

WESTERN JOURNAL OF MEDICAL AND BIOMEDICAL SCIENCES

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Writing for Western Journal of Medical and Biomedical Sciences

Author's Submission Guideline

Type of manuscripts

Letter to editor/short communication

Case report

Original research article

Review article

Photo Quiz

Preparation of original research manuscripts writing Style

All submitted manuscripts should be written in British English with correct syntax, grammar and punctuations. Authors are to use Times New Romans & font size 12.

The Manuscripts Structure

Original manuscripts should follow this order where applicable

Title

Name(s) of Author(s)

Address of Author(s)

Abstract

Introduction

Materials & Methods

Results

Tables, figures, etc

Discussion

Conclusion

Recommendation(s)

Limitation(s)

Acknowledgment

Reference

Conflict of interests

The authors should please comply strictly with this format for original manuscripts.

Maximum length

Text of original research articles should not exceed 4,500 words (including abstract, references, legends, tables and figures).

Unit of Measurement

The authors are to express all measurements & quantities in SI Units

Writing for Western Journal of Medical and Biomedical Sciences

Title

The title should be concise and reflect the nature of the research and findings. The title should not be more than 150 characters.

Authors

The author(s) should provide their email addresses, full names and institutional affiliations. The corresponding author's contact details especially e-mail address and telephone number, should also be provided. (Email addresses of other Co-Authors should be provided in the cover letter).

Abstract

The abstract should have a maximum word count of 250. There should be no paragraphing of the abstract (unstructured abstract).

Keywords

A maximum of relevant 7 keywords, in alphabetical order, should be provided for indexing and coding.

The main body of article text

This should consist of a maximum of 4,250 words and sectioned into the introduction or background, materials and methods, results, discussions, conclusion, recommendation and limitation.

Introduction

This section should contain concise background information to the research, justification, hypotheses and objectives with citation of the relevant references.

Materials and Methods

The authors should provide details of the research design, materials and equipment used, and any other details which will permit reproduction of similar results by other researchers. An explicit description of interventions (or treatments) should be given. Subjects, inclusion and exclusion criteria must be stated. Statistical tests or tools for the analysis of data including the version of software employed must be provided. There must be a clear demonstration that ethical clearance was obtained before commencement of the study and all relevant regulations were followed for both human and animal studies. The anonymity of patients or diagnostic materials must be preserved.

Results

This section must be explicit, concise and free from any form of ambiguity or unnecessary repetition. Tables and figures should be placed as much as possible, in proximity to the part of the text referring to them. Pictures must be of very good quality. All illustrative items must have an in-text reference, annotated and should contain clear descriptive legends.

Discussion

The results of the research should be discussed with particular attention to interpretation. A well-structured discussion will state the main findings, the strength and weakness of the study in comparison with similar studies, unanswered questions and future directions.

Writing for Western Journal of Medical and Biomedical Sciences

Conclusion

A brief summary of key findings, implications and future research.

Acknowledgment

Significant contributors, if any, to the research who does not qualify as authors may be acknowledged.

Conflict of interest

The author(s) must issue a statement concerning conflict of interest in performing or reporting the research.

Referencing style for WJMBS

The journal adopts the Vancouver referencing style recommended at the International Committee of Medical Journal Editors conference in Vancouver, 1978.

Text Citations

References numbers within the text should be in superscript at the end of a sentence, placed after the full stop. It should also be placed after a comma as the case may be. All et al should be in italics followed by either a full stop or a comma, as the case may be. The actual authors can also be referred to, but the reference number must always be given.

Reference List

-General Guide

The reference list comes at the end of your document. Number the references in the list in the order in which they appeared in the text. List the authors' names, starting with surnames, followed by a maximum of two initials. The initials should NOT be separated with a full stop or a comma. The authors' names should be separated with a comma and Full stop should follow the final name. Where there are more than six (6) authors the first 6 should be listed followed by 'et al. and a full stop.

Specific Reference Examples

Print journal article reference

7. Denning PJ, Campbell RT, John HT. Computational thinking in science. *Am Sci* 2017;105(2):13-17.

Online journal article reference

8. Kistner S, Vollmer R, Burns BD, Kortenkamp U. Model development in scientific discovery learning with a computer-based physics task. *Comput Human Behav* [Internet]. 2016 Feb 20 [cited 2017 Feb 13]; 59: 446-455. Available from <http://www.sciencedirect.com/science/article/pii/S0747563216300930>

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3. Susskind L, Hrabovsky G. *The theoretical minimum: what you need to know to start doing physics*. London: Allen Lane; 2013. 256p.

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4. Bonitz M, Lopez J, Becker K, Thomsen H, editors. Complex plasmas: scientific challenges and technological opportunities [Internet]. New York: Springer; 2014. 491 p. Available from: <http://link.springer.com/book/10.1007%2F978-3-319-05437-7>

Referencing a chapter in an edited book

5. Kelsey S. Aristotle on interpreting nature. In: Leunissen M, editor. Aristotle's physics: a critical guide. Cambridge: Cambridge University Press; 2015. 31-45 p.

Referencing a chapter in an E-book

6. Watermann T, Scherrer A, Sebastiani D. Linear response methods in quantum chemistry. In: Bach V, Delle Site L, editors. Many-electron approaches in physics, chemistry and mathematics: a multidisciplinary approach [Internet]. New York: Springer; 2014. 97-110 p. Available from http://link.springer.com/chapter/10.1007/978-3-319-06379-9_5

Citation from unpublished work

5. Eke B. Evaluation of frequency of abdominal surgeries at Benue State University Teaching Hospital Makurdi Nigeria. Ph.D. Thesis, 2017, Benue State University Makurdi Nigeria. 253pp.

Article submission

Articles may be submitted online here <http://wjmb.com.ng> to the Editor-in-Chief or as an email attachment to submit.wjmb@gmail.com. Article submitted to the journal should not have been submitted for peer-review in another journal simultaneously, nor previously published. A research report submitted simultaneously to two journals or submitted twice for publication will attract appropriate sanctions.

Cover Letter

Each submission should be accompanied by a cover letter in a Microsoft Word file. The content of the letter should include, a statement that:

1. The research is original and has not been submitted or accepted for publication elsewhere;
2. Potential conflict(s) of interest(s) do or do not exist;
3. The manuscript has been read and approved by all the authors.
4. E-mail addresses of all Co-Authors should be included.

Guideline on Short Communication

Short Communication presents a brief observation that does not warrant a full-length paper.

Short Communications should be limited to a total of 3000 words.

The manuscript should be formatted without section headings in the body of the text and contain no more than 3 figures or tables, combined.

Writing for Western Journal of Medical and Biomedical Sciences

Required Sections in Short Communication

Authors, affiliations and correspondence should be provided as in full research write up.

1. Title

2. Abstract

The abstract should be limited to 100 words or fewer.

Abbreviations, diagrams and references are not allowed here.

3. Keywords

Five keywords or less should be given below the abstract.

4. Main body or literature

All required parts (Introduction, Materials & Methods, Results and Discussion) should be given in this single section titled "Literature", no section headings.

5. References.

Preface to the Maiden Edition

FORWARD

This maiden edition of the Western Journal of Medical and Biomedical Sciences (WJMBS) goes with the title “COVID-19 Pandemic, a disease stretching Medical knowledge and Innovations beyond limit” is coming at a time all the countries of the world are facing a serious medical emergency with no solution at hand yet-SARS-Cov 2 viral disease. The doors and vaults of Pharmacy shops across the globe have literally been thrown open in search for a drug to bring this pandemic to an end.

From a review study in this issue the authors found no suitable drug to treat the disease at present, and that the heavy casualties recorded by the disease across the globe has not allowed adequate time for research into potentially effective drugs. Also authors have looked into pulmonary and extra-pulmonary manifestations of COVID-19 and came to the conclusion that physicians should be on alert and open minded as the disease could mimic any clinical entity. They went further to state that COVID-19 is still evolving and we may witness other yet-to-be documented features outside gastrointestinal, neurologic, cardiovascular, ophthalmic, and olfactory features. Laparoscopic surgery among patients with liver cirrhosis has always been an issue of serious skepticism among surgeons for fear of uncontrollable bleeding among these patients. In a study researchers looked at the potential benefits vis-à-vis the complications of laparoscopic surgery in patients with liver cirrhosis. They found out that the benefits of this procedure for diagnostic, therapeutic and prognostic purposes far outweigh the perceived complications of the procedure, and they went ahead to recommend it on patients with liver cirrhosis among surgeons.

Gastrointestinal endoscopy is not a new procedure among the arsenals of clinical procedures worldwide, however its rate of utilization and the purposes appear to be generally low in sub-saharan Africa, Nigeria inclusive. In a study the authors looked at the utilization of gastrointestinal endoscopy in a semi-urban community in Nigeria and found out that economic and social factors hampered full utilization of potential benefits of this procedure, and that the procedure was adjudged safe. The range of procedures performed included both diagnostic and therapeutic such as: oesophagogastroduodenoscopy, colonoscopy; sclerotherapy, polypectomy, band ligation, foreign body retrieval and endoscopic mucosal resection.

Acute infectious purpura fulminans is a rapidly progressive infectious disease culminating in disseminated intravascular coagulation requiring a prompt advanced medical intervention. Mortalities are generally high in poor resource-restrained settings due to lack of appropriate facilities. The authors presented a case of Acute infectious purpura fulminans in a two year old child which was successfully managed in the midst of resource and facility constraints, thus demonstrating ingenuity in clinical practice.

Other quite interesting articles on alcohol addiction, domestic violence, and innovative healthcare technologies in otorhynolaryngological practice among others are also available for our education and reading delight.

This is the first double-blind, peer-review scientific journal coming out of University of Medical Sciences, Ondo-City, Nigeria and I thank the Senate of the University for approving the immediate commencement of this journal. I also thank the Dean, Faculty of Basic Clinical Sciences Professor Michael S. Odimayo who served as a link between University management and the journal editorial board to ensure that work was sustained without hitches. I hereby congratulate all the authors who have made history by going through a rigorous review process and their articles found suitable for publication in this maiden edition of the journal. Our desire is to continue to publish high impact research articles borne out of sound scientific researches in all fields of medicine and allied sciences so as to continue to contribute to and improve on the existing body of knowledge. I therefore call on all researchers, faculty members and scientific authorities to partner with us by offering useful counsels, advice, guides and outright criticisms that will help us improve

Preface to the Maiden Edition

on the subsequent editions of the journal. On behalf of the resilient and hard-working editorial board and our dedicated reviewers who despite the challenges posed by COVID-19 remained focused to see to the completion of this edition I, welcome and usher you into the world of WJMBS.

Prof. Godwin TAJOMBO
Editor-in-Chief

Editorial

Extrapulmonary Manifestations of COVID-19: A Call to Extra Vigilance and Tribute to Dr Li Wenliang

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ABSTRACT

COVID-19 pandemic has covered all continents and virtually all countries of the world infecting millions of people with several hundred thousands of death. It was first brought to the attention of a Chinese ophthalmologist Dr Li Wenliang. The disease which was first believed to be solely associated with the lungs and respiratory system has now shown that the spectrum of organ involvement of the disease is much larger than earlier believed. While lung and pulmonary features still account for a much larger presentation of the disease, other clinical manifestations such as fulminant myocarditis, arteriovenous thromboembolism, disseminated intravascular coagulopathy, intracerebral haemorrhage, diarrhea, hypoxic encephalopathy, septicaemia and detection of SARS-CoV-2 particles in stool, saliva and semen of infected individuals are also becoming less infrequent. Haematologic manifestations of hypercoagulable blood are commonly reported among hospitalized COVID-19 patients. An elevated D-Dimer, that is rising in the course of disease may signify disease deterioration. Prolonged PT and aPTT and increased fibrin degradation products with severe thrombocytopenia have been associated with life threatening disseminated intravascular coagulation (DIC). Physicians should therefore be on a watch out for these features in the management of patients and be ready to spot out other new surprises by the disease. This should be through deepening of curiosity by health personnel in the assessment and management of patients to spot out early surprises of COVID-19 to strengthen the sustenance of the ongoing control of the pandemic

Keywords: COVID-19, Extra-pulmonary, Presentations, Li Wenliang, SARS-CoV-2

BACKGROUND

It was Dr Li Wenliang an Ophthalmologist in the city of Wuhan famous for strong clinical judgments among

colleagues that first raised an alarm of new respiratory virus disease on 30th December 2019. In his group chat he wrote “A new coronavirus infection has been confirmed and its type is being identified. Inform all family and

relatives to be on guard,” and the disease eventually took his life at the age of 34 years. Li contracted SARS-CoV-2 infection while treating an infected glaucoma patient and was hospitalized on 12th January, 2020, and later on moved to ICU. His last post from ICU publicly declaring his COVID-19 result “*Today my test has come back positive, the dust has settled, I have finally been diagnosed.*” came on February 1st 2020, shortly after which his ventilator was disconnected due to rapid irreversible deterioration!. As at 8th of May, 2020, COVID-19 has infected over 3.85 million people with at least 270,000 deaths globally, and in Nigeria the official infection rate stands at 3,526 people with 107 deaths¹⁻³.

Usual Presentations

At the outset COVID-19 was generally believed to be a respiratory disease as almost all patients presented with pulmonary symptoms and clinical investigations primarily targeted the lungs and the respiratory system presenting with dry cough, chest pain and difficulty in breathing. The common radiologic and computerized tomographic features include: peripheral patchy lesions or consolidation, halo signs, air bronchogram sign, patchy ground glass opacity among others. This belief has led to the deployment of all prognostic and disease monitoring apparatuses targeting the lungs and respiratory system with little attention towards monitoring of other organ systems that may be as well seriously damaged. This could explain the reason why ventilators often fail to revive some severely ill in ICUs as the underlying pathologies may be extra-pulmonary.⁴⁻⁸

Extra-pulmonary and Unusual Presentations

COVID-19 can present in form of nasal congestion and loss of smell, sore throat, muscle pain and malaise. In a study carried out in China it was found that diarrhea is also not an uncommon finding in SARS-CoV-2 infections. Other clinical features such as mild fever and headache could easily be diagnosed and treated as malaria or one of the enteric fevers especially where there is concurrent blood smear positive for malaria and high widal tests titres

as well.⁹⁻¹¹ The situation may become compounded when there are no facilities to quickly screen such patients and establish early diagnosis as is the case in most parts of Nigeria and entre sub-saharan Africa, hence fueling uninterrupted community spread of COVID-19.¹²

Other studies have shown that COVID-19 patients have presented with the following clinical patterns: fulminant myocarditis, venous thromboembolism, diarrhea, intracerebral haemorrhage, hypoxic encephalopathy, septicaemia, detection of SARS-CoV-2 particles in stool, saliva and semen of infected individuals¹³⁻¹⁷. This may not be the end of the list as other forms of unusual and extra-pulmonary presentations of COVID-19 are probably still ahead.

Haematologic manifestations of hypercoagulable blood is commonly reported among hospitalized COVID-19 patients. An elevated D-Dimer, that is rising in the course of disease may signifies disease deterioration.²⁰ Prolonged PT and aPTT and increased fibrin degradation products with severe thrombocytopenia have been associated with life-threatening disseminated intravascular coagulation (DIC).²⁰

It has also been established in many reports that COVID-19 infected patients, whether hospitalized or ambulatory, have very high risk of venous thromboembolism, the reports also recommend early and prolonged thromboprophylaxis with low molecular weight heparin.

Isolation of SARS-CoV-2 in stool samples clearly shows that environmental sanitation requiring eradication of surface and open air defaecation has become mandatory along with defaecation in trenches and canals before community spread of the disease can be halted. Also its presence in the saliva of asymptomatic carriers brings up the needs to health educate on implications on some of the social practices such as kissing in this wave of COVID-19. In the same vein detection of SARS-CoV-2 in semen potentially could lead to sexual transmission of the virus, and its short and long term impacts on sperm count and fertility of infected individuals need to be ascertained. Adequate sex education may therefore be needed in the global campaign package against COVID-19.^{18,19}

Presentations of cardiac, hepatic, vascular, cerebrovascular, nephritogenic, and gastrointestinal pathologies at specialty as well as Primary Health Care (PHC) clinics should not be taken in isolation during this period of COVID-19 pandemic and possibly in the foreseeable future. COVID-19 status of such patients should be clearly established to rule out remote possibilities of any association.

In conclusion while it appears we may have known so much about SARS-CoV-2 over a very short period of time, the scientific world should be open to surprises that may be thrown up by this same virus as it appears more still needs to be known. Medical doctors and other health professionals should sharpen their curiosity in patient assessment and management so as to detect early some of the evolving unusual presentations of the disease to strengthen control of the pandemic. A strong sense of clinical judgment as displayed by late Dr Li Wenliang which alerted the world of a pending catastrophe should be demonstrated by all health professionals in this 21st century to guarantee continuous human existence on the planet.

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<https://doi.org/10.1002/ajh.25829>

Review Article

As Drugs Assemble to Treat SARS-COV-2, Which Drug will Prove Efficacious : A Search for Suitable Drug or Vaccine to Manage COVID-19 Pandemic

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ABSTRACT

COVID-19 literally ambushed humanity and took the medical world by surprise with no adequate arrangement to manage it in terms of appropriate drugs and vaccine as the origin of the disease still remains a mystery. There has been aggressive search for an appropriate drug that will bring this pandemic with high mortality under control. This study took time to carry out a literature search on the drugs and medications so far tried on COVID-19 patients since its outbreak in Wuhan China to date. We carried out search on Medline, PubMed, SciElo, Google scholar, among others on drugs used for SARS-COV-2 infections and some of the documented outcomes. The study found a constraint in time by researchers to carry out a comprehensive study on any of the drugs since the disease was causing high mortalities across the globe. Most of the drugs that appeared beneficial and non-beneficial in treatment of SARS-COV-2 infections did not use adequate samples enough to draw statistically significant inferences. At the moment, high-impact treatment options for COVID-19 are; Antiviral drugs, Anti-inflammatory drugs, ACE inhibitors and angiotensin receptor blockers, Hydroxychloroquine + Azithromycin and convalescent serum among several other options including COVID organics. We however recommend that treating Physicians are at liberty to use appropriate combination of medications at their disposal based on information provided below as we lack sufficient proof to make any drug recommendation. This may possibly reduce the rates of disease progressions from mild into severe disease requiring intensive care and ventilators.

Keywords: COVID-19, Drugs, SARS-COV-2, Treatment

BACKGROUND

It was in 1965 when Tyrrell and Bynoe isolated a virus named B184 in human embryonic tracheal organ cultures obtained from respiratory tract of adults with common cold. Also Hamre and Procknow isolated a virus they labeled 229E from tissue cultures of medical students who were suffering from common cold symptoms. Both viruses were ether-sensitive but instinctively different from all the ortho- and paramyxoviruses. In a similar manner McIntosh and colleagues isolated several strains of ether-sensitive viral particles from human respiratory tract which they labeled OC.^{1,2}

Electron microscopic studies carried out by Almeida and Tyrrell on these viruses coupled with their serological properties showed that they were distinct with unique morphological features. They are medium sized (80-

150nm), pleomorphic, membrane coated, and are covered with widely-spaced club-shaped surface projections. The viruses were then assigned distinctive viral group called Coronaviruses meaning crown-like appearance of the surface projections of the viruses.²⁻⁴

Coronaviruses have remained zoonotic for the most part associated with several infections such as: feline and canine interstitial pneumonias in wild cats and dogs, bovine pneumoenteric infections in cows, calf diarrhea and calf respiratory BCoV infections, winter dysentery BCoV infections in adult cattle, shipping fever BCoV infections, a respiratory disease in feedlot cattle, feline CoV (FCoV) infectious pneumonitis, and Coronavirus infectious bronchitis (CoVIB), respiratory disease in chickens (See Table below). These diseases had caused severe economic and agricultural losses in the past with very little or limited history of transmission to man with severe consequences.

Table showing various animal corona viruses⁷

Genetic Group	Virus	Host	Respiratory	Disease/Infection		Site
				Enteric ^a	Other ^b	
I	HCoV-229E	Human	X upper			
	TGEV	Pig	X upper	X S1		
	PRCV	Pig	X upper/lung			Viremia
	PEDV	Pig		X SL, colon		
	FIPV	Cat	X upper	X		Systemic
	FCoV	Cat		X S1		
	CCOV	Dog		X S1		
	RaCoV	Rabbit				Systemic
II	HCoV-OC43	Human	X upper	?? (BCoV?)		
	NUN	Mouse		X		Hepatitis, CNS, systemic
	RCoV (sialodocryadenitis)	Rat	X			Eye, salivary glands
	BEV BCoV	Pig Cattle	X X upper/lung	X S1, colon		CNS
III	IBV	Chicken	X upper	X		Kidney, oviduct
	TCoV (TECoV)	Turkey		X S1		
IV??	SARS	Human	X lung	X (?)		Viremia, kidney?
IIA?	Civet cat CoV	Himalayan palm civet	X	X		Subclinical?
		Raccoon dog				
	Raccoon Cat CoV		?	X		Subclinical?

Key: a S1 = small intestine; ?? = BCoV-like CoV from a child, ? = unknown. b CNS = central nervous system.

This narrative has changed since the outbreak of SARS and MERS epidemics in 2003 and 2012 respectively all recording high casualties at each instance by a new strain of Coronavirus.⁵⁻⁷

The SARS-COV-2 a novel coronavirus infection is said to have originated from a bush meat market in Wuhan China while theories of a laboratory accident in the same China are rife. There are also newer information laying claim to the fact that before the COVID outbreak in China, Americans had already got infected by the virus and were already spreading in the country. SARS-COV-2 has plunged the entire world into the most deadly pandemic in recent times since the Spanish Flu of 1918. As at 24th April, 2020, the global infection rate stood at 2.71 million people with over 191,000 deaths. In Nigeria, over the same period the disease burden stood at 981 infections with 31 deaths.⁸⁻

¹¹Due to the rapid spread of SARS-COV-2 with high morbidity and mortality the entire world is aggressively in search for a lasting cure and prevention. This includes the most potent preventive measures including production of

vaccines, and the most appropriate drugs to treat symptomatic cases. This search has led to the trial of virtually all groups of drugs and herbs presently available to humanity in different countries and cultures all in a bid to bring the present onslaught by COVID 19 to a halt. In this review paper, we have carefully looked at the management outcomes of some of the documented drugs and herbs used to combat the raging COVID-19 pandemic¹²⁻¹⁴.

Lopinavir/Ritonavir

The lopinavir-Ritonavir combined oral tablet is used for the treatment of HIV infections by decreasing the amount of HIV particles in the body for the body immune system to work better. They are non-protease inhibitors and may cause sleeping disturbances among other gastrointestinal side effects. Its IUPAC name is: (2*S*)-*N*-[(2*S*,4*S*,5*S*)-5-[[2-(2,6-dimethylphenoxy)acetyl]amino]-4-hydroxy-1,6-diphenylhexan-2-yl]-3-methyl-2-(2-oxo-1,3-diazinan-1-yl)butanamide. Ritonavir, a potent inhibitor of cytochrome P450 3A4 enhances bioavailability of lopinavir for optimum systemic and tissue activity¹⁵.

In a randomized controlled clinical trial at Jin Yin-Tan hospital in Wuhan, Hubei Province of China, 400mg and 100mg of lopinavir were randomly given to SARS-CoV-2 infected patients. Patients were monitored from day 0 to 28 until discharge or death. Results showed that all the 199

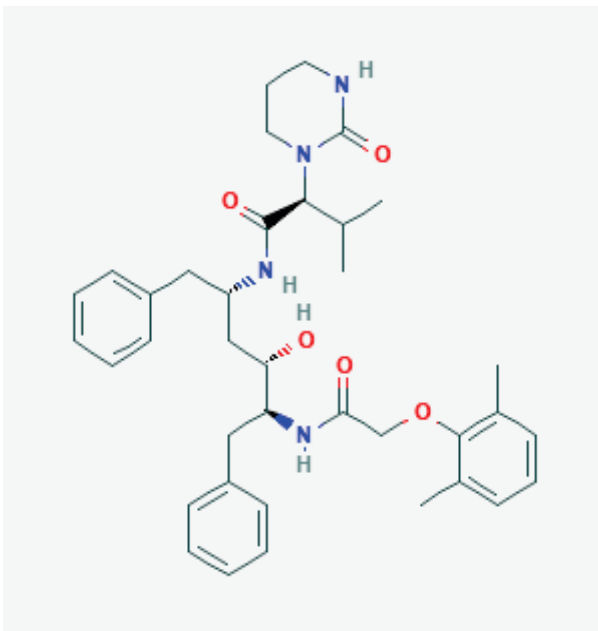
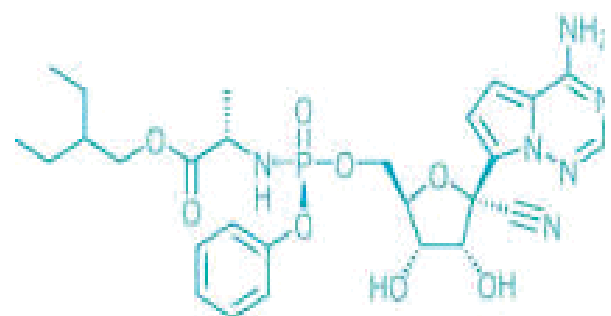


Figure 1: Structure of Lopinavir



Remdesivir

Figure 2: Structure of Remdesivir

patients followed up did not show any clinical improvement different from those on conservative symptomatic management. Trials in England, Italy USA among other countries showed similar outcomes.^{16,17}

Remdesivir and EIDD-2801

Remdesivir and EIDD-2801 are both nucleoside analogues that metabolize into an active form that blocks RNA polymerase which is essential for viral replication. While EIDD-2801 can be given in pill form, remdesivir can only be given intravenously. Its IUPAC name is 2-ethylbutyl (2S)-2-[(2R,3S,4R,5R)-5-(4-aminopyrrolo[2,1-f][1,2,4]triazin-7-yl)-5-cyano-3,4-dihydroxyoxolan-2-yl]methoxy-phenoxyphosphoryl]amino]propanoate and was also found to be effective in the treatment of MERS-CoV infections¹⁸

In a study carried out on 61 SARS-CoV-2 infected patients on remdesivir clinical trial; the patients were selected as follows: United States (22 patients), Japan (9), Italy (12), Austria (1), France (4), Germany (2), Netherlands (1), Spain (1), and Canada (1). A total of 40 patients (75%) were men with the age range of 23 to 82 years. Thirteen of the patients died by the completion of the treatment while

at least 50% of the patients presented with various complications. EIDD-2801 with its similarity to remdesivir showed a better trial on apes of *Macaca* species infected with SARS-CoV-2 and is being awaited for license from American FDA for human trial.^{19,20}

Oseltamivir and Zanamivir (Neuraminidase Inhibitors)

These drugs inhibit neuraminidase enzyme expressed on viral surfaces. The enzyme helps in promoting viral release from infected cells and also facilitates viral movements within the respiratory tract. Oseltamivir has the generic name of (3R,4R,5S)-4-acetylamino-5-amino-3-(1-ethylpropoxy)-1-cyclohexene-1-carboxylic acid, ethyl ester, phosphate. The drugs are useful in the management of influenza and flu-like infections and were tried in Wuhan China at the onset of COVID-19 pandemic but both showed no encouraging outcomes.²¹

Peptide Inhibitors

Computer simulations are being carried out to find the four peptides that mimic the virus-binding domain of the human protein that allows SARS-CoV-2 to enter cells. To infect a cell, SARS-CoV-2 uses its spike protein to attach to the ACE2 receptor on surfaces of certain human cells. This attachment enables the virus to fuse with the host cell membrane and gain entry. Researches are currently ongoing to find compounds that block key regions of the spike protein and then preventing the virus from infecting human cells. In a study carried out on EK1CA, it was found to be highly effective against membrane fusion and infection of other human coronavirus, pseudovirus tested including SARS-CoV, MERS-CoV, and SARSr-CoVs. It also potentially inhibited the replication of 5 live human coronaviruses examined including SARS-CoV-2. It was also observed that intra-nasal application of EK1C4 before or after challenge HCoV-OC43 protected mice from infection. This suggests that EK1C4 could be used for prevention and treatment of infection caused by SARS-CoV-2 emerging and re-emerging coronaviruses.^{22,23}

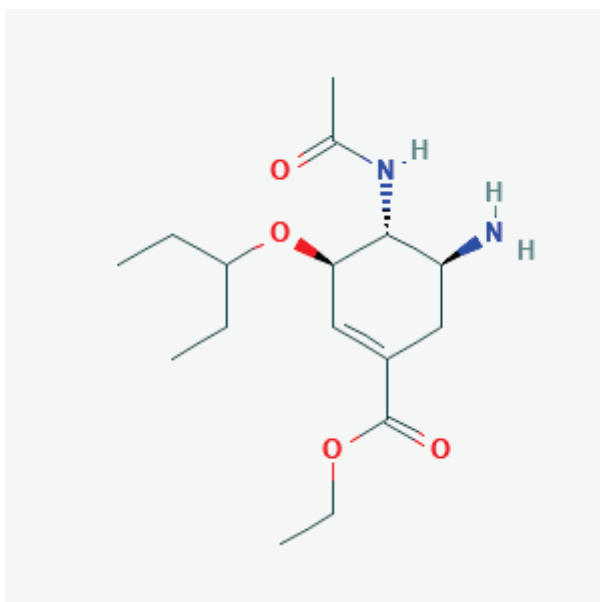


Figure 3: Structure of Oseltamivir

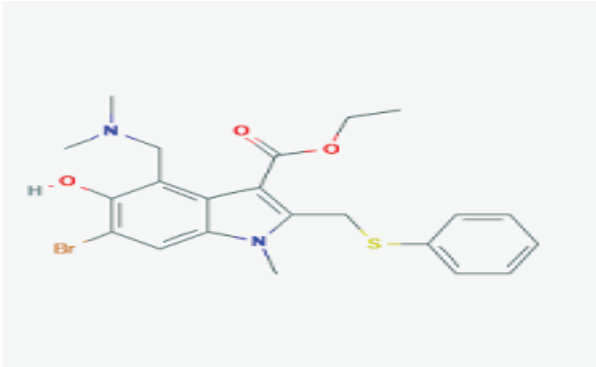


Figure 4: Structure of Arbidol

Arbidol (Umefenovir)

Arbidol (Etyl 6-bromo-4-[(dimethylamino)methyl]-5-hydroxy-1-methyl-2-[(phenylsulfanyl)methyl]-1-H-indole-3-carboxylate) is a broad-spectrum antiviral drug that inhibits cell entry of enveloped viruses by blocking viral fusion with host cell membrane. It interacts with the polar head-group of phospholipid at the membrane interface hence blocking inhibiting the early stages of viral entry into host cells. This Soviet drug for treatment of influenza in both adults and children was tried for treatment of COVID-19 in China but there were no encouraging outcomes²⁴.

Lamivudine (2(1H)-Pyrimidinone, 4-amino-1-[2-(hydroxymethyl)-1,3-oxathiolan-5-yl], (-)(2R,5S) 2',3'-Dideoxy-3'-thiacytidine) and Tenofovir- bis (isopropylxycarbonyloxymethyl) ester are nucleoside

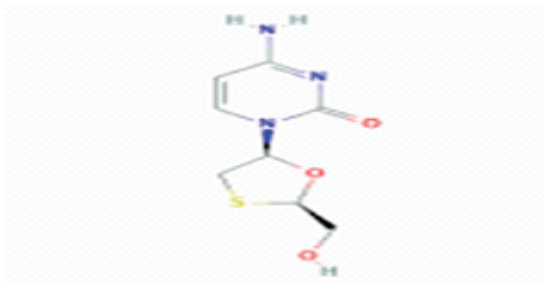


Figure 5: Structure of Lamivudine

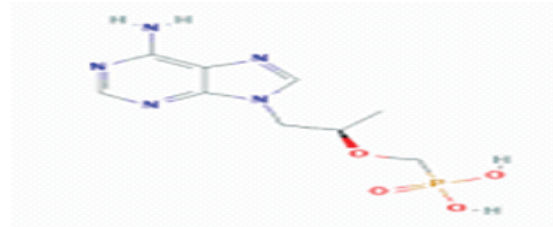


Figure 6: Structure of Tenofovir

reverse transcriptase inhibitors that block the HIV enzyme called reverse transcriptase. This prevents HIV from multiplying thus reducing HIV particles in the body. The drug is used for treatment of HIV/AIDS in both adults and children in combination with nevirapine and stavudine.

Lamivudine is a potent drug for the treatment of chronic hepatitis B infection and is readily available and affordable. These drugs have been tried in China, Singapore and South Korea but without encouraging results^{25,26}.

Nonsteroidal Anti-inflammatory Drugs (NSAIDs)

NSAIDs are those medications that relieve or reduce pain and hence are also referred to as non-opioid analgesics. The commonest NSAIDs in common use are aspirin, naproxen sodium and ibuprofen. Prescription NSAIDs include oxaprozin, etodolac, indomethacin, naproxen, nabumetone, diclofenac and vimovo. They are useful in the treatment of headache, neck pains, backache, cancer pain and neuropathic pain. NSAIDs act by blocking the enzyme cyclooxygenase that is useful in the production of prostaglandins that are essential in inflammation. Reducing the amounts of prostaglandins that are produced as a result of tissue injury then reduces inflammation and pain. NSAIDs also reduce high temperature and fever. Studies from China, most parts of Asia and Europe have not given any convincing results to conclude that NSAIDs help reduce the progression of SARS-CoV-2 infection. Indomethacin however was found to reduce COVID-19 progression in some cases.²⁷⁻²⁹

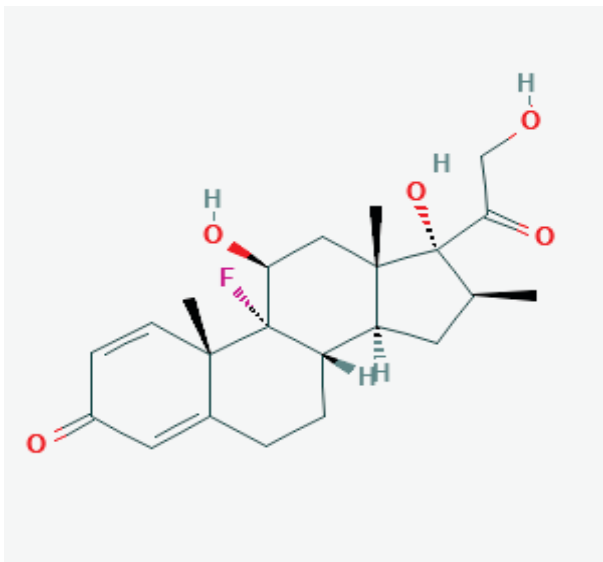
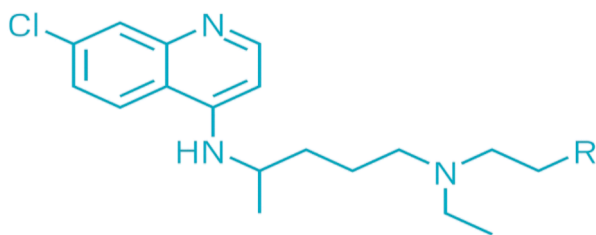


Figure 7: Structure of Betamethasone

Steroids

Steroids are man-made version of chemicals that are referred to as hormones which are made naturally in the human body. Steroids are designed to act like these hormones to reduce inflammation. There are two types of steroids- the catabolic also referred to as corticosteroids, and anabolic used by body builders and athletics. Corticosteroids can generally be grouped into short acting- cortisone, hydrocortisone and deflazacort; intermediate acting- prednisone, prednisolone, methylprednisolone;



Chloroquine, R = H
Hydroxychloroquine, R = OH

Figure 8: Chloroquine and Hydroxychloroquine Structure

and long acting- dexamethasone and betamethasone. Steroids are generally used in the treatment of clinical conditions such as rheumatoid arthritis, lupus, gout, inflammatory arthritis, auto-immune conditions, uveitis and psoriatic arthritis.^{30,31}

In an observational study carried out in Wuhu, Anui province of China on 31 patients with SARS-CoV-2 infection and treated with corticosteroids, there was no association between corticosteroid treatment and virus clearance time. It is however not certain whether a much larger sample size with racial and geographical variations could influence this study outcome.³²

Chloroquine, Hydroxychloroquine

Chloroquine [4-*N*-(7-chloroquinolin-4-yl)-1-*N*,1-*N*-diethylpentane-1,4-diamine;phosphoric acid] is an aminoquinolone that was first synthesized in Germany by Bayer in 1934 primarily for the treatment of malaria until the development of resistance four decades later. It was granted FDA approval in October, 1949. Chloroquine and its derivative hydroxychloroquine has been replaced by pyrimethamine, artemisin, and mefloquine in the treatment of malaria. The drug is however still useful in the treatment of other clinical conditions such as HIV, systemic lupus erythematosus (SLE) and rheumatoid arthritis. Chloroquine acts by inhibiting the formation of hemozoin (Hz) from the heme released by the digestion of haemoglobin. The free heme then lyses membranes and leads to parasite death.³³

In a review study carried out by Cartegiani et al in Italy and Israel, they looked at a narrative letter, one in-vitro study, one editorial expert consensus paper, two national guidelines documents, and 23 ongoing clinical trials in China on use of chloroquine and hydroxychloroquine on SARS-CoV-2 patients. The authors found out that chloroquine and hydroxychloroquine were effective in limiting the replication of SARS-CoV-2 in vitro. Also Devaux et al in France found out that there were encouraging results from preliminary trials of chloroquine on SARS-CoV-2 infected patients in China. These research findings could largely have influenced the

decision of President Donald Trump of United States of America to publicly declare that chloroquine and hydroxychloroquine should be given to all COVID 19 patients in America. This decision has been strongly opposed by leading health professionals in USA including Dr Anthony Fauci, head of the US National Institute of Allergy and Infectious Diseases. The American medical experts have cited lack of sufficient scientific proof to support the efficacy of chloroquine and hydroxychloroquine on successful treatment of COVID 19 patients.^{34,35}

Azithromycin

Azithromycin [(2*R*,3*S*,4*R*,5*R*,8*R*,10*R*,11*R*,12*S*,13*S*,14*R*)-11-[(2*S*,3*R*,4*S*,6*R*)-4-(dimethylamino)-3-hydroxy-6-methyloxan-2-yl]oxy-2-ethyl-3,4,10-trihydroxy-13-[(2*R*,4*R*,5*S*,6*S*)-5-hydroxy-4-methoxy-4,6-dimethyloxan-2-yl]oxy-3,5,6,8,10,12,14-heptamethyl-1-oxa-6-azacyclopentadecan-15-one] is a biostatic antibacterial drug that is useful for the treatment of various bacterial infections in the body including respiratory, skin, ear, eye, and sexually transmitted infections. It acts by inhibiting bacterial growth by binding to the 50s ribosomal subunit of bacteria, thus inhibiting translation of mRNA nucleic acid synthesis in bacteria. This azalide derived from

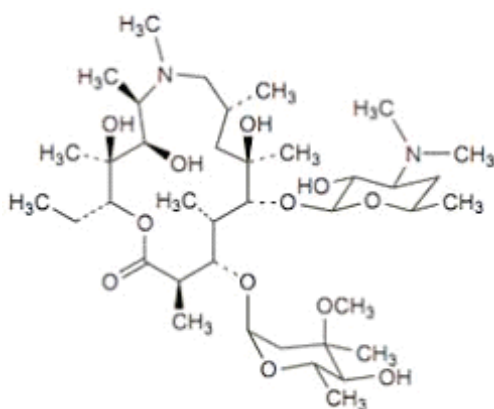


Figure 9 : Azithromycin Structure

erythromycin, a member of subclass of macrolide antibiotics goes by several trade names including zithromax, zmax, azitrom, goxil and azenil is excreted by the biliary and kidney routes in small amounts (4.5%).

In a study carried out in France on 36 SARS-CoV-2 infected patients of which 6 were asymptomatic, 22 had upper respiratory tract infection, and 8 had lower respiratory tract infections. Twenty of the patients were placed on 600mg of hydroxychloroquine plus azithromycin and were monitored from day one to six. There was much significant viral reduction at day 6 compared to the controls. In another similar study in France on 80 mildly infected COVID 19 patients, a combination of hydroxychloroquine and azithromycin were given over a period of at least 3 days. All patients were found to improve clinically with a rapid fall in nasopharyngeal viral load in 83% of the patients by day 7 and 93% at day 8. Also virus cultures from patient respiratory samples were negative in 97.5% of the them at day 5 thus shortening average duration of stay at infectious disease unit. A multi-centre study on a larger population may give a more convincing result.³⁶⁻³⁸

Chinese Herbs

Lianhuaqingwen (LH-C) and ShuFengJieDu are Chinese herbal capsule preparations which have been shown to be effective against some respiratory viruses such as influenza. In a study on viral properties of LH-C in vitro, it was found that LH-C inhibited the proliferation of influenza virus strain in vitro. There was a decrease of the viral titres in the lungs of mice studied. It was also observed

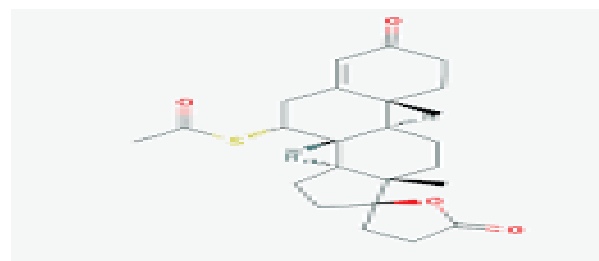


Figure 10 : Spironolactone structure

that there was a decrease in the level of inflammatory cytokines in the early stages of infection^{39,40}.

Spironolactone

Also popularly called aldactone (7 α -Acetylthio-17 α -hydroxy-3-oxopregn-4-ene-21-carboxylic acid γ -lactone) is an aldosterone antagonist that acts primarily by competitively binding to receptors of aldosterone dependent sodium-potassium exchange site in the distal convoluted renal tubule. It is useful in the treatment of several clinical conditions such as: heart failure, hyperaldosteronism, adrenal hyperplasia, hypertension, and nephritic syndrome.

Studies have shown that hypertensives on angiotensin converting enzyme inhibitors (ACEIs) with COVID-19 disease record higher mortality and morbidity due to the use of ACEIs. This is as a result of an over-expression of ACE-2 receptors (ACE-2Rs) in the respiratory system of COVID-19 patients. It is therefore believed that spironolactone could reduce ACE-2 expression on lung-cell surfaces. Introduction of spironolactone will then balance the sudden withdrawal effects of ACEIs and angiotensin receptor blockers hence reducing the high mortality and morbidity among hypertensives infected with SARS-CoV-2. This drug has been tried but at this stage there is not yet desired results.^{41,42}

Angiotensin Converting Enzyme Inhibitors (ACEIs)

SARS-CoV-2 enters cells through angiotensin II converting enzyme (ACE-II). ACE-II expression increases in patients treated with drugs inhibiting the enzyme or with angiotensin II receptor blockers (AT II-RBs). ACE inhibitors include enalapril, ramipril, captopril, lisinopril, and AT II-RBs include losartan, candesartan, valsartan, iversatan, and termisatan. An abrupt withdrawal of these drugs in the course of COVID-19 management could pose serious risks and hence should be properly substituted. Also, their continued use in SARS-CoV-2 infected patients add no value to the disease management and in fact have shown to cause more harm than good⁴³⁻⁴⁵.

Vitamins and Minerals

The vitamins that have been tried against SARS-CoV-19 include vitamins A, B, C, D and E, and minerals include iron, selenium and zinc. The macro- and micro-nutrients are believed to strengthen immunity and help prevent SARS-CoV-2 infections or reduce the impacts of the infections in the body. Vitamin A helps in maintaining structure of cells in the epithelial linings of skin, respiratory and gastrointestinal tracts. It forms a barrier and strengthens the first line of defense and is useful in synthesis of antibodies that neutralize pathogens. The B group of vitamins, B6, B9 and B12 contribute to the body's first immune response on recognition of a pathogen by effecting the production and activity of Natural Killer (NK) Cells. The NK cells act by causing infected cells to undergo apoptosis. Vitamin C and E help in mopping up free radicals in the body from oxidative stress of cells. This prevents accumulation of toxic elements from cellular activity hence preventing cell death and fatigue^{46,47}.

Iron, Zinc and Selenium

These metals help in the healthy development of immune cells. Iron helps to increase the number of free radicals in tissues that destroy pathogens. It also regulates and strengthens antigen recognition and presentation. Zinc and Selenium play the role of antioxidant by mopping up

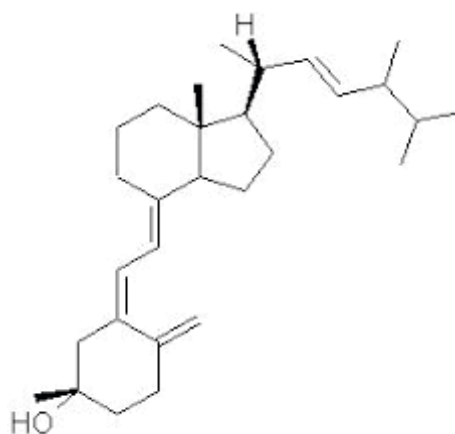


Figure 11 : Structure of Vitamin D

excess free radicals and hence healing the damages caused by oxidative stress, and preserving and maintaining integrity of skin and mucous membranes⁴⁷⁻⁴⁸.

Calciferol (Vitamin D)

Vitamin D is a group of fat soluble secosteroids that is responsible for the intestinal absorption of calcium, magnesium, phosphate and several other functions. It is commonly found in fish liver oils, salt water fish, milk butter, cheese, margarine and cream among other animal products. Vitamin D is converted to 25-Hydroxycholecalciferol and calcidiol by the liver and is then metabolized by the kidney into several active forms including 1,25-Dihydroxycholecalciferol and calcitriol. These active vitamin D metabolites exercise several functions in the body but principally in the maintenance of optimum blood levels of calcium and phosphorus.

Vitamin D is required by cells to help destroy pathogens. In a study carried out in San Francisco on Vitamin D and its ability to reduce respiratory tract infections including COVID-19, it was observed that: Vitamin D can induce cathelicidins and defensins that can lower viral replication rates. This will also lead to reduction in concentration of pro-inflammatory cytokines that produce inflammation that injure the lung lining causing pneumonia. Vitamin D also increases concentration of anti-inflammatory cytokines. There are however mixed results on level of effectiveness of vitamin D in the treatment of COVID-19. The only strong point for vitamin D against COVID-19 as it has so far been established is that, the outbreak occurred in the winter, a time when 25-hydroxy-vitamin D concentrations are lowest in the body⁴⁹⁻⁵¹.

Anticancer Drugs and Immune Modulators

Anticancer drugs are generally grouped into alkylating agents such as cisplatin, carboplatin and oxaliplatin; antimetabolites such as vincristine, vinblastine, docetaxel; and miscellaneous such as hydroxyurea, L-asparaginase and tretinoin. Cytotoxic drugs generally act by inhibiting the multiplication and growth of malignant cells in the body. The effect of cytotoxic drugs on SARS-CoV-2 in

London showed that cytotoxic chemotherapy specifically inhibits severe acute respiratory syndrome coronavirus in vitro. The study further found out that low dose prednisolone may have beneficial effect on COVID-19 patients. Also low doses of anticancer drugs such as methotrexate did not improve healing of COVID-19 patients. Furthermore, the study did not find any evidence that Janus Kinase (JAK) inhibitor and anti-TNF α agents are contraindicated in treatment of COVID-19 patients. Studies on other groups of drugs listed below were carried out such as: Any tumour necrosis factor (TNF) blocker, Mycophenolate, Tacrolimus, Anti-CD20, and CTLA4-Ig. None of them showed good results against COVID-19 treatment⁵²⁻⁵⁴.

Cytokine Antagonists (Tocilizumab)

Cytokines are chemical mediators of inflammation released principally by macrophages and lymphocytes during tissue injury. When released and their concentrations are within physiological limits, they help control infections and limit tissue injury but when released in excess they turn their attack against host tissues. In SARS-CoV-2 induced pneumonia there is marked hyperactivation of effector T cells with excessive production of inflammatory cytokines particularly IL-6 but also appreciable levels of IL-1, TNF Interferon gamma. This scenario is called cytokine storm and it contributes to the pathological process that leads to plasma leakage, vascular permeability, pulmonary microvascular coagulopathy and systemic disseminated intravascular coagulation. These events further disseminate SARS-CoV-2 in the body with more aggressive systemic and multiorgan damages principally, the heart, kidney and liver^{55,56}.

Administration of blocker of IL-6 (tocilizumab), anti-TNFs (infliximab, adalimumab, and IL-12 and IL-23 blockers (ustekinumab) would suppress the acute autoimmune cytokine-mediated tissue injury. These immunomodulators have been effective in the management of auto-immune disease such as rheumatoid arthritis, psoriasis, psoriatic arthritis, ankylosing

spondylitis, and inflammatory bowel diseases^{57,58}.

In a clinical trial of tocilizumab on 21 critical ill patients in ICU in Wuhan China and another critically ill in an ICU in Paris France recorded instantaneous improvement from all of them. Though the trial is on very few patients it particularly holds the promise for SARS-CoV-2 infection treatment if large scale clinical trials prove successful^{59,60}.

Convalescent Plasma

Blood plasma is a yellowish liquid component of blood that holds blood cells in circulation as the liquid part of the blood in which cells, proteins and other components are suspended. It is the intravascular fluid which makes up about 55% of the body's total blood volume. Convalescent plasma is plasma recovered from a patient that has recovered from a particular disease. When administered this plasma can give passive immunization to the recipients as a result of the presence of specific antibodies against the causative agent. Convalescent plasma has been used to treat influenza as far back as 1918 H1N1 pandemic. Also in 2003 convalescent plasma was useful in the management of SARS-CoV-1 outbreak in Hong Kong. In the present pandemic of COVID-19 in a study, 5 critically ill patients received convalescent plasma containing SARS-CoV-2 antibodies (titre >1:1000) and neutralizing antibody (titre >1:40) between day 10 and 22 of admission. The study found a significant resolution in respiratory distress of 4 out of five of the patients also with normalization of the temperature. In another study on 10 COVID-19 patients administered with convalescent plasma, all improved dramatically by day 3 post-transfusion. They all reported increase in neutralising antibody titre, oxygen saturation and lymphocyte counts. Also there was a decrease in C-reactive protein, SARS-CoV-2 viral load, and improved lung lesions on radiological examination. Yet in another study on 4 COVID-19 patients placed on convalescent plasma therapy, all the four fully recovered.

The relatively small samples in all the studies, appropriate inferences cannot be drawn as to effectiveness or otherwise of convalescent plasma in the management of SARS-CoV-

2 severe infections. Studies on a much larger sample size is therefore needed⁶¹⁻⁶⁵.

Antidiabetic Drugs (Biguanides)

The antidiabetic drugs that appear to have antiviral properties belong to the biguanide group including buformin, phenformin, and metformin. These drugs were found effective in the treatment of the 1971 influenza outbreak. It was found that diabetic patients who were treated with phenformin and buformin had far less incidence of influenza than those treated with sulfonylureas or insulin. Studies have also shown that both buformin and phenformin reduce the mortality of influenza in mice. The authors therefore recommended that buformin and phenformin inhalation should be considered a treatment strategy for influenza disease. Biguanides have proved to be effective against SARS-CoV and MERS-CoV and by extension could hold promise against the novel SARS-CoV-2 infections. More exploration may be required to ascertain this⁶⁶⁻⁶⁹.

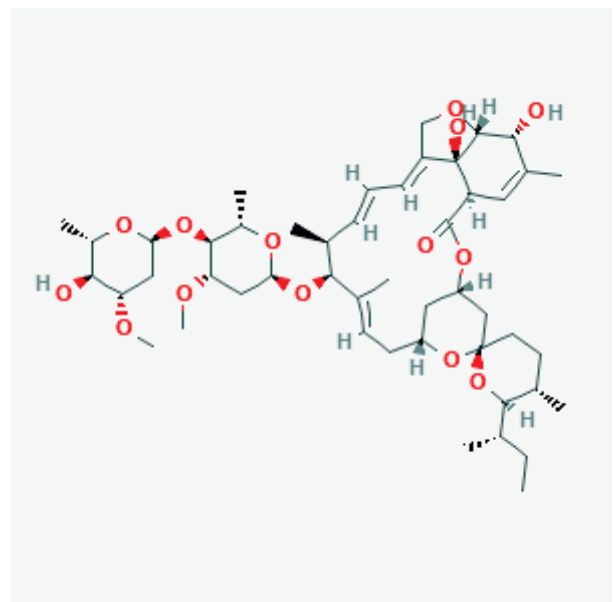


Figure 12 : Structure of Ivermectin

Ivermectin (Antiparasitic Drug)

Ivermectin is broad spectrum antiparasitic drug that is mainly used to treat roundworms. It can be used against several parasitic infections including strongyloidiasis, onchocerciasis, pediculosis capitis, blepharitis, *Mansonella ozzardi* filariasis, *Mansonella streptocerca* filariasis, scabies and gnathostomiasis. It acts by causing an influx of chloride ions through the cell membrane of invertebrates through activation of specific ivermectin-sensitive ion channels. This causes hyper-polarisation leading to muscle paralysis and death of parasites.

In a study carried out in Australia where ivermectin was treated with SARS-CoV-2 infected Vero/hSLAM cell lines, and the supernatant and cell pellets were harvested at days 0-3. This was analysed by RT-PCR for replication of SARS-CoV-2 RNA. It was observed at 24 hours there was a 93% reduction in viral RNA present in the supernatant. And by 48 hours there was a 5000-fold reduction in viral RNA in ivermectin-treated cell culture media compared to the control. In a study in Pennsylvania USA by Guzzo, attaining optimum tissue antiviral levels even with extremely high dosages without toxic consequences in

vivo appeared to be one major draw back in exploring this drug for COVID-19 treatment⁷⁰⁻⁷².

Research into enhancing optimum tissue availability of ivermectin at much lower doses may be required to adequately explore its SARS-CoV antiviral potentials^{73,74}.

Heparin

Heparin (2S,3S,4R,5R,6R)-6-[[[(2S,3S,4S,5R,6S)-6-[[[(2R,3S,4S,5R)-2-carboxy-4,6-dihydroxy-5-(sulfooxy)oxan-3-yl]oxy]-2-hydroxy-4-(sulfomethyl)-5-(sulfooxy)oxan-3-yl]oxy]-3-[[[(2R,3R,4R,5S,6R)-3-acetamido-4,5-dihydroxy-6-[(sulfooxy)methyl]oxan-2-yl]oxy]-4,5-dihydroxyoxane-2-carboxylic acid) is an anticoagulant that helps prevent formation of blood clots and it can be used before surgery to reduce the risk of blood clot formation. It acts by binding to the enzyme inhibitor antithrombin III causing a conformational change that result in its activation through an increase in the flexibility of its reactive site loop. The activated antithrombin then inactivates thrombin, factor Xa along with other proteases, thus preventing and dissolving blood clots.

A study was carried out on 499 COVID-19 patients with pneumonia at Tongji hospital in Wuhan China who were treated with heparin and another 104 non-COVID pneumonia patients. A 28 day follow up showed that the heparin users had lower mortality compared to those who did not use heparin. It was also observed that patients with SARS-CoV-2 associated pneumonia had lower platelet counts compared to the control.⁷⁵

In another study in the same hospital, 499 patients with severe COVID-19 were consecutively enrolled and 99 of them placed on low molecular heparin for 7 days or longer. No difference was found in the 28-day mortality between heparin users and non-users. The mortality of heparin users was however found to be lower than that of non-users in patients with sepsis-induced coagulopathy or D-dimer of > 6-fold of upper limit. More research is therefore required to establish the actual position of heparin in the treatment of severe SARS-CoV-2 infections⁷⁶⁻⁷⁸.

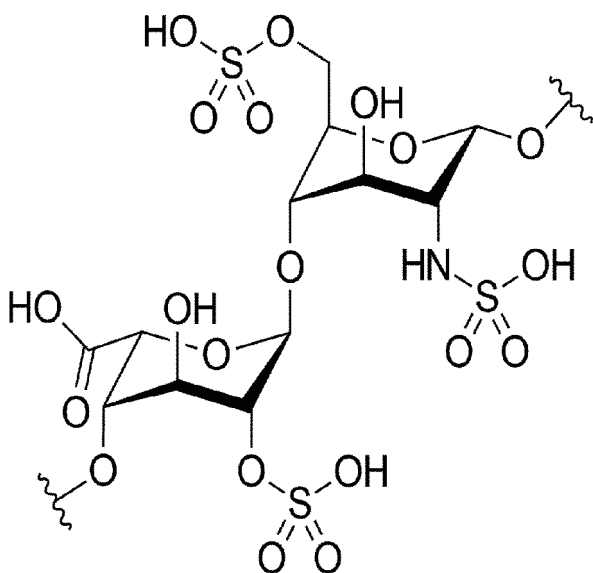


Figure 13: Heparin Structure

COVID Organics

COVID Organics is a herbal preparation prepared by Malagasy Institute of Applied Research of Madagascar. The herb is an extract from *Artemisia annua* which is a plant of Chinese origin and since the 1970s it is being used for the treatment of malaria. The drug is believed to have played a significant role in the SARS-CoV-2 morbidity and with no mortality recorded in the country with over 92 persons out of 128 infected successfully treated. The WHO is yet to accept the preliminary report from Madagascar about the herb and therefore more research is required to establish the veracity or otherwise of the claims and of its safety and tolerability profile in adults and children⁷⁹⁻⁸².

Magic Foods

There are general traditional beliefs among Africans and beyond that ingestion of certain foods could cure COVID-19. These categories of food include garlic, ginger, lemon, supposedly alkaline foods such as limes, oranges, turmeric tea and avocados. These supposedly alkaline foods are believed to have a pH in the range of 9.9 higher than the optimum growth pH for SARS-CoV-2 and hence capable of killing the viruses. But ironically these foods and substances are mostly acidic in nature and some with pH below 3. Also ketogenic diets high in fat and low in carbohydrates is believed to inhibit the multiplication of SARS-CoV-2 in the body. While taking of balanced diet rich in minerals, proteins, fats and carbohydrates is needed for a general boosting of the body's immunity, the specific antiviral properties of these foods against SARS-CoV-2 cannot be ascertained. As a matter of fact they have not healed any COVID-19 patient anywhere in the world⁸³⁻⁸⁵.

Alcohol

The active ingredient in alcohol is ethyl alcohol which is present in all alcoholic beverages be it wine, beer, spirits, or other mixtures depending on its percentage content and other additives. Alcohol has both short and long term effects on the body and can gradually attack every organ system in the body with gradual weakening of the immune system. It is said to facilitate the development of some

cancers and alters the thoughts, judgement, decision making and behavior of an individual. There are general myths surrounding alcohol consumption in the midst of the ongoing COVID-19 pandemic. These include: consuming alcohol destroys the causative agent SARS-CoV-2 and that drinking strong alcohol kills the virus in the inhaled air; also alcohol stimulates and strengthens immunity of an individual against COVID-19. All these assertions have no scientific basis and are perhaps on the contrary in the midst of prolonged intake of alcohol under the ongoing COVID-19 pandemic. Cutting down on alcohol consumption and outright stoppage will rather reduce the rate of infection and as well as the degree of severity of infections⁸⁶⁻⁸⁹.

Disinfectants

Disinfectants are chemical agents applied to non-living objects in order to destroy bacteria, viruses, fungi, mold or mildews living on the objects. Disinfectants are generally grouped into: quaternary ammonium compounds, chlorine compounds, alcohols, aldehydes, iodophors, phenolic compounds and hydrogen peroxide. Disinfectants come in various forms such as gaseous sprays, Liquids, hand sanitizers, soaps among others. Gaseous disinfectants include formaldehyde, ethylene oxide and propylene oxide among others while hand sanitizers are either alcohol-based or alcohol-free⁹⁰.

Alcohol-based contain 60-95% alcohol in form of ethanol, isopropanol or n-propanol where alcohol immediately denatures proteins killing microorganisms. Alcohol-free products include benzalkonium chloride or antimicrobial agents such as triclosan. Since the onset of COVID-19 pandemic there has been a sustained use of disinfectants especially sprays and hand sanitizers by the public. Studies have shown that outdoor spraying of disinfectants does not achieve any meaningful benefits against eradication of SARS-CoV-2 as the disinfectant is inactivated by dirt and debris^{90,91}.

According to WHO, streets and pavements are not considered as reservoirs of COVID-19 infection while regular hand washing with soap and use of hand sanitizers is beneficial. Excessive use of hand sanitizers to prevent

COVID-19 however could predispose to the following:

I. It could trigger irritation of skin making it more vulnerable to further destruction.

ii. It makes the skin excessively dry turning it into a hotbed of disease bacteria increasing the risk of viral infection including SARS-CoV-2 through cuts in the skin.

Thorough hand washing using soap for 30 seconds provides effective protection against COVID-19 and other infections. The outcry in USA over suggestion from President Donald Trump to test efficacy of disinfectants by injecting them into COVID19 patients is justifiable. Disinfectants as generally known are only meant for topical and external use and injecting them into COVID-19 patients could kill the person faster than the disease itself due to their corrosive nature^{92,93}.

CONCLUSION

This is not the complete list of drugs being tried for COVID-19 across the globe as there are other drugs as much as 70 plus currently being experimented and none of these drugs so far has offered a solution to the effective treatment of COVID-19. Due to the fact that the disease literally ambushed humanity and took the world by surprise, the scientific world does not have the luxury of time to carry out a well-planned and structured study over considerable period of time with large sample sizes concerning all the drugs listed in this review. This makes both the successful and failed drugs difficult to adopt in policy formulation on the fight against the disease for now. Moreover, concerning the deadly nature of the disease, ethical and moral constraints abound restraining using sick people who may have benefited from a treatment trial as control subjects.

Recommendations

It is difficult to recommend any line of treatment without sufficient scientific evidence for now. High-impact treatment options for COVID-19 so far are; Antiviral drugs, Anti-inflammatory drugs, ACE inhibitors and angiotensin receptor blockers, Hydroxychloroquine + Azithromycin

and convalescent serum among several other options including COVID organics. We however recommend that treating Physicians are at liberty to use appropriate combination of medications at their disposal based on information provided above. These drugs may possibly reduce the rates of progressions into severe disease requiring intensive care and ventilators as more efforts to find lasting cure should be intensified.

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Declaration

We declare no conflict of interest.

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Review Article

Utilization of Laparoscopic Surgery in Cirrhosis of the Liver

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ABSTRACT

Surgery in patients with cirrhosis of the liver is dangerous and risky due to abnormalities in their physiology. However these patients do present with conditions that may require surgical intervention. Laparoscopic surgery is safer for these patients as it mitigates the dangers and complications associated with open surgery, offers shorter operation time and subserves a diagnostic value in its safe use to determine and confirm the pathology of the liver. The aim of this study is to determine if laparoscopic surgery is dangerous or safe for patients with cirrhosis of the liver. A literature review was done using search engines viz Hinari, goggle, high wire press and overview of our experiences in patients in university of medical science teaching hospital Ondo. References to our experiences during our subspecialty training at world laparoscopy hospital New-Delhi were also beneficial in the course of this study. The results show that the technique of laparoscopy in all index cases is more favourable than open surgery in cirrhotic patients. We conclude that cirrhosis of the liver does not contraindicate the procedure of laparoscopy.

Keywords: Cirrhosis, Laparoscopy, Open surgery

INTRODUCTION

Surgical diseases appear more frequently in patients who present with cirrhosis. Cholecystitis and cholelithiasis is a common problem in patients with cirrhosis and open surgery is definitely riddled with dangers due to changes in homeostasis in the patients which leads to greater morbidity and mortality. In the past, cirrhosis of the liver was considered an absolute contraindication to laparoscopic surgery. Even the open surgical procedures were fraught with life-threatening complications because of associated coagulation

disorders, nutritional deficiencies and sometimes portal hypertension which itself was complicating the outcome of surgery. As the experience of the surgeons grew even in the laparoscopic surgery, cirrhosis is not considered an absolute contraindication for laparoscopic procedures, but is taken with an extra ounce of care. Lots of surgeons have described procedures previously unthought-of laparoscopically but now can be done very safely by just taking a few precautions and following the rules of good laparoscopic techniques. This article reviews some of the effects of cirrhosis on the outcomes of minimal access surgery in recent times. Laparoscopic cholecystectomy is

definitely a better option because of the focal vision and to some extent the magnification offered by the telescope which enables us to see the vessels clearly and also because of the availability of better instruments for example harmonic scalpel. The proven benefits of laparoscopy seem to be especially applicable to patients with chronic disease like cirrhosis of the liver¹. Pathophysiologically, cirrhosis of the liver is a chronic and progressive disease most commonly associated with chronic alcoholism which leads to deformity of the normal liver parenchyma into fibrous nodules which in turn reduce the liver function to such an extent that the normal functioning of the liver is not possible leading to great morbidity and finally mortality. The physiological changes lead to change in the coagulation profiles, nutritional deficiencies, fluid retention, greater susceptibility to infections which in turn increase the peri- and postoperative morbidity due to change in tissue texture and great fluid retention. The diagnostic armamentarium is sometimes not able to correctly classify the stage of cirrhosis. But the latest articles show that laparoscopy is no longer a contraindication, but in fact is recommended as a safe procedure and provides some advantages for some surgeries when cirrhosis is associated. Child–Pugh classification of cirrhosis is still the gold standard for assessing the severity of cirrhosis in patients^{2,3}.

METHODS OF REVIEW

A literature search was performed using the following search engines: Hinari, Google, High Wire Press, PubMed and the online Springer link Meta Press Library available at the Laparoscopy Hospital, New Delhi, India, where this study was carried out. The following terms were used for the search: 'Laparoscopy in liver cirrhosis', 'Liver cirrhosis, diagnosis', 'Laparoscopic surgery in cirrhosis'. 'Surgery and cirrhosis' and 'Surgical procedures in cirrhosis'. A review of articles has proven that laparoscopic surgery is more useful and less harmful than open surgery because of the associated disease of cirrhosis.

RESULTS

There are only a few larger studies on patients with liver cirrhosis undergoing laparoscopic cholecystectomy. Out of 24 cirrhotic patients that had laparoscopic cholecystectomy only 3(12.5%) were converted to open procedures mainly because of the surgeon's inexperience. A comparative study of 4 patients with advanced cirrhosis and 38 patients with early disease found a morbidity rate of 75.0% in the advanced disease compared to 26.0% in early cirrhosis. 14 cirrhotic patients had laparoscopic incisional and umbilical hernia with a low recurrence rate of 0.1%. Three hundred and seventy six laparoscopic appendectomy was done in cirrhotics with a post operative complication of 2-10%.

DISCUSSION

A tremendous amount of patience is necessary in laparoscopic surgery for cirrhotics because conversion to open surgery does not help to control the coagulopathy which is the main danger in cirrhosis.³ In a particular study, they converted 3 out of 24 laparoscopic procedures in cirrhotics. Two of those conversions was due to surgeon's inexperience. Hence, the experience of the surgeon plays a key role in surgery of patients with cirrhosis of the liver. As such, an adequate circulation and volume maintenance is the key to a successful anesthesia in all cases. It does not change in cirrhotics as hepatosplanchnic perfusion may be impaired in cirrhotic cases. But certain drugs like isoflurane increase hepatic regional blood flow, halothane is noted to increase hepatic-arterial resistance. Fentanyl, vecuronium and pancuronium do not significantly affect hepatic blood flow and may be preferable in cirrhotic patients.⁴ In elective surgery, a good preoperative preparation is surgery half done. No words can describe the importance of recognition of coagulopathies by proper investigations and correcting them prophylactically by Vitamin-K administration and or transfusion with fresh frozen plasma, lowering of portal hypertension with medications, maintain adequate fluid and electrolyte balance and control of infection if present. It is important to

determine absolute serum albumin concentration, presence of infection or contamination and number of seconds partial thromboplastin time is deviated from its control value, as the three main pre-operative variables that predict surgical outcome in cirrhotic patients.⁵ Some authors have advocated a number of operative techniques to help minimize the morbidity associated with surgery in cirrhotic patients undergoing laparoscopic procedures. The major risk in cirrhotic patients is transmission of hepatitis B and/or C virus from the patient to the operating team. Hence, as a precaution, proper disposal of sharps and gentle and meticulous transfers of instruments are key to safety.

As said earlier, patience during operation makes it safe, and meticulous haemostasis will prevent the unavoidable blood loss in patients with cirrhosis.

An open technique (Hassan's trocar) for access to prevent inadvertent puncture of an umbilical varix or placement of trocar away from umbilicus in whom the umbilical varices are evident, is another precaution that can be taken.

Modification of surgery in the form of subtotal cholecystectomy, use of ultrasonic energy like harmonic scalpel, glue, oxidized cellulose are other means to prevent more bleeding.⁶

Historically, histopathology of the biopsied liver specimen has been the gold standard in the diagnosis of cirrhosis of the liver. The danger associated with the invasive procedures made surgeons to be cautious in performing those procedures. Hence, other biochemical and indirect tests were performed to give evidence as to the status of liver. Ultrasound provided a good non-invasive means but its ability to diagnose early cirrhosis is debated. It can very well provide clue to the damaged liver in the form of architectural damage and portal engorgement in advanced stage of disease, but its ability to diagnose cirrhosis in early stage is debatable. Moreover, it gives false-positive results of metastatic disease in some cases of macronodular cirrhosis. Laparoscopy has an advantage over other diagnostic means especially in liver cirrhosis. It gives a visual

impression of the severity of the case and also macroscopic evidence of the destruction of the liver. Direct visualization of both lobes of the liver gives a comprehensive view of the amount of liver diseased by cirrhosis. A biopsy performed laparoscopically has the advantage of taking the specimen under direct vision and not blindly as taken by needle biopsy which may not hit the target and falsely give a negative report even when there may be cirrhosis.⁷

Laparoscopy also allows application of direct pressure or a heater probe to attain hemostasis in the event of bleeding from a biopsy site and may hence be carried out safely despite hematological abnormalities (e.g. PTR > 1.3; platelet < 80,000/mm³) which routinely contraindicate blind percutaneous biopsy. The use of diagnostic laparoscopy has, therefore, expanded in liver cirrhosis so much that it was recommended that diagnostic laparoscopy should be incorporated into the training programs for gastroenterologists in America.⁸ Also it was advocated that physicians in the United Kingdom should be the ones performing diagnostic laparoscopy. The incidence of gallstones is reported to be twice in patients with cirrhosis than in the general population.⁹⁻¹¹ Most stones are small pigment stones which are friable and so associated with more complications.¹² Laparoscopic cholecystectomy is hence the most widely performed surgery on patients with cirrhosis.

Open cholecystectomy is associated with high rates of morbidity (5-30%) and mortality (7-25%) in cases with cirrhosis. Hence, laparoscopic surgery was confirmed as an alternative and better procedure for cirrhotic patient as it is associated with less bleeding and associated with shorter duration of hospital stay. There are certain difficulties during laparoscopy which includes adhesions around gall bladder and hilum of liver, thick margin of liver which makes traction on liver difficult and increased vascularity of gallbladder bed. But the use of additional port and extracting the gall bladder fundus first, or a partial cholecystectomy makes life easier for the surgeon and also for the patient. Laparoscopic cholecystectomy is more useful for mild and moderate degree of cirrhosis, but

Child– Pugh's class C(advanced disease) remains relatively contraindicated to laparoscopy. The experience of a particular study with laparoscopic cholecystectomy in 226 cirrhotic patients represents the largest series published so far. However, no patient with advanced disease was operated upon. Another study, compared four patients with advanced disease who had laparoscopic cholecystectomy with 38 patients with early disease in the same center and found a morbidity rate of 75.0% in the advanced disease patients compared with 26.0% in those with early disease. The authors further advised that surgery in patients with advanced disease should be avoided except in acute emergencies where conservative procedures, such as gallbladder aspiration and partial cholecystectomies may be considered. Even in such instances, percutaneous drainage of the gall bladder and other conservative procedures may suffice.¹³ The main concern during hernia repair is the approach. In cirrhosis, the abdominal wall may be riddled with multiple engorged vein due to associated portal hypertension. Performing an open repair of hernia is riddled with bleeding due to these veins and bleeding disorders.

Laparoscopically, all these distended veins are avoided and the abdominal wall is left untouched. The whole surgery is behind the abdominal wall and just involves insertion of a mesh between the peritoneum and the abdominal wall. Hence, avoiding all the potentially distended veins.

In a report of 14 cirrhotic patients who underwent laparoscopic incisional and umbilical hernia repair, it was observed that open repair in cirrhotic patients has significant recurrence rates and frequent wound infections,

Laparoscopic repair yields less morbidity and fewer recurrences. The study further highlighted that the preservation of the anterior abdominal wall in laparoscopic repair avoids the interruption of collateral veins which are not infrequently distended in cirrhotic patients.

There is a tendency to develop umbilical hernias in cirrhosis due to increased portal systemic

communication and opening of obliterated umbilical veins to accommodate the pressure. Laparoscopic umbilical hernia repair in cirrhotic patients appears to offer advantages over the open methods.¹⁴ Ascites may add to this effect of producing umbilical hernia due to increased intra-abdominal pressure.

Successful laparoscopic repair of recurrent incarcerated umbilical hernia in a cirrhotic patient with refractory ascites has also been reported¹⁵. In the report, the authors used dual mesh prosthesis and advocated meticulous sterile fashioning of mesh insertion and fixation. This is important since ascitic fluid infection, which may occur after surgery may affect the hernia mesh repair.

The possibility of mesh migration due to the ascitic fluid can be reduced by placing the mesh in a pre-peritoneal space.¹⁶

Ascites itself may be treated laparoscopically more effectively by placing the peritoneovenous shunt.¹⁷ Surgical treatment of ascites is reserved for severe ascites, others can be treated medically. In cases of ascites with renal failure, insertion of peritoneal dialysis catheters under vision is done.¹⁸ In a reported study, 52 laparoscopic procedures were performed on 50 cirrhotic patients. These procedures, including cholecystectomies, splenectomies, colectomies, diagnostic laparoscopies, ventral hernia repairs, nissen fund application, Heller's myotomy, gastric bypass and radical nephrectomy had a morbidity rate of 16.0% but no mortality¹⁹ Another study had earlier compared open and laparoscopic appendicectomies among patients with liver cirrhosis^{20,21,22} They reported fewer rates of wound infection and wound bleeding in the laparoscopic group. Many other laparoscopic procedures including laparoscopic liver resections for hepatocellular carcinomas^{23,24,25} and laparoscopic ultrasound with radiofrequency ablation are now routinely done in cirrhotic patients in some centers.

CONCLUSION

Cirrhosis of the liver because of its associated comorbidity, is not a contraindication of any simple or

advance procedure by laparoscopy. Although technically challenging because portal hypertension, varices and thrombocytopenia frequently coexist, basic and advanced laparoscopic procedures are safe for patients with mild to moderate cirrhosis of the liver. However, its safety in advanced disease like Child-Pugh's class C is not yet proven, we advocate caution in such cases and further studies need to be done to find out other ways to make laparoscopic surgery safer even in these cases.

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Conflict of interest

None declared

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Review Article

COVID-19 Disease Pandemic in the 21st Century: As Africa Braces up for the Disease What Needs to be known

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ABSTRACT

It was on 7th of January 2020 that China announced an outbreak of a form of strange pneumonia among her people in Wuhan Hubei province and little did the global community anticipate that the announcement would turn out to be a global nightmare within 60 days; COVID-19 pandemic caused by SARS-COV-2 a beta-Coronavirus. This study was therefore set up to review the present impact of COVID-19 pandemic in presentations and drug management along with clinical presentations and suggest best approach for Africa. Study was carried out based on available information, data, records and published scientific works from electronic and print media, social media and communications, newsletters and broadcasts. Data and information was obtained from 1st January 2020 to 31st March 2020 and relevant information such as evolution of Coronaviruses, clinical presentation of SARS-COV-2 infections, laboratory diagnosis, drugs on therapeutic trial for COVID-19 and control models from different endemic countries were compiled. Data obtained was analysed using simple quantitative and qualitative methods. Coronaviruses were first discovered to be human pathogens in 1965 and the first strain to cause disease was CoV-NL-63 that caused only mild respiratory symptoms and SARS-COV-2 SARS-COV-2 is a long term evolutionary mutant of a mild CoV-NL-63 and has no relationship with 5G radiations in the present COVID-19 pandemic. Fever, difficulty in breathing, tiredness and dizziness accounted for 97.3% (n=2,713), 88.6% (n=2,470), 66.2% (n=1,846), 62.7% (n=1,748), and 32.5% (n=906) respectively of the clinical presentation, and gastrointestinal features ranged from 11% to 22%. Rate of specimen positivity from infected individuals showed that bronchoalveolar lavage fluid, sputum, nasal swabs and fibrobronchoscope brush biopsy specimens would give 93%, 72%, 63% and 46% positivity respectively. Drugs on therapeutic trials for SARS-CoV-2 infections across the globe include: chloroquine, Hydroxychloroquine plus azithromycin, remdesivir, actemra, kevsara, convalescent plasma, avigan, TAK-888, and antibody treatment among others all with mixed degrees of success in different parts of the world. We therefore recommend an Afrocentric control model with the following components: wearing of face mask, proper hand washing with soap and water, sanitizers, avoid reflex hand touch on the face, eyes or picking nose, avoid unhealthy cultural practices like handshakes, observe social distancing, regular habit of removing cloaks or outer wears outside the house, regular steam inhalation and drinking of hot fluids. Hydroxychloroquine + azithromycin should be readily available for mass treatment..

Keywords: Clinical Features, Control, Coronaviruses, COVID-19, SARS-COV-2

INTRODUCTION

It all started in Wuhan city, Hubei province in China where doctors noticed a strange severe form of pneumonia in late 2019 following a similar pattern in some patients in the hospital in Wuhan¹⁻². The alarm raised by Dr Li Wenliang, a 34 year old ophthalmologist led to the discovery of a hitherto an unknown form of a virus-associated pneumonia among humans called Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) virus which belongs the family Coronaviridae, a single stranded RNA virus which is predominantly zoonotic causing diseases in other animals both wild and domestic. The virus is now known to cause Coronavirus Disease 2019 (COVID-19) among humans presenting with severe pneumonias with high fatalities and within two months has spread from Wuhan to all continents and most countries of the world³⁻⁵.

As at 6th of April 2020 COVID-19 had afflicted about 1.3 Million people worldwide with 70, 590 deaths; Spain recording 135,032 infections and 13,055 deaths while Italy has so far recorded 128,948 infections with 15, 887 deaths and USA, 337,797 infections with 9,670 deaths. In China where it all started the virus has infected at least 81,708 people with 3,331 deaths and in Nigeria it has infected 322 people with 5 deaths. While the disease has been substantially contained in China where it all started, the spread to other parts of the world is still on the increase with proportionate death tolls. As at today Africa appear to be the only continent yet to experience the monumental havoc the disease has wrecked in other continents of the world. It is therefore difficult to tell whether the disease is on its way heading to Africa or Africa is going to experience less impact from it⁶⁻⁸.

As researches are ongoing across the world to find a lasting cure and also to produce a potent vaccine to contain the disease, it apparently appears not all about the physicochemical, clinical, epidemiological, human kinetic, and pathologic properties of the disease are fully understood. This may explain the different approaches in the control, treatment and prevention of the disease from

different parts of the world and different management outcomes from countries with similar standards of healthcare services recording discordant fatalities. The conspiracy theories about the 5G and religious theories surrounding the illness have all contributed to confusing both the teaming public and health professionals inclusive the world over. As the global struggle to combat the disease continues where Africa stands in this pandemic at present is not precisely known in terms of the likely impact on the continent. A regular and periodic review of the various presentations of the disease from the worst hit parts of the world with far more advanced health settings will serve as a viable source of information for Africa and Africans⁹⁻¹¹.

With her poor health facilities, African countries including Nigeria with inadequate facilities for laboratory diagnosis of COVID-19, reliance on clinical picture may be the only process that health professionals and indeed all healthcare givers may rely upon to make early index of suspicion for the disease. This study was therefore set up to review the various clinical presentations and features associated with the disease from the most affected countries of the world and other related discussions¹²⁻¹⁴.

MATERIALS AND METHODS

The study was based on literature searches on reports and documentations on the clinical presentations and management protocols of SARS-CoV-2 infections among the most afflicted countries and regions of the world from January 1st 2020 to 31st March 2020. This includes clinical presentations; drugs used in the management, likely modes of spread and associated threats in continuous spread of the disease as captured in scientific write-ups, electronic and print media and social media groups. Information was gathered from China, Italy, Spain, France, Germany, USA, Iran, United Kingdom, South Korea as well as other less heavily infected countries. Data was analysed using simple quantitative descriptive and qualitative methods.

Table 1 : Human Coronaviruses associated with clinical diseases

Virus	Genus	Disease	Year of Discovery
CoV-NL-63	Alpha	Mild Respiratory Tract Infection	1965
Cov-229E	Alpha	Mild Respiratory Tract Infection	1967
SARS-CoV	Beta	Human Severe Acute Respiratory Syndrome, 10% Mortality rate	2003
CoV-OC43	Beta	Mild Respiratory Tract Infection	2004
CoV-HKU-1	Beta	Mild Respiratory Tract Infection, Pneumonia	2005
MERS-CoV	Beta	Human Severe Acute Respiratory Syndrome, 37% Mortality rate	2012
SARS-CoV-2	Beta	Severe Acute Respiratory Infections, <2% Mortality rate	2019

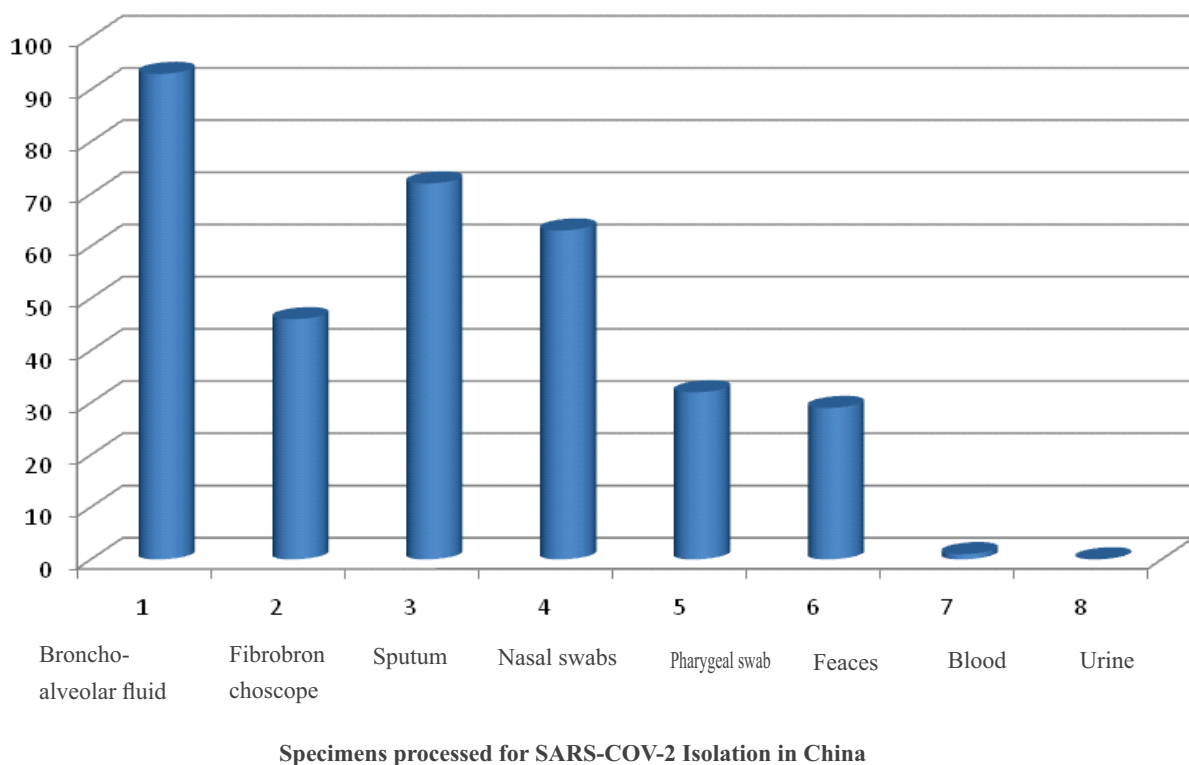


Figure 1: Percentage Positivity in Laboratory Diagnosis of SARS-CoV-2 Infections using PCR from different human samples¹⁶.

Table 2: Associated Clinical Features of SARS-CoV-2 Infections across the globe (N=2,788)

Clinical Presentation	Frequency (%)
Fever	2,713(97.3)
Difficulty Breathing (Severe Cases)	2,470(88.6)
Tiredness	1,846(66.2)
Cough (Dry usually)	1,748 (62.7)
Headache	906 (32.5)
Diarrhoea	622(22.3)
Nausea	496 (17.8)
Dizziness	388(13.9)
Vomiting	326(11.7)
Anosmia	268(9.6)
Loss of appetite	165(59.1)
Abdominal pain	153(5.5)
CNS disease	13(0.5)
Sickle cell Crisis	1(0.04)
Tiger	1(0.04)

Table 3: Drugs presently on therapeutic trials for SARS-CoV-2 Infections across the globe

Chloroquine, Hydroxychloroquine + Azithromycin
Remdesivir- An anti-Ebola drug
Actemra- Rheumatoid arthritis drug
Kaletra (Lopinavir + Ritonavir) Antiretroviral drug
Kevzara
Convalescent Plasma
Avigan
TAK-888 from Japan
Antibody Treatment
Tocilizumab
Sarilumab
Losartan an ACE Inhibiting Antihypertensive
Favipiravir (Avigon) an Anti-Flu drug in Japan
ELDD-2801- Anti-viral genetic mutations, on trial in USA

RESULTS

A total of 2,788 documented records of SARS-CoV-2 infections across the globe were considered. The Coronaviruses that have caused human infections in the past include: CoV- 229E and CoV-NL-63 discovered in 1967 and 1965 respectively up to SARS-CoV-2 which was discovered in 2019. Other Coronavirus species include CoV-HKU-1, CoV-OC43, SARS-CoV and MERS-CoV discovered at different intervals in between but all of them causing varying degrees of respiratory illnesses (Table 1). Analyses of the various clinical presentations of SARS-CoV-2 infections from the available reports show that: fever, difficulty in breathing, tiredness and dizziness accounted for 97.3% (n=2,713), 88.6% (n=2,470), 66.2% (n=1,846), 62.7% (n=1,748), and 32.5% (n=906) respectively. Gastrointestinal clinical features such as diarrhea, nausea and vomiting were not uncommon with 22.3% (n=622), 17.8% (n=496), and 11.7% (n=326) respectively. Central nervous system involvement was reported in 0.5% (n=13) while a clinical case in a caged tiger was reported 0.04% (n=1) (Table 2).

Findings on the clinical samples for isolation of SARS-CoV-2 virus isolation showed that: bronchoalveolar lavage fluid, sputum, nasal swabs and fibrobronchoscope brush biopsy specimens would give 93%, 72%, 63% and 46% positivity respectively. The rate of positivity to SARS-CoV-2 infection from other clinical specimens include: pharyngeal swabs 32%, faeces 29%, blood 1% and urine 0% (Figure 1).

Drugs on therapeutic trials for SARS-CoV-2 infections across the globe include: chloroquine, Hydroxychloroquine plus azithromycin, remdesivir, actemra, kevzara, convalescent plasma, avigan, TAK-888, and antibody treatment. Other drugs include tocilizumab, sarilumab, losartan, favipiravir and ELDD-2801 (Table 3).

DISCUSSION

Research findings have shown that Coronaviruses have been in existence much earlier than the last five decades

when it was first discovered in 1967. From the outset this group of viruses was not associated with severe infections in humans as they often caused asymptomatic to mild and transient respiratory tract infections requiring no hospitalization and no aggressive medical intervention^{17,18}. The very severe and life threatening diseases associated with Coronaviruses began to emerge in 2003 with the emergence of SARS-CoV strain and was followed in 2012 by MERS-CoV, and then the present SARS-CoV-2 strain. The last strain has caused the COVID-19 disease pandemic which is presently ongoing and has claimed lives approaching 100,000 across the globe as at April 11th 2020. This progressive increase in virulence with aggressive worsening clinical picture of Coronaviruses generally can be attributed to the evolutionary trend of the members of the Coronaviridae family. The evolutionary process going on among the viral group has given them increasing adaptations and capabilities to live and survive more comfortably in human tissues and systems with additional ability to cause more damage to the human host.¹⁹⁻²¹

These evolutionary trends as earlier propounded by Charles Darwin in 1859 in his book titled: “*On the Origin of Species*” are purely accidental and a game of chance in the process of selection of preferred species. Viruses evolve through mutations while horizontal gene transfer between viruses, bacteria and eukaryotes can occur via transduction, conjugation, transformation, meiosis and mitosis depending on the cellular complexity.^{22,23}

Noah Whiteman of Integrative Biology research of University of California once remarked:

“*How does something that has been out of a lineage for hundreds of millions of years potentially get incorporated into a foreign lineage that it has no experience with? It's an absolutely fascinating question*” This evolutionary process has not stopped and is still ongoing and is bound to give rise to more virulent infectious agents with potentially more catastrophic impacts on humans. It is interesting to note than microorganisms when they evolved about 4 billion years ago were harmless and were referred to as extremophiles and in the course of evolution

over 95% of these organisms went extinct from natural selection and survival of the fittest. This has given birth to the few that have survived the course of evolution and a few now cause disease in man^{24,25}.

There is therefore a pressing need to be more vigilant in critical patient examination and management to detect early onset of these hitherto unknown infections. Also there should be preparedness in the area of vaccines and appropriate drugs against the likely zoonotic and reemerging viruses with high propensity to higher human virulence and as well higher disease burden.

SARS-CoV-2 Infections and 5G Network

The present theories trying to establish a link between 5G radiations and SARS-CoV-2 infections with the global deaths toll associated with COVID-19 disease lack sufficient scientific basis. COVID-19 is caused by a virus which has been detected and isolated from infected individuals and the evolution of 5G network appear to be a mere coincidence at this time of COVID-19 pandemic. The pulling down of 5G masts in London and Wuhan due to its perceived association with COVID-19 disease clearly shows how limited knowledge the general public have about Corona viruses generally. This could influence the level of acceptability of the control and preventive measures available by the people to break the chain of transmission of the disease. Interestingly, these viruses have been undergoing adaptation over the past century for human habitation in line with the normal evolutionary trends of microorganisms.²⁶

Clinical Presentations of SARS-CoV-2 Infections

Among the common clinical features of SARS-CoV-2 infections include fever, cough, difficulty in breathing, headache, diarrhea and nausea. Both health professionals and the general public should be on a lookout for individuals and groups presenting with these features in health settings and communities respectively to ensure prompt medical attention and arrest spread. More public enlightenment should be intensified in Nigeria and indeed Africa to dissuade the general public from the supernatural

and spiritual dimensions being given to the disease. The detection of the virus in a caged tiger in a zoo in New York brings to attention the possibility of animal reservoirs within the reach of humans as the virus could spread among the wild animals caged in zoos as well as domestic animals such as cats and dogs. The infected animals in zoos could serve as a formidable reservoir for a sustained community spread and re-infections as people continue to visit the parks for social, academic and other purposes. It becomes therefore necessary as the world battles to control COVID-19 pandemic all human visits to zoos in the country should also be highly restricted to break that chain of possible transmission as well. Also special attention should be paid to all domestic animals in settlements and homes where SARS-CoV-2 has had a foothold. These should be equally screened to ensure that there is no animal reservoirs in homes and communities which would have rendered all control measures targeted at humans now ineffective²⁷⁻³⁰.

The activities of cattle, goats and sheep pastoralists in Nigeria and many parts of Africa should be properly designed and ordered to limit their free movements in communities and the countryside. Also mass screening for SARS-CoV-2 infection among livestock should be carried out on regular basis especially in high risk areas.

Laboratory Diagnosis of SARS-CoV-2 infections

From the available reports the three most common samples to yield appreciable positive results in SARS-CoV-2 infected individuals include bronchoalveolar lavage fluid, sputum, and nasal swabs with 93%, 72%, and 63% positivity respectively. This underscores the need for extra vigilance in the prevention of COVID-19 disease as no sample guarantees 100% accuracy and the chances of getting a false negative report is also a possible occurrence. The lack of available confirmatory tests in most health centres across Nigeria and indeed all over Africa makes it mandatory that all health personnel should adopt strict adherence to universal protection protocol in the hospitals while attending to all patients especially during this time of outbreak. This will largely mitigate the

risk of transmission from both carriers and patients in incubation period^{16,31-33}

Drug Treatment of SARS-CoV-2 Infections

It is on record that since the commencement of SARS-CoV-2 infection late last year to date there has been no specific drug for its management and several drugs are on trial on the severely infected patients. These include chloroquine, hydroxychloroquine + azithromycin which was first tried in Wuhan China but with mixed management outcomes and is presently on trial in New York USA also with mixed recovery rate outcomes; remdesivir an anti-Ebola drug is also on trial in China, Italy, Spain and Thailand with varying treatment successes in each country. Also other drugs such as: acterna an anti-rheumatoid arthritis drug, kaletra an anti-retroviral drug, TAK-888 on use in Japan, and losartan an anti-hypertensive have all not agreed on level of uniform successes in different countries of use. The ELDD-2801, a drug that attacks viral genetic mutations is presently on trial in USA, and its success story will be known in due course³⁴⁻³⁶.

As efforts to obtain a lasting cure for SARS-CoV-2 infections continue, the various drugs in use for therapeutic trial should continue to be handy to physicians and other health personnel, and the choices depending on individual preferences and patients pre-morbid and associated clinical picture. Appropriate back up with oxygen and ventilators which are the last treatments of choice should always be handy whenever these drugs fail.

COVID-19 Control Models Across the globe

There are presently at least four main epidemiological approaches across the globe to combat the SARS-CoV-2 infections being implemented by different countries in different ways:

The Dutch model has adopted mass immunization of the entire population through a progressive containment of the entire population. Here only the very vulnerable and sick people are isolated and there is no mass screening. This would allow herd immunity to develop over time and the entire community

will eventually develop resistance to the disease as in the case of influenza disease³⁷.

The Chinese/French-Italian model has adopted a forced and generalized containment with the closure of all places prone to large gatherings such as: both private and public schools, airports and sea ports, metro stations, markets, restaurants and bars, religious gatherings, shopping malls and factories. There is restriction of movements and travels reserved to only essential services, and there is screening of only serious cases and not the general population³⁸.

The South Korean/German model has adopted the testing of all people as in South Korea, or testing of only suspected cases as in Germany. There is isolation of patients or suspects with or without specified places of confinement. In both countries there is closure of all public places such as: both private and public schools, airports and sea ports, religious gatherings, metro stations, markets, restaurants and bars, shopping malls and factories³⁹.

The Raoult model propounded by Professor Didier Raoult in Marseille adopts the policy of mass screening of the entire populace. All those who test positive will then immediately be placed hydroxychloroquine + azithromycin. This is inexpensive with potential impressive outcomes as it yielded over 99% full recovery rate on patients tried⁴⁰⁻⁴³.

Limitations to the Study

This study is limited due to the fact that some of the sources of the information cannot be sufficiently verified especially from social media and the possibility of biases in reportage about the disease from different media organizations. Also the influence of governments over the authenticity and type of information coming from different countries about the disease to suite particular political interests could affect the genuineness of some of the information obtained.

CONCLUSION

As COVID-19 pandemic heads towards Africa, health personnel on the continent should learn from the experiences and challenges of the most advanced countries where the disease has defiled all available control remedies. Important information on clinical presentation, laboratory diagnosis, drug management and various treatment models should be critically analysed in the context of affordability and cost versus benefit to arrive at an implementable and workable plan in the context of the economic and technological strengths of individual African nations. Therefore general containment, restriction of movement of persons, closure of all public places, mass testing of whole populations if adopted while those positive are placed immediately on hydroxychloroquine + azithromycin and promptly isolated would control the disease on the continent. Also adequate supplies of PPE, face masks, respirators, and adequate treatment and well furnished isolation centres would be necessary backup for efficient management of COVID-19.

Recommendations

For African countries that have sufficient resources and can afford we recommend a hybrid of Korean/German and Raoult models which is basically testing all the people, imposing restriction order to movements and banning all social gatherings, and prompt commencement of hydroxychloroquine + azithromycin on those who test positive. Other facilities such as respirators, PPEs, face masks, and adequate treatment and isolation centres should all be adequately provided to ensure that nothing is left to chance in the control of the disease.

Considering the level of poverty, heavy burden of other diseases, and a dysfunctional health system and maladministration, African countries may lack the capacity to implement the Korean/German and Raoult's model of COVID-19 control. This is coupled with the fact that in some African countries such as Nigeria which is experiencing large displacement of people presently in refugee camps, starvation and armed banditry, lockdown

will be more devastating than COVID-19 especially if prolonged. This is because many Nigerians feed daily from their daily outdoor activities and prolonged restriction of movement would lead to mass starvation in the land as the poor of the poor do not have bank accounts to access any social benefits.

We therefore recommend an Afro-centric model of COVID-19 control in Africa to avert grave consequences on national economies especially in the long run. We suggest that the message of infection control practices should be conveyed through every available medium. Even a lay man on the street should be thoroughly educated on infection control practices. This includes among others wearing of face mask, proper hand washing with soap and water, sanitizers, avoiding reflex hand touch on the face, eyes or picking nose, avoiding unhealthy cultural practices like handshakes, observing social distancing, regular habit of removing cloaks or outer wears outside the house and exposing them in the sun at least over 24 hours as one comes back to the house and bathing with soap and water before entering your house and many more.

Also regular steam inhalation and, drinking hot water and in addition to any of our herbs or fruits that are immune boosters, detoxifiers, Ph modifiers and antioxidants should be used. Hydroxychloroquine + azithromycin which are cheap drugs should be readily made available for treatment of symptomatic cases. Finally, provision should be made for adequate and well equipped treatment centres for management of severe cases.

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Original Article

Giving Correct names to Disciplines in Pathology in the 21st Century: A Review of Working Environments among Pathologists across Nigeria

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ABSTRACT

A name gives one identity, inspiration, strength, vision and an ability to see far into the future from the beginning. Pathology disciplines therefore need correct and proper names that will carry along it all those attributes to enable them explore all her potentials unhindered in the 21st century practice of Medicine in the country. This study reviewed the functions of Medical Microbiologists and Haematologists in the midst of incessant inter-professional rivalry involving medical laboratory scientist in the country's teaching hospitals. Data was collected based on information from electronic, online and print media, and social media platforms. Questionnaires were administered to assess the knowledge of students of Adeyemi College of Education Ondo-City on the difference between Consultant Medical Microbiologists and Academic Microbiologists. We found out that in over 85% of the crises in the medical laboratories in the country are from either Medical Microbiology and or Haematology laboratories; disciplines whose names have little to do with pathology, and that Anatomic Pathology and Chemical Pathology disciplines are usually only in solidarity with the two. Also other health personnel including scientists do not feel fully convinced that Consultants in the former two disciplines (Medical Microbiology and Haematology) are truly Pathologists. It was also found that 90% of members of the general public cannot differentiate between a Pathologist who specializes in Microbiology from an individual who graduated with BSc or MSc in Microbiology and so could hardly understand why such could not also practice as Consultant Microbiologist or Lecture in Clinical Pathology departments. At the University of Medical Sciences teaching Hospital Complex (UNIMED THC) where both the discipline and the Department are named Microbial Pathology, the tension has substantially been put under check. The two subspecialties should be properly named as: Microbial Pathology and Haematologic Pathology instead of Medical Microbiology and Parasitology, and Haematology respectively along with their respective Departments.

Keywords: Disciplines, Haematologic, Microbial, Nomenclature, Pathology

INTRODUCTION

The practice of Pathology across the country has had its own fair share of challenges from among the public, other health personnel as well as among Pathologists themselves. The challenge from the public is largely the inability of the public to understand the actual job prescription and relevance of Pathologists in the chain of qualitative healthcare delivery. This can largely be addressed through proper and coordinated public enlightenment and through mass literacy.^{1,3}

The major challenge being faced by Pathologists across the country is that posed by the laboratory scientists mostly in the tertiary health centres. At the University of Calabar teaching hospital (UCTH) Calabar, the hospital management could not admit resident doctors into both Medical Microbiology and Parasitology, and Haematology Departments for over a decade from inception as the laboratory scientists held sway affairs. And of recent they forcefully chased residents doctors and consultants out of the laboratories.⁵ At the Obafemi Awolowo University teaching hospital (OAUTH) complex Ile-Ife, the situation is no different as scientists in haematology at a point stopped both Pathologists and residents from entering the laboratory. Also at the Jos University Teaching hospital (JUTH) Jos, the scientists took entire management of the hospital to court and prayed the court to hand over the laboratories to them.⁶

At the Federal Medical Centre (FMC), Owo, the scientists similarly went to court and prayed that they be declared owners of the laboratories or their own Departments be carved out for them out of the present structures in our health centres. Similar tensions abound and struggle for dominance is the same order of the day at FMC Makurdi, Keffi, Jalingo and Yola. The situation is no different at the University College Hospital (UCH) Ibadan and the Lagos University Teaching hospital and Lagos State University Teaching Hospitals in Lagos where Pathologists have carved out research laboratories for training of resident doctors who have limited access to service laboratories where scientists call the shots. These hostilities and

skirmishes are not different at the University of Portharcourt teaching hospital (UPTH) Portharcourt, and the National hospital along with University of Abuja Teaching hospital all in Abuja where Pathologists are either in direct or indirect confrontation with the scientists in the course of daily work.⁷⁻¹⁰

At the Ahmadu Bello University Teaching hospital (ABUTH) Zaria, Usmanu Danfodiyo University Teaching hospital (UDUTH) Sokoto, University of Maiduguri Teaching hospital (UMTH) Maiduguri, University of Nigeria Teaching Hospital (UNTH) Enugu, and University of Ilorin teaching hospital (UIITH) Ilorin there is relative calm. This is because the scientists have largely conquered these territories and Pathologists along with residents have accepted their fate not to seriously engage them of cause with severe negative consequences on quality of service delivery. In the midst of all these skirmishes and frictions whether low or high keyed all have the potential to impact negatively on the quality of laboratory service in each hospital.¹¹⁻¹³

A name gives one identity, inspiration, courage, strength, vision and an ability to see far into the future end from the beginning. Whether the names given to the Pathology sub-specialties as it operates in our health centres has any role to play in all these needs to be ascertained. This study was therefore set up to assess whether or not there are Pathology sub-disciplines that are prone to friction with scientists across the country, the likely or otherwise, association of their names with this trend; and hence proffer solutions to bring the crises to a halt.

MATERIALS AND METHODS

The study involved search for information on conflicts and frictions among Pathologists, Resident doctors and hospital managements with laboratory scientists across the country. Relevant information was obtained from electronic media such as Nigeria Television Authority (NTA), Channels Television, TVC News, Silverbird, Federal Radio Corporation of Nigeria (FRCN), and Africa Independent Television and Ray Power FM; Print Media

such as Thisday, Punch, Sun, Nation, Daily Post, Daily Independent; online media such as Sahara Reporters and Premium Times; social media such as Facebook, Instagram, Youtube, Whatsapp, Twitter, Telegram using keywords like pathology, pathologists, medical scientists, rivalry, microbiologist, Haematologist and laboratory medicine.; discussions and resolutions at medical specialty conferences such Nigeria Medical Association (NMA), Medical and Dental Consultants Association of Nigeria (MDCAN) and College of Nigerian Pathologists (CNP). Knowledge about Consultant Microbiologists vis-à-vis Academic Microbiologists and related information was obtained from the public using cluster sampling method in Ondo-city where a large number of people were engaged in tailored discussion about the topic. Fellowship certificate awarded to Part II grandaunts by the National Postgraduate Medical College of Nigeria (NPMCN) was also examined. Questionnaires were administered to students of Adeyemi College of Education Ondo-City to assess their understanding on differences between Medical/Consultant Microbiologists and academic Microbiologists (MSc/PhD). Data gathered was analysed qualitatively and quantitatively using arithmetic parameters, and Epi-Info 6 where applicable to situate the relevant subspecialties of Pathology, along with their names prone to friction with laboratory scientists across the country and findings reported as such.

RESULTS

An assessment of the rate of frictions among Pathologists and Medical Laboratory Scientists (MLS) among the 37 health centres across the country surveyed showed that: 46.0% (n=17), 24.3% (n=9), 18.9% (n=7) and 10.8% (n=4) were most prevalent in Medical Microbiology, Haematology, Chemical Pathology and Anatomic Pathology respectively (Figure 1).

An analysis of the origins of the crisis among the four disciplines before it spreads to others showed 81.1% (n=30), 16.2% (n=6) and 2.7% (n=1) emanated from Medical Microbiology, Haematology, and Chemical

Pathology respectively. Crisis were not found to have originated from Anatomic Pathology in any of the centres studied 0.0% (n=0) (Figure 2).

Concerning the persistence of crisis between the MLS and Pathologists; it was observed that: the crisis persisted in 67.6% (25/37) in Medical Microbiology, 55.0% (20/37) in Haematology, 24.3% (9/37) in Chemical Pathology and 0.0% (n=0/37) in Anatomic Pathology (Figure 3).

Scrutiny of a certificate awarded to post part II Fellowship Examination candidates after a successful completion of any discipline in Pathology showed this phrase: '*is Hereby awarded the Fellowship of the Medical College in Pathology*'. This is applicable to: Medical Microbiology, Haematology, Chemical Pathology and Anatomic Pathology (Figure 4).

Among the 251 students studied at Adeyemi College of Education consisting of 172 (68.5%) males and 79(31.5%) females; 17.2% (n=43), 61.5%(n=154) and 21.3%(n=54) had spent a year or less, two years, and three years and above in the school respectively. One hundred and seventy (67.6%) and 81(32.4%) of the students were studying science-related and arts-related education courses respectively (Table 1).

An assessment of the knowledge of the students of Adeyemi College of Education on the difference between Consultant/Medical Microbiologists/Haematologists and academic Haematologists and Microbiologists showed that: 99.0% (n=248) of the students could not differentiate

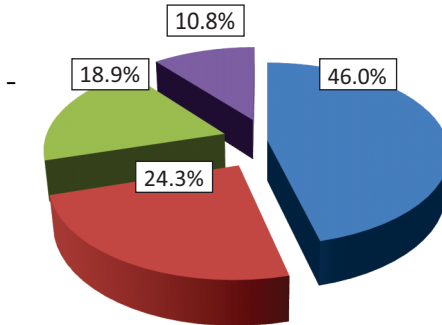


Figure 1. The rate of frictions among Pathology sub-specialties and Medical Laboratory scientists (MLS) in Nigeria (n=37).

Key

- Medical Microbiology (n=17)
- Haematology (n=9)
- Chemical Pathology (n=7)
- Anatomic Pathology (n=4)

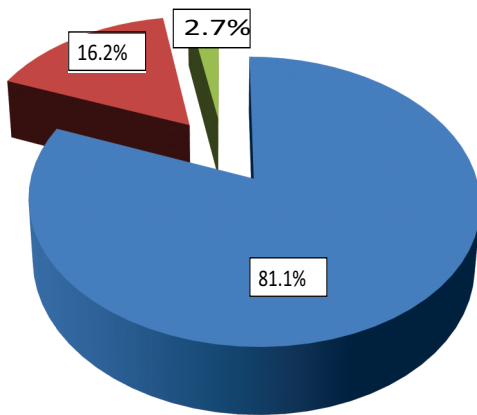


Figure 2: The origins of frictions among the Pathology subspecialties with Laboratory scientists in Nigeria (N=37).

Key

- Medical Microbiology (n=30)
- Haematology (n=6)
- Chemical Pathology (n=1)

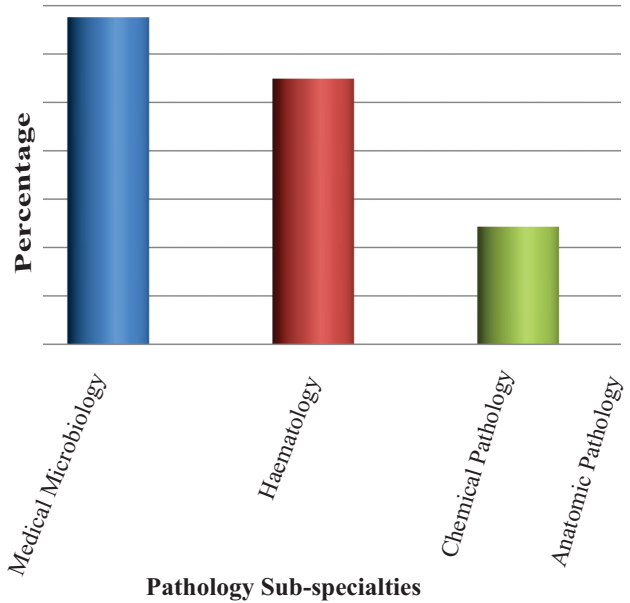


Figure 3: Pathology sub-specialties where frictions with Medical Laboratory Scientists usually do not end easily among hospitals in Nigeria.

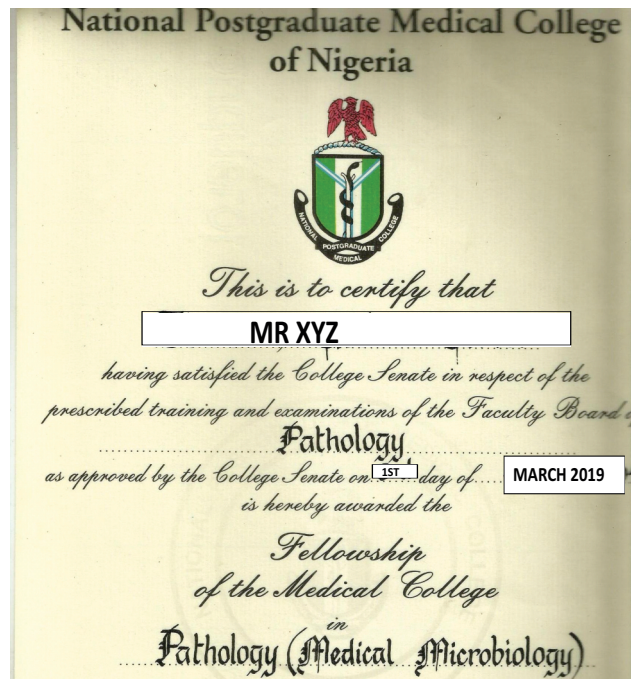


Figure 4: Certificate awarded by National Postgraduate Medical College of Nigeria (NPMCN) to Medical Microbiologists at successful completion of Part II Fellowship examinations.

Table 1: Age and gender distribution of students at Adeyemi College of Education Ondo-city, Nigeria

Age Intervals(Years)	Males	(%)	Females (%)	Total (%)
16-20	7	(2.8)	15 (6.0)	22 (8.8)
21-25	97	(38.6)	51 (20.3)	148 (58.9)
26-30	53	(21.1)	12 (4.8)	65 (25.9)
31-35	12	(4.8)	1 (0.4)	13 (5.2)
36 and Above	3	(1.2)	0 (0.0)	3 (1.2)

(N=251; Males=172, 68.5%; Females=79, 31.5%).

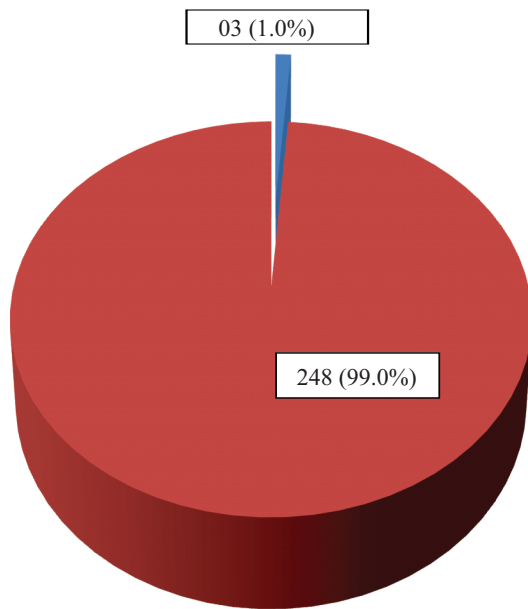


Figure 5: Evaluation of the knowledge on the difference between Consultant/ Medical Microbiologists and Academic Microbiologists among students of Adeyemi College of Education Ondo-City.

Key

- Poor or No knowledge (n=248)
- Sufficient Knowledge (n=3)

between the two while 3(1.0%) could differentiate between the two. For Anatomic Pathology and Chemical Pathology disciplines, 99.0% (n=248) of the respondents acknowledged as trained specialists that work in the hospital ($p < 0.0005$) (Figure 5).

DISCUSSION

Findings from this study clearly showed that friction between the MLS and Pathologist has become endemic and recurrent in most health centres across the country. This has the potential of greatly impeding on the work outputs and qualitative service delivery to the teeming patients that visits our hospitals on daily basis. The worst hit disciplines are Medical Microbiology and Haematology, far less in Chemical Pathology and almost non-existent in Anatomic Pathology. The situation becomes even more precarious when the training of resident doctors and medical students is greatly hampered with dire consequences on the training and availability of future professionals in the field.¹⁴⁻¹⁶ The study has clearly shown that the public do not know the difference between Consultant Microbiologists / Haematologists and Scientists that specialize in those fields or academics in the field (BSc, BMLS, HND, MSc, PhD). The fact that the public cannot differentiate between Scientists working in those disciplines from Pathologists may have contributed in building up their confidence and the level of resistance they have been raising up against Pathologists and resident doctors over the years. This level of awareness is also common among medical students as was observed in a study on final year medical students where some did not know that medical doctors can do residency training in Medical Microbiology.¹⁷ It was established in the study that the subjects interviewed could easily associate Anatomic Pathology and Chemical Pathology with specialty training involving doctors in the hospital but could not associate mostly Medical Microbiology and Haematology with Medical doctors and their specialty practice in the hospital. This mindset of not differentiating MLS form Medical doctors in these two disciplines (Medical Microbiology and Haematology)

could be the genesis of the perennial conflicts being experienced between them and the MLS in the hospital setting in the country. While the other two disciplines are generally seen as specialised disciplines of Pathology (Anatomic Pathology and Chemical Pathology), these other two (Medical Microbiology and Haematology) are erroneously not generally considered to be of same impact, purpose and usefulness to humanity as the former two. This perception unfortunately runs among Pathologists themselves and other surgical and medical specialties who sometimes consider some subspecialties of Pathology above others. Medical and Dental students should be properly indoctrinated in the course of training so as to accord a broad-based acceptability and relevance to all the medical disciplines for the health and survival of the entire profession.¹⁸

At the completion of the residency training in any sub-specialty in Pathology at the NPMCN, certificates are awarded as Fellow of Pathology with the sub-specialty in bracket. While Anatomic Pathology and Chemical Pathology are properly and correctly designated as Pathology disciplines, Medical Microbiology and Haematology has not received this proper and correct designation. These names, the authors believe, have contributed significantly to the crisis being experienced by these two disciplines in our teaching hospitals and FMCs across the country. At the UNIMED and UNIMED TH Ondo-city and Akure, Medical Microbiology has been changed to Microbial Pathology, both the discipline and the Department. This has brought peace and harmony in the Department as the MLS now know that the Department is a Pathology Department for Consultant Pathologists and doctors training to become Pathologists. MLS are only there to assist doctors and cannot lay claim to anything unless as directed by doctors; this is the benefit of giving a person a correct name and identity coupled with proper setting.¹⁹⁻²²

The authors are therefore of the view that in order to confront the present crisis involving Pathologists and MLS, the names of the disciplines having more problems and also serve as inspiration to others should be addressed.

The certificate has clearly stated it as they are all Pathologists after having gone through training in all, wrote examinations and passed. The names of the disciplines should therefore be as follows:

1. Anatomic Pathology
2. Chemical Pathology
3. Haematologic Pathology
4. Microbial Pathology

Also the respective Departments at the Colleges of Medicine and the Teaching Hospitals be re-named to reflect those new names. This would adequately give the correct identity and vision, and capture the philosophy and operational boundaries of the respective sub-specialties.¹³

For the records, a Medical Microbiologist is first of all: an MB,BS or BDS holder who has gone through residency training and has passed the final Fellowship examinations in Pathology or Laboratory Medicine of the NPMCN or that of the West African College of Physicians with sub-specialization in Medical Microbiology and Parasitology, or their equivalents of Postgraduate Medical Colleges across the globe. He or She performs the following functions among others: Managers in the Laboratory responsible for planning, organizing, leading and coordination of activities in Microbial Pathology laboratory; Physicians to the patients in managing severe infections in the hospitals across all disciplines; Primarily involved in managing STI cases; Infection control in the entire hospitals; researchers into tests' usefulness and development of new tests among. He or she helps ensure the safety of those at risk of acquiring infectious diseases, both in hospitals and the community.²³⁻²⁵

CONCLUSION

In conclusion, this study has shown that Medical Microbiology is the main sub-specialty of Pathology commonly engulfed in crisis with MLS followed by Haematology while Anatomic Pathology is the least crisis prone followed by Chemical Pathology. The names of these disciplines have contributed to the rate of the crisis and hence should be changed along with their Departments

to Microbial Pathology and Haematologic Pathology from Medical Microbiology and Haematology respectively. This will contribute to bringing a lasting peace to the effected sub-specialties in Nigeria's health sector.

Limitations

We acknowledge the fact that based on the mode of sampling adopted in the study, some of the information and data collected could not be independently verified with measurable degree of certainty. The findings should however be accepted with a possibility of error margins on some information captured here. The paper no doubt brings up a serious issue threatening the quality of healthcare services in our hospitals as well as both undergraduate and postgraduate medical training in the country.

Conflict of Interest

None declared.

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Original Article

Knowledge, Risk Factors and Preventive Practices against Tuberculosis among Pottery Workers in Southwestern Nigeria

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ABSTRACT

Mortality and morbidity figures associated with tuberculosis are generally scary. Raw materials involved in the pottery making process contain crystalline silica which has been documented as risk factors to the development of tuberculosis. Unfortunately Nigeria pottery workers have no formal occupational health services. This study determined the knowledge of risk factors and preventive practices against pulmonary tuberculosis among pottery workers in Oye, Nigeria. A descriptive cross sectional study was carried out among 198 pottery workers selected using multistage sampling method. Research instrument consisted of a semi structured interviewer administered pretested questionnaire. Data was analyzed using the SPSS software version 23.0. Results shows that a one hundred and ninety four (98%) of the respondents have ever heard of pulmonary tuberculosis, 178(89.9%) of them don't know whether clay soil contained chemicals that could predispose them to tuberculosis. Only 64.1%, 56.6% and 59.1% had good mean general knowledge, good mean knowledge of prevention and good mean perception scores to tuberculosis respectively. Sixty three (31.8%) said that pottery workers are among those at risk of developing Tuberculosis (TB). Only 51 (25.8%) said they used protective equipment. Predictors of good general knowledge and good perception of TB include age above 24 years, being female, having post primary school education, having spent more than 5 years in pottery business and using protective devices ($p < 0.005$). There is need for recognition and prioritization of all silica-exposed workers for screening and treatment services in anti-TB programmes of the Government.

Keywords: Pottery workers, Silica, Hazards, Tuberculosis, Knowledge

INTRODUCTION

Mortality and morbidity figures associated with TB are generally scary, whereas ending the epidemic of Tuberculosis by 2030 is one of the highly strategic health targets of the Sustainable Development Goals. In 2018, an estimated 10 million people fell ill with

tuberculosis (TB) worldwide, out of which about 1.5 million people died in the same year.¹ Nigeria ranked 5th among the 22 highest disease burden countries in the world and 2nd only to South Africa on the African continent.² No fewer than 460,000 cases of TB are reported annually in Nigeria.¹ Despite Nigeria being one of the countries in the world to use the new standard approach of “Directly

Observed Treatment Short Course” to treat tuberculosis, the true prevalence of bacteriologically-confirmed pulmonary tuberculosis can only be directly measured in nationwide population-based surveys which are not readily available. Air polluted by dust in workplaces is associated with a wide variety of occupational respiratory diseases and pulmonary problem. Ceramic and pottery workers are in danger of exposure to dust particles, including crystalline silica. These are generated in many phases of ceramic and pottery materials production and puts handlers at potentially risk of developing occupational pulmonary respiratory diseases.³ Chronic inhalation exposure to ceramic and pottery dust has been associated with elevated risk of pneumoconiosis, chronic bronchitis, and tuberculosis among both male and female workers.^{3,4}

The procedures of mixing, sieving and shaping of pots involve raising dusty particles, which in the absence of precautions, produces a tremendous amount of dust in the air of the work rooms.

Exposure to almost any kind of dust even for a short time is apt to irritate the respiratory tract and produce coughing. It is the desire of the international community that a concerted global effort is made to promote Occupational Safety and Health strategies to prevent tuberculosis (TB), especially in high-risk occupations. These include but not limited to, silica dust exposed workers in mining, construction, pottery and other industries. In Nigeria, pottery sites are mainly owned by individuals and governments who are probably not keen on observing the standard safety practice for their employees. Like in many other informal sectors, most pottery industries are usually small to medium scale industries with little or no occupational health services on ground.^{5,6} A study on knowledge of risk factors for TB would assist those at risk towards taking proactive measures towards disease prevention. This study therefore aimed to determine the knowledge and risk factors for pulmonary tuberculosis among pottery workers in Oye in Southwestern Nigeria.

MATERIALS AND METHODS

Oye community in Southwestern Nigeria is a traditional city noted for pottery and clay production. The prevalence of TB in Oye is not known. This is a descriptive cross sectional study carried out to assess knowledge and risk factors for TB among pottery workers. All pottery workers who used clay for various purposes at the study site constituted the target population. An eligible respondent is a pottery worker who is registered with the central association and who has been in pottery business for at least 5 years. Sample size was calculated using the modified Leslie Fishers formula and a prevalence of pottery workers who have heard about TB disease.⁷ A sample size of 200 was arrived at after correcting for attrition and non response. A multi- stage sampling procedure was used for the selection of respondents. These include selection of six out of the nine pottery clusters within Oye by simple random sampling (simple balloting) in stage 1; and selection of two out of three sub-clusters in an average cluster by simple random sampling (balloting) in Stage 2. The 3rd stage involved a systematic sampling of one in three names on pottery workers list in a sub-cluster and this continued until the desired sample size was reached. A semi-structured, interviewer-administered, pre-tested questionnaire was used in data collection. Sections of the questionnaire included socio-demographic data of pottery workers, factors related to knowledge of pottery workers on the risk of pulmonary tuberculosis, risk assessment to TB and preventive practices against TB infection. A vernacular version of the question was prepared for the illiterate respondents, and these were back translated to English from the local Yoruba language. Data was entered into the computer system and analysed using the SPSS software version 23.0. Charts and frequency tables were generated. Mean scores were generated about risk factors (high or low) and knowledge (good or poor). P-value was considered significant at values less or equals to 0.05 for all inferential statistics done at bi-variate and multivariate analysis levels.

RESULTS

Two hundred (200) pottery workers were recruited for this study; complete responses were obtained from 198, giving a response rate of 99%. Table 1 shows the socio-demographic characteristics of the pottery workers. Mean age was 55.7 ± 5.8 years, 154 (77.3%) were females, 77 (38.9%) attained primary level education, while 90 (45.5%) had been in pottery work for about 7 to 8 years. Table 2 shows the knowledge of pottery workers on pulmonary tuberculosis; 194 (98%) of the respondents has ever heard of pulmonary tuberculosis and 110 (55.8%) of them heard of it through the health facility, 191 (96.5%) of them knew that tuberculosis was dangerous. High proportions 186 (93.9%) of them knew that tuberculosis could kill. Majority 178 (89.9%) of them did not know whether the clay soil they handles contained chemicals that could predispose them to tuberculosis. Few 45 (22.7%) of the respondents reported they had ever had tuberculosis. Majority 143 (72.2%) of them reported that tuberculosis could be cured. Most 186 (93.9%) believed that tuberculosis could be transmitted by inhaling infected air. Table 3 shows the knowledge about pulmonary tuberculosis prevention and DOTs program. It showed that 21 (10.6%) of the respondents have ever heard of DOTs program while 19 (9.6%) reported effectiveness for treatment of TB by DOTs program. Majority 149 (75.3%) of the respondents said that TB is preventable - by taking drugs 135 (90.6%) and through immunization 131 (87.9%). Only 64.1%, 56.6% and 59.1% had good mean general knowledge, good mean knowledge of prevention and good mean perception scores respectively according to Figure 1. Table 4 shows the perception and preventive measures on pulmonary tuberculosis. It shows that 63 (31.8%) said that pottery workers were among those at risk for developing TB, while 42 (21.2%) said that some workers in pottery industry may have TB. Majority 196 (99.0%) said that one can contact TB if working with untreated TB patients, 197 (99.5%) believed that going for TB test early when coughing for more than a month is advisable, 142 (71.7%) believed that taking TB drugs for treatment of TB is the

best treatment advisable. Only 51 (25.8%) said they used protective equipment like face mask, goggles etc, with 19 (37.3%) using it regularly. Reasons for not using protective devices include poor environmental sanitation (95.5%), wet preparation (76.3%) while few 1% claimed it is due to the availability of the first aid box.

Table 5 shows bivariate and multivariate analysis between some socio-demographic characteristics and selected outcome variables of interest. A statistically significant association was found between general knowledge of TB and age, gender, education status, no of years of experience working in pottery industry and use of personal protective devices ($p < 0.05$). Similar association was found with

Table 1: Socio-demographic characteristics of respondents (N=198)

Variables	Frequency (n)	Percentage (%)
Age(years)		
18-27	15	7.6
28-37	25	12.6
38-47	14	7.1
48-57	71	35.9
≥ 58	73	36.9
Sex		
Male	44	22.2
Female	154	77.3
Family structure		
Monogamous	53	26.8
Polygamous	145	73.2
Marital status		
Single	20	10.1
Married	141	71.2
Separated/divorced/widowed/widower	37	18.7
Tribe		
Yoruba	188	94.9
Igbo	5	2.5
Hausa	5	2.5
Educational level		
No formal education	51	25.8
Primary	77	38.9
Secondary	58	29.3
Tertiary	12	6.0
Period of being in to pottery work		
1-2	9	4.5
3-4	10	5.1
5-6	40	20.2
7-8	90	45.5
>9	49	24.7
Income (Naira)		
5000	6	3.0
10000	13	6.6
15000	32	16.2
20000	94	47.5
25000	53	26.8

Table 2: Knowledge of pottery workers on pulmonary tuberculosis (N=198)

Variables	Frequency (n)	Percentage (%)
Ever heard about tuberculosis		
Yes	194	98.0
No	4	2.0
*Source of information		
Friends	75	38.1
Health facility	110	55.8
Co-workers	18	9.1
Television	122	61.9
Tuberculosis is dangerous		
Yes	191	96.5
No	3	1.5
Don't know	4	2.0
Tuberculosis can kill		
Yes	186	93.9
No	6	3.0
Don't know	6	3.0
How common is Tuberculosis among pottery workers		
Not common	162	81.8
Common	34	17.2
Very common	2	1.0
Clay contains chemical that can predispose you to TB		
Yes	16	8.1
No	4	2.0
Don't know	178	89.9
Protect yourself against dust inhalation		
Yes	76	38.4
No	122	61.6
*If yes, protective measures		
Handkerchief	n=76 16	21.1
Face mask	60	78.9
Anybody with TB now and before		
Yes	45	22.7
No	153	77.3
Tuberculosis can be cured		
Yes	143	72.2
No	5	2.5
Don't know	50	25.3
If yes, how		
Modern treatment	n=143 132	92.3
Traditional	10	7.0
Faith healing	1	0.7
How's Tuberculosis transmitted		
Through sexual intercourse	5	2.5
Through bad food and water	7	3.6
By inhaling infected air	186	93.9

Table 3: Knowledge about pulmonary tuberculosis prevention and DOTs program (N=198)

Variables	Frequency	Percentage
Ever heard about DOTs programme		
Yes	21	10.6
No	104	52.5
Don't know	73	36.9
There is effectiveness for treatment of TB by DOTs program		
Yes		
No	19	9.6
	179	90.4
If yes, how		
Sneezing	8	42.1
Singing	8	42.1
Talking	3	15.8
Do you know that TB is preventable		
Yes	149	75.3
No	1	0.5
Don't know	48	24.2
If yes, means of prevention		
Immunization	131	87.9
Taking drugs	135	90.6
Practice good hygiene	50	33.6
Use of protective devices	34	22.8
Herb	52	34.9
Traditional healer	21	14.1
Other preventive measures		
Cover mouth while coughing	169	85.4
Cover nose while sneezing	172	86.9
Avoid overcrowding	75	37.9
Going for screening	25	12.6
Eat well and nutritious food	20	10.1
BCG vaccines protect infants against tuberculosis		
Yes	171	86.4
No	11	5.6
Don't know	16	8.1
Do you use protective equipment like nose mask, goggles and others		
Yes	51	25.8
No	147	74.2
Reasons for not using protective devices (multiple responses with n=51)		
Not necessary	30	58.6
Inconvenient	14	27.3
Not always available	20	39.4
Often forgot	4	8.6

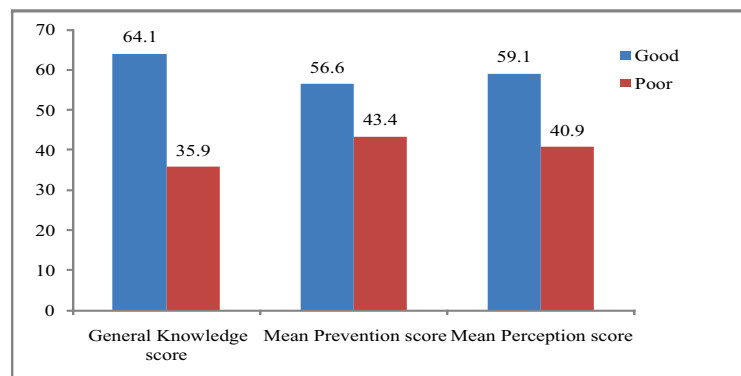


Figure 1: Mean score of TB knowledge and perception

Table 4: Perception and preventive measure on pulmonary tuberculosis (N=198)

Variables	Frequency (n)	Percentage (%)
Pottery workers are among the at risk group of developing TB	63	31.8
Yes	135	68.2
No		
Do you think that some workers in pottery industry may have TB		
Yes	42	21.2
No	24	12.1
Don't know	132	66.7
If you are living or working with untreated TB patients you can contact it		
Yes	196	99.0
No	2	1.0
Going for TB test early when coughing for more than a month is advisable		
Yes	197	99.5
No	1	0.5
Taking TB drugs for treatment TB is best treatment and advisable		
Yes	142	71.7
No	54	28.3
I will advise anyone coughing for more than a month to go for chest x-ray		
Yes	139	70.2
No	59	29.8
How regularly do you use protective device (n=51)	n=51	
Regularly	19	37.3
Not regularly	27	52.9
Don't use at all	5	9.8
Do you think you can never have TB		
Yes	177	89.4
No	21	10.6
Who are those who could have TB then if not you	n=21	
My friend	7	33.3
Other workers	14	66.7
Reasons why you said friend or other workers are at risk	n=21	
Not using face mask	10	47.6
Not using goggle	2	1.0
Not using nose cover	18	85.7
Will you like to be using preventive measures regularly		
Yes	183	92.4
No	15	7.6
*If yes, type of preventive measure	n=183	
Face mask	107	58.5
Goggle	42	22.9
Nose mask	158	86.3

* Multiple responses

Table 5: Association between knowledge and perception of pottery workers to TB and selected socio-demographic variables

	General mean knowledge scores		Statistics	Mean perception scores		Statistics
	Good	Poor		Good	Poor	
Age in years			X ² =4.876			X ² =14.939
<24	28(51.9)	26(48.1)	p=0.021**	20(37.0)	34(63.0)	p=0.001
<24*	99(68.8)	45(31.2)		97(67.4)	47(32.6)	
Gender			X ² =13.275			X ² =27.198
Male	18(40.9)	26(59.1)	p=0.001**	11(25.0)	33(75.0)	p=<0.001
Female*	109(70.8)	45(29.2)		106(68.8)	48(31.2)	
Education status			X ² =9.415			X ² =13.974
Up to primary	92(71.9)	36(28.1)	p=0.002**	88(68.8)	40(31.2)	p=<0.001
Secondary and above*	35(50.0)	35(50.0)		29(41.4)	41(58.6)	
No of years in pottery			X ² =4.916			X ² =7.847
<5 years	31(52.5)	28(47.5)	p=0.021**	26(44.1)	33(55.9)	p=0.004
>5 years*	96(69.1)	43(30.9)		91(65.5)	48(34.5)	
Use protective device (n=51)			X ² =10.831			X ² =18.853
Yes	23(45.1)	28(54.9)	p=0.001**	17(33.3)	34(66.7)	p=0.001
No*	104(70.7)	43(29.3)		100(68.0)	47(32.0)	

Binary logistic regression (with good mean general knowledge)

	Mean good general knowledge			Mean good perception scores		
	95%CI		OR/ P value	95%CI		OR P value
	Lower	Upper		Lower	Upper	
Age in years						
<24	0.2582	0.9280	0.49	0.1483	0.5476	0.29
<24*			0.015			0.001
Gender						
Male	0.1428	0.5722	0.29	0.0704	0.3237	0.15
Female*			0.001			0.001
Education status						
Up to primary*	0.3933	4.6875	2.56	1.6987	5.6951	3.11
Secondary and above			0.001			0.001
No of years in pottery						
<5 years	0.2655	0.9264	0.50	0.2232	0.7738	0.42
>5 years*			0.014			0.002
Use protective device (n=51)						
Yes*	0.1762	0.6546	0.34	0.1193	0.4627	0.24
No			0.001			0.001

**Statistical significance *Reference category

mean perception scores of respondents ($p < 0.005$). Predictors of good general knowledge and good perception of studied pottery workers to TB include age above 24 years, being a female, having post primary school education, having spent more than 5 years in pottery business and using protective devices, though all these observations were found to be statistically significant ($p < 0.005$).

DISCUSSION

Pot making is one of the traditional handwork for which the people of the study area and many other communities are known for. It serves as a source of livelihood for many despite their predisposition to TB by the handling of clay and silica materials in their operations. The socio-demographic characteristics of pottery workers in our study supports that from another Nigerian study,⁸ in which majority were females, with lower level of education. Another cross-sectional survey in Thailand also reported female dominance among pottery workers.⁹ The female characteristics of patience and paying attention to fine details may be responsible for the affinity for pottery work among them.

Majority of the respondents having ever heard about tuberculosis holds a good prospect for TB prevention and control. This figure is higher when compared to another similar study among potters and ceramic workers.¹⁰ Good knowledge is an indicator that respondents would search for in-depth information on mode of acquiring the disease, as well as, what can be done to treat the illness. Some studies revealed that people who have good knowledge adhere more to good TB preventive practices and seek medical treatment early.^{11,12} More than half of our respondents had knowledge of tuberculosis from the health facility, which is in agreement with another local study where more than half of their respondents also had knowledge of tuberculosis and associated hazards from the hospital while seeking health care.⁸

Majority of our respondents did not know if clay soil contained chemicals that may predispose them to

tuberculosis. This figure is far higher when compared to findings from another study.¹⁰ The pattern is however better when compared to another Nigerian study,⁸ where it was found that about half of the respondents were not aware of hazards associated with working with clay. Good general knowledge of TB and its prevention was found among two thirds of our respondents, similar to findings from another study.¹³

Only one quarter of our respondents said they used protective equipment like face mask, goggles and others. This usage pattern is low or poor and not encouraging when compared to other studies,^{8,13} and far lower when compared to another Nigerian study where majority of their respondents reported a high magnitude of utilization of personal protective equipment.¹⁴ However, another study in Dhaka conducted among pottery workers reported non-use of protective devices among two-thirds of the respondents.¹¹ Majority of the respondents indicated willingness to be using preventive measures regularly. This supports another Nigerian study by another study.¹¹ Poor awareness and low use of protective devices may also be attributed to the low level of education observed among the pottery workers in this study, and similar findings from other studies.^{9,14}

CONCLUSION

Pottery workers have a high risk of contracting TB due to the processes involved in their occupation. The low level of education observed among the pottery workers in this study may have accounted for the poor awareness and low use of protective devices. We recommend the need to educate pottery workers, recognize and prioritize all silica-exposed workers for screening and treatment services and their prioritization in anti -TB programmes of Government.

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Conflict of interest

None to declare

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Original Article

Prevalence and Predictors of Harmful Alcohol use in a Sub-urban Community in North-Central Nigeria

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ABSTRACT

Alcohol is a commonly used beverage with adverse health and socio-economic consequences when consumed in excessive amounts. This study determined the prevalence and predictors of hazardous alcohol use in a sub-urban community in Plateau state, Nigeria. Consenting adults aged 18 years and above were selected using multi stage sampling technique. They completed a semi-structured interviewer administered questionnaire adapted from Short Michigan Alcoholism Screening Test-Geriatric Version (SMAST-G) and the World Health Organization's Alcohol Use Disorders Identification Test (AUDIT) tools. Majority 154 (55) of the 280 respondents were males and about half were farmers. About 150 (53.6) of respondents had ever consumed alcohol as at the time of data collection and 112 (77.4) of them were currently using alcohol. Harmful use was prevalent in 93 (83) of current users. Being male, belonging to age group 38-45 years, and being a civil servant or a business person positively predicted harmful use of alcohol while consuming burukutu, was a negative predictor of harmful use. Control efforts need to target these groups to reduce the negative health and socio-economic consequences of alcohol use in the community

Keywords: Harmful alcohol use, Predictors, Prevalence

INTRODUCTION

Alcohol is a psychoactive substance with dependence properties that has been used globally in many cultures for centuries.¹ It is accepted as a key feature of leisure time in many societies including Nigeria, where it is regarded as an important part of traditional ceremonies like marriages and other social gatherings.^{1,2} However, its harmful use causes significant socio-economic and disease burden in societies. Harmful use of alcohol is alcohol drinking that causes detrimental health and social consequences for the drinker, the people around the

drinker and society at large.³ It also includes the patterns of drinking that are associated with increased risk of adverse health outcomes. Globally, alcohol accounts for about 5.3% of total annual deaths, 5.1 % of total disability adjusted life years and is the 7th leading risk factor for premature death and disease.^{1,2} Although moderate alcohol consumption has been previously considered to be harmless or even protective from heart disease and diabetes mellitus, recent findings from the 2016 global burden of disease suggest that even low levels of alcohol consumption could be harmful.^{3,4} In Nigeria the pattern of alcohol use has changed over the

years from the customary occasional use of locally brewed alcohols like palm wine, 'akpeteshi', 'ogogoro' and 'gokolo' by adult males to a regular sometimes daily use of predominantly industrially produced types like beer, wine and whiskey by all including young adults and women.² Data released by the World Health Organisation in 2011 ranked Nigeria as the leading country in alcohol consumption with a per capita consumption of about 13.4 Litres per annum.⁵ In addition, some of the local brews like ogogoro and gokolo have very high and variable alcoholic concentration because of lack of standardisation which makes them potentially more harmful to health.^{6,7} There is therefore concern that consumption of these brews in high volumes or on a regular basis could lead to organ damage and even death. The Plateau state Government banned the production and consumption of the common local brew with very high alcoholic concentration produced in the state, as well as the sell and consumption of alcohol in public places in certain hours of the day about ten years ago in an effort to reduce the damage caused by excessive alcohol consumption but it is unclear if harmful use of alcohol still goes on in communities in the state. The purpose of this study therefore is to determine the prevalence and predictors of harmful alcohol use in Fobur, a sub-urban community in Jos East Local Government Area of Plateau state.

MATERIALS AND METHODS

This study was conducted in Fobur community in Jos east LGA of Plateau state. Fobur is located about 6 km east of Jos municipal area, the capital of the State. It is located between latitude 8° 24' N and longitude 9° 51' and 9° 01' East. The altitude ranges from 1,300 meters to a peak of 1,709 meters above sea level. The temperature of the area ranges from 16 - 35°C yearly, with the highest temperature experienced in the month of March. The mean annual rainfall ranges from 131cm to 146cm.⁸

Fobur community is one of the Semi – urban area with an estimated population of 17,060.⁸ It has an access road, a Primary Health care centre (PHC), a government owned primary and secondary schools, electricity and

telecommunication network. It is predominantly an agrarian community with Afizere as the predominant tribe.⁹

Study Design

This study was a community based survey using members of selected households. It was a cross sectional study that involved all adults aged 18 years and older.

All eligible household members residing in Fobur Community for at least a year who gave verbal or written consent were included in the study whereas migrant households, temporary residents and members who declined consent were excluded from the study.

A multi stage sampling technique was used for selection of respondents. From the list of all the four (4) political wards in Fobur community (Fobur A, Fobur B, Fobur C and Fobur B west) Fobur A ward was selected by simple random sampling technique using balloting method. From the list of all the three (3) settlements in FoburA ward, one settlement – SabonFobur was selected using simple random sampling technique by balloting. Household listing and enumeration was done in the selected settlement giving a total of 238 households. All eligible respondents in all the households in the two settlements were enrolled starting from the household in the settlement centre.

Advocacy visit was paid to community leader to solicit his support for the study and ethical approval was obtained from the ethics committee of Jos University Teaching Hospital. Eight resident doctors from the Department of Community Medicine Jos University Teaching Hospital (JUTH) were trained as research assistants to aid with the data collection.

A semi-structured interviewer administered questionnaire adapted from Short Michigan Alcoholism Screening Test – Geriatric Version (SMAST-G) and World Health Organization's Alcohol Use Disorders Identification Test (AUDIT) tool was used to obtain information about alcohol use from the participants. A scoring system was used to indicate harmful alcohol use, as well as possible alcohol dependence.^{10,11} A total score of 8 and above was considered harmful use.

Data Analysis

Data was cleaned and exported to the software. Analysis was done using statistical package for social sciences (SPSS) version 21. A p-value of < 0.05 was considered statistically significant.

RESULTS

Two hundred and eighty respondents participated in the study. Majority were males 154(55) and married 171(61.1), and almost all were Christians. Their median age was 31 years (IQR 25-75). Table 1.

Table 1: Demographic Characteristics of the Respondents

Characteristics	Frequency n=280	Percentage
Age group (years)		
18-35	216	77.2
36-45	41	14.6
46 and above	23	8.2
Total	280	100.0
Sex		
Female	126	45.0
Male	154	55.0
Total	280	100.0
Marital status		
Single	94	33.6
Married	171	61.0
Separated/divorced	10	3.6
widowed	5	1.8
Total	280	100.0
Religion		
Christianity	258	92.1
Islam	19	6.8
Traditional	3	1.1
Total	280	100.0
Occupation		
Business	33	11.8
Civil servant	28	10.0
Driver	43	15.4
Farming	138	49.3
Unemployed	34	12.1
Others	4	1.4
Total	280	100.0

Mean Age: 35.98 ±14.97 years; Median Age: 31.0 years (IQR = 25 –42) years ** Police, clergymen

About fifty-three percent 150 (53.6) of respondents had ever consumed a drink containing alcohol as at the time of data collection, 112(74.7) of whom were currently using alcohol. About a third of users had commenced using it before 18 years of age. Gskolo was the least commonly used alcoholic beverage among the respondents. Harmful use was prevalent in 93 (83) of current users ((33.2) of

Table 2: Patterns of alcohol use among the respondents

Characteristics	Frequency	Percentage
Lifetime alcohol use		
Ever used	150	53.6
Never used	130	46.4
Total	280	100.0
Current use of alcohol		
yes	112	74.7
No	38	25.3
Total	150	100.0
Age of onset of alcohol use		
< 18 years	47	31.3
=18 years	103	68.7
Total	150	100.0
Level of current alcohol use		
Harmful	93	83.0
Not harmful	19	17.0
Total	112	100.0
Type of alcoholic drink consumed*		
Burukutu	57	51.0
Gskolo	8	7.1
Beer	61	54.5
wine	10	8.9

Mean age of onset of alcohol use: 21.0 ±7.9 years

* Multiple responses allowed.

total respondents) Table 2.

Being male, belonging to age group 38-45years, and being a civil servant or a business person positively predicted

Table 3: predictors of harmful alcohol use among the respondents

Factors	Odds ratio	95% confidence interval	p-value
Age			
18-35	3.39	0.092-5.196	0.235
36-45	8.60	1.010-9.469	<0.05
46 and above	1	-	-
Sex			
Female	0.61	0.009-0.397	0.003
Male	1	-	-
Marital status			
Single	0.06	0.001-1.207	0.120
Married	0.92	0.468-2.386	0.841
Separated/divorced	0.54	0.030-1.968	0.564
Widowed	1	-	-
Type of alcoholic drink consumed			
Burukutu	0.02	0.001-0.274	0.006
Goskolo	2.66	0.116-4.088	0.282
Beer	0.29	0.044-1.921	0.200
Wine	1	-	-
Occupation			
Business	7.49	1.191-9.972	<0.001
Civil servant	15.36	1.172-16.515	<0.001
Driving	0.14	0.092-0.336	<0.001
Farming	0.37	0.025-1.803	0.362
Others**	4.74	1.130-5.022	0.095
Unemployed	1	-	-
Age of onset of alcohol use			
=18 years	0.64	0.251-1.632	0.350
>18 years	1	-	-

** Police, clergymen

harmful use of alcohol while consuming burukutu, was a negative predictor of harmful use of alcohol. Table 3.

DISCUSSION

The prevalence of harmful alcohol use was very high among our respondents suggesting that the measures employed by government so far have not been effective in reducing harmful alcohol use. It is higher than the 32% reported by Hassan et al in an urban community in Jos North, Plateau state North-Central Nigeria, the 69.1% found by Lasebikan and Ola in semi-rural communities in Oyo state South-West Nigeria, and the 34.3% found by Adeoye *et al.*, in a systematic review.^{12,13,14} It is also much higher than the 7.7% reported among older South Africans by Peltzer and Phaswana-Mafuya.¹⁵ Although the much higher prevalence found in this study could be due to differences in tools used to assess harmful use, it could also be because harmful alcohol use is excessive in this community. Prevalence of current alcohol use was also higher than in the other studies suggesting that Fobur community may have a higher alcohol use problem compared to the other communities. There is therefore an urgent need for effective measures to address the harmful use of alcohol in this community.

Although the prevalence of alcohol use in general was not very high compared to findings in other studies,^{12, 13, 14} most of those who were currently using alcohol were using it in a harmful way. This may be because those currently using alcohol are addicted to it and could not be persuaded to stop by existing control measures alone. More effective measures like education and personal interventions may therefore be required to discourage these individuals from continued harmful use. Studies have shown that population level approaches like reducing the

economic and physical availability of alcohol are the most practical and cost effective ways of reducing harmful alcohol use.^{16,17}

Being male, belonging to the age group 38-45 years and certain occupations were found to positively predict harmful use of alcohol. This has differences and similarities to findings reported in other studies. For instance, Hassan *et al.*, found male sex, age of initiation of drinking and the number of drinks considered normal in a sitting to predict harmful alcohol use, while among older south-Africans being male, white (Caucasian), a tobacco user and not obese were predictors of harmful use.

It is noteworthy that being male has been found to be associated with harmful alcohol use in many studies in Nigeria and other parts of the world.^{12,13,14,15} The reasons advanced for this include higher alcohol exposure opportunities among men due to psychological, family, and social factors, gender roles, expectations, and culture in society^{18,19}. Control measures need to pay particular attention to men and the factors that predispose them to harmful alcohol use.

Two occupations (civil servants and in business) were found to positively predict harmful alcohol use. This could be due to the higher disposable income these occupations provide which enable those engaged in them to afford excessive quantities of alcohol.

CONCLUSION

Male sex, age group 38-45 years and certain occupations were found to positively predict the highly prevalent practice of harmful alcohol use in Fobur community. Control efforts need to target these groups to reduce the negative health and socio-economic consequences in the community.

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Conflict of interest

The authors declare that they have no conflicting interests.

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Original Article

Innovative Healthcare Technologies in Otorhinolaryngological Practice in Sub-Saharan Africa: Strategies for Accelerated Uptake

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ABSTRACT

Healthcare innovations are geared towards greater patient comfort, improved diagnosis and better treatment outcomes. Otorhinolaryngology (ORL) has witnessed many technological innovations become a core aspect of daily practice. Sub-Saharan Africa is currently lagging behind the rest of the world in both development and uptake of innovative health technologies. This paper aims to examine these innovations in otorhinolaryngology as well as the challenges and routes to their timely deployment in Sub-Saharan Africa (SSA). A literature review was conducted on papers retrieved from Google scholar and Pubmed. Several factors have hampered practitioners in SSA from fully leveraging new technologies. By applying political, legal, economic, educational and scientific strategies these practitioners may adopt safe, effective, home-grown adaptations of emerging technologies for accelerated uptake.

Keywords: Healthcare, Innovation, mHealth, Otorhinolaryngology, Technology

INTRODUCTION

The use of technology in healthcare has come to stay. Technological advances have helped to make healthcare more accessible, faster and safer with improved treatment outcomes.¹ The sub-specialty of Otorhinolaryngology (ORL) especially lends itself to the application of technological aids as it involves working in orifices which are often dark and difficult to assess. It also involves working within bones which contain many vital neurovascular structures tightly packed together as well as surgery in the cosmetically important regions of the face, head and neck. In its raw form, most major ORL surgeries

often have life-changing cosmetic and functional consequences. With advances in technology however, ORL surgeries have become less radical, more precise and safer with improved and better functional and cosmetic results. Many technological innovations have become part of routine ORL practice.^{2,3} For example nasendoscopy is now a routine part of nasal examination and endoscopic sinus surgery has largely taken over many of the indications for open sino-nasal surgeries. In the same vein, the use of the surgical microscope is the standard of care for virtually all ear and throat surgeries.³ There is hardly any part in the head and neck region which will not benefit from the use of technological advances in tackling pathology. There is also an ever growing body of innovative

technology within the sub-specialty; the growing field of endoscopic ear surgery compared to the microscopic surgeries to which we are accustomed is one such example. These innovative technologies are not restricted to the operating room but span from surgical training, to patient evaluation, diagnosis, treatment and follow-up.

Sub-Saharan Africa refers to the part of Africa that lies south of the Sahara and consists of 46 of the 52 countries on the continent of Africa. It encompasses Central, West, East and Southern Africa, with Nigeria being its most populous nation. Studies have shown a poor uptake of new health technology in SSA.⁴ SSA has the lowest rate of mobile health (mHealth) adoption in the world even though they inarguably have the most need for it.⁴ Why is this so and what can be done to change it? This paper is aimed at trying to answer these questions.

MATERIALS AND METHODS

A non-systematic search of literature was carried out using Google scholar and PubMed. The search was carried out using the keywords: healthcare, technology, otolaryngology, innovation and Africa. A total of 30 publications were included in this review.

RESULTS

The rise of wearable technology offers clinicians the opportunity for remote ambulatory measurement of patient parameters for better assessment and follow-up.⁵ It may obviate the need for traditional in-hospital testing for example the need for an overnight stay in a sleep lab in the assessment of obstructive sleep apnoea. Measures like heart rate, blood pressure, oxygen saturation and ECG may be measured and evaluated with a smartwatch thereby increasing the patient's comfort and reducing the cost needed to set-up these expensive facilities. It also obviates the cost of transportation to the health facility.

Familiarity with the anatomy of the temporal bone and head and neck is considered a critical part of the training of an ENT surgeon requiring extensive practice of temporal

bone and head and neck dissection in the temporal bone laboratory. In recent times, medical schools around the world have had limited supply of cadaver heads from which temporal bones and other structures can be harvested for trainee dissection.⁵ In response to this the use of virtual reality (VR) in simulating these structures have been found to be useful. While not without its problems the use of VR may enable surgeons in training to have remote access to the temporal bone laboratory/dissecting room round the clock allowing multiple dissection sessions at his/her convenience.⁵ Arguably, there remains a need for dissection of real temporal bones/tissue as learning the feel of the bones and dealing with normal variations in the anatomy are critical to subsequent operative success. Similar VR simulations may be used by surgeons in preparation for surgical procedures.⁶

Clinical decision support systems such as IBM's Watson and other less advanced models also lend themselves to use in ORL.^{5,7} These Artificial Intelligence (AI) tools operate based on millions of published research and treatment guidelines. They are programmed to evaluate patient data and suggest the best management plan for a patient to doctors.^{5,7} These systems have recorded varying levels of success in different settings with different pathologies, but are especially useful in cancer patients with multiple morbidities and in the future may replace inter-disciplinary clinical conferences often required for management planning in these patients.⁷

In Sub-Saharan Africa (SSA), we face a dual problem of shortage of healthcare providers due to inadequate production as well as a high rate of health worker migration out of the region. In Kenya, there are 1.2 otolaryngologists and 0.12 audiologists/million people.⁸ As at 2015 there were only 170 ENT surgeons in Nigeria, 13 Audiologists and 4 Speech therapists representing 1 otolaryngologist per million people.⁹ This shortage is consistent across all countries in SSA. In addition these professionals are concentrated in large urban cities with poor penetration into the rural areas where most of the population live.^{3,11} It is imperative therefore to adopt technological innovations that improve access to the services these people provide in

an efficient and cost effective manner.¹¹ The use of mobile technology in tele-audiology has been successfully used in Kenya and South Africa and represents such adoption.^{8,9,10} Much has been said about the low level of exposure to ORL in undergraduate medical training such that fresh medical school graduates have limited clinical skill in the recognition and treatment of ORL conditions; as we know many ENT emergencies are unforgiving requiring intervention in minutes.¹² This is further amplified by the poorly developed emergency health service in the region. From the foregoing, the adoption of mHealth and telemedicine would seem imperative. With a high level of mobile phone and internet penetration even in very rural areas the basic infrastructure for this appears to be well laid.

The emergence of robotic surgery using such haptic systems such as the Da Vinci robot for Transoral Robotic Surgery (TORS) in oropharyngeal carcinoma has the potential to make surgeries faster and safer with minimal incisions.^{3,13} Robotic assisted procedures continue to grow in number now including Total laryngectomy, thyroidectomy and skull base surgeries among others.¹³ Algorithms based on a patient's CT scan or MRI scan can be designed to prevent injury to vital structures while drilling the temporal bone/skull base.⁶ Some systems prevent the surgeon's drill from going within a certain distance of specified structures improving the safety of the procedure. In spite of their advantages these systems are very expensive and in order to use them surgeons need to train which represents an additional cost.

The growing field of 3-D printing also holds multiple possibilities for ORL practice. For training, 3-D models have been found to be very useful simulators for practice in paranasal sinus, skull base and temporal bone surgery.¹⁴ It has also become very useful in the production of prostheses such as auricular prostheses and hearing aids. In fact, most hearing aid shells are now 3-D printed worldwide.¹⁴ 3-D bioprinting is now being studied as an alternative to harvested cartilage for surgical management of long segment tracheal replacement and other surgeries

requiring cartilage grafts.¹⁴ It has also been used successfully in the printing of bio-resorbable nasal septal implants in septal surgeries.¹⁵ There exists the possibility of bio-printing of whole or part of organs for transplantation. Within the fields of 3-D printing and tissue engineering there are endless possibilities with the potential to maintain function following major ORL surgery.

In the mobile technology space, multiple applications (apps) have been developed to cater to a variety of ORL conditions.⁵ These apps are available on both Google and Apple stores for android and iOS operating systems and many are for free.¹⁷ These apps could potentially be used in the management of patients if properly evaluated and validated.^{5,17} These apps generally have low level of physician participation and the clinical utility of many of them are not proven and so they are not routinely used in clinical care of patients.¹⁷

Like the apps described above, many technological innovations are not translated into clinical practice due to failure when tried in a clinical environment.^{18,19} This is especially sad as the entire aim of developing healthcare technologies is for them to be used failing which it's just a huge waste of resources. Sometimes there are difficulties with integrating a technological solution into the health system. As health systems differ from country to country, technological solutions that work effectively in one system may fail in another.²⁰ There is also the problem of usability with many technological designs found to be difficult to use by healthcare providers in practice which potentially causes patient harm.²¹

It has been stated that in spite of their many benefits, ultimately the utility and hence the value of any healthcare technology lies in its acceptance and use by healthcare providers. Historically, healthcare providers have been noted to resist change of time-tested methods in medical practice. It was reported that Daniel Fahrenheit faced great resistance when he first introduced his temperature sensor in a tube. Many physicians of his day argued that nothing could assess temperature better than a physician's hand.²²

DISCUSSION

The barriers to uptake of innovative surgical technologies in SSA may be traced to a number of factors. First of which is a lack of finance and infrastructure to support these technologies.^{1,11} Many countries in SSA have a relatively small healthcare budget. This makes it difficult for health institutions to acquire cutting edge technological equipment for use. In the same vein, application of cheaper technology is hampered by poor infrastructure such as power failure, and poor internet connectivity.^{4,11} There is a need for advocacy for governments in SSA to increase healthcare spending. Practitioners in the region should be encouraged to continue to synthesize local modifications of existing technologies to suit scant resources and environment. Such modifications of existing technologies include PEEK which allows a simple mobile phone to be used in screening for eye disease currently being used in Kenya.¹⁹

There is also a severe shortage of skilled manpower to install, use and maintain relevant equipment when they are acquired.^{1,11,23} Many equipment have to be transported back to their countries of manufacture for routine maintenance and/or calibration greatly increasing the cost of owning such equipment. An NIH funded project in Nigeria, Ghana and South Africa which trained biomedical engineering technicians (BMET) in selected pilot hospitals found that hospitals with BMET that they had trained had 35% less out-of service equipment than those without these staff.²³ Biomedical engineering modules may also be introduced into the undergraduate medical training curriculum either as compulsory modules, elective modules or intercalated degrees.⁵ This will help spur clinically relevant healthcare technological innovations which are suited for the local healthcare system within available resources and reduce the waste associated with failure at clinical translation in the face of scant resources. This is probably of particular interest in ORL which is relatively under represented in innovative technologies emerging from the region due to limited exposure of many undergraduates and health workers to the sub-specialty.

Lack of ethical and legal framework surrounding the use of these new technologies has led to extreme caution in their adoption and use by healthcare practitioners.^{1,11} Infact younger doctors in Nigeria have been shown to be more resistant to adoption of mHealth and telemedicine than older more experienced doctors.¹⁶ This would seem counterintuitive as the younger doctors are more tech-savvy and familiarity with digital tools is associated with faster uptake of innovative technologies.¹ Fear of litigation could be a major part of this restraint.¹¹ It has been suggested that AI decision support systems be given legal personhood such that when errors are made due to erroneously generated management plans the system is held liable rather than the practitioner.⁷ In the same vein, another group of authors suggest the formation of 'app boards' consisting of ORL practitioners to evaluate and validate ORL related apps to allow their integration into clinical practice while reducing the risk of treatment failure and legal problems.¹⁷ Such predictability will allow appropriate insurance cover for liability, decrease liability for the practitioner and increase uptake of these technologies.⁷ A clearly defined legal and ethical framework set out by regulatory and constitutional bodies may encourage faster development in this area.¹¹ National and regional guidelines for telemedicine and e-professionalism will also encourage its uptake without fear of legal consequences.

Uncoordinated efforts with multiple pilots in varying areas across the continent, some of them repetitive with minimal potential for wider replication have been the norm.¹¹ This leads to waste of resources as well as slows the integration of these technological interventions into the healthcare system. National and regional plans for the implementation of eHealth should be drawn up as seen in US, UK, Canada and Japan and other countries.¹¹ It is also necessary for healthcare providers to be carried along in such planning to ensure success of the programmes.¹

CONCLUSION

In order to engage healthcare innovation for improved patient care, modern ORL practitioners in SSA need to be both creative and strategic in the face of deficient infrastructure, scant resources and lack of legal and regulatory guidance.

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Original Article

Prevalence of Domestic Violence in Abakaliki, Ebonyi State

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ABSTRACT

Physical violence, by definition, is the intentional use of physical force with the potential for causing death, disability, injury or harm. Physical violence among both men and women is a universal problem around the globe, and different people experience and perceive it differently. It is known to occur across society, irrespective of age, gender, race, sexuality, wealth or geography inclination. It is also known not to be affected by intimate or non-intimate relationship in males and females. We analyzed 102 cases in the Accident and Emergency Department, Federal Teaching Hospital Abakaliki over two years from January 2016 to December 2018. Out of 102 cases, we recorded eight cases of death. The results obtained showed different types of domestic violence which include: physical violence, psychological violence and sexual violence. The age of the couples and their employment status did not correlate with domestic violence among couples, and that gender and educational status did not associate with domestic violence significantly. Thirty-four cases (33.3%) sustained bruises as a result of physical assault from either the husband or his relatives. Most of the women complained of being beaten and raped by their husbands, and from this study, it showed that thirty-one cases (30.4%) were reported as rape cases. One significant finding of this index study is that urban women prevalently experience domestic violence. Implying that the financial stress placed on men by their wives compounded with the high rate of illiteracy and unemployment among the individuals may not be unconnected with domestic violence stimulators.

Keywords: Autopsies, Abuse, Domestic, Physical, Violence, Women

INTRODUCTION

Violence among both men and women is a universal problem in many countries. By definition, physical violence is the intentional use of physical force with the potential for causing death, disability, injury or harm¹ Scratching, shoving, pushing, grabbing, throwing, biting, shaking, choking, slapping, burning or punching are

examples. Others include the use of a weapon, use of restraints or one's size of the body, or strength against another person, though the list is not exhaustive (United States Department of Health and Human Services, 2007).¹ Physical violence is known to occur across society, irrespective of age, gender, race, sexuality, wealth or geography inclination. It affects both males and females in an intimate or non-intimate relationship. Physical violence

presents in different shades like threats, coercion or arbitrary liberty deprivation, which could manifest in the victim's public or private life (United Nations, 1993).² Types/forms of domestic violence.³

At home, different forms of abuse may occur, and these include:

1. Physical abuse. This act is associated with the use of physical force which directly or indirectly results in inflicting injury to the victim or creating a situation where the victim is at risk of being harmed. The act of kicking, beating, knocking, choking, punching, and confinement are in this category. By this definition, female genital mutilation is a typical example of physical abuse. Physical abuse is known as one of the most prevalent forms of violence. In a study done by Obi and Ozumba, as much as 83% of respondents reported physical abuse.⁴ A similar study titled Prevalence of Domestic Violence in Nigeria: Implications for Counseling by Aihie, ON, physical violence was also noted to be high.⁵
2. Neglect: The failure to provide for dependants who may be children or adults, denial of particular basic fundamental human needs like food, clothing, medical care, shelter, and protection from harm or a sense of being loved and valued to a family member is a type of domestic violence.^{5,6}
3. Sexual abuse: This involves all forms of sexual harassment, assaults, or exploitation. It includes forcing or coercing a person to participate in sexual activity, the use of a child for sexual purposes either in the form of child prostitution and pornography. Marital rape also categorized under this purview.^{5,6}
4. Economic abuse: This involves defrauding or stealing from a loved one, withholding money or precious goods that may be needed for the acquisition of essential items like medical needs or food, manipulation or exploitation of family member for selfish financial gains, prevention of a loved one from working or having control over his/her choice of occupation.^{5,6}
5. Spiritual Abuse: This involves the act of prevention of a person from freely engaging in his/her spiritual or

religious practices or the use of one's religious belief to manipulate, dominate or control him/her.^{5,6}

6. Emotional Abuse: Any act that negatively impacts on a person's sense of self-worth or puts a person at risk of developing severe behavioural, emotional, cognitive or mental disorders is termed emotional abuse. Examples of such acts are issuing threats to a person, the person's possession or harming his or her sense of self-worth by subjecting him/her at risk of severe behavioural, emotional, cognitive or mental disorders. Shouting at a partner which was found to be the most common abuse by Obi and Ozumba is included.³ Also involved in emotional abuse are criticism, name-calling, social isolation intimidating or routinely making unreasonable demand or exploitation to dominate, terrorizing a person verbally or physically and exposing a child to violence.^{4,6}

Abuse may occur once, or it may repeatedly happen often in an escalating or cascading manner. An individual may be a victim of more than one form of abuse.

Domestic violence is also regarded as a pattern of abusive behaviour occurring in any relationship that is utilized by one of the partners as a weapon to gain or maintain power and have control over another close partner. This definition goes further to add that domestic violence can occur to anyone irrespective of one's race, sexual orientation, gender, age or religion. Domestic violence is known to take many forms, which include: physical abuse, emotional, sexual abuse, psychological and economic abuse.⁷ Other names of domestic violence are domestic abuse, battering, spousal abuse, intimate partner violence and family violence. It is also known as a pattern of abusive behaviours by one partner against another in a close relationship such as family, cohabitation, marriage or dating. Other forms of the definition of domestic violence, include physical aggression or assaults in the form of (hitting, biting, kicking, shoving, slapping, restraining, throwing objects), or threats thereof; emotional abuse; sexual abuse; controlling or intimidation; domineering; stalking; passive/covert abuse otherwise known as neglect; and economic deprivation.⁶

Domestic violence and abuse are not limited to apparent physical violence. It also involves endangerment, kidnapping, criminal coercion, unlawful imprisonment, harassment, trespassing, and stalking.^{8,9} Families from all racial, racial economic, religious and educational backgrounds experience domestic violence in different ways. In the United States of America, on women experience about 4.8 million experience close partner-related physical assaults and rapes while men are found victims in about 2.9 million intimate,¹⁰ Similar studies conducted in Oyo State, Nigeria and other parts of Nigeria, yielded strictly comparable results, which showed that the incidence of domestic violence is high in Nigeria. In a research performed by Obi and Ozumba,³ on factors commonly associated with domestic violence, in South East, Nigeria, they found that 70% of respondents reported abuse in their family with as much as 92% of the victims being female partners and the remaining 8% were male victims. Project alert,¹⁰ in a survey on violence against women, which was done by conducting interviews with women working in the market places and other areas of work involving girls and young women who are in secondary schools and universities, in Lagos State, Nigeria. Forty-five of the women interviewed (representing 64.4%) in the workplace said they had at a time been beaten by a partner (husband or boy friend), forty-eight of the (representing 56.6%) interviewed market woman accepted experiencing such violence at home.¹⁰ Amnesty International documented that, the Federal and State governments have a responsibility and failure in governance is partially responsible for the alarming figures.¹¹ Neither the Federal nor State governments were perceived as being committed to providing a solution that would stem this violence. The governments are accused of condoning violence against women, thus subjecting at risk millions of women nationwide.¹¹ In Ghana, assault to spouses top the list of domestic violence.¹² In Nigeria; reports reveal a "shockingly high" level of violence against women.¹³ Amnesty International reported that a third (and in some cases as much as two-thirds) of women were believed to have been subjected to sexual, physical and

psychological violence done to them primarily by husbands, fathers and partners.¹¹ In some situations, girls were often forced into early marriage, exposing them to high risk of punishment, especially if they make an attempt to escape from their husbands.¹¹ More pathetic is the revelation of gross under-reporting and non-documentation of domestic violence due to cultural factors.¹⁴ in its study documented that traditionally in Nigeria, just as in many other African countries, wives' and children's beating has a full approval as a form of discipline. It is, therefore, believed that in beating their children, good parents are instilling the desired discipline in them. The same thing also applies to husbands beating their wives, which was regarded as the way children are disciplined. This cowardly act of societal indiscipline must be curbed.

Cases of domestic violence against women are noted to be on the increase in Nigeria.¹⁵ Reports of cases where husbands kill or seriously maim their wives in the media abound.¹⁶ In one story on the statistics of domestic violence presented by the Government of Nigeria's 2013 Nigeria Demographic and Health Survey (NDHS), the figures were intriguing.¹⁷ It was revealed that about 50% of women had been battered by their husbands at one time or the other.¹⁰ It is shocking to note that more educated women (65%) are in this terrible situation when compared with their low-income counterparts which represent 55% of all the cases. Most persons (especially women) passing through this ordeal prefer to endure, with the belief that they have nowhere to go. They resort to such action by sticking to their partners even in the face of overt risk to their lives because they have this notion that the law will not protect them. A staggering figure of 97.2% of them is not willing to report to the Nigeria Police.¹⁰

MATERIALS AND METHODS

We carried out at the Department of Morbid Anatomy, Federal Teaching Hospital, Abakaliki. The cases retrieved from the archive of the Department of Accident and Emergency, Federal Teaching Hospital, Abakaliki. This

work analyzed 102 cases in Accident and Emergency Department of the hospital over two years from January 2016 to December 2018. Approval had been obtained from the Research Ethics Committee of the Federal Teaching Hospital Abakaliki to meet the ethical guidelines to enable. Results of these cases were collated and subsequently analyzed. Medical Records register in Accident and Emergency Department of the hospital were retrieved from the archives and were reviewed by the investigators, who are consultant pathologists to confirm the various diagnoses in respect to the cases. Out of one hundred and two cases that were analyzed, we recorded eight cases of death, and autopsies performed on them.

Our inclusion criteria in the study are:

1. Established cases of Domestic violence whose diagnosis had been verified by at least two pathologists.
2. Cases with complete patient data. While the exclusion criteria are:
 1. Cases with incomplete patient data.
 2. All cases that could not be gotten from the departmental archive or store of A&E.

Data collected was analyzed using International Business Machine, Statistical Package for Social Science (IBM SPSS) window 23. Relevant means and frequencies were presented in tables, figures, and summary indices. Inferential statistics (bivariate analysis) was done using the chi-square test. P-value < 0.05 was considered significant.

Sexual, physical, emotional and sexual violence is the measured outcome of interest of domestic violence. Questions included experiences of one or several of the following acts of abuse by a victim:

Sexual, physical, emotional and sexual violence is the measured outcome of interest of domestic violence. One or more of following acts of abuse by a victim are worthy of discussion:

Physical violence: i) shaking, pushing or throwing an object something at her is one usual acts; ii) the victim could be slapped; iii) arm twisting or hair pulled; iv) punching or hitting the subject with the intent of inflicting harm; v) beating, kicking or dragging the subject; vi)

burning or choking on purpose, and vii) attacking or threatening the victim her with a harmful weapon like penknife or gun.

Sexual violence: viii) forced sexual intercourse; ix) physically forcing her to perform any other sexual act when undesired, and x) forcing her with threats to perform sexual acts when undesired.

Emotional violence: xi) humiliating her in public; xii) threatening to hurt or harm someone close to her, and xiii) insulting or making her feel bad about herself

RESULTS

The results obtained showed that couples are faced with different types of domestic violence which are: physical violence, psychological violence and sexual violence; the age of the couples and their employment status did not correlate with domestic violence among couples, and that gender and educational status did not correlate with domestic violence significantly.

Out of one hundred of two cases (102) that reported to the relevant authority before taking to hospital thirty-four cases representing 33.3% sustained bruises as a result of physical assault from either the husband or his relatives. In some instances, most of the women complained of being beaten and raped by their husbands and from this study, it showed that thirty-one cases representing 30.4% reported as a case of rape. Table 1 showed that injury sustained as burns had the least number of case 1 representing 1%. There were a few instances where the man was attacked by his wife by pouring hot water on him. There are incidences where husband attacks his wife by pouring hot water on her body, creating more than 60% burn that eventually took the life of the patient and an autopsy was done on her. This accounted for only 1% of the cases of injury sustained by patients in this study. However, this could be more than just 1 case reported if the victims of this domestic violence report to the necessary or relevant authorities, the number are expected to be on the rise because of the high rate of wife battering in the state. These women believed that things would one day turn around for good, without

knowing that evil day is fast approaching. Most of these women presented with various types of fracture, ranging from simple to comminuted fracture. There are only 5 cases of fracture documented in this study, and this represented 4.9%. Bruises and Laceration were other nature of injuries sustained by these patients, and they were 34 and 21 cases representing 33.3% and 20.6% respectively. Table 2 of this study showed that head was the commonest affected site 32 (31.4%), followed by multiple site injuries with 28 cases representing 27.5%, followed by injury in the genitals which had 22 cases representing 21.6%. Table 3 showed age groups of the patients that were involved in this study. The highest number of cases recorded in this study was seen in the group of 20 to 29 years which 45 cases were recorded representing 44.1%, followed by 30 to 49 years age groups which have thirteen (23) cases representing 22.5% respectively and the least number of cases were seen in the age groups of 80 to 89years and 90 to 99 years, which recorded 0 and 1% respectively. This study showed that young people are mostly involved in domestic violence; this may occur due to a lack of maturity in mind and character among young people. Contributing factors could also be over-dependence of female partners on their male counterparts. Table 4 illustrated several factors contributing to domestic violence (abuse). As confirmed in the table, ten women representing 9.8% of the cases attributed its occurrence to drunkenness; 55 (53.9%) of

Table 1: Nature of injury

Nature of injury	Frequency	Percentage
Bruises	34	33.3%
Penetration (Rape)	31	30.4%
Abrasion	5	4.9%
Laceration	21	20.6%
Fracture	5	4.9%
Burns	1	1.0%
Total	102	100.0%

Table 2: Site of injury

Site	Frequency	Percentage
Head	32	31.4%
Neck	4	1.0%
Anterior Chest	2	2.0%
Posterior Chest	2	2.0%
Upper arm	1	3.9%
Forearm	4	3.9%
Anterior Abdomen	4	3.9%
Posterior Abdomen	1	1.0%
Buttock, Thigh	1	1.0%
Genitalia	22	21.6%
Multiple sites	28	27.5%
Leg	1	1.0%
Total	102	100.0%

Table 3: Physical assault according to Age groups

Age group	Frequency	Percentage
0 - 9yrs	0	0.0%
10 -19yrs	3	2.9%
20 - 29yrs	45	44.1%
30 - 39yrs	23	22.5%
40 - 49yrs	16	15.7%
50 - 59yrs	9	8.8%
60 - 69yrs	2	2.0%
70 - 79yrs	3	2.9%
80 - 89yrs	0	0.0%
90 - 99yrs	1	1.0%
Total	102	100.0%

Table 4: Factors Contributing to Domestic Violence

Factor(s)	Frequency	Percentage (%)
Drunkenness	10	9.8
Financial Demand	55	53.9
Sexual Advances	15	14.7
Annoyance/ Provocation	12	11.8
Cultural Factors	6	5.9
Combined Factors	4	3.9
Total	102	100

them claimed it was due to financial demand; 15(14.7%) suggested that it was because of rebuffed sexual advances; 12 (11.8%) of the victims blamed their abuse on the annoyance nature or temperament of their husbands; 6 (5.9%) of them pointed at cultural and stereotypical beliefs; while 4 (3.9%) of the women said that combination of these factors was responsible for their abuse by men.

DISCUSSION

In some African regions, including Nigeria, the act of beating wives and children has been an accepted a way of life, enshrined in the societal norms.⁵ The dastardly act is widely recognized as a form of discipline and punitive measure for correcting misbehaviour among women and children.⁵ Therefore, in beating their children, some parents have the notion they are instilling the needed discipline in their children, just as some husbands who beat their wives believe the same with the intents of imbibing moral codes in them- an act so rampant among women who are economically dependent on the man.⁵ The society appears patriarchal, and women's position within the system remains subordinate by arrangement.⁵ Domestic violence has been consciously designed by the community to consistently subjugate women into submissiveness to men within customary society. This study revealed that 33.3% of women had bruises from punching and kicking (Physical assault) inflicted by their male partners during domestic violence; this is similar to studies done in Oyo, Lagos and Enugu other parts of the country. This finding is different from other studies done were the common forms of abuse were slapping or pushing (77%), shouting at a partner (93%) and kicking 40%. Interestingly, the data obtained appear disturbing to note due to the display of ignorance by some women who do not know if they had been abused or not (Afrol News 2007),¹³ this could be due to the acceptance of some abusive behaviour as usual. Print and electronic media are engorged with vicious attacks on women by loved ones which range from rape, 'acid bath', beatings, some of which sometimes culminated in victim's death. Moreover, it is appalling to note that sizable

populations of women who are violated fail to report the incident for fear of reprisal from abusers or the belief that the police and legal system may not be of assistance. The police are also said to frequently dismiss complaints of domestic violence as a 'private matter'. The index we created included areas such as household decision-making, access to and control over economic resources, which also have been used in other studies.^{14,18} However, indices created in other studies did not include education, literacy, media exposure or age at first cohabitation/marriage. This interaction, although small, underscores the importance of contextual factors in Domestic violence occurrence. Even if a woman had high status, community norms among men tend to override the effect of her position. Men would readily go with the standard that expects them to be in control of their home affairs and discipline their partners when the need arises since prevailing norms influence behaviour and non-compliance with such norms can attract consequences.^{6,14,19} Therefore, if individual women's status was to be improved, a woman cannot realize the full benefits if there is no change in men's attitudes towards Domestic violence, particularly at the community level. One research revealed that the protective effect of education against Intimate Partner Violence was muted by community norms that approved of Intimate Partner Violence. Some studies have found that the protective effect of women's status against Intimate Partner Violence is absent in culturally conservative contexts.²⁰⁻²⁵

CONCLUSION

One significant finding of this index study is that domestic violence is prevalently experienced by urban women as 85% of the women who reported and present to the Accident & Emergency of the Hospital (AUEFTHA) complained that they were abused by their spouses. This agreement with the previous studies that have observed domestic violence is a global problem and that it transcends social, geographical and ethnic divide (Odumegwu 2001, WHO, 2004). The study also uncovers the factors that contribute to such menace in the urban areas

are: Over-dependence on men for financial demand, snubbed sexual advances, annoyance, a lousy economy and cultural factors. A more significant percentage of the victims who had bruises as a nature of injury at presentation stated that they were beaten by their spouse on financial demand/ request. This implies that the financial stress placed on men by their wives is much, which most time results in disagreement between husbands and wives. The financial burden may be compounded with the high rate of illiteracy and unemployment among the individuals.)

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Original Article

Beliefs and Perceptions about COVID-19 among Students of a Higher Institution in South-western Nigeria

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ABSTRACT

The on-going coronavirus disease outbreak is arguably one of the greatest public health challenges of our time. Being a novel disease discovered in December 2019, little is known about it. This study examines the beliefs and perception on coronavirus disease among students of an institution of higher learning in Southwest Nigeria. Two hundred and sixty (260) students were selected through a two-staged non-probability sampling method for the study. Data was collected using structured questionnaire which tested the general knowledge of respondents on the subject as well as their beliefs and perception about the disease. Even though 90.0% of the participants have heard of Coronavirus as a pathogen, their knowledge of the associated disease was fair on the average due to misconceived notions probably because information was sourced majorly from unconfirmed sources such as word of mouth from family members (56.5%), print media (56.2%), social media (51.2%), television (50.0%), and to a lesser extent from school (43.1%), health talk (42.7%), hospital (35.8%), over the radio (30.8%) as well as posters and billboards (24.2%). These misconceived notions, despite their level of education, include but not limited to claims that disease can be transmitted through mosquito bite (33.5%) and believing that it is a consequence of man's sin (48.1%). Some doubt its existence (28.8%) while a sizeable number believes they cannot be infected (44.2%) and peradventure if infected, prayer and fasting can cure it (44.2%). We therefore advocates for an intense public enlightenment campaign.

Keywords: Awareness, Beliefs, Coronavirus, COVID-19, Knowledge, Misconception

INTRODUCTION

COVID-19 is an infectious disease caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2).¹ It was first discovered in Wuhan, China in December 2019 and ever since, the disease has spread globally, being reported in almost all countries of the world hence recognised as a pandemic in March.^{2,3} Common

symptoms of the disease include fever, cough, and shortness of breath.⁴ Others may include muscle pain, sore throat, dry cough, diarrhoea, loss of smell, and abdominal pain.^{5,6,7} However, while the bulk of cases present as mild symptoms, some present as moderate to severe disease such as pneumonia and multi-organ failure.^{2,8} The mode of transmission of SARS CoV2 is via respiratory route when an individual comes in contact with respiratory

droplets of an infected person generated through the process of coughing and sneezing.^{9, 10} It can also be contacted through touching a surface contaminated with respiratory droplets, fomites or body fluids of an infected and subsequently touching of the eyes, nose or mouth with such hands.^{9,10} Individual is highly contagious when symptomatic though considerable transmission has also been reported in subclinical and asymptomatic cases.¹⁰ Research has shown that SARS CoV2 can survive on wooden surfaces for up to 72 hours and remain viable for up to 24 hours on cardboard and 72 hours on steel and plastic.¹¹

Incubation period is usually between two to fourteen days, with an average of five days.^{5, 12} Infection can be prevented by hand washing, social distancing i.e. maintaining physical distance from others, especially from symptomatic persons, cough etiquette which include coughing and sneezing into disposable tissues or inner elbow, and avoid touching eyes, nose and mouth with hand.^{13,14} Currently there is no vaccine or specific antiviral treatment for COVID-19 but it can be managed by treatment of symptoms, supportive care, isolation of cases and experimental drugs have been used with success.¹⁵

In January 2020, The World Health Organization (WHO) declared the Covid-2019 outbreak a Public Health Emergency of International Concern (PHEIC)^{16,17} and on 11 March 2020 it was declared a pandemic.³ Ever since the disease was identified in December 2019, the figure of cases globally has continued to rise. As of 30th of March 2020 over 700,000 coronavirus cases have been recorded globally with about 35,000 deaths.¹⁸ In Nigeria, the index case was recorded on the 28th of February 2020 by an Italian who flew into the commercial nerve city of Lagos from Italy on 25 February.¹⁹

As of 30th of March 2020 over a hundred cases have been recorded in Nigeria.¹⁸ There are also speculations that this figure may continue to rise if adequate measures are not put in place to contain the spread of the disease.²⁰ It therefore becomes imperative to assess the level of awareness, knowledge, beliefs and sources of information

of coronavirus among young people in institutions of higher learning that usually socialise in crowds and clusters in and around campuses which may expose them to the virus.

MATERIALS AND METHODS

The study was conducted among students of the Adeyemi College of Education. The school is located in the heart of Ondo town in Ondo State, South West Nigeria. It offers academic and professional training courses that aim to qualify students for the award of the Nigeria Certificate in Education (NCE). A total of 260 students selected through a two-staged non-probability sampling methods participated in the study. These include cluster sampling method to identify locations around the school where students gather to socialise and convenience sampling method to select participants for the study.

Primary data was retrieved through administration of structured questionnaire which contained questions which tested the general knowledge of respondents on the subject as well as their beliefs and perception about the disease while seeking to find out their source of information. Informed consent was obtained from the participants while the purpose of the study was explained to them before the research was conducted. Data was analyzed with the Statistical Package for the Social Sciences (SPSS version 20) and presented in tables and charts.

RESULTS

Socio-demographic characteristics of participants is as shown in Table 1, with 161 (61.9%) male and 99 (38.9%) female. One hundred and nineteen (45.8%) participants were within 21-25 years age bracket while 97(37.3%) were aged ≤ 20 years. Two hundred and twenty nine (88.1%) were single, 232 (89.2%) were Christians while the Yoruba ethnic background predominated as 167(60.4%) participants were from that ethnic background. Igbo participants were 68 (26.2%) while

Table 1: Socio -demographic factors of Participants

Demographic Data	Frequency (%)
Sex	
Male	161 (61.9)
Female	99 (38.1)
Total	260(100.0)
Age	
≤ 20	97 (37.3)
21-25	119 (45.8)
25-30	32 (12.3)
31-35	6(2.3)
Total	260 (100.0)
Marital status	
Single	229 (88.1)
Married	31 (11.9)
Total	260(100.0)
Religion	
Christianity	232 (89.2)
Islam	28 (10.8)
Total	260(100.0)
Ethnic group	
Yoruba	157(60.4)
Igbo	68(26.2)
Hausa	13(5.0)
Others	22(8.5)
Total	260(100.0)

Researchers' survey 2020

Table 2: Awareness and Knowledge of Coronavirus among students of Adeyemi College of Education Ondo-city, Nigeria

Awareness and Knowledge	Yes (%)	No(%)
Have you heard of coronavirus before	234 (90.0)	26(10.0)
Coronavirus is transmitted from animals to man	159 (61.2)	101(38.8)
A healthy looking person can have coronavirus	171 (65.8)	89(34.2)
Coronavirus is a respiratory disease	184(70.8)	76(29.2)
Coronavirus is an air borne disease	189 (72.7)	71(27.3)
Corona virus currently has no cure	202(77.7)	58(22.3)
Coronavirus can lead to death	213 (81.9)	47(18.1)

Researchers' survey 2020

Hausa represented 13 (5.0%) of the sampled population. Participants awareness and knowledge on coronavirus is as depicted in Table 2. Majority (90.0%) of the participants in the study have heard about coronavirus prior to the survey out of which a total of 159(61.2%) knew that coronavirus is transmitted from animals to man while 171(65.8%)of the participants knew that a healthy looking person can be infected with coronavirus. one hundred and eighty-four(70.8%) participants knew that coronavirus is a respiratory disease while 189(72.7%) believes coronavirus is an air borne disease. In addition, 202(77.7%) knew that there is presently no cure for coronavirus disease while 213 (81.9%) knew that coronavirus infection can result into death of the infected. Shown in table 3 is participants knowledge on the mode of transmission of the disease and it was revealed that majority of the participants knew the disease can be transmitted through close contact with an infected person (95.8%), inhaling the respiratory droplets generated by the infected (75.8%), or the surface contaminated by this droplets is touched (49.2%) such as tables, desks and other surfaces. Likewise, some participants believe other means of transmission of the virus is possible, among which are eating food contaminated with faeces and urine of infected animals (66.5%) and drinking water contaminated with

faeces and urine of an infected person (54.6%). Table 4 depicts the common symptoms of the disease. sneezing and coughing as symptom was mentioned by 200(76.9%) participants. other symptoms were fever 190 (73.1%), Runny nose 193 (74.2%), sore throat 164 (63.1%), rashes 163 (62.7%), bleeding from nose, ear, eyes and gum 149 (57.3%), cold and shivering 143 (55.0%), loss of consciousness 124 (47.7%), breathing difficulties 120 (46.2%), passage of watery stool 107 (41.2%) and kidney failure 100 (38.5%).

Participants' responses on the preventive measures against infection were enumerated

Table 3: Participant's perception on mode of transmission of Coronavirus

How is Coronavirus transmitted	Yes(%)	No(%)
Through close contact with an infected an person	249(95.8)	11(4.2)
Inhaling respiratory droplets from an infected person	197(75.8)	63(24.2)
Touching surfaces contaminated by respiratory droplets from an infected person such as table, desks and other surfaces	128(49.2)	132(50.8)
Bites from insects such as mosquito	173(66.5)	87(33.5)
Eating food contaminated with faeces and urine of infected animals	166(63.8)	94(36.2)
Drinking water contaminated with faeces and urine of infected animals	142(54.6)	118(45.4)
Mode of transmission is not known	15(8.3)	166(91.7)

Researchers' survey 2020

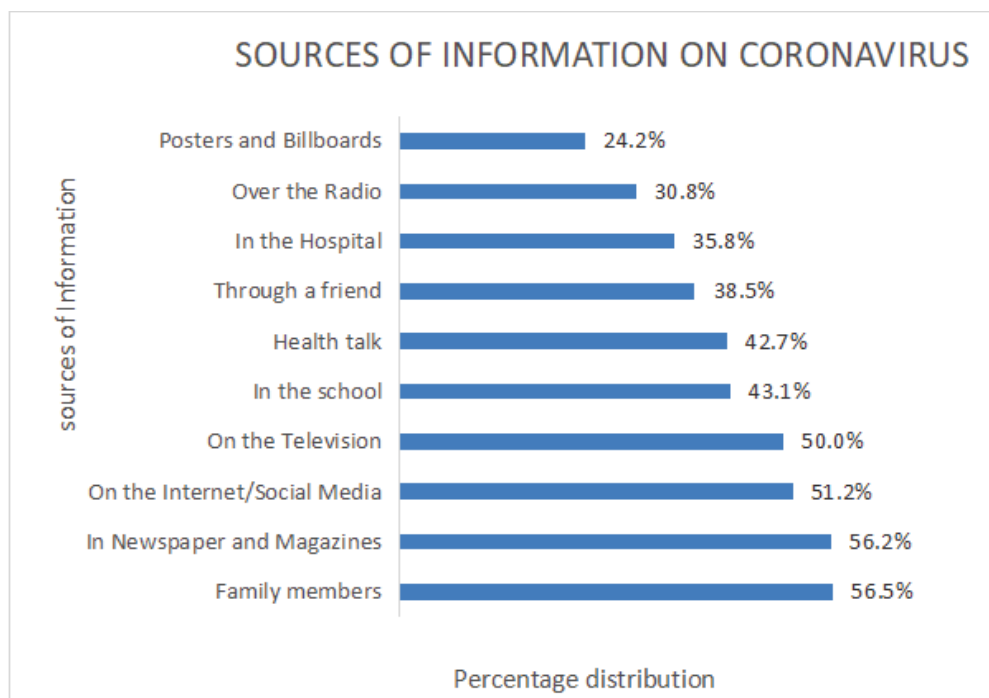


Figure 1: Bar Chart showing sources of information on coronavirus among Students of Adeyemi College of Education, Ondo-city, Nigeria.

Table 4: Common Symptoms of Coronavirus infection known to participants

Common Symptoms of Coronavirus infection	Yes (%)	No (%)
Fever	190 (73.1)	70(26.9)
Sneezing and Cough	200 (76.9)	60(23.1)
Runny nose	193 (74.2)	67(25.8)
Sore throat	164(63.1)	96(36.9)
Breathing difficulties	120(46.2)	140(53.8)
Passage of watery stool	107(41.2)	153(58.8)
Kidney failure	100(38.5)	160(61.5)
Rashes	163(62.7)	97(37.3)
Loss of consciousness	124(47.7)	136(52.3)
Bleeding from nose, ear, eyes and gum	149(57.3)	111(42.7)
Cold and shivering	143(55.0)	117(45.0)

*Researchers' survey 2020***Table 5:** Preventive Measures to curb disease

Coronavirus Preventive Measures	Yes (%)	No (%)
Regular hand washing	207(79.6)	53(20.4)
Use alcohol hand sanitizer	139(53.5)	121(46.5)
Covering mouth and nose when coughing and sneezing	168(64.6)	92(35.4)
Thorough cooking of meat and eggs	101(38.8)	159(61.2)
Avoiding close contact with people who are sick	138(53.1)	122(46.9)
Dispose and don't re-use tissues paper	144(55.4)	116(44.6)
Avoid touching your eyes, nose, and mouth	129(49.6)	131(50.4)
Clean and disinfect frequently touched objects and surfaces	124(47.7)	136(52.3)
Avoid crowded places	134(51.5)	126(48.5)
Take lots of water	126(48.5)	134(51.5)
Take lots of fruits and vegetables	130(50.0)	130(50.0)
Bath with salt water twice a day	92(35.4)	168(64.6)

*Researchers' survey 2020***Table 6:** Participants' Beliefs on coronavirus aetiology

Beliefs on Coronavirus	Yes (%)	No (%)
Coronavirus is an act of God	95(36.5)	165(63.5)
Coronavirus is as a result of sin of man	125(48.1)	135(51.9)
Coronavirus is a sign of the end time	132(50.8)	128(49.2)
Coronavirus is a white man disease	88(33.8)	172(66.2)
I don't believe coronavirus exist	75(28.8)	185(71.2)
I can never be infected with the disease	115(44.2)	145(55.8)
Corona virus can be cured through prayers and fasting	101(38.8)	159(61.2)

Researchers' survey 2020

Table 7: Grading participants level of Knowledge about COVID-19

Knowledge score on coronavirus	Frequency n(%)	interpretation
≤49%	17(6.5%)	poor knowledge
50-67%	164(63.1%)	Fair Knowledge
≥70%	79(30.4%)	Good knowledge
Total	260(100.0%)	

in table 5. These measures were regular hand washing 207(79.6%), covering mouth and nose when coughing and sneezing 168(64.6%), disposing and not re-using tissue papers 144 (55.4%), the use of alcohol hand rub or sanitizer 139(53.5%), avoiding close contact with people who are sick 138 (53.1%), avoiding crowded places 134(51.5%), taking lot of fruits and vegetables 130(50.0%), avoiding touching of eyes , nose and mouth 129 (49.6%), taking lots of water 126 (48.5%), frequent cleaning and disinfecting hard surfaces of objects 124 (47.7%).

In table 6, participants' belief about the virus and the disease it causes was examined. A small cohort of participants doubt the existence of the virus (75; 28.8%). Some who do believe it exists are of the opinion that it is a sign of the end time (132; 50.8%), an act of God (95; 36.5%), a white man disease (88; 33.8%) while (125;48.1%) believed that coronavirus is as a consequence of the sin of mankind. Some participants believed that they can never be infected with coronavirus (115; 44.2%), others were of the opinion that the disease can be cured through prayer and fasting (101;38.8%).

Figure 1 shows the participants' sources of information on coronavirus. The most commonly accessed source of information on coronavirus in the study was the family (56.5%). This was followed closely by newspaper and magazine (51.2%) and then internet and social media (51.2%), television (50.0%), school (43.1%), health talk (42.7%), through friends (38.5%) hospital (35.8%), over the radio (30.8%) and posters and billboards (24.2%).

Table 7 shows the average knowledge of respondents about the disease. Questions were asked to test respondents awareness of the disease and knowledge about its mode of transmission, clinical features and preventive measures. How many correct answers participants give to these questions provides an indication of how much they know about the coronavirus. A grade of $\geq 70\%$ was labelled as good knowledge, meaning

respondents answered $\geq 70\%$ of the questions asked correctly. A score of 50-69% was termed fair Knowledge while 49% and below was referred to as poor knowledge.

DISCUSSION

This study accessed awareness, knowledge, beliefs and sources of information of coronavirus among students of an institution of higher learning in southwest Nigeria. Result from the study showed that almost all the participants in the study have heard about coronavirus as a pathogen as at the time of the survey. This may be due to the global attention the disease has attracted as a result of the wide and rapid spread involving many continents and resultant deaths recorded. Ever since it was first reported in December 2019, the media has gone frenzy with news about its contagious nature, the means of spread, its clinical features, how it can be recognized and how many nations of the world have been infected. People have access to loads of these information online even though the bulk of it is misleading. In disease outbreaks of the magnitude that's being witnessed with COVID 19, the risk of infodemic is high as large volume of information about the disease is available, sometimes ambiguous, uncertain, low-quality, misleading or outright falsehood.^{21,22} With social media, this phenomenon is amplified, spreading faster and reaching further. A survey carried out by the Reuters Institute for the Study of Journalism at the University of Oxford revealed that one of every three individual read atleast one misleading information on

COVID 19 on social media.²³

A typical example of peddled falsehood in the media is that SARS COV2 is not a natural virus but a bioweapon produced in the laboratory to wreak havoc to human race. Likewise in this part of the world is the erroneous belief that the high temperature of the tropical sun is protective against the virus hence the low incidence and case fatality recorded.

The fair knowledge on the subject demonstrated by participants may mirror the level of education as participants were students of a tertiary institution of learning. Education has been found to positively influence access to information, its understanding, its internalization and utilization which will in turn influence their health seeking behavior.²⁴ Despite this high level of educational status, many erroneous beliefs and misconceptions were noted in the responses stemming basically from religious inclinations and the source of health information. For example, it has been documented that it is hard to isolate people's religious beliefs from their health seeking behaviour. Researchers have argued that the influence of religion over health outcomes cannot be underrated.²⁵

If the educated can be this misinformed about the novel disease, the less educated or uneducated are likely to be devoid of accurate information about the disease. Information (and misinformation) is noted to be crucial in shaping how people understand and respond to a public health crisis.²⁶ It is therefore critically important that people have access to accurate news and information that can help them understand the coronavirus crisis, what they can do to protect themselves and those around them. Hence it is imperative for all stakeholders, health personnel, political leaders, traditional leaders to launch an aggressive information dissemination, health education campaign to inform and educate the masses ahead of the wide spreading misinformation they have access to on the social media.

The closest knit to any individual and the first source of information, behavioral pattern and habits is the family. It is within the family that an individual learns ideologies that influence his life outside the immediate family and within

the community²⁷ This perhaps is the reason why family was the highest source of information on the subject of coronaviruses and its associated disease. This was followed closely by print media (newspaper and magazines), internet and social media, broadcast media (television and radio), school, health talk, through friends, hospital, as well as posters and billboards. Information retrieved from the family may not be totally adequate hence certain misconceptions revealed in the participants knowledge of the disease. The SARS CoV 2 pandemic is a recent entity, with many properties of the virus not known, its mode of transmission speculates, pathogenesis of disease inferred from the closely related SARS CoV and MERS-CoV and clinical features updated as more cases are present and treatment modalities and guidelines upgraded as consecutive cases are managed with success. This could influence the level of knowledge the participants displayed as reported in this survey.²⁸

In the face of lack of effective antiviral to treat and vaccine to protect against COVID19, the disease can only be curtailed, transmission reduced in a bid to flatten the epidemic curve. This can only be achieved when the population understands the situation at hand and react accordingly. To this end, the most important determinant is how knowledgeable people are about coronavirus. This will influence how they would respond to the pandemic. Access to accurate, relevant, reliable, and trusted information is hence a lifesaver, as important as therapeutic options in the midst of this pandemic.

CONCLUSION AND RECOMMENDATIONS

The study accessed awareness, knowledge, beliefs and sources of information of coronavirus among students of an institution of higher learning in southwest Nigeria. The study concluded that almost all the participants were aware of coronavirus disease and that participants in the study have a fair knowledge about the disease being fraught with certain misconceptions. The highest source of information of coronavirus among the participants is the family which

was followed closely by media in the form of conventional and social media. reliance on these sources of information may misinform the populace hence more likely to hold false beliefs about the pandemic and the coronavirus The study recommends that this level of awareness be sustained and improved through information about the disease in the studied and indeed the general population so as to ensure a sustained control of the disease.

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Original Article

Gastrointestinal Endoscopy in the Riverine Southwestern Ondo State of Nigeria: An Eight Year Review

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ABSTRACT

Gastrointestinal (GI) endoscopy is a notable advancement in the diagnosis of diseases in the digestive tract. It offers the advantage of biopsy and a range of cost-effective therapeutic options. The aim of this research was to study the range of GI endoscopy procedures, indications, spectrum of findings and outcome of GI endoscopy in a typical private specialist gastroenterology institution in a developing country. This was a cross sectional observational study of patients referred for GI endoscopy to a referral health facility in southern Ondo, Ondo state, Nigeria from February 2012 to February 2020. The variables studied were demographics of the patients, indication, the type of endoscopic procedure carried out and outcome. Statistical analysis was done using SPSS version 20 (SPSS, Chicago, IL, USA). Four hundred and ninety-six cases of endoscopy were performed during the study period comprising 313(63.1%) males and 183(36.1) females. The age range was 15 months - 86years (mean age of 48.9 ± 16.2 years). Upper and lower gastrointestinal bleeding were the commonest indications for endoscopy referral - 181 (36.5%). The range of procedures performed included oesophagogastroduodenoscopy 266 (52.8%) and colonoscopy 177 (35.9%); the therapeutic procedures carried out ranged from sclerotherapy 35(7.0%), polypectomy 24(5.0%), band ligation 6(1.0%), foreign body retrieval 6(1.0%) to a case of endoscopic mucosal resection EMR.

In our experience, the practice is safe with a high diagnostic yield and therapeutic achievement.

Keywords: Gastrointestinal tract, Endoscopy

INTRODUCTION

A rapid development of flexible gastrointestinal endoscopy into a therapeutic instead of a purely diagnostic discipline has been witnessed in the last few years.¹ The skills and technique involved in flexible endoscopy have long been embraced by gastroenterologists with much reluctance from surgeons.²

The Fundamentals of Endoscopic Surgery (FES) program of American Board of Surgeons was designed to address the challenge of endoscopic skills acquisition.³ In Nigeria, the last two decades have witnessed remarkable upsurge in the use of this technology, though not to the same degree as obtains in the western world. The scarcity of trained endoscopic surgeons, relevant infrastructure and support staff are some limiting factors. The purpose of this paper is

to report the range of endoscopy procedures, Indications, spectrum of findings and outcome from nearly 500 consecutive gastrointestinal endoscopic procedures in a surgical gastroenterology practice in the riverine southwestern Ondo state.

PATIENTS AND METHOD

Study design/setting

A cross-sectional observational single-centre study was conducted on patients who had GI endoscopy in the George and Martin privately-owned health facility in Ore, southern Ondo, Ondo State Nigeria which serves as a referral endoscopy centre for a considerable part of this region. The study duration was February 2012 to February 2020 with patients either referred or presenting primarily for the procedures. There was prospective data collection using Microsoft Excel software at presentation and following the procedure. The variables collated were demographics of the patients. Indications for referral, the nature of endoscopic procedures performed and their outcomes. The age of patients was stratified into age group of 10 years interval.

Patient Preparation/Procedure

A detailed history was obtained including indication, comorbidities, medication and previous endoscopy experience. All procedures were performed by the same surgeon endoscopist.

Upper gastrointestinal endoscopy

A routine haemoglobin count was done, and an educational leaflet was given during obtaining consent from patients. The patients were fasted for 6 hours before the procedure. A local anaesthetic spray to the pharyngeal mucosa and mild sedation with 0.25- 5mg of benzodiazepine was the routine practice. Sometimes total intravenous anaesthesia with endotracheal intubation was used, primarily for paediatric endoscopy, in patients with acute bleeding condition and uncooperative patients. A complete diagnostic procedure is adjudged by

intubation of the duodenum and visualization of the second part in the absence of an obstructing lesion. The vital signs were monitored during and at least 15 minutes after the procedure with moderate sedation, or until full recovery from general anaesthesia, then discharged home or back to referring hospital.

Lower gastrointestinal endoscopy

Routine pre-procedure tests as for upper gastrointestinal endoscopy was performed. A bowel preparation using polyethylene glycol or a combination of bisacodyl/castor oil or Sodium picosulphate citrate (Picolax) was used based on availability. A pre- procedure dietary restriction for 2 days prior to the colonic examination was the practice but for proctoscopy, there was no need for bowel preparation. An opioid analgesic (pentazocine 30mg) and mild sedation (0.25-5mg diazepam) were administered prior to procedure, intravenously, with patient monitoring.

Statistical analysis

Statistical analysis was done SPSS version 20 (SPSS, Chicago, IL, USA). Mean age and standard deviation were calculated for quantitative variables while Chi-square and Fisher's exact tests were performed on categorical variables where appropriate. Statistical significance was determined for the tests when $P < 0.05$.

RESULTS

A total of 496 gastrointestinal endoscopic procedures were performed during the study period. The age range was from 5 - 86 years with a mean age of 48.9 ± 16.2 years (Figure 1); 313(63.1%) were males and 183(36.9) females. The payment for endoscopy service was out- of-pocket in 469 (94%), while those by health insurance reimbursement 30(6.0%). Upper gastrointestinal endoscopy was the most common endoscopic procedure done in 264 (53.2%) cases(Figure 2). The three most common indications for upper GI endoscopy were epigastric pain 141 (28.4%), upper abdominal discomfort 37(7.5%) and dysphagia 23 (4.6%) (Table 1). There were: 5 band ligations for

oesophageal varices; 6 cases of foreign body extraction- 2 button batteries, 2 dentures, 1 coin and 1 tooth brush; 3 cases of sclerotherapy for gastric bleeding from isolated gastric varices and 2 peptic ulcer diseases. The remaining 252(94.9%) OGDs were diagnostic for various upper gastro-intestinal symptoms and pathologies; 5 on-table oesophagogastroduodenoscopy (OGD) as work up for laparoscopic cholecystectomies. Transient sore throat and flatulence were the common complications observed following upper GI endoscopy. There was no recorded case of cardiopulmonary complication, perforation or death. The leading indications for lower GI endoscopy were bleeding per rectum 46(61.33%) and lower abdominal pain 27(5.4%). There were 233 lower GI endoscopies: proctoscopy 13(2.6%); rigid video proctosigmoidoscopy 5(1.0%); flexible sigmoidoscopy 33(26.7%) and colonoscopy 177 (36.7%) (Table 1). The interventional endoscopic procedures done were: 34 sclerotherapies; 25 polypectomies; 1 endoscopic mucosal resection EMR. The findings at endoscopy are as shown in Table 2. Gastritis was the commonest finding at upper gastrointestinal endoscopy 109(22.0%) followed by

Table 1: Distribution of symptoms among patients presenting for gastrointestinal endoscopy

Symptoms	Frequency (n)	Percentage (%)
Bleeding Per rectum	157	31.7
Epigastric Pain	141	28.4
Upper Abdominal discomfort	37	7.5
Screening	29	5.8
Lower Abdominal pain	27	5.4
Haematemesis	24	4.8
Dysphagia	23	4.6
Constipation	17	3.4
Anal pain/protrusion	16	3.2
Others (follow-up etc)	7	1.4
Foreign body ingestion	6	1.2
Vomiting	4	0.8
Diarrhea	4	0.8
Flatulence	4	0.8
Total	496	100

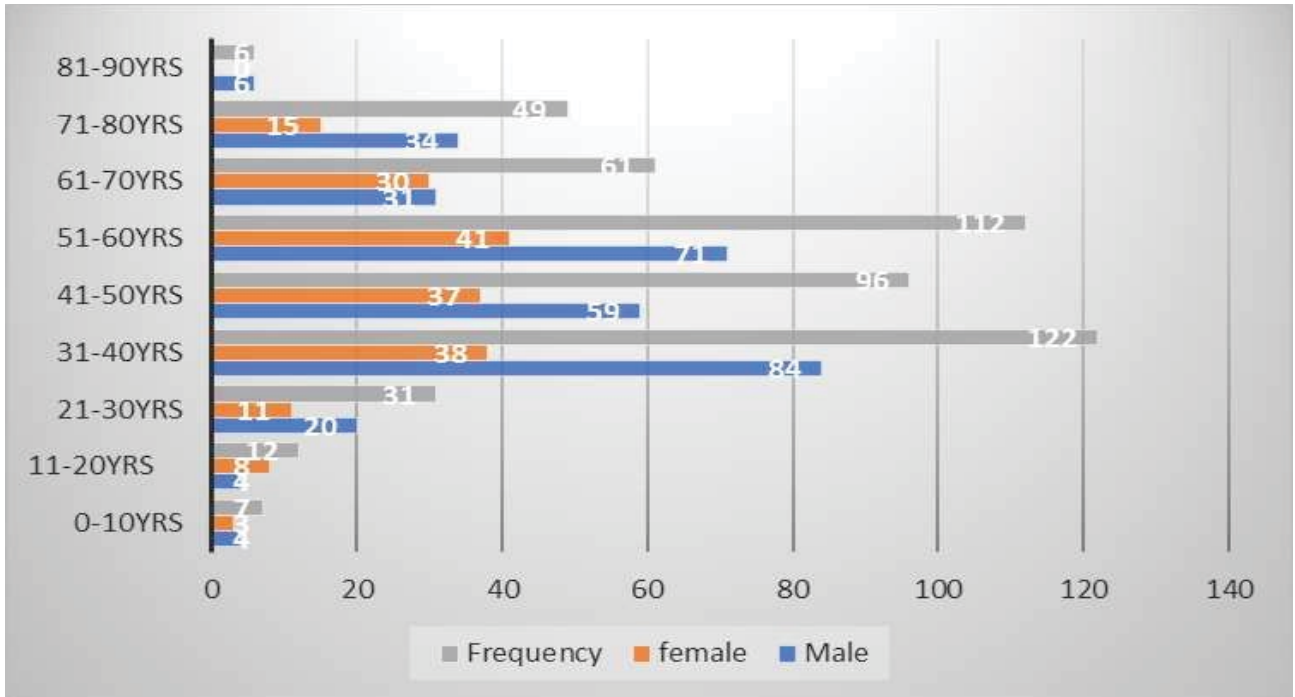


Fig. 1: Age and gender distribution of patients presenting for gastrointestinal endoscopy.

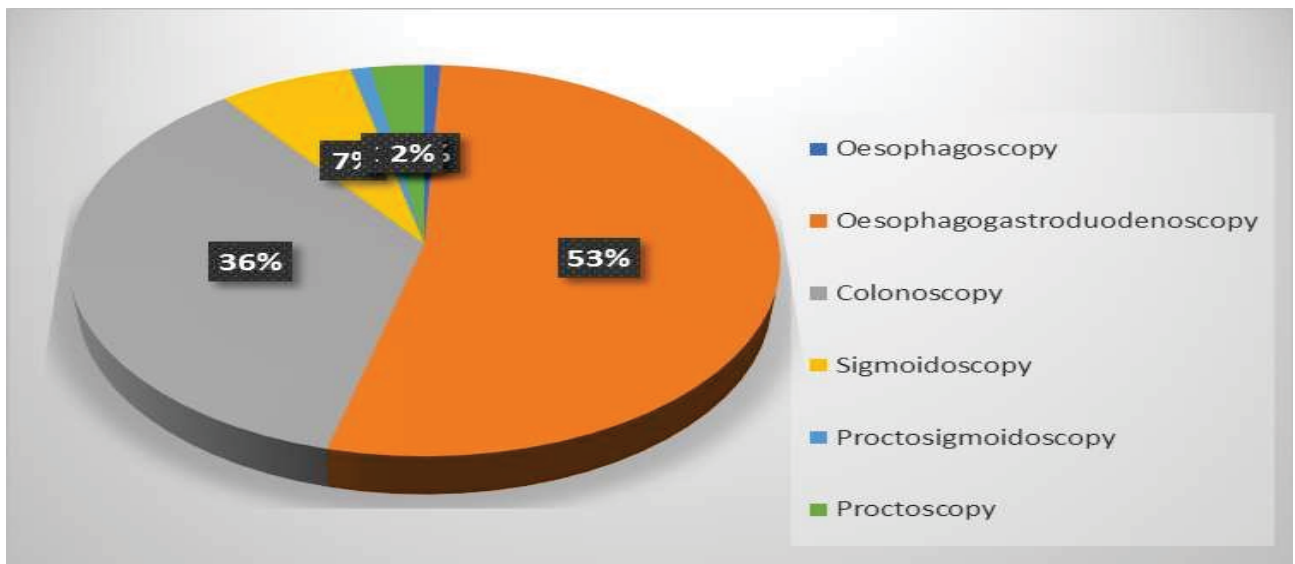


Figure 2: Endoscopy procedures performed on patients presenting for gastrointestinal endoscopy

Table 2: Endoscopy findings among patents presenting for gastrointestinal endoscopy in Ondo state, Nigeria.

Symptoms	Frequency (n)	Percentage (%)
Gastritis	109	22.0
Haemorrhoids	98	19.8
Normal Study	62	12.5
GOERD/Hiatus hernia	46	9.3
Colorectal neoplasm	36	7.3
PUD	18	3.6
Diverticular Disease	14	2.8
Gastric tumour/polyp	12	2.4
Colitis	9	1.8
Others (Necrotizing fasciitis Mucosal oedema etc)	9	1.8
Oesophageal Varices	8	1.6
Oesophageal Tumour	8	1.6
Fissure-in-ano	8	1.6
Foreign Body removal	7	1.4
Incomplete study	7	1.4
Diverticulosis	7	1.4
Biliary reflux	5	1.0
Obscure GI bleeding	5	1.0
Proctitis	4	0.8
Candida Oesophagus	4	0.8
Duodenitis	4	0.8
Gastric erosion	3	0.6
Mallory Weiss tear	3	0.6
Angiodysplasia	2	0.4
Ulcerative colitis	1	0.2
Oesophageal web	1	0.2
Gastric Varices	1	0.2
Total	496	100

gastrooesophageal reflux disease 46 (9.3%). Peptic ulcer disease constitutes 18 (3.6%) while gastric tumour/polyp accounted for 12 (2.4%). Oesophageal tumour and oesophageal varices each accounted for 8 (1.6%) respectively of the findings. The least of the findings were oesophageal web 1 (0.2%) and gastric varices 1 (0.2%). The

commonest finding at colonoscopy was haemorrhoids 98 (19.8%) followed by colorectal neoplasm 36 (7.3%). Next is diverticular disease 14 (2.8%) and colitis 9 (1.8%) and fissure-in-ano 8 (1.6%), diverticulosis 7 (1.4%). There was incomplete study 7 (1.4%). Endoscopic findings were normal in 62 (12.5%).

DISCUSSION

Gastrointestinal endoscopy is a keystone diagnostic procedure in gastroenterology. In this study, the male to female ratio was 1.7: 1 and patients who were scoped were mostly in their 4th decade of life. Over half of the cases (50.4%) were persons aged 20 to 50 years, who are in the productive years of their lives, with attendant loss of man hours. This burden of hours lost from the active work force due to ill health underscores the importance of prompt accurate diagnosis and treatment of digestive diseases.

A small proportion of patients seen were of paediatric age group 16(3.0%). The practice of paediatric endoscopy by adult gastroenterologists in developing countries is not ideal but rather a pragmatic step to fill in for the dearth of skilled paediatric gastroenterologists.^{4,5,6}

Epigastric pain was the most common indication for upper GI endoscopy seen in 141(28.4%) cases. This is a part of the symptom complex of dyspepsia. Dyspepsia is a chronic or recurrent central upper abdominal pain or discomfort arising from the upper gastrointestinal tract usually associated with food intake or brought on by hunger.⁷ There is a paucity of literature on the prevalence of dyspepsia in Nigerians however there is report of gastritis being the most common endoscopic finding at upper GI endoscopy in patients with dyspepsia.^{8,9,10} In US, the annual prevalence of dyspepsia is about 25%.¹¹ For the lower tract, bleeding per rectum was the most common indication for endoscopy referral and this was the case in 142 (29.0%) cases. A similar finding was seen in other lower GI studies from Nigeria.^{12,13} This is probably because of the alarming nature of this symptom which compels patients to seek medical attention and accept the cost-effective option of endoscopy for an accurate diagnosis and intervention.¹⁴ There were 15 cases of upper gastrointestinal endoscopy that were performed as part of endoscopic evaluation for bleeding per rectum because massive upper gastrointestinal bleeding can manifest as haematochezia.

Flexible video gastroscopy was performed in 264(53-0%) cases and thus was the most common gastrointestinal

endoscopy procedure. Similar combined upper and lower GI studies from different parts of Nigeria report oesophago-gastroduodenoscopy as the most common GI endoscopy procedure.^{15,16} Flexible endoscopy is a useful tool for pre, intra, and post-operative assessment of surgical patients. An oesophagogastroduodenoscopy prior to laparoscopic cholecystectomy could disclose other gastroesophageal disorders with similar symptoms to gallstones.¹⁷ An OGD was performed on table just prior to laparoscopic cholecystectomy for 5 cases as the theatre was equipped with flexible endoscopy equipment. A case of post-operative assessment of a gastro-jejunostomy was recorded.

There was a very low complication rate and no mortality was recorded in this study. Only transient sore throat and bloating were reported by some patients after upper GI endoscopy. A case of post-polypectomy bleeding was recorded following an interventional colonoscopy. There were also reports of transient abdominal discomfort in a handful of colonoscopy cases. Reports of severe acute complications following GI endoscopy are rare. However when they do occur, they are more apt to be related to anaesthetic complications, bleeding, perforation or infection^{15,16,18}.

There was a wide spectrum of gastrointestinal diseases recorded. In the upper digestive tract, the most common pathologies were gastritis (22.0%), gastroesophageal reflux disease (GOERD)-9.3% and peptic ulcer disease (PUD) 3.6% in decreasing order of frequency. A low rate of diagnosis of peptic ulcer disease in cases of dyspepsia was observed in keeping with the global reduction in incidence of peptic ulcer disease.^{19,20} In the small population of peptic ulcer disease recorded, males were four times more affected and the ratio of gastric to duodenal ulcers was 2.6:1. The diseases of the lower digestive tract that were recorded, in decreasing order of frequency, were haemorrhoids, colorectal neoplasms and diverticular disease. Reports of lower GI endoscopy from Nigeria also show haemorrhoids as most common diagnosis.^{21,22,23} In all 65 (13.0%) of the patients studied presented with normal endoscopic features.

Nigeria is a developing country with middle per capita income.^{24,25} The current National Health Insurance Scheme NHIS is largely non-inclusive of the cost of endoscopy as the study shows majority of payments for procedures were made out-of-pocket. Health insurance reimbursement was applicable in only 30(6.0%)cases. A diagnostic flexible endoscopy procedure in our region costs from \$100 - \$200 (₦40, 000 to ₦80, 000). This service, unfortunately, is not affordable by a significant portion of the population. Beyond cost, effective GI endoscopy service also face other challenges which include a non-ready availability of endoscopy consumables and failure of prompt referral of patients by primary care physicians/other specialists. In the authors view, an increased enlightenment of the availability and usefulness of endoscopy services among health care givers in addition to a more appropriately priced and comprehensive health insurance scheme are needed.

CONCLUSION

Through endoscopy a wide range of gastrointestinal conditions can be detected. Therefore the needed expertise in a broad range of therapeutic endoscopic procedures will be desirable.

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Original Article

The Influence of Career Choice on Neurological Academic Performance Among Critical Care Students In Abuja, Nigeria

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ABSTRACT

In Nigeria, Critical care is yet to subspecialize; the neurology curriculum is a core subject. The evidence of career choice motivation and neurological academic performance has not been well elucidated, as such, demonstrating a valid premise that critical care students choice resulted in better academic performance will be very useful. The value can be seen in improved students' guidance, better curriculum development and improved healthcare setting goals. This study was set up to ascertain the relationship between career choice motivators and learning outcomes among critical care nursing students with emphasis on neurological curriculum. A cross sectional quantitative descriptive study and analysis techniques were explored using three academic sessions of critical care nursing students of the School of Post Basic Critical Care Nursing of University of Abuja, Nigeria. Responses to the question "why did you choose critical care nursing" were collated and then themes developed. Their score in neurology was used to assess academic performance. Statistical analysis conducted using IBM-SPSS version 23. Ninety students responded with males constituting 24 (26.7) and females, 66 (73.3). There was statistical difference between 'passion for critically ill', 'having no reason' and academic performance, ($\chi^2=8.707$, $p=0.003$), and ($\chi^2=13.306$, $p < 0.001$) respectively. Passion was found to be responsible for career choice and motivating influence on neurocritical academic performance.

Keywords: Academic performance, Career choice, Critical care, Influence, Neurocritical care

INTRODUCTION

A student's choice of study presumes that the intellectual development of the student will be greatly impacted through exploring in depth a subject of their choice. This will be critical to harness the most performance in the chosen field. What motivates the student in making the choice is critical to the learning process –this is the career choice motivator. This has been

corroborated by research, as it influences performance.^{1,2} Equally, students' motivation influences their academic achievement in medical education.³ As healthcare students can have unique intentions and motivations, it is important to understand the influence of the reasons of their career choice on learning and performance.⁴ Critical care is being increasingly embraced in our environment, and so its uptake in tertiary health facilities. Presently, there are no Critical Care training facilities for physicians

in Nigeria, but, Nursing has 2 training centers and these have been the hub of turning out this critical manpower for our healthcare. There is therefore the need to critically build manpower with a strong and purposeful adherents and practitioners. Neurocritical care is an example of its subspecialty, with care that includes a distinct focus on neuroprotection that can lead to better outcomes for patients with critical neurologic disorders.^{5,6} Knowledge of the pathophysiology of the neurologic system in critical illness is in fact recognized as a core entrustable professional activity during fellowship.⁷

Career choice motivation involves intrinsic and extrinsic factors.¹ While intrinsic factors relate to pursuing an activity for personal gain or enjoyment, extrinsic factors include pursuits of an activity for a desirable outcome, be it to obtain a reward or from peer pressures.⁴ Furthermore, personal interest and drive are intimately related to intrinsic motivation.^{8,9}

To achieve the performance of high quality work from critical care practitioners, objective key motivators need to be identified and their values expounded.¹⁰ A key unanswered question relates to the impact of critical care student choice on academic performance. If it could be shown that critical care student choice resulted in better academic performance, this would be important evidence of benefit. Currently, empirical evidence linking career choice motivations and academic neurological performance is lacking. This study, therefore, sets out to explore the relationship between career choice motivation among critical care nursing students and their academic performance in neurology.

MATERIALS AND METHODS

A cross sectional quantitative descriptive study and analysis techniques were conducted to explore the influence of career choice motivation on neurological academic performance.

Participants and Setting

The study was conducted among the Critical care nursing students of the School of Post-Basic Critical Care Nursing

of the University of Abuja Teaching Hospital, Gwagwalada, Abuja, Nigeria. Three academic sessions were studied (2017, 2018 and 2019). Each school session consists of 30 students making a total of 90 participants, as all participated.

Institutional ethical approval was not requested for the present study, because it was part of the annual survey of students that pertain to their learning outcomes. Participation was voluntary and consent was implied with the return of the responses.

Instruments and Procedures

At the first interaction with the students of each session, they were given 10 minutes to think and write down the reasons why they choose a career in critical care. A structured questionnaire was not employed so that the individual and unique intentions of all participants can be accommodated.

All the 26 reasons given by all participants were collated and 130 responses were generated, as participants had from 1 to 4 reasons. These were then separated into six (6) thematic areas as common underpinnings were noticed to be recurring: passion, knowledge and skills, lucrateness, traveling abroad, religiousness and having no reason.

The performance at the end of the neurology/neurosurgery curriculum was used to assess their academic performance. The standard educational grading of A, B, C, D, E, and F was used to transform obtained raw scores into grades. This nomenclature was used to define the pass rate. But for an optimal overall analysis of all participants academic performance, the grades were sub-stratified into A and B, Adjudged-Good Score, C, D, E, F, Adjudged-Poor Score. The curriculum pass limit is grade C, which is 50% score. Grade C was, however, included in the Adjudged-Poor performance score as core competence expected of a critical care practitioner ought to be higher, and patterned after the certification process of the American Association of Critical-Care Nurses.¹¹

Independent t-test was performed to compare the students' reasons, and academic performance. Additionally, distributions of participant backgrounds (i.e., gender) were

RESULTS

A total of 90 (100) students responded which males were 24 (26.7) and females 66 (73.3).

Table 1: Distribution of students’ performance in grades by critical care nursing students at University of Abuja Nigeria

Grade	Frequency (n)	Percentage (%)
A	21	23.3
B	28	31.1
C	31	34.4
D	5	5.6
E	5	5.6
Total	90	100.0

Table 2: Reasons (themes) and performance by critical care nursing students for choosing the discipline among nursing students compared to their academic performance at University of Abuja Nigeria

Variables	Poor score n=42(%)	Good score n=48(%)	Total n=90(%)	χ^2 value	P-Value
Passion					
Yes	23(36.5)	40(63.5)	63(100)	8.707	0.003*
No	19(70.4)	8(29.6)	27(100)		
No reason					
Yes	14(87.5)	2(12.5)	16(100)	13.303	<0.001*
No	28(37.8)	46(62.2)	74(100)		
Knowledge					
Yes	12(54.5)	10(45.5)	22(100)	0.726	0.394
No	30(44.1))	38(55.9)	68(100)		
Lucrative					
Yes	3(33.3)	6(66.7)	9(100)	0.714	0.398
No	39(48.4)	42(51.9)	81(100)		
Religious					
Yes	1(25.0)	3(75.0)	4(100)	0.790	0.374
No	41(47.7)	45(52.3)	86(100)		
Traveling abroad					
Yes	1(33.3)	2(66.7)	3(100)	0.222	0.638
No	41(47.1)	46(52.9)	87(100)		

*P value significant at <0.05

Table 3: Academic performance across the Classes by critical care nursing students at University of Abuja Nigeria

Variables	Poor score n=42(%)	Good score n=48(%)	Total n=90(%)	χ^2 value	P-Value
Class 2017	11(36.7)	19(63.3)	30(100)	9.911	0.007*
Class 2018	10(33.3)	20(66.7)	30(100)		
Class 2019	21(70.0)	9(30.0)	30(100)		

*P value significant at <0.05

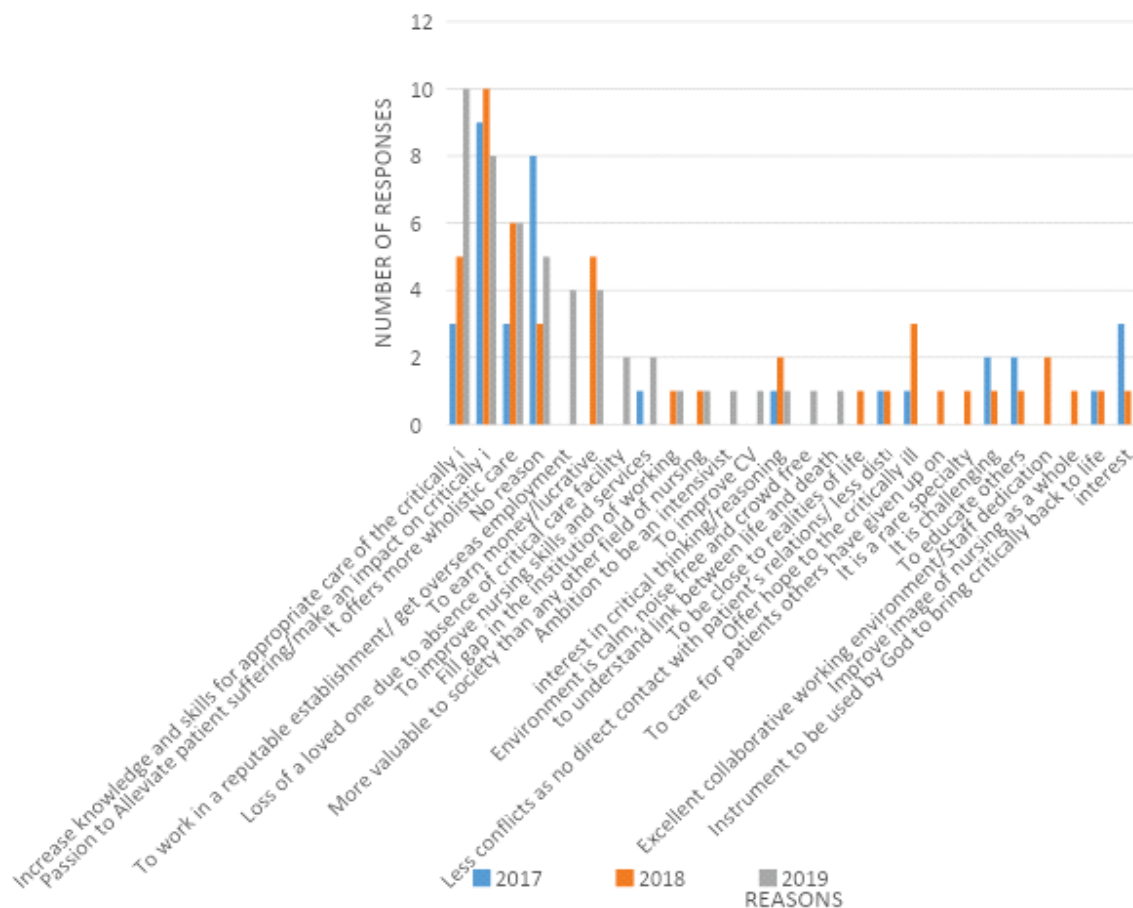


Figure 1: Reasons given by critical care nursing students for choosing the discipline among nursing students at University of Abuja Nigeria.

There were 26 reasons generated from 130 responses, of the main reason or reasons why a career in critical care was chosen, 30% (n=27) respondents expressed 'passion to alleviate the suffering/impact on critically ill', 20% (n=18) revealed 'to acquire increased knowledge and skills to appropriately manage the critically ill', 18% (n=16) participants had no reasons and 17% (n=15) revealed that 'critical care affords them to offer more holistic care to the critically ill. These 4 reasons constitute 65% of all the responses.

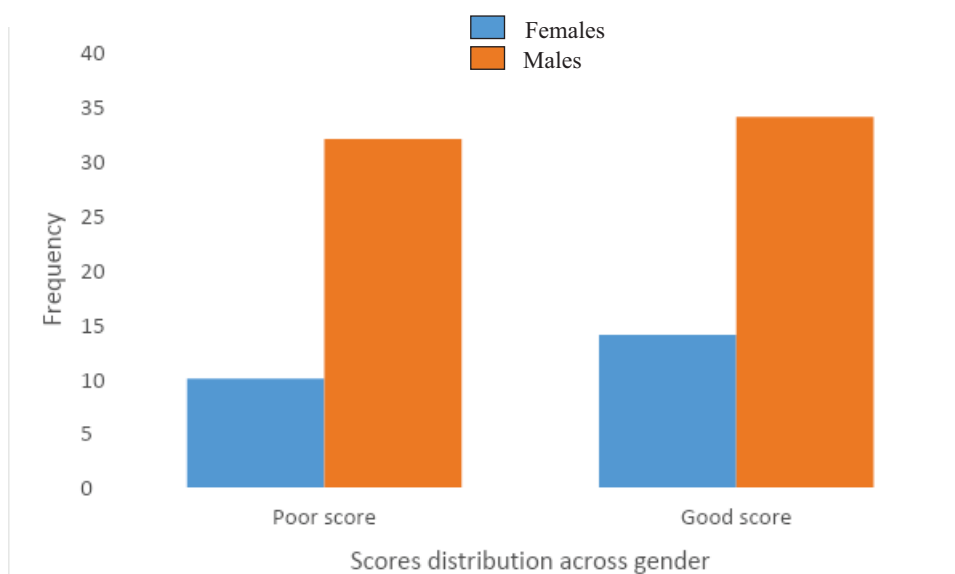
Thematic Analysis

There was significant statistical difference between passion for the critically ill and academic performance ($\chi^2=8.707, P=0.003$), and also, 'having no reason' and academic performance ($\chi^2=13.306, P<0.001$). There were no differences across academic performance and the following reasons; 1. 'To acquire increased knowledge and skills to appropriately manage the critically ill' ($\chi^2=0.726, P=0.394$), 2. 'Critical care is very lucrative' ($\chi^2=0.714, P=0.398$), 3. 'Religious reason of those who want to be used by God/God's instrument to heal the critically ill' ($\chi^2=0.790, P=0.374$), or 4. 'Those who see critical care as affording them the opportunity to relocate abroad' ($\chi^2=0.222, P=0.638$).

Table 4: Academic performance and multiplicity of reasons by critical care nursing students for choosing the discipline among nursing students at University of Abuja Nigeria

Variables	Poor score n=42(%)	Good score n=48(%)	Total n=90(%)	χ^2 value	P-Value
Reasons					
Multiple	12(52.2)	11(47.8)	23(100)	0.376	0.539
Single	30(44.8)	37(55.2)	67(100)		

*P value significant at <0.05



$\chi^2 = 0.329, P\text{-value} = 0.566$

Figure 2: Academic performance in relation to gender by critical care nursing students at University of Abuja Nigeria

compared across groups of different career choice motivations using chi-square test. IBM-SPSS version 23 and the significance level was 95% for the statistical analysis.

DISCUSSION

This study investigated the influence of career choice motivation among critical care nursing students and academic performance. Though, they were not matched for age, previous academic performance and competences,

our study suggests career choice motivation may account for differences in academic performance among critical care nursing students.

Considering the academic performance against the thematic areas, passion, being the most common reason, constituted 48% of responses. Passion has been reported, consistently to be associated with improved performance.¹² Passion determines personality traits as a major intrinsic influencer of motivation, allowing for commitment and conscientiousness. This study also revealed that the nurses whose motivation is passion are more dependable,

intelligent, flexible and highly motivated. This was statically significant as compared to other nursing students who listed other reasons for studying the course ($P < 0.05$). The converse could therefore be said to be true. Those who came into critical care nursing school without a reason had poor performance ($P = 0.000$). 12% of the respondents had no reasons. This apparent lack of a well-defined motivator may have been responsible for 87.5% failure score amongst them.

As lofty as the reason to acquire increased knowledge and skills to appropriately manage the critically ill may be, it was not a motivator in our study. 17% of respondent who advanced this reason had 54.5% failure score. This is surprising, as to acquire increased knowledge and skills applies to intellectual curiosity and the outcome of autonomy and performance of independent skill-sets in clinical scenarios.

Religious beliefs is an important motivator from this study. Religious beliefs including being instruments in the hand of God to help the critically ill featured prominently among the good score sheet. It has been found that religious beliefs gives energy, allows for clear conscience and focused activities and a greater effectiveness in output.¹³

The assumption that a student with a single reason may be more motivated and focused and therefore, perform better academically did not project in this study ($P = 0.539$). It was thought that the less the plethora of reasons the more attention is paid to the sole ambition of achieving the desired goal. Equally, there was no difference across gender. Students' tend to work towards overall academic performance, despite single or multiple motivational basis, so as to achieve the goal they have set for themselves.

Lucrativeness of the critical care profession and the reason to afford to travel abroad are good motivators. 66.7% of both respondents had good scores and so appeared to be well motivated. However, these reasons did not significantly impact on the performance output of the students. This may not be unrelated to the relatively few number of respondents in these categories. The manner in which one has been reared has an important impact on the formation of these beliefs. Our environment is such that

healthcare workers are seeking for improved remuneration and overseas' employment for hopes of improved earnings.

CONCLUSION AND RECOMMENDATION:

This study exposes the various influence of career choice motivators on neurocritical care students' academic performance. Our study has shown that understanding critical care nursing students' reasons for career choice may assist our knowledge of factors that influence learning and academic performance. Such knowledge can guide policies towards developing curriculum and optimal learning capacities. Finally, our study found there to be a relationship between career choice motivation and academic performance, but does not account for how the career choice motivation achieved the improved academic performance, further multivariate analysis will be needed for this.

Limitation

Being a relatively novel study, our study is not without limitation. This was a preliminary study into reasons for academic performance and neurocritical care education at a single institution with relatively small sample size.

Conflicts of Interest

None declared.

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Original Article

Pattern and Correlates of Human Immunodeficiency Virus Testing among General Population in Nasarawa State, Nigeria: Findings from a Population-based Survey

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ABSTRACT

Human Immunodeficiency Virus testing provides an entry point into the HIV care and treatment services, necessitating the UNAIDS strategic target of getting 90% of all people living with HIV to know their HIV status by 2020. This study was aimed at determining the prevalence and factors associated with HIV testing among the general population in Nasarawa State, Nigeria. The study was an analysis of a cross-sectional survey conducted among 903 randomly selected sample of the adult population in Nasarawa state, Nigeria. Prevalence of recent HIV testing and its association with respondents' Sociodemographic variables, risky sexual behaviours, drug and alcohol use, among other factors were determined using logistic regression analysis. The proportion of respondents who ever tested for HIV was 53%, while 30.1% did the test in the previous one year. Logistic regression revealed that factors significantly associated with HIV testing in the previous one year secondary education and higher (AOR = 1.92, 95% CI 1.35–2.72), knowing where HIV testing are done (AOR = 31.37, 95% CI: 9.98–99.79), comprehensive knowledge of HIV (AOR: 1.72, 95%CI: 1.24–2.39) and those with low HIV personal risk perception (AOR = 3.56, 95%CI : 1.49 – 8.31). HIV testing among the general population in Nasarawa State is relatively low. Higher education, knowing where HIV testing are done, comprehensive knowledge of HIV, low HIV personal risk perception were significantly associated with HIV testing. Awareness campaigns on HIV and specifically on the importance of HIV testing in communities must be intensified

Keywords: HCT, HIV, Nasarawa

INTRODUCTION

Nigeria and specifically, Nasarawa State, is characterized by a generalized HIV epidemic, though with higher rates of infection among the key populations, which include female who sell sex (FWSS), people who inject drug (PWID) and men having sex with

men (MSM).^{1,2} The 2014 Nigeria HIV sentinel survey showed that the state has HIV prevalence of 6.3%, making it the state with the 6th highest prevalence in Nigeria. The 2018 Nigeria HIV/AIDS Indicator and Impact Survey (NAIIS) showed that Nasarawa State had an appreciably lower HIV prevalence of 2.0%, though still placed as the state with the second highest in the North central Nigeria.³

HIV testing provides an entry point into the HIV care and treatment services. A meta-analytic review carried out on 27 publications between 1985 – 1997 showed that HIV counseling and testing effectively serves as secondary prevention for HIV positive persons.⁴ There is therefore an increasing investments aimed at increasing access to HIV counseling and testing services among different populations. The increasing emphasis on HIV testing is in line with the global HIV response UNAIDS strategic targets of 'Ending AIDS by 2030' and Fast Tracking to reach 90-90-90 by 2020. A key element of the Fast Tracking is that 90% of all people living with HIV will know their HIV status by 2020.⁵

HIV testing among the different population groups has remained low in sub-Saharan Africa. A review of DHS in sub-Saharan Africa indicates that only 36.5% of young persons know their HIV status.⁶ Estimates showed that the proportion of persons who knew their HIV status were 9.9% and 22% of the general population Ghana, and Sierra Leone respectively, and 44.2% among students of tertiary institution in South East Nigeria.^{7,8,9} Factors associated with HIV testing among an Italian general population were having sexual partners multiple, age group (30 – 30 years more likely than younger age group) and higher education.¹⁰

Among an African American population, predictors of HIV testing in the previous 12 months were marital status and intention to test.¹¹ In Sub Saharan Africa, HIV testing has been found to be significantly associated with gender, age, age at sexual debut, HIV knowledge and poverty.^{6,8} A systematic review in Gambia revealed that higher education, marital status and misconception were significantly associated with HIV testing uptake. In Sierra Leone, urban residence, age 25 – 44 years, secondary education or higher, later sexual debut and been previously married were significantly associated with HIV Testing.⁸ Among Nigerian couples, HIV knowledge and perceived risk of contracting HIV were predictors of HIV testing.¹² A secondary data analysis from 2012 National HIV /AIDS and Reproductive Health Survey showed that among Nigerian Youth, higher educational attainment, comprehensive HIV knowledge and higher economic

status were associated with more likelihood of doing HIV test.¹³

The modes of HIV transmission (MOT), incidence analysis carried out in 2011 estimated that close to half of the new HIV infections in the state occurred amongst persons who engaged in low risk sex. This includes members of the general population, such as couples who do not engage in risky sexual or other behaviours. The findings of the MOT analysis is very consistent with populations with generalized epidemic in which the bulk of new HIV infections occur amongst persons who do not report high risk sex.¹⁴ Despite the increasing resources made available for HIV testing and other HIV services in Nasarawa State, Nigeria, there are no enough information on factors associated with uptake of HCT at the general population level. Providers of HIV prevention services and policy makers would need this information to improve uptake and efficiency of HIV testing service. The study was aimed at determining the prevalence and factors associated with HIV testing among the general population in Nasarawa State, Nigeria

MATERIALS AND METHODS

Study Design

This cross-sectional analytical study was conducted in 2011 among the general population in Nasarawa State Nigeria. Persons eligible to participate in the study were females aged 15 - 49 years and males aged 15-64 years and living in Nasarawa State Nigeria.

Sample Size and Sampling Technique

A sample size of 903 was determined using Contraceptive Prevalence rate of 9.7% obtained from the National Demographic Health Survey Nigeria, 2008 and 2.5% level of precision. Probability sampling techniques was used through a two stage sampling. In stage one, 30 enumeration Team Areas (ETA) were selected using the cumulative measure of size of the Enumeration area in the state. The ETA were listed with their cumulative population sizes and selection was done using random numbers. In stage two,

eligible individuals were randomly selected from a list within each cluster. The sample allocation to urban and rural areas was proportional to the rural/urban distribution of the population. A locality with a population of less than 20,000 was classified as a rural area. In this stage, the buildings and households within each selected ETA were identified and members of the households were listed with their names, ages and sexes. All eligible persons were identified and numbered serially. Systematic random sampling procedure was used to select 28 persons (14 males and 14 females) from each cluster.

Data Collection

Each of the selected respondents was approached and given explanations about the study and then signed an informed consent form. A structured questionnaire was administered to selected individuals. Information was obtained on the background information of respondents, sexual behavior, knowledge and perception of HIV/AIDS, substance use, accessibility and use and access to HIV Counseling and Testing by trained interviewers.

Data Analysis

Data analysis was done using the SPSS version 20 software. The level of significance for the analysis was 5% and analysis was done using chi square, crude logistic regression and multivariable regression. Prevalence of recent HIV testing and its association with respondents' sociodemographic variables, multiple sexual partnering, drug and alcohol use, among other factors were determined using chi square test and logistic regression analysis.

Ethical Consideration

Permission to carry out secondary data analysis was obtained from Society for Family Health (SFH) Nigeria while ethical approval for the original data collection was earlier obtained from the research and ethical committee of the Nigerian Institute of Medical Research. The data do not have identifiers, so confidentiality of population that was used for the original data is maintained. Ethical approval for the original study was given by National Health

Research Ethics committee of Nigeria (NHREC).

RESULT

Sociodemographic characteristics of Respondents

Table 1: Socio-demographic characteristics of a sample of general population in Nasarawa State, Nigeria, 2014

Characteristic	n	%
Sex		
✓ Male	469	51.9
✓ Female	434	48.1
Age (years)		
Mean Age: 29.1 ± 10.26		
✓ 15-19	158	17.5
✓ 20-29	345	38.2
✓ 30-39	247	27.4
✓ 40 or greater	153	16.9
Marital status		
✓ Currently married	476	52.7
✓ Single	371	41.1
✓ Divorced/Widowed /Separated	56	6.2
Location		
✓ Urban	168	18.5
✓ Rural	735	81.5
Highest level of education		
✓ Primary or lower	590	65.3
✓ Secondary	210	23.3
✓ Tertiary	103	11.4
Employment Status		
✓ Unemployed	616	68.2
✓ Employed	287	31.8

Table 1 gives the results of the socio-demographic characteristics of the 903 respondents sampled from the general population of Nasarawa State Nigeria. The mean age was 29.1 ± 10.26 years and majority were aged 20-29 years (38.2%) followed by 30-39 years (27.4%). The male were 51.9% of the respondents and majority were married

(52.7%), rural residents (81.5%), had primary education or lower (65.3%) and unemployed (68.2%).

Prevalence and Pattern of HIV testing among Respondents

The proportion of the respondents who ever had HIV test were (53%), while 47% ever done test and got results and

30.1% did HIV test in the previous 12 months. Majority of the respondents asked to be tested (50.3%) while 39.9% were offered and accepted to be tested and 9.8% were required to do the test and had to do it. Most of the respondents, 76.7% knew at least one HIV testing centre (Table 2). Among respondents who did not do the test, 50% thought doing HIV test was not necessary, 18.4% did so because of fear and anxiety, 14.3% did not want to know their HIV status and 10.2% could not afford the cost of testing (figure 1).

Table 2: HIV Testing among the general population Nigeria, 2014 in Nasarawa State,

Variable	n	%
i. Ever done HIV Test		
✓ Yes	479	53.0
✓ No	424	47.0
ii. Ever Had HIV Test and got result		
✓ Yes	424	47.0
✓ No	479	53.0
iii. How the last Test was done		
✓ Asked for the test	241	50.3
✓ Was offered and accepted	191	39.9
✓ Was required to do it	47	9.8
iv. Done HIV Test in last 12 months		
✓ Yes	272	30.1
✓ No	631	69.9
v. Know an HIV testing centre		
✓ Yes	693	76.7
✓ No	210	23.3

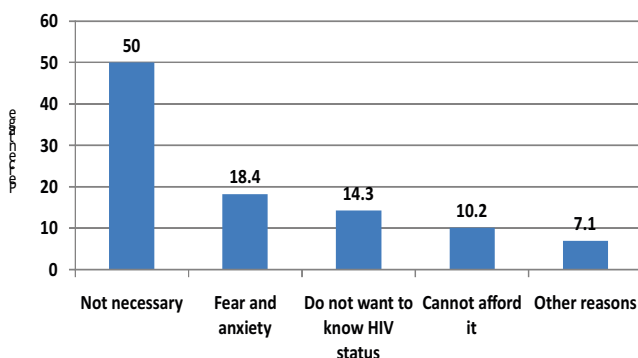


Figure 1: Reasons for not doing HIV Testing among General Population in Nasarawa State, Nigeria, 2014.

Factors Associated with HIV Testing

The logistic regression analysis, as shown in table 3, shows that higher education, knowing where HIV test can be taken, comprehensive knowledge of HIV and low HIV personal risk perception were significantly associated with

Table 3: Logistic Regression Analysis of factors Associated with HIV Testinamong the general population in Nasarawa state, Nigeria, 2014g

Variable	AOR	95% C.I. for OR	Sig.
Sex			
➤ Female	Ref		
➤ Male	0.90	0.65 – 1.27	0.557
Age (Years)			
➤ = 29yrs	Ref		
➤ = 30 yrs	0.78	0.55 – 1.10	0.162
Education			
➤ Primary or lower	Ref		
➤ Secondary or higher	1.92	1.35 – 2.72	<0.001
Employment Status			
➤ Unemployed	Ref		
➤ Employed	0.75	0.51 – 1.10	0.136
Use of Illicit Drugs			
➤ No	Ref		
➤ Yes	1.20	0.60 – 2.38	0.606
Had Sex for gift previous year			
➤ No	Ref		
➤ Yes	1.34	0.75 – 2.65	0.283
Know where HIV test can be taken			
➤ No	Ref		
➤ Yes	31.37	9.86 – 99.79	< 0.001
Comprehensive Knowledge of HIV			
➤ No	Ref		
➤ Yes	1.72	1.24 – 2.39	0.001
HIV Transmission self Risk Perception			
➤ High	Ref		
➤ Low	3.56	1.49 – 8.31	0.004

doing HIV test in the previous 12 months. Adjusted odd Ratios suggest that respondents with secondary education and higher were 1.92 times more likely to use HIV testing services (OR = 1.92 (95 % CI 1.35–2.72). The odd ratios for respondents who knew where HIV testing are done were 31.37 times more likely to do the test than those who didn't know (OR = 31.37, 95% CI: 9.98-99.79). Respondents with comprehensive knowledge of HIV were 1.72 times more likely to do the test compared those without comprehensive knowledge (AOR: 1.72, 95%CI: 1.24 – 2.39) and those with low HIV personal risk perception had AOR of 3.56 and 95%CI of 1.49 – 8.31 compared to those with higher risk perception. (Table 3)

DISCUSSION

Our study revealed that, among the general population in Nasarawa state, the prevalence of ever done HIV test was 53.0% while 30.1% did their most recent test in the previous 12 months. These findings are lower than expected to meet the UNAIDS strategic targets of getting 90% of all people living with HIV to know their HIV status by 2020. However, previous studies showed generally lower HIV testing prevalence. A review of DHS data in Sub Saharan Africa showed that 36.5% of young persons knew their HIV status and only 9.9% and 22% of general population in Ghana and Sierra Leone, respectively, knew their HIV status.^{6,7,8}

We identified four key significant factors associated with HCT uptake in Nasarawa State in the past one year prior to this study. These were educational level, comprehensive knowledge of HIV, knowing HIV testing sites and HIV transmission self-risk perception. On the other hand, core risk determinants of acquiring HIV infections were not significantly linked to HCT uptake including use of illicit drugs, regular alcohol ingestion and having sex in exchange for gifts.

In our study, those with secondary education or higher were more likely to go for HCT when compared to those with lower education (adjusted Odds Ratio 1.9, CI 1.6 – 2.7, and P-value < 0.001). Persons with low education are

likely to be less knowledgeable about HIV and may not fully appreciate the benefits of testing for HIV. This finding is in agreement with many previous studies. A study conducted in Nigeria among youths confirmed that those with higher education were 4.4 times more likely to volunteer for HIV testing than those with primary school or no education, P value < 0.001¹⁵. Many other previous studies conducted in Nigeria and Africa showed that persons with higher education were more likely to do HIV testing than those with lower education.^{8,10,13,16-19}

Respondents with comprehensive knowledge of HIV were 1.7 times more likely to do HIV test. This was logical going by the finding in the preceding paragraph on education where those with low education had poor uptake of HCT. This agrees with a systematic review of global studies on factors associated with HIV testing which showed that HIV knowledge and testing had a positive and significant relationship (d = 0.22, 95 % CI 0.14–0.31, P-value 0.001).²⁰ Similarly, a study in ten southern African countries pointed to the fact that knowledge gained by hearing about HIV/AIDS or talking often about it in the last one year was significantly associated with HCT²¹. Our finding with predominant rural participants was similar to that of rural Ethiopian population¹⁶, one with predominant youths in South Africa and in Conakry, with participants being female sex workers.^{22,23}

Those who knew where to access HCT were 30 times more likely to go for HCT than those who don't know the testing site, but with low uptake of HCT at 30% in this study. Similar finding was noted in a study on youths in Kano and Bauchi states where knowing a source for obtaining VCT was significant at last model of logistic regression with even lower proportion of VCT at about 10%.²⁴ However two negative findings in this study were against the significant finding about HCT sites at univariate analysis. Firstly, about 631 (70%) of the participants did not know where to go for HCT services. Thus, it could be that there were no enough HCT sites, as was noted in a study in Kwara state.²⁵ Secondly, 580 (66%) or two-thirds of the participants had primary or lower educational status, a situation where health seeking behavior may be negatively

affected. It was however contrary to a study in Ghana, where over 95% of the students were knowledgeable about HIV and even knew where get an HIV test but only 45.4% had tested for HIV. There is thus a need for a push for uptake of HCT services generally through enhanced social mobilization activities, directing the populace to HCT sites for services. Without active HCT services, Nasarawa State lacks power to pursue 90-90-90 initiative towards 2030 target to eliminate HIV menace.

Those with low HIV transmission risk perception were 3.6 times more likely to go for HCT than those with higher risk perception. This finding agrees with a previous study which showed that the majority of respondents who rated themselves as 'greatly' or 'quite a lot' at risk of HIV had not tested in the past year while 29.6% of men and 39.9% of women who did HIV test in the previous 12 months were classified as low risk.²⁶ Our finding is, however, in disagreement with findings from many other previous studies which showed that high personal risk perception was associated with more likelihood of doing HIV test.^{12,27,23,16,20}

The association between low risk perception and HIV test may be as a result of fears and anxiety related to doing the test. This study found that among respondents who didn't do the test, 18.4% of them did so because of fear and anxiety and 14.3% said they were not interested in knowing their HIV status (Figure 1). This finding has however provided a new evidence to support previous reservations held against the interpretation of personal risk perception of contracting HIV. A previous study in South Africa showed that personal risk perception may be affected by psycho social factors not related to sexual and other risk taking behaviours.^{28,29} It is therefore imperative that the concept of risk perceptions is contextualized.

CONCLUSION

HIV testing among the general population in Nasarawa State is relatively low. Higher education, knowing where HIV testing are done, comprehensive knowledge of HIV, low HIV personal risk perception were significantly

associated with HIV testing. Reasons given for not doing HIV testing were fear and anxiety, affordability and the feeling that doing HIV test was not necessary.

Recommendation

More awareness campaigns should be undertaken using the mass media and other locally acceptable platforms such as village development committees, churches and mosques and the use of community theatres. More HIV testing and counseling centres should be established to bring the services closer to the people. In carrying out HIV awareness campaigns in Nasarawa State, it must be ensured that the general population understands the basic modes of HIV transmission as well as addressing myths and misconceptions. More research should be undertaken to determine the acceptance and efficiency of self HIV testing among the general population in this setting.

Limitations

One limitation of this study is the skewed nature of the sample, particularly with respect to location (urban and rural). This is however in line with the rural nature of the state. In addition, there is likelihood of recall bias with regards to HIV testing and other variables such as sexual activities.

Conflict of Interest

None declared

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A Case Report

Acute Infectious *Purpura fulminans* in A 2-Year Old Child

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ABSTRACT

Purpura fulminans (PF) is a rapidly progressing clinical syndrome of haematologic and cutaneous manifestations accompanied by an underlying dysfunction of coagulation resulting in disseminated intravascular coagulation (DIC). It is a life threatening haematologic emergency characterized by extensive skin necrosis with haemorrhagic infarction, hypotension and gangrene which may arise from severe sepsis, mostly gram negative organisms. Some gram positive organisms and viral infections have been implicated in the aetiology of PF. We reported a case of purpura fulminans in a 2 year old boy with severe sepsis and peripheral gangrene from gram positive coccus (*Staphylococcus aureus*). Even though we were faced with limitations in terms of laboratory support and parental financial constraints in the management of the patient; he survived mainly on supportive care and antibiotics.

Keywords: Sepsis, *Purpura fulminans*, disseminated intravascular coagulation (DIC), .

INTRODUCTION

Purpura fulminans (PF) was first described by Guelliot in 1884, ever since; several cases have been reported.¹ The French researcher noticed gangrenous-like cutaneous manifestations that rapidly developed among a population of his patients who contracted certain infections.² It is a medical emergency requiring prompt diagnosis and management,³ PF is characterized by an acute purpuric rash characterized by coagulation of microvasculature leading to cutaneous necrosis.⁴ There are three forms of purpura fulminans viz; neonatal-, idiopathic- and acute infectious purpura fulminans. Neonatal purpura fulminans is characterized by hereditary deficiency of anticoagulants protein C, S and antithrombin III.⁵ Idiopathic purpura

fulminans is a post-infectious autoimmune disorder following an initial febrile illness which later progressed to purpura. Acute infectious purpura fulminans (AIPF) is the commonest form of PF found in severe septic patients with predilection to certain infectious agents such as in meningococcal, streptococcal, staphylococcal, gram negative sepsis and falciparum malaria.^{6,7} AIPF is also seen in physically or functionally asplenic patients. *Purpura fulminans* is common in infants and younger children, often associated with multiple organ failure and death.¹ Studies have shown that *Klebsiella* species are found to be associated with PF in children in Nigeria.^{2,8} The acute inflammatory response found in sepsis activates coagulation and complement cascades leading to endothelial injury, usually triggers disseminated

intravascular coagulopathy (DIC).⁹ The consumption of clotting factors and platelets leads to bleeding, while loss of key anticoagulants, protein C and co-factor protein S, promotes thrombosis, inhibits fibrinolysis and further activate inflammation.¹⁰

PF may lead to auto-or surgical amputation in up to 50% of survivors and a mortality of up 52% has been documented.^{10,11} Although the pathology once triggered is irreversible, prompt identification of potential risk factors with early haematologic evaluation and intervention provides timely appropriate management to reduce mortality and prevent debilitating tissue damage. The case reported here highlights the need for high index of suspicion in a child presenting with sepsis along with other risk factors for PF.

CASE REPORT

A 2year old boy presented with fever, yellowness of the eyes and diarrhea for 5days. No history of reduced urinary output. However, he was extremely weak and without improvement despite the over-the-counter drugs. He was conscious, and in obvious respiratory distress.

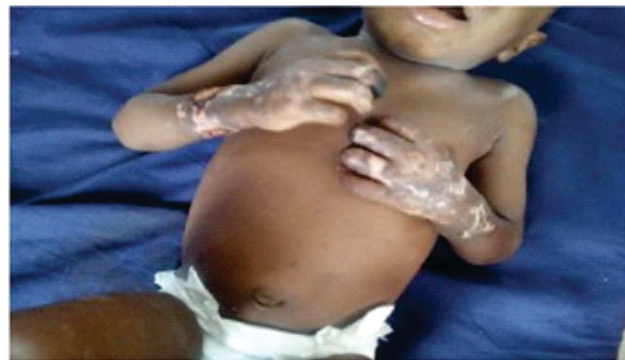
Examination reveals a critically ill child, febrile (temperature of 39.9 C), pale, deeply icteric, dehydrated with cold clammy extremities. Respiratory system examination revealed a dyspneic child as evidenced by grunting respiration, flaring nares and subcostal as well as intercostal recessions, and crackles sound heard globally on auscultation. The heart rate was 184 beats per minute with haemic murmur. Oxygen saturation in room air (SP02) was 55%. An assessment of Anaemic heart failure secondary to severe malaria/sepsis was made.

He was resuscitated with IV fluids and intranasal oxygen was commenced. An urgent packed cell volume (PCV) done was 7% and he had blood transfusion twice. He was also commenced on parenteral ceftriaxone and gentamicin, as well as parenteral anti-malaria. His SPO₂ improved to 78% following the initial blood transfusion.

Five days after admission, his condition gradually improved, the diarrhoea has stopped, vital sign has



A



B



C

Figure 1: A-C; Diffuse purpuric rashes of the upper and lower limbs with gangrene of the digits

Table 3: Microbiological evaluation findings in the patient

Test category	Components	Results at presentation
Blood culture	Culture	Growth of gram positive coccus (<i>Staphylococcus aureus</i>)
	Sensitivity	Sensitive to: ceftriazone, gentamicin, and azithromycin Resistant to: Augumentin.
Viral studies	HBsAg	Negative
	HCV	Negative
	HIV-1&2	Negative
Malarial test	Thick film	Negative

HBsAg: Hepatitis B surface antigen, HIV: Human immunodeficiency virus. HCV: Hepatitis C virus

improved with SPO₂ – 92% at room air; respiratory rate was 30 cycles/min, heart rate was at 96 beat/min, but still febrile. There was poor compliance with medications as outlined due to financial constraint. Ecchymotic patches began to appear on the lower extremities and ischemic patches on the toe nails and upper extremities symmetrically, with associated tenderness and non-pitting edema up to the ankle. The ecchymotic and purpura lesions were progressing from the toes and fingers to the distal 3rd of the legs and fore arm respectively. Proximal part of the lesion was demarcated by blisters. The radial and popliteal pulses were palpable on both sides. The posterior tibial and dorsalis pedis pulses were not palpable on either side.

Investigation done revealed abnormalities suggestive of severe sepsis (peripheral blood film showed markedly increase granulocytes and left shift with toxic granulation) features of evolving DIC, (polychromatic cells, numerous target cells, thrombocytopenia and fragmented cell), deranged clotting profile and liver function test parameters. Malaria parasite test was positive. Further evidence for DIC (plasma D-dimer, fibrinogen level and urinary fibrinogen degradation product (FDP) and doppler ultrasound were unavailable due to financial constraints. Blood culture yielded gram positive coccus organism sensitive to ceftriazone, gentamicin, and azithromycin. We commenced intravenous metronidazole and hydrocortisone upon the appearance of the ecchymotic lesions.

Exchange blood transfusion was not done as the parents refused the procedure despite thorough counselling. The

overlying skin became darker while the limbs were immobile with loss of touch sensation at the extremities. Fresh frozen plasma and heparin were considered for use but was not readily available due to financial constraints. Orthopaedic and plastic surgical teams were invited for possible amputation of the gangrenous toes which was rejected by the parents even after counseling. Intravenous antibiotics were continued and he was subsequently discharged after a month for follow up. At discharge patient had improved significantly. There was improvement in the ecchymotic lesion and fever has subsided. The boy was discharged in a good clinical status and is being followed up in the clinic.

Table 1: Haematologic parameters of the patient

Test category	Components	Results at presentation	Results at the time of discharge
Full blood count	White blood cell	12.4 x 10 ⁹ /L	10.2 x 10 ⁹ /L
	Red blood cell*	0.8 x 10 ⁹ /L	3.2 x 10 ⁹ /L
	Neutrophil	80%	70%
	Lymphocytes	22%	26%
	Platelets*	74,000/L	80,000/L
	Haematocrit*	7%	24%
	Haemoglobin concentration*	2 g/dL	8 g/dL
	Mean corpuscular volume	86 fL	88 fL
	MCHC	30 g/dL	32 g/dL
Peripheral Blood film	Red blood cell:		Anisopoikilocytosis Polychromatic cells Numerous target cells Fragmented cells
	White blood cells		Leucocytosis Left shift Hypersegmented neutrophils Atypical lymphoid cells
Clotting profile	Platelets:		Thrombocytopenia
	Prothrombin time**	47 seconds	43seconds
	Activated partial thromboplastin time**	88 seconds	71 seconds

*:Low; **:Elevated; MCHC:Mean corpuscular haemoglobin concentration

Table 2: Biochemical profile of the patient

Test category	Analytes	Lab values at presentation	Lab values at the point of discharge	Reference intervals
Kidney	Sodium ion	140 mmol/L	135 mmol/L	135-145
	Potassium ion	4.0 mmol/L	4.6 mmol/L	3.5-5.0
	Chloride ion	94 mmol/L	98 mmol/L	95-105
	Bicarbonate ion	22mmol/L	21mmol/L	20-30
	Urea	4.0 mmol/L	4.1 mmol/L	2.5-6.0
	Creatinine	83 µmol/L	93 µmol/L	55-100
Liver	Total protein	7.2 g/dL	6.7 g/dL	6.4-8.4
	Albumin	4.1 g/dL	3.6 g/dL	3.0-5.5
	ALT*	20 IU/L	35 IU/L	<12
	AST*	16 IU/L	26 IU/L	<12
	ALP	302 IU/L	289 IU/L	90-360
	GGT	23 IU/L	33 IU/L	30-78
	Total bilirubin*	2.8 mg/dl	1.4 mg/dl	<1.0
	Direct bilirubin	0.7 mg/dl	0.3 mg/dl	<0.4
Glucose	RPG	93 mg/dL	78 mg/dL	<200

ALT: Alanine aminotransferase, AST:Aspartate aminotransferase, ALP:Alkaline phosphatase, GGT: Gammaglutamyl transferase, RPG:Random plasma glucose

DISCUSSION

Purpura fulminans is a rare but rapidly progressing thrombotic disorder manifesting with widespread purpura.¹² This condition has been associated with a high mortality rate of 35% or more, although recent advances in diagnosis and treatment strategies have reduced mortality.³ Skin findings of PF have a characteristic non-blanching dark red-to-purple appearance, which distinguish them from other purpuric lesions.¹³ Erythema is rapidly followed by irregular central area of blue-black hemorrhagic necrosis with a surrounding erythematous border.¹⁴ PF usually presents with cutaneous vesicles and bullae. The lesions are tender, raised, angulated. The necroses can be widespread and involve the deep muscle and sometimes the bone. Healing leads to scarring and auto-amputation of digits and extremities can occur.¹⁵

Purpura fulminans lesions have characteristic erythema with central areas of blue-black haemorrhagic gangrenous necrosis with a surrounding erythematous border.¹⁶ In this case; we isolated *Staphylococcus aureus* as the culprit for acute infectious *purpura fulminans* (AIPF). Staphylococcal AIPF, initially reported as rare, becoming a common occurrence among diverse group of patients.¹⁷ Toxin shock syndrome toxin-1 producing *Staphylococcus aureus* has been found to be an under recognized aetiological agent in *purpura fulminans*.¹⁸ Even though we isolated *S. aureus* in the blood of the patient but we were unable to demonstrate if it was TSST-1 producing- or methicillin resistant *Staphylococcus aureus* (MRSA) as both strains have been widely documented as common cause of PF.¹⁹

The clinical improvement of this patient can be adduced to prompt commencement of broad spectrum antibiotic (intravenous ceftiazone) after specimen collection, haemodynamic stability following blood transfusion, as well as normal organ function. There was biochemical derangements seen in liver function test and the Full blood count and peripheral blood film done also showed features of sepsis.

PF occurs predominantly in three clinical setting. Firstly is the most common inherited or acquired defect in protein C or S. The hematologic derangement usually leads to a more benign presentation that does not usually lead to sepsis. The purpuric lesions usually start in the distal limbs and progress proximally.⁶ It has been documented more in neonate but can also be seen in adults. The idiopathic PF occurs 7-10days after a relatively benign antecedent infection usually of the skin, such as varicella, scarlet fever rubella, measles, streptococcal tonsillo-pharyngitis etc.⁷ Acute infectious purpura fulminans which occurs in the case discussed earlier in conjunction with acute infectious illness particularly sepsis with endotoxins (lipopolysaccharide) producing gram-negative and positive bacteria.²⁰ However most cases of acute infectious PF associated with meningococcal sepsis but can also occur with other organisms in the setting of septicaemia with DIC. Other organisms which have been reported to cause acute infectious PF are *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Staphylococcus aureus*, *Klebsellapneumoniae*, *E. coli*, *Proteus mirabilis*, *Neiseria catarrhalis*, *Capnocytophagasppetc*.²⁰ Approximately 60 to 70% cases of acute PF have been reported among children of 2 years of age and above.²⁰ The occurrence of sepsis, dehydration and shock in this child were potent predisposing factor for *purpura fulminans* and DIC, thus contributing to the development of gangrene.¹

Two cases of severe malaria patients presenting with PF has been reported in literature,⁷ malaria was also documented in this child. The haematologic and coagulation derangements along with thrombocytopenia observed suggested the evolving DIC. However lack of protein C, protein S, Antithrombin III and plasma/urinary FDPs assay constituted major limitations to completeness of laboratory evaluation in this child, especially as these parameters are useful for confirmation and staging of DIC.^{1,11,20}

The empirical choice of intravenous ceftriaxone /gentamicin for the isolated organism gave a good clinical

response. Lack of platelet concentrate, coagulation factor, protein C and S, antithrombin III concentrates and non availability of fresh frozen plasma due to financial constraints, which are known to be beneficial in patients with PF and DIC constituted some of the limitations encountered in this patient.

CONCLUSION

Purpura fulminans is a rare clinical condition that should be promptly recognized and empirically treated. Empirical use of antibiotics is advocated especially if the patient has features suggestive of sepsis and disseminated intravascular coagulopathy. Early recognition and prompt management are crucial in reducing morbidity and mortality in patients with *purpura fulminans*. Despite limitations posed by laboratory support and financial constraints, the outcome in this patient was good due to prompt use of intravenous broad spectrum antibiotics and other supportive therapies.

Recommendation

We recommend early recognition and prompt management of *purpura fulminans* in order to reduce morbidity and mortality.

Competing Interest

We hereby state that there is no competing interest in this report.

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A Short Communication

Double Sides of COVID-19 Pandemic: African Countries should Break Grounds or be Permanently Broken

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ABSTRACT

COVID-19 crept into the world December, 2019, and within a short time, has gone round the whole world and still infecting, affecting and afflicting the all regions of the world. The effect on Africa is grave, not in terms of the morbidity and the mortality, but in terms of its economic impact and the apparent exposure of the weak health system in many parts of Africa. It is hoped that this event will set the governance of the continent right so that the governments will effectively ensure a stronger and more economically vibrant nations emerge after the pandemic.

Keywords: African, Broken, Countries, COVID-19

LITERATURE

In December 2019, little did the whole world realized that a novel coronavirus (now called SARS-CoV-2) which was detected in three patients with pneumonia connected to the cluster of acute respiratory illness cases from Wuhan, China was on the verge of taking on the world by storm.^{1,2} It did, and in less than six months, it has affected about four million people and has killed over a quarter of a million and still counting.^{3,4} Following the outbreak in China in late December, and its spread to parts of Asia, Europe, the Middle East and the US, Africa seems to have been spared a major outbreak for months, recording its first confirmed case only on 14 February in Egypt.⁵ Though Africa has close ties with China, its risk of importation of COVID-19 based on travel exposure to China is lower compared to Europe (1% to 11% respectively)^{1,2,5}. By the end of February 2020, several countries were experiencing sustained local transmission of the coronavirus disease.^{5,6} Its rapidity of spread, morbidity and mortality have

necessitated some hard decisions with grave economic consequences globally and changed the world apparently permanently. It was declared as a pandemic on 30th of January 2020 by the World Health Organization.⁶

As at 6th of May, 2020, it has affected 212 countries and territories around the world and two international conveyances. Developed countries are the worst hit with the United States of America being the current epicenter of the world accounting for over 30% of the current global burden with the highest number of mortalities associated with the disease. This is followed by Spain, Italy and the United Kingdom. South Africa, Egypt and Morocco are the top three most affected countries in Africa with 8,232, 7981 and 5,548 positive cases respectively. The respective mortality figures in these countries are 161, 482 and 183. Nigeria is the fifth most affected country in Africa with 3,145 cases and 103 deaths.^{3,4}

The rate of infection as well as the case fatality is obviously lower in the Africans compared to the Europeans and the Americans. This notwithstanding, the burden of the

infection on the economy of the African continent is massive. It has crippled several businesses and the effect of the virus is likely to be aggravated by the means employed by many African countries to control it.^{7, 11} For instance, with the advent of COVID-19, a pack of surgical face masks that sold for less than two dollars (N500) skyrocketed and sold for 50 dollars (N18,000).

The COVID-19 pandemic is already affecting global food availability, supply chains, and purchasing practices. Panic buying and growing demand for food items are creating a strain on global supply chains while restrictions on trade and movement have had a knock on availability of food stuffs. Price increases will further inhibit equitable access to quality nutritious food.¹²

Aside the effect on economy, COVID-19 has affected several other aspects of human endeavours across the world. From schooling at all levels, to tourism, social gathering, private and government work places, humanity, health care and transportation to list a few. Shortly after the onset of the pandemic, many nations declared different grades of restriction of movement to complete lockdown. In several African countries, declaration of lockdown was accepted by others, and condemned by some, when partial relaxation of the lockdown was declared, it also met similar mixed feelings of acceptance and rejection by significant number of the populace.

This pandemic is obviously not the first and might not be the last, the grave danger with this condition is the ease with which it spreads and the fact that an infected person that is asymptomatic may transmit the disease.^{1,2,6,13} While many African nations are following step by step the management directives by World Health Organization, some self-designed pathway in tackling the novel virus pandemic and variable successful results are reported. Examples of African countries with significant strides following self-created management include Madagascar, Uganda, South Sudan, Central African Republic (CAR). All these countries had cases in excess of 100 as at 12th of May, 2020 with no single mortality. Africa has comparative advantages when it comes to COVID-19.^{3,14} One advantage is its demography. Africa is the youngest

continent in the world, with a median age of less than 20, and it currently seems that younger populations appear to suffer milder symptoms than older people, who have a significantly higher risk of expressing severe symptoms apparently due to old age and presence of co-morbidities and sub-optimal immunity.^{5,15} Madagascar, the world's 47th largest country, second largest Island Country and the 4th largest Island the world over, had a total of 193 cases and 101 have recovered and their economy has been reopened.^{16,17} This is an African nation that has produced a medication (*Madagascar's COVID-19 Organics*) which she claims to have preventive as well as a curative ability for COVID-19. The World Health Organization (WHO) has called for clinical trials of Madagascar's COVID-19 Organics.¹⁶ This is a great feat.

That the current pandemic will be resolved is not a bone of contention at any level, the focus of divergent opinions is what happens especially to Africa after the pandemic.^{5,14,18,24}

Should the continent remain naturally rich, humanly endowed but economically submissive, then she would remain broke permanently. The other option is for the continent to harness her potential and move out of the "potential" to "actualize" zone so that she can remain positively relevant in the scheme of events. This calls for discipline, transparent and purposeful leadership and followership, adequate funding for health and education, massive investment in trade, job creation, citizen vital data bank and security. Every life must be valued.

According to scenario simulations of the International Monetary Fund (IMF), global growth could fall by 0.5 for the year 2020. Several other sources are also predicting a fall in global growth due to the direct effects of the COVID-19 outbreak.^{8,5,9,11} The global economy has been projected to enter a recession at least in the first half of the year 2020, when adding the direct and indirect effects of the crisis.^{8,9} U.N. chief Antonio Guterres warned that a global recession, "perhaps of record dimensions", was a near certainty. "This is a moment that demands coordinated, decisive, and innovative policy action from the world's leading economies," he added that "We are in an unprecedented situation and the normal rules no longer apply."²⁵

As a reactive process, several Governments and policymakers the world over as well as in Africa are slashing interest rates to try to stabilize economies suffering from the impact of quarantined consumers and disrupted supply chains. The stimulus package in Nigeria was the N50bn (\$128.4m) Targeted Credit Facility.^{26,28} The COVID-19 pandemic's global cost could range from \$2 trillion to \$4.1 trillion (2.3% to 4.8% of the global gross domestic product) (GDP). Brent oil prices are expected to average \$35 per barrel this year, down from \$64 in 2019 (current price is \$30 per barrel)^{10,26}

Kevin Sneader and Shubham Singal wrote that the coronavirus is not only a health crisis of immense proportion—it's also an imminent restructuring of the global economic order and recommended that countries should act across five stages, leading from the crisis of today to the next normal that will emerge after the battle against coronavirus has been won.²⁹ The five steps were listed as Resolve, Resilience, Return, Reimagination, and Reform. This article is most recommended for most African leaders as only few have actually demonstrated resolve to tackle the crisis headlong talk less of the other four recommended stages according to this model. The summary of the stages is to produce Africans that are truly Africans in thinking and in patriotism. Africans that are disciplined and that want to take charge of their destiny. In other words, just like African trained medical practitioners are able to diagnose and treat their patients, African trained Engineers must be able to identify problems and provide solutions. Biomedical, Computer, electrical engineers and the likes must go beyond white-collar jobs. Tools needed to make life function must be produced in the continent. This is very possible. The continent has all it takes.

Africa should not need to depend on the other parts of the world to develop medication or vaccine for ailments found in Africa. There should be a great collaboration among countries and territories within the continent. This crisis will reveal not just vulnerabilities but opportunities to improve the performance of businesses. There is need to reconsider what is required versus nice to have. The most

glaring on this is the acclaimed development of a cure for COVID-19 by Madagascar, an African country. All effort should be made by the continent to support her and recommend any amendment necessary. The fact that zero mortality has been recorded is a pointer to the possibility of the efficacy of the medication. Business leaders in Africa need to anticipate popularly supported changes to policies and regulations as society seeks to avoid, mitigate, and preempt a future health crisis of the kind we are experiencing today.

In most economies, healthcare system changed little since post-World War II. It is necessary to enable the system meet a rapid surge in patient volume, managing seamlessly across in-person and virtual care. Some countries already demonstrated the capacity for this. China and United Arab Emirates are examples here. No African country is able to do this. There were recorded incidents of misappropriation of finances meant to expand medical infrastructures in this novel corona virus pandemic. Public-health approaches, in an interconnected and highly mobile world, must rethink the speed and global coordination with which they need to react. Policies on critical healthcare infrastructure, strategic reserves of key supplies, and contingency production facilities for critical medical equipment will all need to be addressed. The aftermath of the pandemic will also provide an opportunity to learn from a plethora of social innovations and experiments, ranging from working from home to large-scale surveillance. In fact, COVID-19 pandemic was the necessity that gave birth to some inventions in Nigeria when academics and students united to design and produce ventilators in a number of institutions.^{30,31} The pandemic revealed to several tailors that they are able to produce face masks, it revealed that several apparently jobless ones could be gainfully self-employed by producing hand sanitizers and/or liquid soap. It also revealed that many Engineers and technicians can be sensitized to exhibit their innovations such as seen in the production of pedal operated liquid soap, water and hand sanitizer dispensers. With this has come an understanding that several innovations, if adopted permanently, might provide substantial uplift to economic and social welfare.

In Conclusion, COVID-19 has changed many norms, forced many new orders written, provided several new opportunities. Will African leaders allow the lessons taught to stay and do good to the continent? Only time will tell. Jeroen Kraaijenbrink³² identified seven opportunities in the current pandemic. These are: opportunity for more time, opportunity to reflect and reconsider, opportunity for speed and innovation, opportunity for better meetings, opportunity to reconnect and help, opportunity for cleaner environment and opportunity for modesty and acceptance. COVID-19 is a global leveler. Unlike several previous global disasters, it gave no opportunity for the escape of the influential and government officials especially in Africa. It is no respecter of socio-economic class with several dark sides and many bright sides. Its effects will restructure many parts of the world especially those governed by selfless leaders and the nations will come out permanently better than it hit them. It teaches the human race humility that even an invisible organism can reorder the world.

We hereby recommend that post this pandemic, African governments should feel emboldened and should be supported by their citizens to take a more active role in shaping the continent's economic activity. Africa should prevent herself from the dark sides of COVID-19 and take advantage of the bright side. We should be ready to uphold the discipline we have acquired already and ensure that the continent is a better version of herself after the pandemic. Quality education with the capability to produce a world class machinery, medication, materials of global demands and profitability from scratch to completion should be the norm. Africans should produce vaccines for Africans. Government and the led must resolve to make Africa great again so that the abundant resources therein will be made to serve the inhabitants of the land and not any foreign economic power.

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A Short Communication

Mosquitoes and their Medical Importance

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ABSTRACT

Mosquitoes are vectors of many biologic agents of infection that range from bacteria, viral and parasitic infection. They cause diseases with high rate of morbidity and mortality. Plasmodium species are transmitted by the female anopheles genus and is the etiologic agent of malaria which is the major cause of absenteeism from work, school, reduced productivity, reduction in labour supply, illness and death in the tropics. Burkitts lymphoma is a malignancy that is higher in malaria endemic region. The genus culex and mansonia are the vectors of nematodes in the filariodea family. They cause spectrum of diseases ranging from eosinophillia, allergic lymphadenitis, lymphoedema and persistent infection could cause "elephantiasis". The vector of zika virus is Aedes species. It is responsible for microcephaly in fetus of pregnant women infected in pregnancy. Yellow fever is a viral haemorrhagic fever caused by a flavivirus and transmitted also by the aedes species. Vector control with proper cleaning of the environment, individual use of insecticide treated net, use of prophylactic and prompt treatment of diseases caused by them are methods that have been suggested to reduce the mortality associated with the diseases caused by these mosquitoes.

Keywords: Eosinophilia, Flavivirus, Haemorrhagic, Microcephaly, Plasmodium

LITERATURE

Vectors are either arthropods or any living thing that transmits infectious agents to a susceptible host. A vector can play either a biological or mechanical role in the transmission of an infectious agent. A biological role is played when the vector is important in the essential phase of the lifecycle of the infectious agent. The vector plays a mechanical role when it carries the infectious agents to a susceptible host on its body, limbs, body fluids and faeces.¹ Vectors include mosquitoes, fleas, ticks and mites. Mosquitoes belong to the phylum : arthropoda, Class : insecta, Order: *Diphthera*, Family: Culcidae with

Subfamily: Anophelinae and Culcinae.² Genus in this families are: *Aedes*, *Anopheles*, *culex*, *Culiseta*, *Ficalbia*, *Latzia*, *Mansonia*, *Mimomyia*, *Onirion* and *Udaya*. There are about 3000 species of mosquito, of which about 100 are vectors of human diseases.³ They have a long, slender body and long, needle-shaped, piercing mouthparts. Females of most species are ectoparasites whose tube-like mouth called proboscis pierce the host skin to consume blood. The adult mosquito measure between 2 mm and 12.5 mm in length.³ They feed on blood of vertebrates, mammals, birds, reptiles and fishes. They can survive in a variety of environment because of their special adaptational skills. They can survive in clean, dirty, small and large bodies of water.⁴

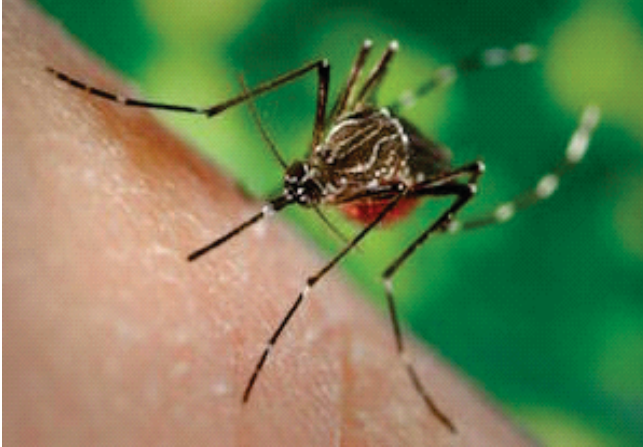


Figure 1: Picture of a mosquito⁵

They have four stages in their lifecycle. egg, larva, pupa and adult. The females usually mate only once but produce eggs at regular intervals throughout their life. A blood meal is needed to propagate the species hence the need for them to constantly bite human and animals. Female mosquitoes lay up to 50-500 eggs after a blood meal. The eggs are released through a genital opening.⁶ The egg is able to survive the aquatic environment with the hydrophilic inner surface and a hydrophobic outer surface. Factors such as water quality, incidence of light, existing eggs, available food, and local vegetation are decisive factors in selecting a favourable breeding site by female anopheles mosquito. The eggs develop after 2-7 days of been laid depending on the temperature.⁶ The Larva is legless and the body is divided into three distinct parts: (a) the head with mouth-parts, eyes and antennae; (b) the broader thorax and (c) the abdomen which is composed of seven almost identical segments and three modified posterior segments. The larval food consists of microorganisms, algae, protozoa, invertebrates and detritus.⁴ They can be classified based on their feeding behaviours into filter or suspension feeders, browsers or predators. Larvae moult four times at intervals, before reaching the pupal stage. At each moult, the head capsule is increased to the full size characteristic of the next instar, whereas the body grows continuously.

The pupa stage is aquatic, last for 2 days and is temperature dependent. Some larval organs are subsequently histolysed, whilst the body of the adult is formed through the development of imaginal disks (cells or groups of cells that remained quiescent in the larval body until the pupal stage). The adult stage develops at the completion of the final stage of metamorphosis, the males in the population usually emerge 1–2 days before the females in order to achieve sexual maturity at the same time as the emerging females. The life cycle again of mating, feeding and oviposition begins soon after the emergence into adult.⁴ The male deposits the spermatozoa in the bursa copulatrix of the female within less than half a minute.⁶ The female mosquito can only mate once whereas the male mosquito can mate several times. The female therefore stores sufficient sperm in their spermathecae to fertilize several egg batches without further copulation. The search for a host to obtain a blood-meal is the next important phase after insemination in order to propagate their kind. They are vectors and have been linked to the following illnesses

Malaria

Malaria is an old disease whose name is derived from the Italian (mal-aria) or “bad air”. It is also known as Roman fever, ague, marsh fever, periodic fever, paludism.⁷ Malaria control was revolutionalised when Dr. Ronald Ross in 1898 discovered that the female Anopheles mosquito was actually responsible for transmitting malaria parasite.^{8,9} Malaria is a disease mostly of tropical and subtropical areas, It is prevalent in sub-Saharan Africa and common in other tropical regions of China, India, Southeast Asia, South and Central America.¹⁰ Malaria accounts for 65 percent of all diseases reported in Nigerian health facilities and in 42% of pregnant women.¹¹ At least 1 million people die of malaria each year, mostly children under 5 years of age.¹² More than 80% of the deaths worldwide occur in sub-Saharan Africa.^{12,13} In Nigeria, statistics show that malaria accounts for 25% of under-five mortality, 30% of childhood mortality and 11% of maternal mortality.¹⁴ The

parts of the world that are continuously at high risk of malaria are predominantly the poorest.¹⁵ Malaria is the major cause of absenteeism from work and school in Africa and reduced productivity, reduction in labour supply, illness and death.¹⁶ *Plasmodium falciparum*, *Plasmodium vivax*, *Plasmodium ovale* and *Plasmodium malariae* are the four known species of Plasmodium genus that transmits malaria. *Anopheles gambiae*, *Anopheles funestus*, *Anopheles arabiensis* and *Anopheles melas*. *A.arabiensis* species are the anopheles species that are vectors of this parasite.¹⁷ Over 80% of malaria infections are caused by *P. falciparum* while up to 15% are caused by *P. malariae* and less than 5% are caused by *P.ovale* infections.^{17,18} Variation in climatic conditions has profound effect on the life of a mosquito and on the development of malaria parasites. Temperature and humidity are the most important factors. The best conditions for the development

of Plasmodia in the Anopheles and the transmission of infection are when the mean temperature is within a range of 20-30°C while the mean relative humidity is at least 60%. A high relative humidity lengthens the life of the mosquito and enables it to live long enough to transmit the infection to several persons.¹⁹ The lifecycle of malaria is shown in the diagram below

The symptoms of uncomplicated malaria include headache, fever, jointaches, reduced appetite and bitter taste. That of complicated malaria include : coma, DIC, kidney failure and Acute respiratory distress syndrome. The group of individuals that are most vulnerable to complicated malaria are children, pregnant women, immunosuppressed patients and immigrants from malaria non endemic areas. Drugs that were used in the past to treat malaria include: Chloroquine, Quinine, Sulphadoxine/

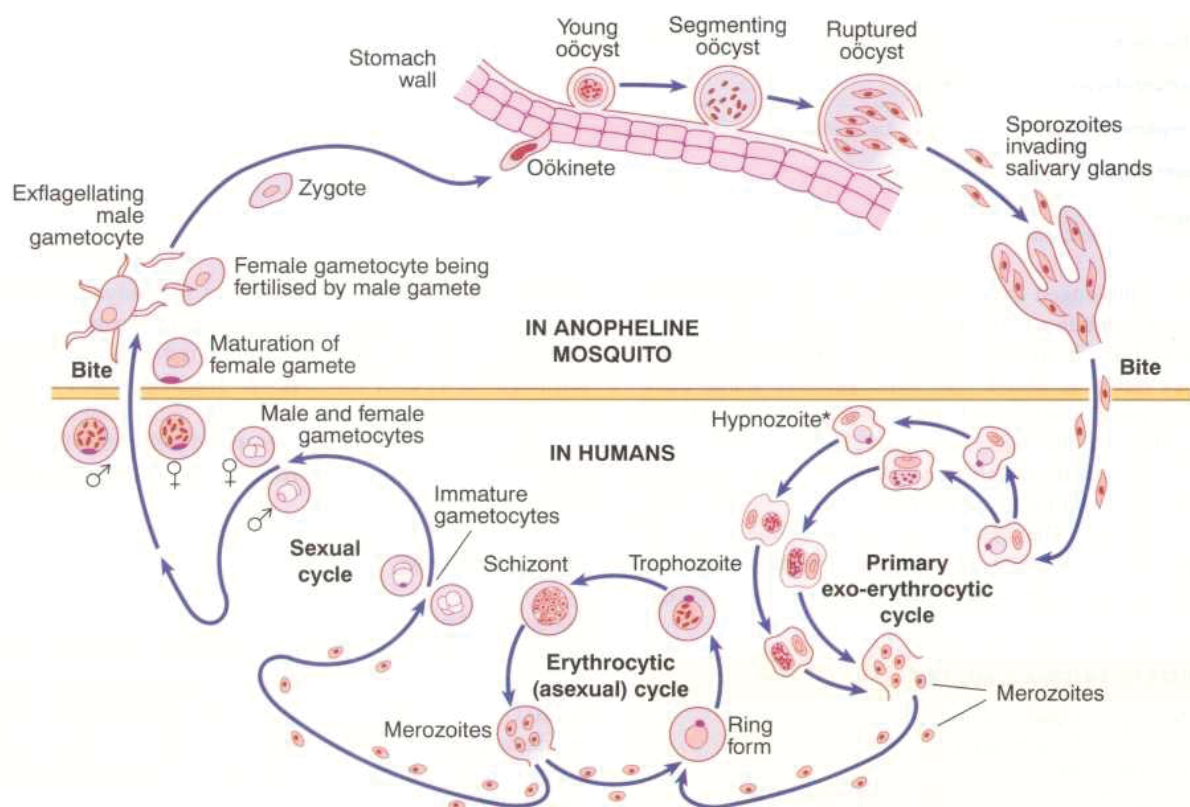


Figure 2: Malaria parasite life cycle.²⁰

Pyrimethamine and halofantrine .The WHO now advocates the use of Artemisinin Combination Therapy for the treatment of malaria.²¹

Burkitts lymphoma : was first discovered in Uganda, East Africa by Dr Denis Burkitt about 5 decades ago. The incidence of BL has increased in the endemic areas in Africa in recent years, overlapping with the epidemic of HIV and malaria in the region.²² It results from translocation of cmyc oncogene from 8 to 14. Several forms of Burkitt Lymphoma exist depending on its geographic distribution, incidence magnitude and risk factors .Endemic BL (eBL) is the disease originally described by Burkitt and largely found in Africa, characteristically affecting the facial skeleton in children between ages two to nine. Sporadic Burkitt's lymphoma (sBL) is the form subsequently described outside the African region, morphologically similar to eBL and affecting the abdomen mainly. It has no age specificity. A third subtype has been proposed based on its association with HIV infection. It is well described in the developed world and known among HIV positive adults in Africa. The likelihood of the disease among HIV positive children has not been well characterized.²³ It presents with swelling of the facial skeleton with CNS involvement. A starry-sky pattern is usually present, imparted by numerous benign macrophages that have ingested apoptotic tumor cells . Despite that Burkitt has been linked to EBV (lymphotrophic gamma human herpesvirus widely spread among humans).²⁴ *P. falciparum* role in its development has been suggested by the shared geographic distribution of eBL and holoendemic malaria. Both diseases show highest incidence rates in the lymphoma belt or malaria belt, an area around the equatorial Africa (+/-10°C) where average temperature exceeds 15.5°C and have yearly rainfall higher than 50 ml. The suggested pathways by which both infections could induce eBL include the fact that malaria could disrupt immune response against EBV, leading to BL. A reduction of BL incidence was observed in areas where malaria was eradicated.²⁵

Filariasis

Filariasis is caused by several nematodes in the *filariodea* family which infects humans. Larva stages are inoculated by the flying mosquitoes. These larvae develop into adults and produce millions of microfilariae after mating and migrate in the blood or skin.²⁰ Disease caused by the adult worm or the microfilariae is due to the host immune response to the parasite and its characterized by massive eosinophilia.²⁶ *Wuchereria bancrofti* and *Brugia malayi* are transmitted by *Culex* species and *Mansonia* species of mosquito respectively. Presence of the adult worm in the lymphatic system causes allergic lymphadenitis.



Figure 3: Picture of Elephantiasis²⁷

Subsequent infection will lead to lymphatic obstruction which may progress to lymphoedema. Clinical features in the acute stage include fever, pain and tenderness on the path that involves the inflamed lymph vessels. Chronic and persistent infection leads to enlargement of the regional lymph nodes and subsequently leads to “elephantiasis” The development of elephantiasis takes at least 10 years of infection and it is common in highly endemic region. Treatment is with the use of Diethyl carbamazine (DEC) which kills the microfilariae and the

adult worms. Treatment of elephantiasis may require surgical intervention. Prevention and control involves the use of insecticides and individual avoidance of mosquito bite.

Zika

Zika is a zoonotic disease that is caused by an arbo (arthropod borne) virus called Zika virus. It was first discovered in was discovered in Zika Forest in near Entebbe in Uganda in 1947 during a mosquito and primate surveillance.^{28,29} It's been 'quiet' but for some few isolated outbreaks in the state of Yap and French Polynesia until March 2015 whole world went agog when an exanthematous illness was identified in Brazil and had spread to about 14 Brazilian State and Columbia by October 2015.³⁰ This same mosquito borne viral illness was declared a Public Health Emergency of International Concern by WHO on the 1st of February 2016.³¹ It is an RNA flavivirus transmitted majorly by a bite from *Aedes* species of mosquitoes. *A. aegypti* which is well distributed in the tropical and subtropical region and *A. albopictus* which exists more in the temperate region.³² The Zika virus is neurotropic in that it is attracted to neural cells.³³ This explains how it destroys the growing fetal neural tissues causing a teratogenic effect of microcephaly. Microcephaly is defined as a head circumference that measures more than two standard deviations below the mean for age and sex.³⁴ It is a major cause of mental retardation, seizure disorder and developmental delay. Zika virus also causes meningo-encephalitis in adults. It is said to be the only virus that has teratogenic effect and this shows that mosquitoes can cause diseases with serious deleterious effects like monstrous babies.

Yellow Fever

Yellow fever is caused by a flavivirus. It is a zoonosis of monkeys that inhabit tropical rainforest in West and Central Africa and South and Central America. transmitted among humans in urban areas by *Aedes aegypti* by

mosquitoes living on tree tops *Aedes africanus* and *haemagogus* in Africa and America respectively.²⁰ It causes 200,000 to 300,000 death per year mainly in the Sub Saharan Africa. It has an incubation period of 3-6 days. Clinical features include high fever and rigors, backache, headache, bone pains, nausea and vomiting, jaundice, haemorrhagic diathesis, haemorrhages into the mucosa, gastrointestinal bleeding and oliguria. management involves fluid and electrolyte balance with fluids, monitoring urine output and blood pressure, Use of plasma expanders and blood transfusion may be necessary. Patients should be isolated and contacts should be quarantined.¹ Yellow fever has been incorporated into the Expanded programme on immunization for infants and persons entering or leaving an endemic area are required to possess a valid certificate of vaccination. The certificate is valid for 10 years after which the person is requested to be revaccinated.

CONCLUSION

Mosquitoes are important vectors of many communicable diseases. The diseases caused by the organism they carry are major causes of morbidity and mortality. A lot has to be done in the area of mosquito control, prophylactic and prompt treatment of infection and reducing the complications of the infection caused by them.

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