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Cover Picture:

The Unique Riyom Rock Formation, one of the several wonderful rock formations of Jos

Modified from Source: *http://omgvoice.com/lifestyle/rock-formations-jos-plateau-state/*

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TABLE DES MATIÈRES

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MISSION

The Bingham Journal of Medicine (BJM), a publication of the College of Medicine and Health Sciences and the Bingham Medical Society, is for clinicians, scientists andothers interested in the field of medicine and other biomedical sciences. The Journalwhich accepts articles in English aims to educate clinicians, improve the life and care ofpatients, stimulate and disseminate findings from research in medicine and allied biomedical sciences and related areas and provide a forum for the documentation and exchange of information in the clinical and biomedical sciences.

MANUSCRIPTS

The Journal accepts only articles that have neither been published nor are being considered for publication by any other journal. BJM publishes reports of

experimental and clinical work on all aspects of research in medicine, and related subjects and disciplines. Manuscripts must be written in the form suggested in the Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication by the International Committee of Medical Journal Editors. http://www.icmjc.org/urm_full

A detailed general write-up on "Information for Authors" is given at the ICMJE reference (….) . This site/article should be consulted by all potential **BJM** authors. BJM will publish contributions dealing with all aspects of medicine and related disciplines. Articles submitted to BJM should fall into one of the following categories:

(a) Original research article
(b) Brief communications and case reports
(c) Medical education matters and issues
(d) Reviews and meta-analysis
(e) Conference and Workshop reports
(f) Supplements
(g) Editorials and commentaries
(h) Correspondence (Letters)
(i) Patient vignettes and quizzes
(j) Book Reviews
(k) Medical and Health News
(l) Miscellaneous (memoranda, prose, poetry, socio-political issues, etc.).

The full manuscript, which should be in UK English (with abstract in both French and English and of no more than 250 words), is to be submitted electronically including full set of tablesand figures. Authors should submit an electronic version of the manuscript (using point size 12 of New Times Roman) and illustrations to bjmedicine@yahoo.com. Manuscripts should be typed double-spaced throughout (including references and tables) and sent to the Editor-in-Chief at the above address.

The manuscript should be organised under the following sections:
(1) Title page; (2) Abstract; Keywords (using MeSH of Index Medicus); (3) Abbreviations; (4) Introduction; (5) Subjects/Participants, Materials and Methods; (6)Results; (7) Discussion; (8)Acknowledgements; (9) Conflict of Interest (if applicable); (10) References;(11) Tables; (12) Figures; (13) Legends to Figures.

Appropriate variations from this outline apply to such contributions as memoranda, editorials, commentaries, prose and poetry etc. Abstracts of original contributions including case reports should be structured into Background; Objectives; Methods; Results, Conclusions, and keywords.

The title page should contain the title of the article, the names, highest degree, appointments and affiliations of the authors as well as a suggested running title and the details of the corresponding author.

References citing journal titles should be spelt out as in Pubmed/Medline. Tables and legends should be provided in line with the "Uniform requirements for manuscripts submitted to Biomedical Journals." (1)

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Data are not to be sliced to the size ofthe smallest publishable unit but should be a complete documentation of a study. Contributors are requested to disclose any conflicts of interest that might bias their work. They should acknowledge in the manuscript all financial support for the work and other personal connections.

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Corresponding authors should ensure that:

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BINGHAM JOURNAL OF MEDICINE (BJM)

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Section B: **Brief Communications and Case Reports**

Examples of these include unique case reports, clinical experiences, reports of adverse drug effects, and short reports of original research. The text should not exceed 1,500 words, with a total of three figures and/or tables or less; and no more than 15references. The format should be as for a standard paper.

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Included here are important innovations in medical education for clinicians as well as continuing professional improvement. The text length and other requirements are as for an original research publication.

Section D: **Reviews and Meta-Analyses**
Detailed systematic and critical evaluation and meta-analysis of the literature on clinical practice topics, drug therapy, mechanisms of disease, current concepts on clinical topics, or other topics of scientific or clinical interest. These will normally be submitted on request but the EIC will also entertain unsolicited contributions. The maximum length should be 5,000 words and should contain sub headings (maximum three sub-sub heads). Maximum number of 60 references and 10 Tables/illustrations.

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Section F: **Editorials and Commentaries**
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Section G: **Correspondence**
Letters to the Editor should contain a maximum of 600 words, five references and no more than two illustrations and/ or tables. Letters may be on matters concerning clinical observations, other matters of clinical relevance or reactions to articles published in the *Journal*. Correspondence should be typed double-spaced and submitted in duplicateby e-mail. Accepted letters may be edited before publishing.

Section H: **Miscellaneous**
These include book reviews, prose (100 words) and poetry (60 lines), socio political issues related to medical care and personal opinion or issues for debate (maximum 2,000 words).

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Number the manuscript pages consecutively starting from the title page through the tables. Each of these subsections should be started on a new page in the sequence given above.

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The abstract should either be structured (maximum 250 words) or unstructured (150 words or less) depending on the type of article. Articles that need structured abstracts include original research papers, case reports, reviews and meta analyses and brief reports. Other contributions may be provided only with a 150-word summary in the conventional manner. In any event the abstract should include the purpose, methods, results and conclusions. Editorials, correspondence, commentaries, prose and poetry and similar contributions should not carry abstracts.

Structured abstracts should be provided as follows:

(i) **abstract for original contributions, case reports and brief reports should consist of the following sections:** (a) Background and objectives, (b) Methods which should include design, participants, materials, setting and measurements (c) Results and (d), Conclusions.

(ii) **A review article abstract** (including meta-analysis) should be organised into the following sections: (a) Background/Purpose, (b) Data sourcem (c) Study selection, (d) Data extraction, (e) Results, and (f) Conclusions.

Keywords: Provide four – ten keywords or short phrases that can be used for indexing, immediately following the abstract. Use terms from *Index Medicus Medical Subject Headings (MeSH).*

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Give each column of the table a short heading. The units in which results are expressed should be given in brackets at the head of each column. Place explanations in the footnotes but not in the heading. For footnotes, use the following symbols in the given sequence in order from left to right or from top to bottom in the body of the Table *, †, ‡, §, ¶, **, ††, ‡‡, §§ etc. No internal horizontal or vertical rules should be used in the table. If a table **must** extend beyond a page, repeat the title followed by "contd" and repeat the column headings.

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Present units of scientific measurements in the units in which the research was conducted (with the conventional or SI equivalents in parentheses) in the text. In a table or figure, a conversion factor should be provided as a footnote

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Acknowledgement of general, financial and material support or technical and secretarial help etc. should be indicated at the end of the main text. It is the responsibility of the authors to obtain consent of those being acknowledged.

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The references should be numbered as superscripts in the order in which they appear in the text, tables, or legends. References should be in the Vancouver style, as laid down in the "Uniform Requirements for manuscripts submitted to Biomedical Journals (1)".

At the end of the article the full list of references should give the surname and initials of all authors unless there are more than six, when only the first six should be given, followed by *et al*. The author's name should be followed by the title of the article, the title of the Journal abbreviated as in *Medline*, the year of publication, the volume number and the first and last pages. For books, the references should follow the following format: the author, title of book, place of publication, the publisher, the year and the relevant pages. Journals not listed in *Medicine* should be spelt out in full.

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1. *Standard article:* Adeja M, Moses J, Emuh P. Effect of Exercise on Glycaemic Control in Patients with Type 2 Diabetes Mellitus. Bing J *Med* 2016; 1: 45 –49.

2. *Standard article:* Adeja M, Moses J, Emuh P, Williams MK, Odjede YT, Okums GK, *et al*. }revalence of hypertension among Secondary School Students in Jos Metropolis. Bing J *Med* 2016; 2: 67–71.

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      Makamer EN. *Diabetes mellitus for Medical Students*. 6th ed. Nairobi. Princess Publisher; 1990.

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4. *Volume with Supplement*
   Shen HM, Zhang QF. Risk assessment of nickel carcinogenicity and occupational lung cancer. *Environ Health Perspect* 1994;102 (Suppl): 1275–82.

5. *Issue with supplement*
   Payne DK, Sullivan MD, Massie MJ. Women's psychological reactions to breast cancer. *Semin Oncol* 1996; 23(1 Suppl 2): 89–97.

6. *Volume with part*
Ozben T, Nacitarhan S, Tuncer N, Plasma and urine sialic acid in non-insulin dependent diabetes mellitus. Nig *Ann Clin Biochem* 2014; 32(Pt.3):33–56.

7. *Type of article indicated as needed*
Enzensberger W, Fischer PA. Metronome in Parkinson's disease (letter). *Lancet* 1996; 347:1337.

8. *Personal author(s)*
Ringsven MK, Bond D. Gerontology and leadership skills for nurses, 2nd ed. Albany (NY). Delmar Publishers; 1996.

9. *Editor(s), compiler(s) as author*
Norman IJ, Redfern SJ, editors. Mental health care for elderly people. New York. Churchill Livingstone; 1996.

10. *Conference proceedings*
Kimura J, Shibasaki H, editors. Recent advances in clinical neurophysiology. Proceedings of the 10th International Congress of EMG and Clinical Neurophysiology. 1995 Oct 15-19, Kyoto, Japan. Amsterdam: Elsevier, 1996.

11. *Conference paper*
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12. *Dissertation*
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13. The Holy Bible. King James version. Grand Rapids (MI): Zondervan Publishing House; 1995. Ruth 3:1 – 18. 1973.

Electronic Material

13. Journal article in electronic format Morse SS. Factors in the emergence of infectious diseases. Emerg Infect Dis (serial online) 1995 Jan-Mar (cited 1996 Jun 5); (1):(24 screens); Available from: URL: http/www.cdc.gov/ncidod/ EOD/eid.htm.

14. *Monograph in electronic format*
CDI, clinical dermatology illustrated (monograph on CD-ROM), Reeves JRT, Maibach H. CMEA Multimedia Group, producers. 2nd ed. version 2.0 San Diego. CMEA: 1995. Hemodynamics III the ups and downs of hemodynamics (computer program). Version 22. Orlando (FL). Computerized Educational Systems, 1993.

15. *Journal article on the Internet*[Edited 12 May 2009]
Amos BM. Quality improvement initiative in nursing homes: the ANA acts in an advisory role. Am J Nurs [Internet]. 2002 Jun [cited 2002 Aug 12];102(6):[about 1 p.]. Available from: http://www.nursingworld.org/ AJN/2002/june/ Wawatch.htmArticle

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1. **Consent:** All manuscripts reporting experiments in human beings must be accompanied by a statement in the method section that the authors have complied with the requirements of the local ethical committee. If investigators have no access to an ethics committee, the principles outlined in the Helsinki Declaration (2) should be followed. Avoid using patient's names, initials or hospital numbers. If full-face photographs are to be used, such photographs must be accompanied by a signed or thumb printed informed consent of the person. Animal experimenters must also follow the institution's guidelines on the use of laboratory animals in research.

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The criteria for authorship are as expressed in the Uniform Requirements (1) which state that "authorship credit should be based only on substantial contribution to":

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Authors should meet conditions a, b, and c. Collecting and assembling data reported in a paper are not, by themselves, qualifications for authorship. The corollary also should not be over looked i.e. those who meet criteria for authorship should not be excluded.

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4. Previous and Redundant Publications
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1. International Committee of Medical Journal Editors. Uniform requirements for manuscript submitted to Biomedical Journals.http:// www.icmjc.org/urm_full

2. 41st World Medical Assembly. Declaration of Helsinki's recommendations guiding Physicians in Biomedical Research and involving human subjects Bulletin Pan-American Health Organisation.1990; 24: 606–9.

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BINGHAM JOURNAL OF MEDICINE

Editorial

We are most delighted to introduce to you the maiden edition of the *Bingham Journal of Medicine* (BJM), a publication of the College of Medicine and Health Sciences of the Bingham University and the Bingham Society of Medicine.

Our mission is to provide a forum for the dissemination and sharing of research findings that will enable all serve humanity better. In so doing, we would be bringing the fruits of "studying for excellence and wisdom" to the calling of our profession.

In this maiden edition, Professor Parry addresses our first medical graduates, the core message of which is the need *to serve the Lord through service to humanity*. Nothing could be more apt for any academic or practising christian doctor.

The birth of BJM coincided with the induction of our first set of doctors. It was worth celebrating. However, the celebrations were almost marred by the death of Professor Felix Idowu Anjorin, the idefitigable pioneer Provost of our Medical School and a former Vice-Chancellor of the Bingham University. His loss could not have come at a more difficult time, a few days to the emergence of his first set of medical students.

Diffult to question why the Lord calls at a particular time. Professor Anjorin did and sacrificed everything to ensure the take-off and sustainance of the Medical School. As we mourn his departure in the manner good christians do, we are consoled that Felix fought a good fight. He accomplished his mission. The rest – knowing him – is to be at peace with his maker, having served humanity and the Lord.

We can use the Bingham Journal of Medicine to serve our Lord through serving humanity. Join us in this unique service to the Lord through studying for excellence and wisdom by sharing your research findings with us.

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Professor Augustine E. Ohwovoriole
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MEMORANDUM

Serve the Lord Truly by Serving Humanity

An Induction Address to the First Medical Graduates of the College of Medicine and Health Sciences by Professor Sir Eldryd H. O. Parry, Founder of Tropical Health and Education Trust on 19th March 2015, at Bingham University, Karu, Nasarawa State, Nigeria

Mr. Vice-Chancellor, Provost College of Health Sciences, Registrar Nigeria Medical Council, friends, colleagues; I am deeply honoured by your invitation to give an address at this historic occasion and to share with you the triumph which your University celebrates today, yet while it is a time of celebration it is also a time for reflection for all of us. Many of you will know the reason for this statement. My invitation to address you today was sent, on behalf of the University, by my dear friend, my colleague and my former student, but also my brother in Christ, Professor Felix Anjorin. His earthly race has been run, he now enjoys the invitation to enter the joy of his Lord, welcomed with wonderful words, "Well done, good and faithful servant". We celebrate the University which he struggled to develop, we celebrate you, the graduates whom he and many others have laboured to educate and equip. He now joins the great cloud of witnesses before whom we who remain are called to run the race set before us with endurance, the race which Professor Anjorin has now run, and the race which, with his example, we must run, as the writer to the Hebrews urges us, "looking unto Jesus".

Professotr Anjorin's invitation to me gave an outline of what he wanted me to say in my address; I quote his words - **"to challenge our young graduates to ensure that they serve the Lord truly by serving humanity in ways that bring glory to our Lord and Saviour Jesus Christ and dignifying to humanity."** I shall now try to do this and to put his instructions into words which you will remember and which I hope will help and guide you in the years of professional life which stretch out before you.

First this morning, I should like to congratulate those who had the vision to dream of the possibility of Bingham University producing its own medical graduates, and who then had the courage and the resolve to put their shoulders to the task. I know well the demands of a new medical school, I know well the difficulties, I know well the disappointments, but I also know the delight of success, the celebration of achievement and the exultation of the community which surrounds the first group of graduates. We celebrate today not only the graduates, but their proud mothers and fathers and their families.

My address has three parts, first what it means to be a doctor, second what must characterize a Christian in the twenty first century and third, how the graduates of Bingham can be examples of service to the people of Nigeria in the years ahead, by marrying the chief lessons of the first two parts.

Our Secondment to UCH Ibadan

I want, however, before we consider these critically important matters, to tell you a little about my experience of your country.

In 1960, two weeks before the Nigerian flag was raised over a newly independent Nigeria, my wife of a little less than three weeks and I disembarked at Apapa wharf after sailing from Liverpool in the United Kingdom. We came to the department of medicine at University College Hospital, Ibadan, on secondment from my post at the Hammersmith Hospital, Royal Postgraduate Medical School, London. UCH Ibadan had all the intensity of a fine teaching hospital and, before the end of that year, it enjoyed all the wonder of producing the first indigenously trained Nigerian doctors. We practised classical clinical medicine with a strong scientific base and so, unconsciously, we set a standard for all subsequent medical schools in Nigeria.

We came to Nigeria expecting to stay for only one year but l loved our teaching hospital work and, although the secondment was officially for one year, it became two and a half years. Those years irrevocably changed our lives and sent us back to my post in London with the hope perhaps of returning. Then, in our second year in London, when I was putting the final touches to my doctoral thesis on Endomyocardial Fibrosis, I was asked whether I would be interested in taking a teaching post in the new Haile Sellassie I University Medical School in Addis Ababa, Ethiopia. After a prospective visit to the country, and with the support of the Wellcome Trust, we accepted the invitation to leave a career in the United Kingdom; our little family flew to Ethiopia in January 1966.

It was the very beginning of Ethiopia's own medical school, just as Ibadan had been. All that we did was new, and yet our model was the classical model of a scientifically based modern medial school. There was little space for innovation, our responsibility was to establish a medical school which would provide the country with the doctors that it so desperately needed. Those who have not had to go through the prolonged labour of a new medical school may assume that innovation is easy; it is never easy, primarily because the medical profession resists change and because statutory bodies, which have to approve new ideas because they are responsible for national standards, prefer safety and convention over risk and innovation.

Academic medicine in those cooler highlands was

intensely interesting and, importantly, we also thrived as a family. The ancient culture, the raw disease, and the opportunity to shine the light of clinical science on historic plagues such as louse-borne relapsing fever, provided a clinical and cultural feast.

Invitation to Zaria

We had always wondered whether we might return to Nigeria, not least because we had seen a note in *the Lancet* about a new medical school in Zaria. Then, to our astonishment, in the middle of our third year in Ethiopia, I had a letter from the Vice Chancellor of Ahmadu Bello University, Zaria, Dr Ishaya Audu, a paediatrician whom I had met in London when he was doing postgraduate training; his letter invited me to come to Zaria as Professor of Medicine. It was a dark time, war raged and Lagos was empty of visitors when I flew from Addis Ababa in July to see Dr Audu in Zaria. It did not take us long to accept the invitation and, although it was very hard indeed to say good bye to so much in Addis Ababa, we flew directly across Africa to Lagos and then on to Kaduna in February 1969.

While we celebrate new graduates today, we should at the same time celebrate that great Nigerian, that fine paediatrician, that single-minded Christian, Professor Ishaya Audu. As Vice-Chancellor of ABU he insisted that the University would serve areas of the country which desperately needed skilled and trained people. I was a member of the Admissions Committee of the Faculty of Medicine, which often sat late into the evening as we grappled with dis-advantage and as we tried to find fair and practical solutions for admission. I had to learn the map of Nigeria intimately and particularly the minority areas of much of the country. It was our policy that those with less privilege and without early advantages could gain admission and would not be crowded out by students who had enjoyed good secondary education at the many good schools from which they could choose. At no stage did we compromise minimum and basic standards. It was a necessary, humane and strategic policy. Amongst those early students in the Medical Faculty in Zaria were some of the pioneer teachers here at Bingham University. The pioneer students in Zaria proved that the products of a new medical school set the tone for its future and for the reputation which it may acquire. It is they, not their teachers, who are its ambassadors and who will thus be used by outsiders to judge whether it is successful. Bingham will be judged by you, by today's graduates.

The Zaria Pattern of Education

I emphasise that the training at UCH, Ibadan, was the best that a classical clinical training could be; while we were determined to do this also at ABU, we also resolved to consider our patients in the context of their home, their family, their village. When clinical teaching was well established, Oxfam gave us a Peugeot pick up which we modified to take students so that on Friday afternoons I was able to go with a load of students to the home of a patient, or we would take a patient who was ready to leave hospital to their home. I wanted our students to try to understand, and in some cases even to cost, the burden on the patient of their disease, or the burden of having to return to hospital. For some students this was a new experience of rural reality, indeed one student once said to me when we were in a remote village, "I did not know that there were all these people here". In those days we did not talk about poor people, we just served them, whereas now, the business of development both numbers and measures poverty and its obliteration within its targets.

I have given you this short history so that you can put your own training and education here at Bingham in the context of the wider development of relevant medical education in Nigeria.

Essential Values for a Doctor

Allow me to ask you a question; how in your practice in the twenty-first century, can you put your ideals as a new member of our ancient and I hope, still respected, profession?

Let me give you some absolute essentials; I have not set them in their order of importance, but they have a logical sequence, yet they are still just my list.

First, you will work hard and conscientiously; you will not look for every little opportunity to cut corners, to be less than thorough, to scribble something in a case note folder instead of writing carefully and legibly.

The Health Team

Second, you will work with your colleagues as a member of a team, and not just as an individual. Medicine is changing all over the world; the era of the unchallenged individual has passed. In any forward looking and scientific medical school there is no place for a senior physician, for example, who speaks dogmatically, who goes unchallenged, and who denies his students the opportunity to think. Today's physician must now bring evidence to support what he says, or to refute what someone else has proposed. This leads to a healthy environment of enquiry and learning, a questioning and critical approach to clinical evidence, which is an ideal culture medium for tomorrow's doctors.

In the medicine of today, however senior an individual may be, that man or woman is no more than one member of a team, of which they may or may not be the leader. You will have to work alongside others in a clinical or community team and you will have to learn to respect the other members of the team and the parts that they play. Let me illustrate this from my current experience in Ethiopia where, based upon two rural teaching hospitals, my colleagues Dr Yoseph Mamo and Dr Shitaye Alemu have pioneered the rural care of patients with chronic disease, for example rheumatic heart disease, epilepsy, diabetes. This decentralized programme is revolutionary for poor village patients; they are saved the cost and the disruption of travel to a health centre, thus their follow up improves and they learn to trust the health team at their local health centre. The programme is led by a team and not by an individual and the overall supervision and training of the staff at the health centres are given primarily by our managing nurse. I have sat with him in a health centre clinic and have been amazed at his clinical antennae, his understanding of the diseases, and his good relationship with

his patients and colleagues. Through the training given to them by this nurse, the nurses, pharmacists and health officers at health centres have become part of an essential clinical team. If each of you could have seen such a professional individual, you would have needed no persuasion that you could learn within that team. I hope that all of you are ready to learn from such people.

Third, if you are the leader of a team, you will do all you can to bring the best out of everyone in the team. Thus you will not exercise hard authority over the others, rather you will encourage its members, you will help each one to contribute their part, you will make each one feel valued. Then and only then will they in their turn give of their best.

Let me tell you a story: when I was working at ABU Hospital, Zaria, I was too hard on some of the juniors and too ready to be critical of them. I still have to be careful as I can find myself being too critical of colleagues even now. One day, two of my junior colleagues came to me and said that I should not be too hard on them. It was brave of them to warn me; I was deeply humbled by their approach and I went away, like Peter, and wept bitterly. They did me a great service, they were not angry, rather they just wanted to help me to relate to them and the other juniors in a positive and good way.

Fourth, you will treat your patients with the same courtesy whoever they are, a daily paid labourer or a high ranking official. Allow me to ask you, are you a big enough person to be able to relate to a really poor patient? Will you be ready to give dignity to the weak and insignificant, will you treat them as real people, mothers, fathers, orphans, whoever they are?

Let me give you an example; in the first few years at ABU we took our students across the country to Adamawa, from Zaria to the leprosy hospital in Garkida, to learn from the great Dr Roy Pfaltzgraff. I only remember one patient; he had lost the fingers of both hands to leprosy, he was illiterate, the sort of person who could be quietly forgotten and disregarded. But Dr Pfaltzgraff had a better way, he saw this poor and deeply disabled man as a precious person, a man for whom Christ died, a man who could be served and whose humanity could be dignified through such service, if I may again use Professor Anjorin's words. Pfaltzgraff gave the man without fingers, poor and insignificant as he was, a job which he could do, of which he could be proud, and through which he would have his own part to play in the economy of the leprosy hospital. He was made the bell ringer; unable to hold the rope without fingers, he could bend his arm and hold the bell's rope in the bend of his elbow. Now he was a person who could hold his head high; what medicine, what humanity, what dignity!

Continue to Learn

Fifth, you will recognise that your learning has only just begun; do not stop your reading and your study. Learn to love your work, get excited about learning, about meeting new and interesting clinical problems, about growing up as a young enquiring doctor. As a more mature learner, you will take responsibility for your own learning. Do not wait to be taught by others, set aside time to learn. Much of medicine is visual, and there is no short cut for clinical experience. As part of this learning, you will be ready to admit your mistakes, which will be difficult if, in your culture, you will expect to be respected and admired. It will be difficult for those of you who like to be right and who like to show others that you are right, this may be a very troublesome part of your learning.

As you learn, so you will want to contribute academically to your profession, and practically to the care for which you are responsible

Endurance

Sixth, you will have to learn not to give up when the going is hard, when you seem to be stuck, both because there is so much work to do and because you feel burdened by its demands on your time, on your mind and on your leisure, and when circumstances are against you, whatever these may be. Last week I reread a letter that I received from Dr Ishaya Audu only two years before he died; he wrote that very few Christian preachers warned that believers would, in this transient world, endure tribulation. He was lamenting the unhealthy teaching about success and prosperity in Nigeria at that time; he denounced this prosperity teaching as it was diametrically different from the tribulation which was promised by the Carpenter of Nazareth. Audu wanted to warn those who would listen to him against the distorted values which excluded endurance and the determination to go through difficulties and overcome them.

Seventh, you will follow the high ethical standards of behaviour and of decision-making that have been set out by the Nigeria Medical Council and other associated bodies.

Responsibility of the Christian Doctor

All that I have just outlined I would be ready to present at any medical school, but yours is not just any medical school, the Christian foundation of Bingham has to be the foundation of your practice; your professional values will be Kingdom values and your professional compass will be set for the glory of God.

This is not an easy path as I have just suggested from Professor Audu's letter.

In whatever society you are living you will have to be ready to be known as a Christian, this may be difficult and even lonely; you are certain to have to swim against the tide, to deal with a clash of values. Let me give you a recent personal example; I was a member of a Medical Association which, in a dispute over money with Government, said that it would call its members out on strike and they would therefore withdraw their services. Some friends and I reckoned that this was immoral, how could we refuse to treat someone as would happen if we withdrew our services? So we resigned from the Association.

You may be challenged in a different way, perhaps related to personal gain. This is the lot of every Christian in any society. In some parts of the world now, as you well know, genuine faith is tested to the very limit.

It is now 2015 and you may reasonably ask me who do I think that I am, a foreigner, *bature*? Who am I, a

visitor who has not lived in Nigeria for thirty five years, who am I to set out a pattern for you?

I do so because I have been invited to give this address today, a precious opportunity to tell you what I believe, and to pronounce again the Kingdom values which we share, you and I, as brothers and sisters in Christ primarily, and as those who are colleagues in our profession secondarily, and also to tell you how we should live and work within medicine.

The New Testament is rich in its practical guidance for every day living as a Christian. In the early Church, Christians were described as those who belonged to the Way, they were distinctive. They had exchanged the values of a classical, Roman and Greek culture for the values of One Who had lately been numbered with those who had broken the law, the transgressors, One Who had been despised and rejected, One who had nowhere to lay His head, One Who was called the Friend of sinners. Here is your role model.

Some years ago I was gripped by the title of a book *Christian Counter Culture.* The author was one of the most distinguished practical Bible teachers of the last century, the Reverend Dr John Stott. His book applies to today's world the matchless truths of Christ's Sermon on the Mount.[1] This is where you can start. Time and again Dr Stott emphasized, so that no reader could be in any doubt, time and again he comes back to his theme, the new way - "you have heard *that it was said*, when the law of Moses shaped the culture of the community and the behaviour of the people of God, *but I tell you…*" where His law of love and His deeply countercultural teaching would challenge values and set a wholly new level of Kingdom values. In that sermon, *You have heard that it was said, Love your neighbour and hate your enemy, but I tell you "Love your enemies and pray for those who persecute you"*[2]

This is the radical realm of behaviour where all those who call themselves Christians belong. These are Kingdom values. These are the values, this is the ethical culture, this is the fulcrum for your life and behaviour, and therefore this has to be the fulcrum for your clinical practice.

There is enough in that great sermon for you and for me; it was dramatically counter cultural, love for enemies, giving to those in need, attitudes to personal possessions and wealth; there is enough to challenge our conformist and comfortable Christianity; there is enough to make one ask questions about how can a vibrant personal faith be shown in 2015? There is enough for us to examine the practice and the rewards of medicine to day. Where will your faith give you a wider horizon?

I described above some of the basic characteristics which must be evident in any doctor; but there is more for you and for me if we call ourselves Christian. I know of no passage of Scripture which expresses quite simply what this more is. The apostle Paul had been teaching in a busy metropolis, a commercial crossroads, a port and town with advanced worship of the goddess Diana; it was Ephesus. He called together the elders of the small Christian community, he had come to say goodbye. He said, "*you know how I lived the whole time I was with you, I served the Lord with great humility…… you know that these hands have supplied my own needs and the needs of my companions; in everything I showed you that by this kind of hard work, we must help the weak, remembering the words the Lord Jesus Himself said," it is more blessed to give than to receive"*[3]

First, he was consistent *I lived the whole time;* consistent day in, day out.

Second, he did not push himself, he did not boast of himself yet he was a man of massive learning; he did not stand on rank, yet he was a man of the privileged birth of a Roman citizen, who *served the Lord with great humility* among ordinary dockworkers and merchants.

Third, he expressed his humility by doing ordinary everyday labour.

Fourth, having given of himself, so that he would not be a burden on the members of the church at Ephesus, he demonstrated practical giving.

Fifth, he sought to help the disadvantaged, the weak, whether in body, mind or position in society it does not matter; he did it for the weak.

Now let us bring this example into Nigeria 2015.

First, wholeheartedness; Scripture is rich in its commands that, whatever one's hand finds to do, one should do it with all one's strength. Paul's conscience was clear, not only had he lived and taught among them but he was so determined to take nothing from them and thus not to take advantage of them, so that what he said is a model for all of us here today.

Wholehearted hard work, but more than that, he did the sort of thing that an educated privileged man in his position would not be expected to do. This is no easy road, it is so countercultural, so against the image of the big man, of the important woman. But what a wonderful testimony to a man's character, to a woman's dignity, what wonderful words to be said of someone, he helped the weak; that is royal behaviour, how much more distinguished, how much more relevant, how much more telling than all the boasted pomp and show of affluence and power, of prosperity and of rank.

Second, transparency of behaviour; the shining light of integrity searches out motives. Is this not needed throughout Nigeria today?

Third, and this is peculiarly Christian, humility. Be glad not to push yourself forward, be ready to acknowledge the contribution of others, rather than your own, take every opportunity to take the humble part. This leads naturally into the model for all Christian health care professionals, humility expressed in service. Be glad just to serve; there is no finer verse of Scripture than *I am among you as One who serves.*[4]

The servant king is well known as a modern song. It links the greatness of majesty and of Kingship, with the greatness of service.

There is no frenzied rush for recognition here, there is no seeking of personal gain; instead there is a deeply servant attitude. I talked about the

Sermon on the Mount being a countercultural statement; this servant behaviour of Paul was commandingly counter cultural. In the terminology of today here was a big man doing manual labour, a big man serving the weak.

Is this the pattern today in this country? It was once. I have been reading Dr Walter Miller, who came to Kano in 1899 and who described in his important book, *Reflections of a Pioneer*, the life and work of the Reverend W. A. Thompson a West Indian clergyman who came to Nigeria to serve in Kano and Zaria under the Church Missionary Society. Thompson was *a man of sterling worth and great love of the people. No man has done more spiritually for the Hausa people than this African brother of theirs. No man known to me so completely won their respect and confidence.*

Such an attitude must also have gripped the mind and the life of a fifteenth Century Spanish Nobleman, a soldier, who became known as Saint Ignatius of Loyola; he wrote a prayer which distils into a few simple words the sort of behaviour and the set of mind which those, who have worked so hard to make this day possible, hope will be manifest in the graduates of Bingham. Your family and friends, your teachers and colleagues, are justifiably proud of you today; your test will be that they should be more proud of you in the years ahead as you strike out in the sort of medical service which the poor and the weak are longing to receive.

This is Igantius' prayer:[5]
Teach us good Lord,
To serve you as you deserve,
To give and not to count the cost,
To fight and not to heed the wound
To toil and not to seek for rest,
To labour and not to ask for any reward,
Except to know that we do your will.

This is your servant doctor. This embodies all the historic values of our profession within its own distinctive Christian frame.

I must emphasise that in my practice in this country, it was my privilege to work alongside people who did not necessarily share my Christian faith and yet were good people who worked within the classic ethical and practical limits of our profession.

While you will thus follow in their steps, there will be times when the very centre of your values will be under scrutiny, when you feel the pressure of what is currently done, but which may be contrary to the meaning and the application of the words "*but I tell you*". This will be difficult, particularly when the needs and demands of your family or your friends apparently clash with what you believe to be right. Misunderstandings may follow, and you may be confronted with the need to forgive; you will learn not to insist on your own way.

These occasions will undoubtedly arise, be ready to dig deep into a firm foundation of faith, for example, if you are well founded you will reject behaviour which refuses a patient urgently needed care because the patient does not have sufficient money.

Pause to ask yourself, will you be prepared to put service before self, will you be prepared to disregard cash and demonstrate compassion, will you be ready to be countercultural towards rewards?

As each one of you starts out on your professional journey, you have a choice.

In today's Nigeria, you are called to a new level of faithfulness. Never before was such bravery needed. After Ishaya Audu's public service he opened a private hospital which he called Savannah Polyclinic, in Dogon Yaro, Samaru, Zaria. A newspaper reporter wrote that "*it was more or less a missionary hospital. It was a place where the poor and the down trodden flocked for medical services which were largely free. In fact, when any of his patients needed surgery, Audu would use his personal funds to get an external surgeon*. Profesor Ozigi described his virtues as simplicity, humility, absolute integrity, self discipline, courage, steadfastness, firmness, straightforwardness as reported by Taiwo Obe, in the *Guardian Sunday;* his daughter, Hussaina, said that he taught her the true meaning of meekness. Intrinsic to its definition is love and gentleness, and an ability to value the weak and the vulnerable and make them feel important. Premium Times 20th June 2014.

Serve the Lord Truly by Serving Humanity

I want to finish this address as I began with the charge which the Late Professor Anjorin gave me **to challenge our young graduates,** that is you**, to ensure that they,** that is you**, serve the Lord truly by serving humanity in ways that bring glory to our Lord and Saviour Jesus Christ and dignifying to humanity.**

I celebrate with Bingham University on this academic milestone, I congratulate you and your families, I salute those colleagues who have trained you, and I wish you all fulfilled professional lives of exemplary service.

REFERENCES

1. Stott J. The Message of the Sermon on the Mount: Christian Counter -Culture Downeis Grove: Intervasity Press. www.ivpress.com.
2. Matthew 5: 43–44. The Holy Bible, New International Version.
3. Acts 20 : 19, 24. The Holy Bible, New International Version.
4. Luke 22 : 27,. The Holy Bible, New International Version.
5. Prayer for Generosity (St. Ignatius of Loyola). wwwprayerfoundation. org/ prayerofignatius ofloyolahtml

BINGHAM JOURNAL OF MEDICINE

RESEARCH ARTICLE

Dysglycaemia among Adult Outpatients in Banjul, The Gambia

Dysglycémie chez les Adultes Externes à Banjul, Gambie

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ABSTRACT

BACKGROUND: **Glucose intolerance is a major risk factor for cardiovascular disease. Besides a few epidemiological studies on diabetes mellitus, there is limited information on glucose intolerance in the Gambia. The few studies that have been were several years ago.**

OBJECTIVE: **To determine the prevalence of, and associated risk factors for, dysglycaemia among outpatients in Banjul, The Gambia.**

METHODS: **In a cross-sectional study, 308 adult patients were enrolled at the Outpatient clinics of Edward Francis Small Teaching Hospital and Medical Research Council Laboratories in Fajara, Banjul. Data gathered included socio-demographic, anthropometric ,and clinical features as well as glucose tolerance status. Glucose tolerance status was assessed using a WHO standard oral glucose tolerance test. Summary data are presented as mean±(SD) and proportions as percentages. Association between and among variables are presented as odds ratios. Data analysis was performed using SPSS version 20. Statistical significance is set at p<.0.05**

RESULTS: **A total of 296 participants had complete data for analysis, of which 101(34.1%) were males. The mean age of the participants was 53.2 ± 12 years. . The mean fasting plasma glucose was 5.3 ± 0.8 mmol/l while the mean ± (SD) plasma glucose at 120 min after glucose load was 7.7 ± 2.3 mmol/l. About 56% of the participants had a normal glucose tolerance, 8% had impaired fasting glycaemia, 26% had impaired glucose tolerance, and 10% had previously undiagnosed type2 diabetes mellitus . The main risk factors for dysglycaemia were age, hypertension, body mass index, waist circumference, waist-hip ratio, systolic and diastolic blood pressure.**

CONCLUSION: **The prevalence of previously undiagnosed diabetes mellitus and prediabetes in patients attending clinics in Banjul , the Gambia appears to be high. Rates for impaired glucose tolerance appear higher than in many other reportrd studies from Africa. The risk factors for dysglycaemia in the Gambian attending clinics include age, hypertension, and obesity. The reason for the particularly high rates of impaired glucose tolerance among the Gambians are unclear and deserve further studies. BJM 2017; 1(1): 8–14.**

Keywords: Essential Hypertension, Impaired Fasting Glycaemia, Impaired Glucose Tolerance, Diabetes Mellitus, Oral Glucose Tolerance Test, The Gambia, Risk factors.

RÉSUMÉ

CONTEXTE: L'intolérance au glucose, est un facteur de risque majeur de maladie cardiovasculaire. Outre quelques études épidémiologiques sur le diabète sucré, il existe peu d'informations sur l'intolérance au glucose en Gambie. Les quelques études qui ont eu lieu il y a plusieurs années.

OBJECTIF: Déterminer la prévalence et les facteurs de risque associés à la dysglycémie parmi les patients ambulatoires à Banjul, en Gambie.

Méthodes: Dans une étude transversale, 308 patients adultes ont été inscrits dans les cliniques externes de l'hôpital Edward Francis Petit hôpital d'enseignement et les laboratoires du Conseil de recherches médicales à Fajara, Banjul. Les données recueillies comprenaient des caractéristiques sociodémographiques, antheropométriques et cliniques, ainsi que la tolérance au glucose. L'état de tolérance au glucose a été évalué au moyen d'un test de tolérance au glucose orale standard de l'OMS. Les données récapitulatives sont présentées sous forme de moyenne ± écart-type et de proportions en pourcentage. L'association entre les variables est présentée comme étant des odds ratios. L'analyse des données a été effectuée à l'aide de SPSS version 20. La signification statistique est fixée à p <0,05

Résultats: Un total de 296 participants avaient des données complètes pour l'analyse, dont 101 (34,1%) étaient des hommes. L'âge moyen des participants était de 53,2 ± 12 ans. . Le glucose plasmatique moyen à jeun était de 5,3 ± 0,8 mmol / l alors que le glucose moyen ± SD à 120 minutes après la charge de glucose était de 7,7 ± 2,3 mmol / l. Environ 56% des participants avaient une tolérance normale au glucose, 8% avaient une glycémie à jeun altérée, 26% avaient une tolérance au glucose altérée et 10% avaient un diabète de type 2 précédemment non diagnostiqué. Les principaux facteurs de risque de dysglycémie étaient l'âge, l'hypertension, la masse corporelle idex, le tour de taille, le rapport taille-hanche, la pression artérielle systolique et diastolique.

CONCLUSION: La prévalence de diabète sucré et de prediabète non diagnostiqués auparavant chez les patients fréquentant des cliniques à Banjul, en Gambie, semble être élevée. Les taux d'inhibition de la tolérance au glucose semblent plus élevés que dans de nombreuses autres études menées en Afrique. Les facteurs de risque de dysglycémie dans les cliniques gambiennes sont l'âge, l'hypertension et l'obésité. La raison des taux particulièrement élevés de tolérance au glucose altérée chez les Gambiens est peu claire et méritent d'être étudiées plus avant. **BJM 2017; 1 (1): 8–14.**

Mots-clés: Hypertension artérielle essentielle, glycémie à jeun altérée, Tolérance au glucose altérée, diabète sucré, test oral de tolérance au glucose, Gambie, facteurs de risque.

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Abbreviations: 2HPG, Two Hour Plasma Glucose; **BMI,** Body Mass Index; **BP,** Blood Pressure; **DM,** Diabetes Mellitus; **FHx,** Family History; **FPG,** Fasting Plasma Glucose; **GI,** Glucose Intolerance; **HTN,** Hypertension; **IFG,** Impaired Fasting Glycaemia; **IGT,** Impaired Glucose tolerance; **MRC,** Medical Research Council; **NGT,** Normal Glucose Tolerance; **RF,** Risk Factor; **SBP,** Systolic Blood Pressure **WC,** Waist Circumference; **WHR,** Waist-Hip Ratio.

INTRODUCTION

Glucose intolerance (GI) also referred to as dysglycaemia, consists of any one of diabetes mellitus (DM), impaired fasting glycaemia (IFG), and impaired glucose tolerance (IGT). It is associated with significant morbidity and mortality especially with increased cardiovascular disease.[1, 2] Reported studies of glucose intolerance or dysglycaemia in The Gambia are few. A nationwide survey for diabetes mellitus (DM) in 1996 found a prevalence rate of 0.3% for DM while later community studies reported a rural DM prevalence rates of 0.8–2.2% and an urban prevalence of about 8%.[3–8]

Thus there is limited information on GI in the Gambia as several risk factors were not reported. As part of our studies on the risk factors for cardiovascular diseases in the Gambian, we determined the prevalence and types of glucose intolerance and its risk factors among hypertensive and non hypertensive Gambians.

SUBJECTS, MATERIALS, AND METHODS

In a cross-sectional study conducted at the Medical Research Council (MRC) Laboratories, Fajara and the Royal Edward Francis Small Teaching Hospital (REFTH), Banjul, The Gambia, participants without a known history of DM were recruited from the Hypertension Clinic of REFTH and the Gate Clinics of the MRC. Three hundred and sixteen (209 female and 107 male) consecutive patients seen during the period of study accepted to participate in the study.

Inclusion criteria included being an adult of age > 25 years and freely consenting to participate in the study. Patients with major diseases (other than hypertension), severe inter-current illness, systemic or metabolic diseases and/or morbid obesity (BMI > 35 kg/m^2) were excluded from the study.

The study was approved by The Gambia Government / MRC Ethical Committee. All the participants gave written informed consent

Research Procedures

Using the appropriate local language, an assistant gathered information on socio-demographic data, family, social and past medical history. Anthropometric measurements that included weight, height, waist and hip circumferences, using standard techniques were taken. [9] Measurements of height as well as body circumferences were made to the nearest 0.5 cm while body weight was recorded to the nearest 0.5 kg. A digital blood pressure (BP) machine (Omron ^{r} HOM – 705 CP, Japan) was used to measure blood pressure on the left arm. Three BP readings were taken; the mean of the last two readings was used for the analysis.

A standard oral glucose tolerance test (OGTT) was performed using 75 g anhydrous glucose.[10] Venous plasma was drawn for glucose levels at 0, 30 and 120 minutes and other analytes at 0 minute. Venous blood glucose was determined immediately upon taking the samples using a Haemocue analyser (Haemocue AB, of Sweden). For the purposes of analysis and interpretation, venous whole blood glucose concentrations were converted to venous plasma glucose concentrations (PGC) following the instruction accompanying the Haemocue® Manual.

Definition of Terms and Criteria.

The operational definition of terms and criteria adopted for this study are shown in Table 1.

Data Management and Statistical Analysis

The data obtained were managed using Microsoft Excel 2007 and analysed using Stata version 8.0 statistical package (Stata Corporation, College Station, Texas, USA). Percentages which were calculated for discrete variables were compared using Pearson chi-square test. Average values are presented as means and standard deviation for continuous variables and compared using student t-test. Summary results of nonparametric data were compared using Pearson Chi-square test. P-values of less than 0.05 were taken as statistically significant while clinical significance was determined using odds ratio or effect size.

RESULTS

Quality of Data and Clinical Characteristics of Participants

Three hundred and sixteen outpatients were recruited into the study. Twenty of the participants (twelve females and eight males) had incomplete data and were excluded from further analysis. Thus the completion rate of the study was about 94%. The performance of the plasma glucose assay was satisfactory. Tthe intra-assay coefficients were 1.3% at 5.4 mmol/L and 1.6% at 16.1 mmol/L and the inter-assay coefficients of variation were 1.2% at 5.2 mmol/L and 2.5% at 14.8 mmol/L.

Characteristics of Study Participants

The study had more women than men (65.9% v 34.1%). Male and female participants were similar with regards to age, weight, and fasting plasma glucose. About three quarters of the participants were in the middle age group of 45-64 years. The females had higher values of

Table 1: Operational Definition of Terms and Diagnostic Criteria

Entity	Definition / Criteria
Systemic Hypertension	Systolic blood pressure $\geq$ 140 and / or diastolic blood pressure $\geq$ 90.mmHg or use of antihypertensive medications[11]
Global Adiposity	Normal, overweight and obesity respectively: BMI < 25, 25–29.9 and $\geq$ 30 kg / m ^{2}. [12]
Central Obesity	Waist Hip Ratio $\geq$ 0.9 (males) and $\geq$ 0.8 (females). OR WC $\geq$ 88 cm (Female), $\geq$ 102 cm (male). [12]
Diabetes Mellitus	Fasting venous plasma glucose $\geq$ 7.0 mmol/L and or 2h post glucose PGL $\geq$ 11.1 mmol/L [1, 2]
Impaired Fasting Glycaemia	Fasting venous plasma glucose $\geq$ 6.1 mmol/L and < 7.0 mmol/L. [1, 2]
Impaired Glucose Tolerance	Fasting venous plasma blood glucose < 7.0 mmol/L and 2h post glucose load $\geq$ 7.8 mmol/L and < 11.1 mmol/L.[1, 2]

Table 2: Characteristics of Study Participants

Characteristic	Mean (SD) or N (%)		
	All	Male	Female
		Mean SD	
N (%)	296 (100)	101 (34.1)	195 (65.9)
Age (years)	53.2 (12.0)	54.4 (10.6)	52.5 (12.6)
SBP mmHg	136.2 (27.8)	139.5 (28.3)	134.5 (27.45)
DBP mmHg	83.2 (15.6)	83.3 (13.8)	83.3 (14.5)
FPG mmol/L	5.27 (0.84)	5.26 (0.82)	5.26 (0.85)
2hPGL mmo//L	7.73 (2.25)	7.54 (1.85)	7.82 (2.43)
		Number (%)	
Age (years)			
< 45	69 (23.3)	18 (17.8)	51 (26.2)
45–64	173 (58.4)	63 (62.4)	109 (56.4)
≥ 65	55 (18.6)	20 (19.8)	35 (17.9)
Overweight/Obesity	158 (53.3)	39 (38.6)	119 (59.5)
Normal BMI (<25)	138 (46.6)	62 (61.4)	76 (38.5)
Overweight (25–29.9)	81 (27.4)	26 (25.7)	55 (28.2)
Obese, BMI (≥30)	77 (26.0)	13 (12.9)	64 (32.8)
Cigarette Smoking	65 (22.0)	51 (50.5)	14 (7.2)

2hPGL = Two Hour Plasma Glucose, BMI = Body Mass Index, DBP = Diastolic Blood Pressure, FPG = Fasting Plasma Glucose, SBP = Systolic Blood Pressure

Table 3: Distribution of Participants by Risk Factors for Type 2 Diabetes Mellitus

RF for T2DM	Number (%)			P value
	All Participants	Male	Female	
Global obesity	77 (26.0)	13 (12.9)	64 (32.8)	<0.001
Overweight	81(27.4)	26(25.7)	55 (28.2)	>0.05
↑ WC	216 (74.3)	34 (33.72)	182 (93.3)	<0.001
↑ WHR	220 (74.3)	41 (40.6)	179 (91.8)	<0.001
FHx of DM	44 (14.9)	10 (9.9)	34 (17.4)	0.08
HTN	208 (70.3)	70 (69.3)	138 (70.7)	0.66
Smoking	73 (24.7)	58 (53.2)	15 (7.7)	<0.001
IFG	14 (4.7)	5 (4.9)	9 (4.6)	0.92
IGT	90 (28.5)	34 (30.4)	56 (28.7)	0.44
Age ≥45 years	227(76.7)	83 (82.1)	144 (73.8)	0.345

DM, diabetes mellitus; FHx, family history; IFG, imaoired fasting glycaemia; IGT, impaired glucose tolerance; HTN, hypertension; RF, risk factor; ↑WC, increased waist circumference; ↑WHR. increased waist-hip ratio.T2DM, type 2 diabetes mellitus

body mass index,_BMI), waist circumference (WC), waist to hip ratio (WHR) and frequency of overweight and/or obesity. Smoking was much significantly commoner among the men than among the female participants (50% v 7%). Table 2 shows a summary of the characteristics of the study participants.

Prevalence of risk factors for Type 2 Diabetes Mellitus

The prevalence of risk factors for type 2 diabetes mellitus (T2DM) among the study participants is shown in Table 3. Overall the commonest risk factors for T2DM were central obesity, age > 45 years, and global obesity. The three commonest risk factors for diabetes mellitus in the males aside hypertension were increasing age, smoking, and central obesity. Among the female participants the three leading risk factors (excluding hypertension) were central obesity, overweight / obesity, and age ≥45 years. All anthropometric indices of propensity to develop DM were more common in the female than in the male participants. The least common risk factor for DM was IFG followed by a low rate of positive family history of diabetes mellitus.

Frequency and Types of Dysglycaemia

Figure 1 shows the distribution of participants by the type and frequency of glucose tolerance status they had at assessment. Overall, 131(44.3%) of the patients had dysglycaemia, about 23% of which were undiscovered type 2 DM. Prediabetes was the commonest class of GI, affecting 37.6% of the males and 36.9% of the females. About a third of the participants and three quarters of all those with GI had prediabetes. . Impaired glucose tolerance (IGT) was significantly more common than either IFG or DM in both males and females. Prediabetes either as IFG or IGT was more prevalent in the males than in females($p > 0.05$) but undiscovered DM was more common among the females than males.

Relationship Between Glucose Tolerance Status and Risk Factors

Table 4 shows a comparison of the participant characteristics by the various degrees of glucose metabolism, from normal glucose tolerance to diabetes mellitus. Generally the patients with GI were older and fatter by BMI or waist circumference. All other indices of proneness to developing DM were higher in the participants with GI than those who were glucose tolerant. The participants with DM had the highest mean or frequency of all the risk factors except age which was highest among those with prediabetes. The mean of values and / or prevalence rates of anthropometric risk factors progressively increased from NGT subjects through prediabetes to type 2 diabetes.

Association Between Type 2 Diabetes Mellitus Versus its Principal Risk Factors among Study Participants

Table 5 shows the univariate analysis of the relationship between T2DM and its principal RFs among the study participants presented as odds ratios (ORs). The Table shows that in the males the risk factors strongly associated with T2DM (OR >3) were a positive family history of DM, global and central forms of obesity, and a history of cigarette smoking. In the females age more than 45 years, central obesity (high WC and high WHR) and IFG were the leading risk factors. In the females obesity but not overweight (BMI of 25–29.9) was moderately associated with having diabetes mellitus.

DISCUSSION

The purpose of this work was to determine the prevalence of glucose intolerance and its associated risk factors among Gambians attending outpatient clinics. The quality of data was generally satisfactory. The response rate was of good quality at about 94% while the precision of the glucose assays were both satisfactory with intra- and inter-assay repeatabilities of less than 5%.

The distribution of the participants by sex was skewed towards the women but both sexes had sufficient participants to undertake a meaningful sub-analysis. The preponderance of females may reflect the differences between African men and women in their health-seeking behavoiur. The female participants were generally heavier and smoked less. Concerning other variables, including baseline serum analytes and clinical features, the men and women were generally comparable.

Prevalence of and Types Dysglycaemia

About 40% of the participants had one form or the other of dysglycaemia. The prevalence of previously undiagnosed Type 2 DM in adult Gambians of 10% found in this study was high but similar to the reports from a previous Gambian study. That study reported a prevalence of 0.3%.[3,4] In an urban Banjul community study however, the prevalence of DM (both diagnosed and undiagnosed) was 8% in men and 9% in women.[5] Relatedly, the prevalence

Table 4: Comparison of Participants by Glucose Tolerance Status and Risk Factors

Risk Factor	NGT	Prediabetes	DM	All Dysglycaemia
		Mean (SD)		
Age (Years)	51.5(10.8)	55.6(12.4)	53.3(9.9)	55.2(11.9)
BMI(Kg/m^2)	26.0(6.0)	26.16(6.2)	29.2(6.9)	26.8(6.5)
WC (cm)	91.0(13.2)	92.7(12.7)	98.94(12.7)	94.08(17.9)
WHR	0.867(0.068)	0.884(0.056)	0.897(0.07)	0.887(0.060)
SBP(mmHg)	132.84(26.7)	139.52(29.2)	144.7(5.8)	141.13(38.5)
FPG (mmol/l)	4.0(0.53)	5,4(0.77)	6.6(1.10)	5.7(0.96)
2HPG(mmol/l)	6.3(0.83)	8.64(1.16)	12.3(2.7)	9.5(2.2)
		Number (%) with Factor Present		
N	**165**	**101**	**30**	**131**
Males	56(33.9)	38(37.6)	7(23.3)	45(34.1)
Females	109(66.1)	63(62.4)	23(76.7)	85(65.9)
FHx	24(14.5)	10(9.9)	7(23.3)	17(13.0)
Cigarette Smoking	30(18.2)	28(27.7)	7(23.3)	35(26.7)
↑ WHR	116(70.3)	72(71.3)	27(90.0)	99(75.6)
BMI > 25	86(52.1)	52(51.5)	20(66.7)	72(55.0)
↑ WC	78(47.3)	49(48.5)	23(76.7)	72(55.0)
HTN	60(36.4)	65(64.3)	17(56.7)	97(82.8)

2HPP = Two Hour Plasma Glucose,; BMI, body mass index kg/m2; DM. diabetes mellitus; ; FPG = Fasting Plasma Glucose ; FHx, family history; IFG, imaoired fasting glycaemia; IGT, impaired glucose tolerance; HTN+, hypertension; ↑WC, increased waist circumference; ↑ WHR. increased waist-hip ratio.T"DM, type 2 diabetes mellitus

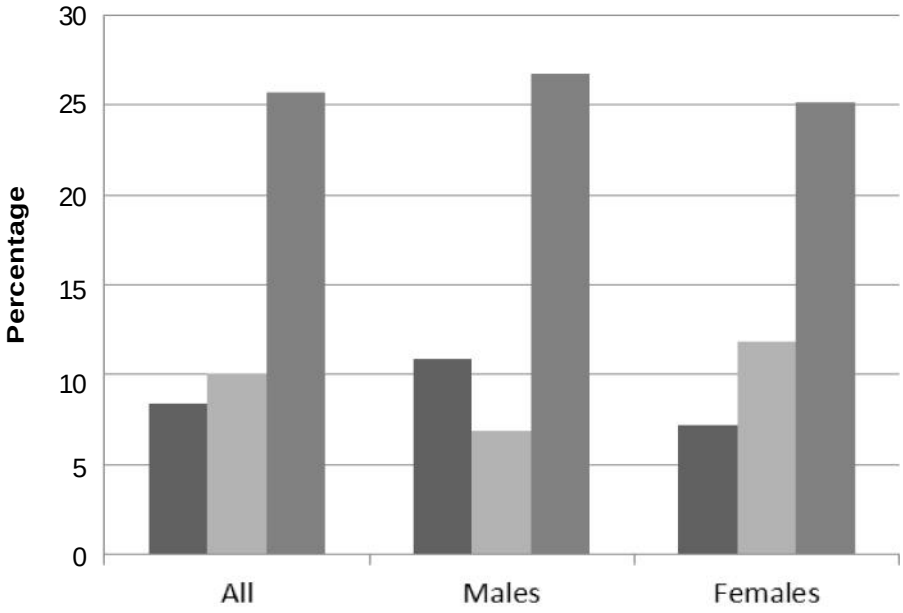

Fig. 1: Frequency of Dysglycaemia Subtypes Among Gambians at a Routine Outpatient Clinic. Overall, about 45% of the patients had dysglycaemia, about 23% of which were undiscovered type 2 diabetes DM. Prediabetes was the commonest class of dysglycaemia, affecting about 37% of both the males and of the females. *DM, diabetes mellitus IFG, impaired fasting glycaemia, IGT, impaired glucose tolerance.*

Table 5: Univariate Analysis of the Relationships Among Risk Factors and the Odds of Undiagnosed Type 2 Diabetes Mellitus

Risk Factor	OR(95%CI)			
	Males		Females	
Age	1.29	0.15 – 11.48	9.04	2.68 – 30.47*
FHx DM	4.97	0.81 – 30.43*	1.56	0.53 – 4.70
Cigarette Smoker	2.61	0.48 – 14.12	1.39	0.29 – 6.73
BMI ≥25	3.67	0.67 – 20.05*	0.79	0.28 – 2.25
BMI ≥30	3.05	0.53 – 12.69*	1.45	0.60 – 3.50
↑*WC*	4.67	0.94 – 23.31*	9.52	2.76 – 32.82*
↑*WHR*	3.68	0.68 – 19.98*	10.32	1.31 – 81.37*
HTN	1.81	0.38 – 8.56	1.99	0.83 – 4.79
IFG	3.02	0.57 – 17.49*	5.35	1.87 – 15.33*

**, Clinically significant association; BMI, body mass index (kg/m²). DM. diabetes mellitus; FHx, family history; IFG, impaired fasting glycaemia; IGT, impaired glucose tolerance; HTN, hypertension; RF, ↑WC, increased waist circumference; ↑WHR. increased waist-hip ratio.*

of hypertension was high at 17% and 19% in men and women respectively.[3–8] These discrepant higher prevalence rates found in the Banjul studies compared to the rural areas may be partly due to urbanization and adoption of western lifestyle as has been reported by others.[13]

Reports from other parts of Africa have shown a similar trend.[14-18] In urban Ghana, Amoah et al reported a DM prevalence of 6.3% (1.9% diagnosed and 4.4% undiagnosed),[14,15] a rate very much lower that reported (1.5%) in the Ashanti region.[16] A hospital based study in Kumasi found 18% previously undiagnosed Type 2 DM among these patients.[17] The National NCD survey in the 1990s in Nigeria recorded a national DM prevalence of 2.2% but middle aged participants from urban Lagos had a higher prevalence of 7%.[18] Other Nigerian studies have reported varying prevalence rates[19–22] Sabir *et al* found a prevalence of about 5% undiagnosed DM in urban Fulanis in Northern Nigeria.[23] These DM prevalence rates from West Africa are either similar to or lower than those reported from a Chinese population.[24]

Prevalence of Prediabetes Mellitus

Pre-diabetes may manifest as IFG and or IGT. Prediabetes is not a clinical entity *per se* but represents a risk factor for DM and some cardiovascular diseases.[28–30] In this study the prevalence of IFG was 8% when the WHO criterion was applied. This Gambian prediabetes rate is quite low compared to several other studies.[14,15,23–26,30–32]

Using the WHO criterion for IFG , Sabir *et al* reported a higher prediabetes prevalence of 16.9% from Northern Nigeria.[30] Similarly in the Accra community studies the prevalence of IFG was higher than ours at 10.7%.[14, 15] On the other hand studies from Australia and China have reported prevalence rates similar to ours.[24,31] In the US the prevalence of IFG was reported to be higher in men than women a phenomenon which is attributed to the higher fasting plasma glucose in US men.[25–27] This sex difference trend which appears to be at variance with our results was also reported in the Australian study.[31]

This study found an IGT prevalence of 26% which appears high but is similar to reports from other studies.[25] The prevalence of IGT was higher in the males than in he females, a finding that is similar to several others including the Gambian reports.[3–8, 26, 28] An IGT prevalence of 28% was reported in the community study in The Gambia, with about 25% in participants with normal BMI and 50% in the obese participants.[3–8] Reports from several African centres indicate much lower IGT prevalence rates than we found in this study, most being about 15%.[14,15,22,33] Sabir *et al* reported a prevalence of 15% from northern Nigeria,[22] Amoah reported a prevalence of 15.8% from Accra, Ghana[14, 15] while Elbagir *et al* reported a lower prevalence of 7.9% from northern Sudan.[33] The prevalence rates of IGT from other continents show similar differences to our findings. The NHANES survey in 1988 – 1994 recorded a crude prevalence of 15.6% with similar findings in men and women while in the 2005–2006 survey a prevalence of 5.4% isolated IGT and 9.8% combined IFG and IGT were reported.[26–27] Other studies have IGT prevalence rates varying from 10% to 24%.[31,34-36] The reason for the much higher IGT prevalence in our study compared to other reports is not obvious from our study and deserve further studies.

Risk factors for Diabetes Mellitus and Prediabetes Mellitus

In this study, the main risk factors for DM were age, hypertension, BMI, WC, WHR, and BP . Previous Gambian studies had showed that the prevalence of hypertension was higher in DM patients than in the general population and that among the urban Gambian participants there was frequent co-existence of obesity, hyperlipidaemia, physical inactivity, hypertension and DM.[3-8] The earlier study also had 3.3% of the participants reporting a family history of DM. Though our study found a moderate proportion of participants with a family history of DM, this was not associated with DM and pre-diabetes. Sabir *et al* identified age and obesity as the major risk factors for dysglycaemia in the northern Nigerian population[30] while in Ghana, Amoah reported dysglycaemia to be associated with increasing age, SBP, DBP and BMI.[14, 15]

Conclusion

The major strength of this study was the performance of a standard OGTT in a large number of participants with no history of DM in The Gambia . The main weakness of this study was the fact that it was a hospital based cross - sectional study which was likely to be fraught with some biases.

The prevalence of prediabetes and previously undiagnosed Type 2 DM in the urban adults attending outpatient clinics in Banjul in the Gambia appears to be high and much higher than previously

reported. The most common form of dysglycaemia among the Gambians studied was prediabetes with IFG being predominant. The risk factors associated with dysglycaemic states are increasing age, hypertension and obesity. This increasing trend of dysglycaemia is likely to be the result of the change in lifestyle of urban Gambians. There is therefore the need to increase screening, management and control of these factors. Further larger and prospective studies may yield more robust data to support or refute our results and our therefore called.

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REFERENCES

1. Alberti KG, Zimmet PZ. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med*. 1998; **15:** 539–53.
2. World Health Organisation. Definition and diagnosis diabetes mellitus and intermediate hyperglycaemia: Report of a WHO/IDF Consultation, Geneva, Switzerland. 2006.
3. van der Sande MA, Bailey R, Faal H, Banya WA, Dolin P, Nyan OA *et al*. Nationwide prevalence study of hypertension and related non-communicable diseases in The Gambia. *Trop Med Int Health*. 1997; **2:** 1039–48.
4. van der Sande MA, Walraven GE, Milligan PJ, Banya WA, Ceesay SM, Nyan OA *et al*. Family history: an opportunity for early interventions and improved control of hypertension, obesity and diabetes. *Bull World Health Organ*. 2001; **79:** 321–8.
5. van der Sande MA, Ceesay SM, Milligan PJ, Nyan OA, Banya WA, Prentice A *et al*. Obesity and undernutrition and cardiovascular risk factors in rural and urban Gambian communities. *Am J Public Health*. 2001; **91:** 1641–4.
6. van der Sande MA, Milligan PJ, Nyan OA, Rowley JT, Banya WA, Ceesay SM *et al*. Blood pressure patterns and cardiovascular risk factors in rural and urban gambian communities. *J Hum Hypertens*. 2000; **14:** 489–96.
7. van der Sande MA, Walraven GE, Bailey R, Rowley JT, Banya WA, Nyan OA *et al*. Is there a role for glycosuria testing in sub-Saharan Africa? *Trop Med Int Health*. 1999; **4:** 506–13.
8. van der Sande MA, Milligan PJ, Walraven GE, Dolmans WM, Newport M, Nyan OA *et al*. Geographical variation in prevalence of hypertension within The Gambia. *J Hum Hypertens*. 2001; **15:** 733–9.
9. World Health Organisation. WHO STEPS surveillance manual : the WHO STEPwise approach to chronic disease risk factor surveillance / Non-communicable Diseases and Mental Health, World Health Organization. 2005.
10. World Health Organisation. Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus. Report of a WHO consultation. 1999.
11. Chalmers J, MacMahon S, Mancia G, Whitworth J, Beilin L, Hansson L *et al*. 1999 World Health Organization-International Society of Hypertension Guidelines for the management of hypertension. Guidelines sub-committee of the World Health Organization. *Clin Exp Hypertens*. 1999; **21:** 1009–60.
12. Clinical Guidelines on the Identification, Evaluation, and Treatment of Overweight and Obesity in Adults—The Evidence Report. National Institutes of Health.*Obes Res*. 1998; **6:** 51S–209S.
13. Schulz LO, Bennett PH, Ravussin E, Kidd JR, Kidd KK, Esparza J *et al*. Effects of traditional and western environments on prevalence of type 2 diabetes in Pima Indians in Mexico and the U.S. *Diabetes Care*. 2006; **29:** 1866–71.
14. Amoah AG. Undiagnosed diabetes and impaired glucose regulation in adult Ghanaians using the ADA and WHO diagnostic criteria. *Acta Diabetol*. 2002; **39:** 7–13.
15. Amoah AG, Owusu SK, Adjei S. Diabetes in Ghana: a community based prevalence study in Greater Accra. *Diabetes Res Clin Pract*. 2002; **56:** 197–205.
16. Plange-Rhule J.A study of the risk factors for cardiovascular disease in the Ashanti region of Ghana. FWACP Dissertation 2007.
17. Micah FB, Nkum BC. Lipid disorders in hospital attendants in Kumasi, Ghana. *Ghana Med J*. 2012 ;46:14-21.
18. Akinkugbe OO, Final report of the National Expert Committee on Non Communicable Diseases in Nigeria. 1997 (Federal Ministry of Health and Social Services, Series 4): 64–90.
19. Ohwovoriole AE, Kuti JA, Kabiawu SI. Casual blood glucose levels and prevalence of undiscovered diabetes mellitus in Lagos Metropolis Nigerians. *Diabetes Res Clin Pract*. 1988; **4:** 153–8.
20. Erasmus RT, Fakeye T, Olukoga O, Okesina AB, Ebomoyi E, Adeleye M *et al*. Prevalence of diabetes mellitus in a Nigerian population. *Trans R Soc Trop Med Hyg*. 1989; **83:** 417–8.
21. Puepet FH, Ohwovoriole AE. Prevalence of risk factors for diabetes mellitus in a non-diabetic population in Jos, Nigeria. *Niger J Med*. 2008; **17:** 71–4.
22. Owoaje EE, Rotimi CN, Kaufman JS, Tracy J, Cooper RS. Prevalence of adult diabetes in Ibadan, Nigeria. *East Afr Med J*. 1997; **74:** 299–302.
23. Sabir AA, Isezuo SA, Ohwovoriole AE. Dysglycaemia and its risk factors in an urban Fulani population of northern Nigeria. *West Afr J Med*. 2011; **30:** 325–30.
24. Gu D, Reynolds K, Duan X, Xin X, Chen J, Wu X *et al*. InterASIA Collaborative Group. Prevalence of diabetes and impaired fasting glucose in the Chinese adult population: International Collaborative Study of Cardiovascular Disease in Asia (InterASIA). *Diabetologia*. 2003; **46:** 1190–8.
25. International Diabetes Federation atlas. Available at http://www. diabetes atlas.org/contact and accessed on 3rd May, 2015.
26. Cowie CC, Rust KF, Byrd-Holt DD, Eberhardt MS, Flegal KM, Engelgau MM *et al*. Prevalence of diabetes and impaired fasting glucose in adults in the U.S. population: National Health and Nutrition Examination Survey 1999–2002. *Diabetes Care*. 2006; **29:** 1263–8.
27. Karve A, Hayward RA. Prevalence, diagnosis, and treatment of impaired fasting glucose and impaired glucose

tolerance in nondiabetic U.S. adults. *Diabetes Care*. 2010; 33: 2355–9.
28. Nathan DM, Davidson MB, DeFronzo RA, Heine RJ, Henry RR, Pratley R, Zinman B; American Diabetes Association. Impaired fasting glucose and impaired glucose tolerance: implications for care. *Diabetes Care*. 2007; **30:** 753–9.
29. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*. 2006; **29:** S43–8.
30. Sabir AA, Isezuo SA, Ohwovoriole AE. Dysglycaemia and its risk factors in an urban Fulani population of northern Nigeria. *West Afr J Med*. 2011; **30:** 325–30.
31. Dunstan DW, Zimmet PZ, Welborn TA, De Courten MP, Cameron AJ, Sicree RA *et al*. The rising prevalence of diabetes and impaired glucose tolerance: the Australian Diabetes, Obesity and Lifestyle Study. *Diabetes Care*. 2002; **25:** 829–34.
32. Genuth S, Alberti KG, Bennett P, Buse J, Defronzo R, Kahn R *et al*. Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. Follow-up report on the diagnosis of diabetes mellitus. *Diabetes Care*. 2003; **26:** 3160–7.
33. Elbagir MN, Eltom MA, Elmahadi EM, Kadam IM, Berne C. A high prevalence of diabetes mellitus and impaired glucose tolerance in the Danagla community in northern Sudan. *Diabet Med*. 1998; **15:** 164–9.
34. Sekikawa A, Eguchi H, Tominaga M, Igarashi K, Abe T, Manaka H *et al*. Prevalence of type 2 diabetes mellitus and impaired glucose tolerance in a rural area of Japan. The Funagata diabetes study. *J Diabetes Complications*. 2000; **14:** 78–83.
35. Williams DR, Wareham NJ, Brown DC, Byrne CD, Clark PM, Cox BD *et al*. Undiagnosed glucose intolerance in the community: the Isle of Ely Diabetes Project. *Diabet Med*. 1995; **12:** 30–5.
36. Chen KT, Chen CJ, Gregg EW, Williamson DF, Narayan KM. High prevalence of impaired fasting glucose and type 2 diabetes mellitus in Penghu Islets, Taiwan: evidence of a rapidly emerging epidemic? *Diabetes Res Clin Pract*. 1999; **44:** 59–69.

BINGHAM JOURNAL OF MEDICINE

RESEARCH ARTICLE

Relaxative Effect of Cold Water Stem-Bark Extract of *Erythrophleum suaveolens* on Frog *Rectus Abdominis*

Effet relaxant de l'eau froide Extrait de la tige-écorce d'Erythrophleum suaveolens sur le Rectus Abdominus de la grenouille

T. O. Ogundeko, M. I. Builders*, E. A. Ogbole

ABSTRACT

BACKGROUND: ***Erythrophleum suaveolens* is a folkloric plant claimed to be a muscle relaxant. The frog rectus abdominus muscle is a tissue that is apt for the study of neuromuscular junction activities.**

OBJECTIVE: **To determine the muscle relaxant effect of *Erythrophleum suaveolens* on the isolated frog rectus abdominis muscle in the presence of acetylcholine.**

MATERIALS AND METHODS: **Dose- response relationships (DRC) of cold water bark extract of *Erythrophleum suaveolens*, acetylcholine (Ach) only in the presence of *E. suaveolens* at varying concentrations and volumes from given stocks of $1x10^{-4}$ in each case were studied. Responses were obtained isotonically and recorded via a dynamometer.**

RESULTS: **Stem-bark water extract of E. *suaveolens* blocked the contracture effect of acetylcholine. The relaxing effect of the extract on the isolated rectus abdominis muscle was slow, though blockade effect on the acetylcholine-induced contractions decreased with increasing dose of acetylcholine. However, the effect of Ach on frog rectus abdominis muscle was dose-dependent. Effective concentrations (EC50) of Ach and E. suaveolens plus Ach were $3.16 x10^{-9}$ and $2.58 x10^{-7}$ g/ml respectively.**

CONCLUSION: ***Erythrophleum suaveolens* is a skeletal muscle relaxant,which appears to be a potent non-depolarizing neuromuscular blocker. BJM 2017; 1(1): 15–18.**

Keywords: *Erythrophleum suaveolens*, Frog rectus Abdominis, Acetylcholine, Inhibition, Muscle Relaxant.

ABSTRAIT

CONTEXTE: Erythrophleum suaveolens est une plante folklorique prétendu être un myorelaxant. Le rectus grenouille est abdominus muscle est un tissu qui est apte pour l'étude des études de jonction neuromusculaire.

OBJECTIF: Déterminer l'effet myorelaxant de Erythrophleum suaveolens sur la grenouille isolé rectus abdominis muscle en présence d'acétylcholine.

MATÉRIELS ET MÉTHODES: relation dose-réponse (RDC) de froid extrait d'écorce de l'eau de Erythrophleum suaveolens, acétylcholine (Ach) seulement en présence de E. suaveolens à des concentrations et des volumes variant de stocks de données de 1x10-4 dans chaque cas ont été obtenus avec réponses isotonique enregistrées (1mm / sec) par l'intermédiaire d'un dynamomètre.

RÉSULTATS: Stem écorce extrait de l'eau de E. de l'extrait bloqué l'effet de contracture de Ach. L'effet relaxant de l'extrait isolé sur le muscle droit de l'abdomen a été lente, bien que l'effet de blocage sur les contractions induites par l'acétylcholine a diminué avec l'augmentation de la dose d'acétylcholine. Cependant, l'effet de l'Ach sur le rectus abdominis muscle grenouille est dose-dépendante. Les concentrations efficaces (CE50) de Ach et E. suaveolens ainsi Ach étaient 3.16 x10-9and 2,58 x10-7g / ml, respectivement.

CONCLUSION: Erythrophleum suaveolens est un relaxant musculaire squelettique, et semble être un non-dépolarisants bloquant neuromusculaire puissant. **BJM 2017; 1(1): 15–18.**

Mots-clés: Erythrophleum suaveolens, grenouille rectus abdominis, acétylcholine, Inhibition, Relaxation.

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Abbreviations: Ach, Acetylcholine; **DRC,** Dose-response curve; **EC_{50}**, Effective concentration at 50%; **NMJ,** Neuromuscular junction.

INTRODUCTION

The rectus abdominus muscle of the frog though striated does not behave like normal voluntary muscle and responds to acetylcholine (Ach) by giving a slow contraction. It is an extremely useful preparation for showing the actions of those compounds that block transmission at the neuromuscular junction (NMJ) by acting the same way as an excess of Ach. Such compounds will also block transmission in the rat phrenic nerve diaphragm and stimulate the slow fibres of the frog rectus.[1–2]

Drugs like diltiazem and verapamil have been reported to inhibit contractions of frog rectus abdominus muscles in the presence of Ach.[3] The relaxing effect of cold water stem-bark extract of *E. suaveolens* is evident on skeletal muscle such as the rat phrenic nerve-diaphragm. An observed relaxation-pattern of *E. suaveolens*on rats phrenic nerve diaphragm preparation showed it as closely related with that of hexamethonium thus suggesting as an explorable potent- muscle relaxant as claimed by traditional healers.[4] The determination of LD_{50} on albino mice gave an insight into the safety margin of E. *suaveolens* (223.8±0.05mg/kg body weight) falling within the very toxic range as defined by Hodge and Sterner categorization.[5] Investiga-tions carried out on isolated ileum tissue of the guinea-pig (*Caviaporcellus*) and smooth muscle of the rabbit jejunum (*Oryctolagus-cuniculus*) by running a dose-response relationship of agonist test drugs (acetylcholine, histamine, and barium chloride; isoprenaline and adrenaline) in the presence of the cold water crude extract of stem-bark of *Erythrophleum suaveolens* showed an antagonist effect with a right shift and inhibitory nature of *Erythrophleum suaveolens.*[6]

Detailed investigations on plant materials especially such that are already in use especially by trado-medical practitioners should not be taken with levity. *Erythrophleum suaveolens* is used for diverse purposes: as drinks, the bark is used as alcoholic and stimulant as well as laxative, abortifacient, antibiotics, and in the treatment of oedema, gout, rheumatism amongst others in the area of medicine.[7–9]

This study aimed to further confirm the muscle relaxant effect of *Erythrophleum suaveolens* on the isolated frog rectus abdominis muscle in the presence of acetylcholine.

MATERIALS AND METHODS

Thr stem-back of *Erythrophleum suaveolens* was collected from Buruku Local Government Area, Benue State central Nigeria. This was identified and classified by Professor Hussaini (Botanist with the University of Jos Nigeria) and Dr Okonkwo (Taxonomist with the College of Forestry, Jos, Nigeria). Plant sample was dried in the Pharmacology Laboratory of Bingham University, Jos while the process of extraction was done as described earlier.[4–7]

Freshly-prepared isolated frog r*ectus abdominis* muscle was attached to a lever (0.5–1g load) and mounted on an organ bath (50–100ml) containing freshly prepared frog ringer solution (NaCl–6.50g, KCl –0.75g, $CaCl_2$ –1.00g, $NaHCO_3$–0.40g – Sigma Chemical Company, Louis, USA, Kernel Chemicals, Germany). Contraction and relaxation responses were isotonically recorded (1mm/sec) via a dynamometer (UgoBasile, Comerio, Italy) (5volts), frequency (0.5Hz), pulse width (1.4mls), (1). pH (7.4), aeration (air) and temperature (320C). Acetylcholine - Sigma Chemical Company, Louis, USA was used as the reference drug.

Dose- response of relationships (DRC) of cold water bark extract of *Erythrophleum suaveolens*, Acetyl-choline and Ach in the presence of *E. suaveolens* at varying concentrations and volumes from given stocks of $1x10^{-4}$ in each case were obtained. Responses were isotonically recorded (1mm/sec) via a dynamometer.

RESULTS

Erythrophleum. suaveolens extract produced no response on the isolated tissue of frog rectus abdominis muscle, thus no amplitude of response was observed (Table 1). Tissue in the presence of Ach exhibited contractile response with threshold and maximum heights response of 1.5cm and 3.2cm respectively, at $4.0x10^{-7}$ g/ml, percentage maximum response was 100 as shown in Table 2.

Table 3 indicates that *E. suaveolens* extract in the presence of Ach reduced tissue response (lowest height–0.6cm) at $2.2 x10^{-8}$g/ml with percentage maximum response of 70 and (highest–0.9cm) at $1.0x10^{-6}$g/ml with percentage maximum response of 100.

A dose-dependent graph indicating effective eoncentration (EC_{50}) of Ach and E. *suaveolens* plus Ach $3.16 x10^{-9}$ and $2.58 x 10^{-7}$g/ml was obtained by plotting percentage maximum responses against log concentrations (Figure 1). The curve showed a shift to the right in compliance with the characteristics of an agonist in the presence of Ach (percentage maximum response = 100). However, the curve obtained from that of Ach in the presence of *E. suaveolens* extract (percentage maximum response = 100) also produced a shift to the right.

Table 1: Dose Effect of *E. suaveolens* Extract on Frog Rectus Abdominis Muscle

Ach (g/ml)	*ESE*	FBC (g/ml)	Log FBC	MR (cm)	Responses	MedR (cm)	MMR %
$1 x 10^{-4}$	0.2	$4.0 x 10^{-6}$	–6.0	0.0	3	0.0	0.0
$1 x 10^{-4}$	0.4	$8.0 x 10^{-6}$	–9.0	0.0	3	0.0	0.0
$1 x 10^{-4}$	0.6	$1.2 x 10^{-5}$	–7.9	0.0	3	0.0	0.0
$1 x 10^{-4}$	0.8	$1.6 x 10^{-5}$	–2.0	0,0	3	0,0	0,0
$1 x 10^{-4}$	1.0	$2.0 x 10^{-5}$	–3.0	0.0	3	0.0	0.0
$1 x 10^{-4}$	2.0	$4.0 x 10^{-7}$	–7.4	0.0	3	0.0	0.0

Ach, Acetylcholine; ESE. E. suaveolens extract (ml); FBC, final bath concentration; MedR, median response (cm); MMR, Mean Maximum Response (%) ; MR, Mean Response (cm).

Table 2: Effect of Acetylcholine Concentration on Frog Rectus Abdominis Muscle

Ach (g/ml)	*ESE*	FBC (g/ml)	Log FBC	MR (cm)	Responses	MedR (cm)	MMR %
1×10^{-4}	0.2	4.0×10^{-7}	–6.40	1.5	3	1.5	46.9
1×10^{-4}	0.4	8.0×10^{-7}	–6.1	2.0	3	2.0	62.5
1×10^{-4}	0.6	1.2×10^{-7}	–5.92	2.7	3	2.7	84.4
1×10^{-4}	0.8	1.6×10^{-6}	–5.80	2.8	3	2.8	87.5
1×10^{-4}	1.0	2.0×10^{-5}	–3.01	3.2	3	3.2	100.0
1×10^{-4}	2.0	4.0×10^{-7}	–7.4	3.2	3	3.2	100.0

Ach, Acetylcholine; ESE. E. suaveolens extract (ml); FBC, final bath concentration;MedR, Median response; MMR, Mean Maximum Response; MR, Mean Response.

Table 3: Dose-response Relationships of Acetylcholine in the Presence of *E. suaveolens* extract on Frog Rectus Abdominis Muscle

Ach (g/ml)	*ESE*	FBC (g/ml)	Log FBC	MR (cm)	Responses	MedR (cm)	MMR %
1×10^{-4}	0.2 + 0.5	1.4×10^{-8}	–7.85	0.0	3	0.0	0.0
1×10^{-4}	0.4 + 0.5	1.8×10^{-8}	–7.74	0.0	3	0.0	0.0
1×10^{-4}	0.6 + 0.5	2.2×10^{-8}	–7.70	0.63	3	0.63	70.0
1×10^{-4}	0.8 + 0.5	2.6×10^{-8}	–7.60	0.7	3	0.7	77.8
1×10^{-4}	1.0 + 0.5	3.0×10^{-8}	–7.52	0.8	3	0.8	88.9
1×10^{-4}	0.5 + 0.5	1.0×10^{-6}	–6.0	0.9	3	0.9	100.0

Ach, Acetylcholine; ESE. E. suaveolens extract (ml); FBC, final bath concentration; MedR, Median response; MMR, Mean Maximum Response; MR, Mean Response.

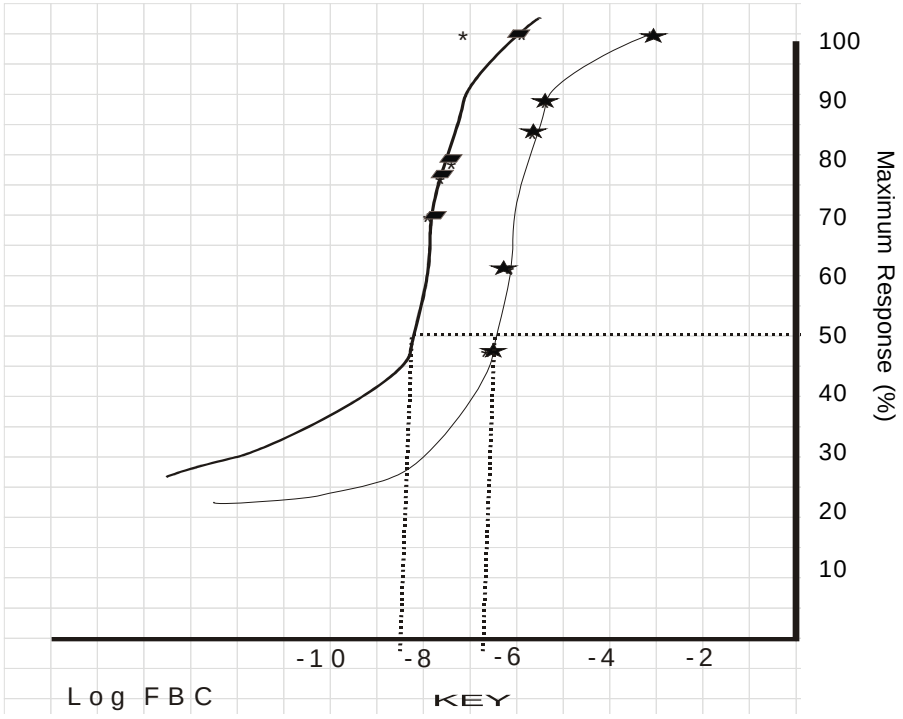

Fig. 1: Maximum Response against Log Final Bath Concentration of Acetylcholine alone and Acetylcholine in the presence of *E. suaveolens.* ★ Acetylcholine alone ■ Acetylcholine + *E. suaveolens.*

DISCUSSION

The fact that muscle relaxants are very powerful drugs which may produce negative effects has left one to explore the use of *Erythrophleum suaveolens* for same purpose in traditional medicine practices. This is also useful for drug development.

***Erythrophleum suaveolens* extract alone**: *Erythrophleum suaveolens* extract blocked the nicotinic actions of endogenous ligand acetylcholine by way of inhibiting flow of nerve impulses within the tissue.[10] Acetylcholine is a natural endogenous ligand and one of the synaptic transmitters. The acetylcholine receptor transmits its signal across the plasma membrane, increases transmembrane conductance of the relevant ion and thereby altering the electrical potential across it membrane. Acetylcholine causes the opening of the ion channel in the nicotinic acetylcholine receptor (Ach R), which allows Na^+ ions to flow down its concentration gradient into cells, producing a localized excitatory postsynaptic potential- a depolarization, and excitation.[10]

***Erythrophleum suaveolens* in the presence of acetylcholine:** The inhibitory effect of the extract of *Erythrophleum suaveolens* may be due to blockage of the receptor and thus preventing the entry of ions during depolarization of skeletal muscle by acetylcholine. The results of the present investigation suggest that an extract of *Erythrophleum suaveolens* may exert an inhibitory effect on skeletal muscle contraction and this may be due to inhibition of the effect of acetylcholine at the receptor site.[10]

Neuromuscular blocking drugs inhibit neuromuscular transmission from nerves to muscles by competitively blocking the binding of acetylcholine to its postsynaptic receptors at the motor end plate, thereby causing paralysis of the muscle.[11] *E. suaveolens* extract exhibited non-depolarizing muscle relaxation by preventing access of acetylcholine to the receptor protein. This results in no depolarization and prevents a change in resting potential of the motor end-plate. The result is lack of muscular contraction or paralysis.[12]

E*rythrophleum suaveolens* extract blocked the contracture effect of Ach. The relaxing effect of the extract on the isolated rectus abdominus muscle was slow, though blockade effect on the acetylcholine-induced contractions decreased with increased dose of acetylcholine. Paralysis is increased when using either non-depolarizing or depolarizing relaxants by substances such as halogenated volatile anesthetic agents, ether, lidocaine, digitalis glycosides, quinidine, diuretics, and procaine. Also non-depolarizing blocks are increased by additional non-depolarizers.[13]

Muscle relaxation is the mainstay of modern anaesthesia and intensive care. Through manipulation of the traditional structure-action relationships, many new and improved muscle relaxants have been created, and several have been brought to clinical use.[14] Research in the field of neuromuscular-blocking drugs such as the isolation of tubocurarine and *Malouetiabe quaertiana* through improved understanding of the physiology of neurons and receptors over the years[15–16] suggests similar compounds may also be responsible for non-depolarizing blocking activity of *E. suaveolens.*

Conclusion

The cold water stem-bark extract of *E. suaveolens* exhibited antagonizing effect on the Ach-induced contraction of the isolated frog rectus abdominis muscle. This study corroborates the fact that *E. suaveolens* is a skeletal muscle relaxant. There is therefore need to proffer better approach to the use of *E. suaveolens* as skeletal a muscle relaxantin tradio-medicine as well as in drug development.

Conflicts of interest:

No conflict of interest.

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REFERENCES

1. Bikhazi GB, Leung I, Flores C, Hassan MJ, Mikati MD, Foldes FF. Potentiation of neuromuscular blocking agents by calcium channel blockers. *Anesth Analg.*1988; **67:** 1–8.
2. Chattopadhyay RN, Roy RK, Das AK. Comparative studies of the effect of calcium channel blockers on isolated skeletal muscle preparation. *Indian J Pharmacol.* 1992; **24:** 233–234.
3. Ogundeko TO, Idyu II, Ojo MT, Idyu VC, Ogbole EA, Builders MI, *et al.* Investigation of relaxative effect of stem-bark extract of Erythrophleum suaveolens on rat phrenic nerve-diaphragm muscle. *J Advances Medical Pharmasci.* 2015; **3:** 24–30.
4. Idyu II, Kela SL, Idyu VC, Akinyede A, Builders MI, Ogbole EA, *et al.* Acute toxicity studies of Erythrophleum suaveolensin Albino Mice (Mus-musculus). *Int J Sci Res.* 2014; **3:** 366–371.
5. Idyu II, Olaoye TO, Sokomba EN, Idyu VC, Ramyil MS, Ogbole EA, *et al.* The Pharmacological evaluation of cold water stem-bark extract of Erythro-phleumsuaveolens on gastrointestinal muscle of guinea pig (Caviaporcellus) ileum. *Int J Sci Res.* 2014; **3:** 602–607.
6. OgundekoTO, Ramyil MS, Idyu CV, Idyu II. Comparative effect of cold hydro stem-bark extract of Erythro-phleumsuaveolens on gastrointestinal muscle of rabbit jejunum (Oryctola-guscuniculus). *Ame J Pharmac Sci* 2014; **2:** 52–55.
7. Akinpelu BA, Dare CA, Adebesin FI, Iwalewa EO, Oyedapo OO. Effect of stem-bark of Erythrophleumsua-veolens (Guill. & Perri.) saponin on fresh water snail (Lanisteslybicus) tissues. *Afr J Environmental Sci Technol.* 2012; **6:** 446–451.
8. Burkill H. The Useful Plants of West Tropical Africa.1985; **3:** 116–120.
10. Kavimani S, Elango R, Gupta M, Majumdar UK. The effect of aqueous extract of Orthosiphonthymiflorus on isolated skeletal muscles. *Ant Sci life.* 1998; **18:** 46–49.
9. Grosse-Sundrup M, Henneman JP, Sandberg WS, Bateman BT, Uribe JB, Nguyen NT, *et al.* Intermediate acting non-depolarizing neuromuscular blocking agents and risk of post-operative respiratory complica-tions: prospective propensity score matched cohort study. Bri Med J. 2012; **345 10:** 1–14.
10. Crna MA. Neuromuscular blocking agent: A review. *J AmeAssoc Nurse Anaesth.* 1981: 159–165.
11. Lee C. Conformation, action, and mechanism of action of neuromuscular blocking muscle relaxants. *J Pharmacol Therap.* 2003; **98:** 143–169.
12. Raghavendra T. Neuromuscular blocking drugs: discovery and development 2002; **95:** 363–367.
13. McKenzie AG. Prelude to pancuronium and vecuronium. *Anaesth* 2002; **55:** 551–556.
14. Bowman WC. Neuromuscular block. *Bri J Pharmacol.* 2006; **147:** S277–S286.

BINGHAM JOURNAL OF MEDICINE

RESEARCH ARTICLE

Hepatitis B and C Viral Infections among Clinical Medical Students in Jos, North Central Nigeria

Infections virales des hépatites B et C chez les étudiants en médecine clinique de Jos, Centre-Nord du Nigeria

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ABSTRACT

BACKGROUND: **The people most at risk of hepatitis B virus (HBV) and hepatitis C virus (HCV) infection by mucocutaneous exposure are healthcare and public safety workers who are exposed to blood and body fluids. Medical students who are being trained to practise within the healthcare environment are also at risk of contracting these viruses.**

OBJECTIVES: **The objective of this study was to determine the prevalence of HBV and HCV infection among clinical medical students in Jos and vaccinate those who were hepatitis B surface antigen (HBsAg) seronegative.**

METHODS: **We conducted a cross sectional study of clinical medical students. All clinical medical students of Bingham University were targeted. A structured questionnaire was administered to obtain demographic data on risk of exposure to HBV and HCV infections. Laboratory analysis of hepatitis virus antibodies from blood sample collected from each student was undertaken. The prevalence rate and test of association between variables were appropriately determined.**

RESULTS: **Of a total of 116 students enrolled, 51(44%) were males and 65 (56%) were females. Six (5.2%) students were HBsAg seropositive, none was previously immunized against HBV infection, among them, four (3.5%) had detectable serum HBeAb levels. None of the students who previously had HBV vaccination was seropositive for HBsAg. Two (1.7%) students had detectable serum anti-HCV, one from each gender.**

CONCLUSION: **We conclude that the prevalence rates of HBV and HCV infections are relatively low among the clinical medical students. All HBsAg seronegative students should be offered HBV vaccine. BJM 2017; 1(1): 19–22.**

Keywords: Hepatitis B virus, hepatitis C virus, medical students, Jos.

ABSTRAIT

CONTEXTE: Les personnes les plus à risque de virus de l'hépatite B (VHB) et le virus de l'hépatite C (VHC) par l'exposition mucocutanée sont les travailleurs de la santé et de la sécurité publique qui sont exposés au sang et les fluides corporels. Les étudiants en médecine sont formés et se pratiquer dans le milieu des soins de santé; ils sont à risque d'exposition à ces virus.

OBJECTIFS: L'objectif de cette étude était de déterminer la prévalence du VHB et du VHC chez les étudiants en médecine clinique à Jos et vacciner ceux qui étaient HBsAg séronégatifs.

Méthodes: Nous avons mené une coupe, étude descriptive transversale d'étudiants en médecine clinique. Tous les étudiants en médecine clinique de l'Université Bingham ont été ciblés. Un questionnaire structuré a été administré pour obtenir des données démographiques sur le risque d'exposition au VHB et du VHC. L'analyse en laboratoire des anticorps du virus de l'hépatite de l'échantillon de sang prélevé sur chaque sujet a été entreprise. Le taux de prévalence et le test d'association entre les variables a été déterminée en utilisant le test de chi carré de Pearson.

RÉSULTATS: Sur un total de 116 sujets inscrits, 51 (44%) étaient des hommes et 65 (56%) étaient des femmes. Six (5,2%) sujets étaient HBsAg séropositifs, aucun n'a été préalablement immunisé contre l'infection par le VHB, parmi eux 4 (3,5%) avaient Ac anti-HBe sérique détectable. Aucun des sujets qui avaient auparavant vaccination contre le VHB était séropositif pour HBsAg. Deux (1,7%) des sujets avaient antiHCV sérique détectable, un de chaque sexe.

CONCLUSION: Nous avons conclu que la prévalence du VHB et du VHC sont relativement faibles chez les étudiants en médecine clinique. Tous les sujets séronégatifs HBsAg devraient être offerts vaccin contre le VHB. **BJM 2017; 1(1): 19–22.**

Mots clés: VHB, VHC, étudiants en médecine, Jos.

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Abbreviations: HBV, hepatitis B virus; **HCV,** hepatitis C virus, **HBsAg,** hepatitis B surface antigen; **HBeAb,** hepatitis B antobody.

INTRODUCTION

Hepatitis due to hepatitis B virus (HBV) and hepatitis C virus (HCV) are oa a major global public health concern because of worldwide distribution of the viruses and significant attendant mortality and morbidity.[1,2] They are also the leading cause of liver cirrhosis and cancer around the world.[3] The persons at most risk for hepatitis infection by cutaneous or mucosal exposure are healthcare and public safety workers who are reasonably anticipated to be exposed to blood and body fluids.[4] Hepatitis B virus is a prototype for the hepadnaviridae family of hepatotropic partially double stranded DNA viruses, while HCV is a single stranded RNA virus belonging the family, Flaviviridae.[7] Although very different at the molecular level, HBV and HCV share may similarities as pathogens.

Perinatal and sexual exposures to viral pathogens are highly efficient modes of transmission and person-to-person spread of viral hepatitis. This infection occurs among household contacts of a chronically infected person, likely as a result of non-intact skin or mucous membrane contact with secretions containing blood.[8] Percutaneous exposures that have resulted in transmission of hepatitis include contaminated equipment , illegal injection drug use, and needle sticks or other injuries from sharp instruments sustained by hospital personnel.[9] In addition, occasional outbreaks of HBV infection have been associated with tattooing and acupuncture.[10] In developing countries, donor testing for HBsAg is not universal. Transmission through unsafe therapeutic practices, including inadequately sterilized needles and medical instruments, and the reuse of disposable needles and syringes remains a significant problem.[11] Rarely, transmission has followed bites from infected persons and it has been suggested that most horizontal transmission within families and among young children is due to inapparent parenteral exposure to saliva or blood.[12] Health education is the cornerstone in the prevention of these viral infections.[13–15] Immunization remains the most effective way to control HBV infection.[16] This stresses the importance of HBV vaccination among all health care workers including clinical medical and nursing students. Hepatitis B vaccination is recommended for healthcare personnel at risk for occupational exposure to this blood borne pathogen.

Bingham University medical students who would come to the hospital for clinical training to be trained in a hospital will be at risk of HBV and HCV infections. We conducted a cross sectional, descriptive study of fresh intake of clinical medical students of Bingham University Teaching Hospital. The aim of this study was to determine the HBV and HCV status of all medical students coming to Bingham University Teaching Hospital for training and to immunize those students who were found to be HBsAg seronegative.

SUBJECTS

All the clinical medical students of Bingham University were targeted. The 123 clinical medical students who were eligible to be recruited included all medical students who started clinical training in the years 2012, 2013 and 2014. Each student was enrolled within two weeks of reporting to the hospital for clinical training. Only clinical medical students who accepted to participate by signing the informed consent form were recruited. Ethical clearance for the study was obtained from the Bingham University Teaching Hospital, human research and ethics committee (BHUTH/HREC/SNO/00033).

Pretest counseling was given to each student in confidence and an informed consent obtained. A structured questionnaire was administered to obtain demographic risk of exposure to HBV and HCV infection data from each student. The questionnaire included questions on socio-demographics, medical history, and exposure to sexual activity, jaundiced patients and socio-cultural activity that involved blood. Each student was then registered with a unique study number which was used to track their blood sample.

A blood sample of 4-5 ml was collected from each student into an EDTA vacutainer bearing the unique subject number. Each sample was centrifuged at 2500 rpm for five minutes and plasma obtained. The plasma was divided and held in duplicate vials stored at –20°C until needed. A stored sample was thawed and brought to room temperature just before it was analysed. Each sample was screened for HBsAg using ABON (HBsAg) and anti-HCV using ABON (antiHCV) rapid test strips (Abon Biopharm, China). All the samples that were found positive for HBsAg were also tested for anti-HBsAb and HBeAb by a second test using One step HBV (Biotec, Middlesex UK) rapid test strips. Blood samples from students previously vaccinated against HBV were also tested for anti-HBsAb and HBeAb.

The data was analysed using SPSS (SPSS Inc., Chicago IL.U SA) version 17. The Pearson's Chi square test at 95% confidence with statistical significant level set at $p<0.05$ was used to test the data obtained.

RESULTS

A total of 116 students were recruited, of which 51 (44%) were males and 65 (56%) females. The mean age for males was 23.4 years and for females 23.6 years with a range of 19–51 years. One hundred and eleven (95.7%) of the students lived in a city rather than town or village; 99 (85.3%) of the students were domiciled in Plateau state.

Twenty-one (18.1%) students were previously immunized against HBV infection, 13(11.2%) of whom were males and eight (6.9%) were females. Thirty-six (31.0%) students were previously hospitalized or had surgery, 14 (12.0%) were males, 22 (18.9%) were female. Forty-four (37.9%) had contact with jaundiced patients, 18(15.5%) were males, 26 (22.4%) were females while 46(39.7%) students had dental procedures performed on them (Table 1). Sixteen (13.8%) shared sharp objects with others, 6(5.2%) were males, 10 (8.6%) were females. Eleven (9.5%) had tattoo marks, 5(3.0%) were males, 9 (7.7%) were females. Six (5.2%) female students suffered jaundice another 3 (2.6%) female students had traditional surgery like tattoo, scarifications and circumcisions. Three students (2.6%) had blood transfusion, two (1.7%) were males, one (0.9%) was female.

Table1: Distribution of Medical Students by Risk Factors for Viral Hepatitis

Risk Factor	Number (%)		
	Male	Female	Total
N	**51**	**65**	**106**
Immunization	13(25.5)	8(12.3)	**21(19.8)**
Hospitalization	14(27.5)	22(33.8)	**36(33.3)**
Dental procedure	17(33.3)	29(44.6)	**46(43.3)**
Blood Transfusion	2(39.2)	1(1.5)	**3(2.8)**
Shared sharps	6(11.3)	10(15.4)	**16(15.1)**
Suffered jaundice	0	6(7.2)	**6(5.7)**
Contact Jaundice	18(35.3)	26(40.0)	**44(41.5)**
Scarification mark	5(9.8)	6(9.2)	**11(10.4)**
Traditional Surgery	0	3(4.6)	**3(2.8)**

Six (5.2%) male students were HBsAg seropositive, none of whom was previously vaccinated against HBV. The Chi square output revealed that the prevalence of Hepatitis B virus infection for male and female respondents differed significantly ($p<0.05$). There was a rise of HBV infection with increasing age starting at age 21 years (Figure 2). Among the seropositive students, four (3.5%) had detectable HBeAb, only nine (7.8%) out of the 21(18.1%) previously vaccinated students had detectable serum antiHBsAb. None of those previously vaccinated against HBV infection however, was seropositive for HBsAg.

Two (1.7%) students were seropositive for HCV infection, one each from either gender ($p>0.05$). This gave a HCV prevalence of 1.7% in our study subjects.

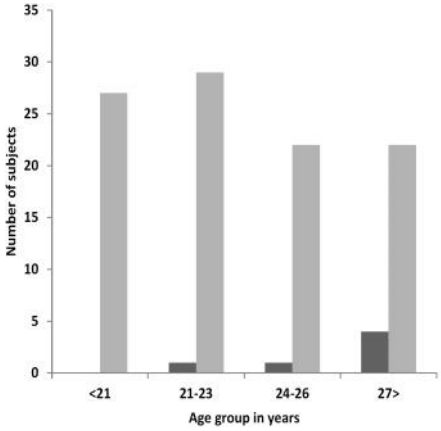

Fig. 1: Distribution of Participants by Age and HBsAg Serum Reaction ■ Reactive ■ Non-reactive.

No socio-demographic variable was significantly associated with HBV or HCV infection. There was no co-infection for the two viruses in any subject.

DISCUSSION

this study, we examined the occurrence of HBsAg and anti HCV among clinical students in Jos. A common socio-demographic risk of exposure associated to HBV and HCV infection could not be determined from this study.[11] Significantly however, is that none of the students who previously had accepted HBV vaccine intervention was seropositive for HBsAg in this study, this may be an indication of efficiency of the vaccine given. All the HBsAg positive students were male, this was surprising; the reason for this bias if determined would be a significant finding.

We found HBsAg prevalence of 5.2% and anti HCV prevalence of 1.7% among our students. This HBsAg prevalence of about 5% is low compared to findings from other parts of Nigeria[17,18] and Africa[19] as well as earlier studies from Jos.[20–22] The relatively low HBsAg prevalence in these students compared to the prevalence in the general population is not surprising. These students, who were undergraduates, were more likely to be from families with better education and health awareness. These students were likely to be less exposed to the negative risk of exposure and unsafe practices associated with HBV and HCV infections compared to the general population.

The prevalence of HBV and HCV infections are relatively low among these clinical medical students compared to the prevalence of the general population. However, there is a need to screen all clinical medical students at commencement of their clinical study years so as to vaccinate those who are seronegative against HBV, to protect them from future risk of infection by the virus.

Conflict Of Interest

I declare no conflict of interest that might have led to bias in this work.

REFERENCES

1. Alta MJ. Epidemiology of viral hepatitis and HIV co-infection. *J Hepatol*. 2006; **44:** 6–9.
2. Kane A, Llyod J and Zaffaran M. *Transmission of hepatitis B, hepatitis C and human immunodeficiency viruses through unsafe infections in the developing world. Model-based regional estimates. WHO Bull.* 1999; **27:** 801–807.
3. CDC. Morbidity and mortality weekly report. MMWR. 2/7/2012; **61:** 545–64.
4. Paul K N, Bradley M M, Benjamin C, Holly H, Don D J, Danielle H and Louisa D. Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: results of systematic reviews. *The Lancet.* 2011; **378:** 571–83.
5. Sarra E, Lamya OAMS, Sahar IM, Shima EEA, Nazik FEM, Ekram HH *et al*. Staff Knowledge, adherence to infection control recommendations and seroconversion rates in hemodialysis centers in Khartoum. *AJANT.* 2011; **4:** 13–19.
6. Egesie JO, Joseph ED, Egesie UG and Odeh CI. Trends in the Incidence of Hepatitis B, C and Human Immuno-deficiency Virus (HIV) among Blood Donors in a Tertiary Hospital in Nigeria. *J Med Trop.* 2011; **13:** 79–81.
7. Karl-Dimiter B, Stefan F W, Pu T, Masanori I, Tam T. L, Francis V. C, and Inder M. V. Human liver chimeric mice provide a model for hepatitis B and C virus infection and treatment. *J Clin Invest.* 2012; **120:** 924–30.
8. Destang JL. Hepatitis B Virus infection. N Engl J Med. 2008; 359: 1486-1500.
9. Henderson DK. SHEA Guideline for Management of Healthcare Workers Who are Infected with Hepatitis B Virus, Hepatitis C Virus and/or Human

Immunodeficiency Virus. *Infect Control Hosp Epidemiol*. 2010; **31:** 204–232.

10. Ali M, Idrees M, Ali L, Abrar H, Rehman IU, Saleem S, Afzal S and Butt S. Hepatitis B virus in Pakistan: A systematic review of prevalence, risk factors, awareness status and genotypes. *Virol J.* 2011; **102:** 1–9.
11. Iroezindu MO, Daniyam CA, Isa ES, Edith NO, and Oche OA. High risk behavior among hepatitis B virus infected patients in a Nigerian tertiary hospital. *J Med Trop.* 2012; **6:** 8–12.
12. Ado A, Alhassan S, Chonoko UG, Samaila AU. Sero-prevalence of hepatitis Ba surface antigen (HBsAg) among Blood Donors attending Ahmadu Bello University Teaching Hospital (ABUTH), Zaria, Nigeria. *Bajopas* 2010; **3:** 20–22.
13. Gadour MO and Mohammed BET. HBV, HCV and HIV among patients with hemophilia in Khartoum-Sudan. *SJMS*. 2011; **6:** 50–51.
14. Emechebe GO, Emodi IJ, Ikefuna AN, Ilechukwu GC, Igwe WC, Ejiofor OS and Ilechukwu CA. Hepatitis B virus infection in Nigeria – a review. *NMJ.* 2009; **50:** 42–49.
15. Hassan A, Nur H A, Christian R and others. Prevalence and risk factors of hepatitis B and C virus infections in an impoverished urban community in Dhaka, Bangladesh. *BMC infectious disease.* 2010; **10:** 23–33.
16. Ndako J A, Echeonwu GON, Olabode AO *et al.* Seroprevalence of Hepatitis B Surface Antigen (HBsAg) among children of Primary school age in a community, North Central Nigeria. Sierra Leone J Biomed Res. 2010; 2: 32-37.
17. Balogun TM, Emmanuel S and Ojerinde EF. HIV, Hepatitis B and C viruses co-infection among patients in a Nigerian tertiary hospital. *Pan Afr Med J.* 2012; **12:** 2–3.
18. Mabayoje V.O, Akinwusi P.O., Opaleye O.O, Aboderin O.A, Egbewale B. E, and Fagbami A.H. Prevalence of hepatitis B surface antigen, hepatitis C and human immunodeficiency virus antibodies a in a population of students of tertiary institution in Nigeria. *Afr J Cln Exper Microbiol.* 2010; **11:** 68–74.
19. Komas NP, Bai-Sepou S, Manirakiza A, Leal J, Béré A and Faou A. The prevalence of hepatitis B virus markers in a cohort of students in Bangui, Central African Republic. *BMC Infectious Diseases.* 2010; **10:** 1–7.
20. Egah DZ, Banwat EB, Audu ES, Iya D, Mandong BM, Anele AA, *et al*. Hepatitis B surface antigen, hepatitis C and HIV antibodies in a low-risk blood donor group, Nigeria. *East Mediterr Health J.* 2007; **13:** 961–6.
21. Chukwuedo AA, Eze NCO, Nimzing L, Okwori AEJ. Prevalence of hepatitis B virus surface antigens (HBsAg) and Hepatitis C virus antibodies in blood donors at Jos, Plateau State, Nigeria. *Inter J Nat App Sc.* 2009; **5:** 398–401.
22. Jombo GTA, Egah DZ, Banwat EB. Hepatitis B virus and Human Immunodeficiency Virus co-infection in Zawan community of Plateau State. *J Med Trop.* 2005; **7:** 21–26.

BINGHAM JOURNAL OF MEDICINE

Severe Acute Maternal Morbidity Associated with Septic Abortion: A Case Report

Morbidité Maternelle Aiguë Sévère Associée à l'Avortement Septique: Rapport de cas

A. Mustapha*, S. David†, A. G. Adebiyi, A. Bashir

ABSTRACT

BACKGROUND: **Massive upper gastrointestinal haemorrhage (UGIH) is a common surgical emergency. It is however uncommon for it to present as the only site of bleeding in a patient with septic abortion.**

OBJECTIVE: **To report a case of the occurrence of non-steroidal anti-inflammatory drug (NSAID)-induced gastropathy as a cause of massive UGIH in a patient with septic abortion.**

CASE REPORT: **A 19-year-old woman presented with fever and bleeding *per vaginam* and haematemesis about two weeks after an unsafe abortion. Examination revealed a young woman in shock. She was fully investigated and successfully resuscitated**

RESULTS: **She had intractable haematemesis which was initially suspected to be due to disseminated intravascular coagulopathy. She was rhesus negative. The haematemesis was subsequently found at endoscopy to be due to acute upper gastrointestinal ulceration following non-steroidal anti-inflammatory drug abuse. She had, among other treatments, 13 units of rhesus negative blood transfused, intensive care and triple therapy for the UGIH, anti-D immunoglobulin administration and manual vacuum aspiration for retained products of conception. She recovered fully.**

CONCLUSION: **Severe acute maternal morbidity can be due to several causes. A high index of suspicion for unusual causes such as non-steroidal anti-inflammatory induced gastropathy and prompt appropriate multidisciplinary approach to management are key to a favourable outcome. BJM 2017; 1(1): 23–25.**

Keywords: Gastrointestinal haemorrhage, NSAID-induced gastropathy, septic abortion, maternal near-miss, severe acute maternal morbidity

ABSTRAIT

CONTEXTE: hémorragie digestive haute Massive (UGIH) est une urgence chirurgicale commune. Il est cependant rare, pour présenter, comme le seul site de saignement chez un patient présentant un avortement septique.

OBJECTIF: Rapporter un cas de l'apparition d'un médicament anti-inflammatoire non-stéroïdien (AINS) gastropathie induite comme une cause de UGIH massives chez les patients présentant un avortement septique.

RAPPORT DE CAS: A 19 ans, la femme a présenté de la fièvre et des saignements PV et hématémèse environ deux semaines après l'avortement à risque. L'examen a révélé une jeune femme instinct. Elle a été entièrement étudiée et réanimée avec succès

RÉSULTATS: Elle était rhésus négatif, elle avait hématémèse intraitable qui a été initialement soupçonné d'être due à une coagulopathie intravasculaire disséminée. Le hématémèse a découvert par la suite à l'endoscopie soit due à l'ulcération gastro-intestinale supérieure aiguë suite à l'abus de drogues non-stéroïdiens anti-inflammatoire ; une histoire qui a été difficile d'obtenir d'elle. Elle avait, entre autres traitements, treize unités de sang rhésus négatif transfusés, les soins intensifs et la triple thérapie pour le UGIH, anti-D administration d'immunoglobuline et l'aspiration manuelle pour les produits de conception retenus. Elle est complètement rétablie.

CONCLUSION : la morbidité maternelle aiguë sévère peut être fait à plusieurs causes. Un indice élevé de suspect pour des causes inhabituelles telles que la gastropathie induite anti-inflammatoire non stéroïdien dans les cas et l'approche multidisciplinaire appropriée invite à la gestion sont essentielles à une issue favorable. **BJM 2017; 1(1): 23–25.**

Mots-clés: Hémorragie massive gastro-intestinale, gastropathie induite par les AINS, l'avortement septique, maternelle quasi-accidents, graves de morbidité maternelle aiguë

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Abbreviations: DIC, Disseminated intravascular coagulation; **MVA,** Manual vacuum aspiration; **NSAIDs,** Nonsteriodal anti-inflammatory drugs; **PCV,** Packed cell volume; **SAMM,** maternal near-miss or severe acute maternal morbidity; **UGIH,** Upper gastrointestinal haemorrhage.

INTRODUCTION

In Nigeria, an estimated 20–40% of maternal deaths result from abortion complications[1] with much more suffering disability. Massive upper gastrointestinal hemorrhage (UGIH) which be defined as bleeding from the upper gastrointestinal tract is associated with haemodynamic instability, acute anemia and/or the need for blood transfusion of at least four units of blood.[2]

Non-steroidal anti-inflammatory drugs (NSAIDs) are the most highly prescribed drugs for pain, inflammation and fever but they are associated with severe side effects including gastro-intestinal injury and peptic ulceration which can lead to gastrointestinal haemorrhage.[4,5]

A maternal near-miss or severe acute maternal morbidity (SAMM) can be defined as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy. Criteria for identifying near misses could be clinical, intervention-based, or organ-system dysfunction-based criteria.[3]

Massive UGIH may present in relation to septic abortion but usually as a component of disseminated intra-vascular coagulopathy (DIC).[3] We did not find any report on massive upper gastrointestinal hemorrhage in patients with septic abortion that were not due to DIC.

We report a rare presentation of massive upper GI bleeding from NSAID-induced gastroduodenal ulcerations in a teenager with septic abortion who was a maternal near-miss.

History

The patient was a 19-year old para 0+1 who presented to us with a 13-day history of unsafe induced abortion at 10 weeks of gestation, a 7-day history of fever, bleeding *per vaginam* and an 8-hour history of haematemesis. Abortion was carried out using manual vacuum aspiration (MVA) at the home of the practitioner. Pain subsided same day with use of some tablets but spotting continued. Six days post abortion, bleeding *per vaginam* worsened necessitating use of 24–30 pad strips per day as against her premorbid use of two-three pad strips during menses. She had a repeat MVA four days prior to presentation at the same place and by the same person. Bleeding subsided but she developed copious foul smelling vaginal discharge, low back pain, fever, and coffee ground vomitus. Eight hours prior to presentation, she had four episodes of frank haematemesis of about 500ml per episode. She then developed severe body weakness and dizziness after the fourth episode. Other relevant aspects of the history were that she was blood group B-negative, had never used contraceptives, was not aware of pap smear, and had one sexual partner who broke up with her on discovering the index pregnancy.

Physical Examination

On examination at presentation, she was lethargic, severely pale, febrile (axillary temperature was 38.2^0C), with cold clammy extremities, sweating, tachydyspnoeic with impalpable radial pulses. The carotid pulse was 136 beats per minute and the blood pressure was 80/50 mmHg. The saturated partial pressure of oxygen was 62%. She had two bouts of frank haematochezia of about 150 ml/bout while being examined. There was marked suprapubic tenderness but no ascites. Her perineum was soiled with foul smelling purulent discharge seen trickling from the cervical os, No product of conception was seen. The anal area was bloodstained, and the rectum was roomy and empty.

An initial impression of septic abortion with massive upper gastrointestinal bleeding in a rhesus negative single student secondary to DIC was made.

Management

She was resuscitated including intravenous fluids, passage of a nasogastric tube and urethral catheter. Intravenous ceftriaxone and metronidazole were commenced as well as.

Her admitting packed cell volume (PCV) was 16% . Two units of fresh B negative blood were transfused three hours after presentation. The clotting profile showed no laboratory evidence of DIC. Indirect Coombs test was negative. Urgent ultrasound scan (USS) done showed retained products of conception. Full Blood count showed a leucocytosis of $22x10^9$/L with neutrophilia of 98%, toxic granulations and left shift. The platelet count was normal.

Further Management Challenges

Haematemesis and haematochezia continued with the average blood loss of 2–3l/day and syncopal attacks after bouts. Transfusion of rhesus negative blood continued with intermittent calcium gluconate administration after every four units. Additional history revealed she was taking four tablets of ibuprofen four to six times daily in addition to ampicillin capsules in the preceding four days. A diagnosis of NSAID-induced gastro-pathy was then entertained.

The gastroenterologists and the general surgeons were invited. She was placed on nil per oral, and was commenced on intravenous ranitidine. She was slated for oesophago-gastroduodenoscopy but her PCV had dropped to 13% after six units of blood. There was difficulty procuring Rhesus negative blood for transfusion and a letter was written to the National Blood Transfusion Service at Kaduna for assistance with prompt response. Endoscopy done on the fourth day of admission revealed a huge ulcer in the first part of the duodenum that measured about 2cm x 2cm, with a visible vessel and thick adherent blood clot on the ulcer. There were also multiple areas of gastric erosion in the body and antral parts of the stomach.

On the fifth day of admission, she vomited two litres of fresh blood with associated clots and she developed altered sensorium, with systolic blood pressure of 60 mmHg, un-recordable diastolic blood pressure, and saturated partial pressure of oxygen of 35%–60% even after four hours of resuscitation. Anesthetists reviewed for intensive care and she was given intravenous ephedrine, oxygen therapy, intravenous fluids and blood transfusion.

After two days of intensive care, she was improving, UGIH was subsiding, and her vital signs were normalizing. She was commenced on clarithromycin, rabeprazole, and amoxicillin and she

made some clinical improvement. She developed hypokalaemia of 2.5 mmol/L, which was corrected. She had a total of 13 units of blood transfused with post transfusion PCV of 28%.

Repeat USS showed retained products of conception with destructive endometrial changes. She had cervical stenosis, which was dilated and manual vacuum aspiration was done. Anti-D immunoglobulin was administered. After 12 days on admission, she developed features of malaria fever, which was confirmed on blood film and treated.

She thereafter maintained steady progress. Both the patient and her parents were adequately counseled. She was referred to the reproductive health clinic for post abortion care including papanicolaou smear. She was discharged after 13 days on admission.

DISCUSSION

Massive UGIH can occur with septic abortion as well as in patients with stress-induced gastrointestinal ulceration, ingestion of caustic substances, NSAIDs, in intensive care unit patients and patients with severe burns. Reported cases of massive UGIH in septic abortion are due to DIC.[3] Other authors have reported melena.[7] We didn't find any publication on massive UGIH in septic abortion attributable to concurrent use of NSAID and subsequent development of NSAID induced gastropathy. The closest case was that following soap-induced abortion.[8] A high index of suspicion may help in the diagnosis, as most patients who undergo induced abortion will be on analgesics mostly NSAIDs.

The cause of her massive UGIH was due to NSAID induced gastroduodenal ulceration, which was confirmed at a diagnostic endoscopy. Although different endoscopic therapies are available to secure haemostasis including injection and thermal therapies, at the time the patient presented to our facility, none of these techniques was operational though a surgical consult was obtained in the event of failure of medical management. The decision to give triple therapy to the patient for *Helicobacter pylori* eradication without a urea breath test was based on the fact that the patient was weak at presentation and we would not have been able to wait for 10 days to wean her off the previous antibiotics she was on and also for her to have an overnight fasting and breathing into the breath card would not be possible

Severe Acute Maternal Morbidity

An analysis of cases of SAMM or near-misses has the potential to highlight the deficiencies (as well as the positive elements) in the provision of obstetric services in any health system. The higher frequency of near misses compared to maternal deaths allows a more rapid, comprehensive and statistically reliable quantitative analyses that are valuable to clinical audit. Also, compared to maternal deaths, survivors could tell their own stories. This patient was one out of the numerous women who suffered SAMM. For every maternal death, at least 30 women suffer SAMM.[5]

The diagnosis of SAMM in our patient was based on clinical, intervention-based and organ-system dysfunction-based criteria . The clinical criterion she had was in the form of severe haemorrhage with blood loss of over 2.4L. The intervention-based criteria were transfusion of over 2L of blood and also admission into intensive care unit. The organ-system dysfunction-based criteria were a systolic blood pressure <90mmHg lasting more than 60 minutes despite aggressive fluid replacement of greater than two litres and oxygen saturation less than 90% for greater than 60 minutes. Prompt multidisciplinary approach was paramount to successful treatment.

CONCLUSION

Unsafe induced abortions are common in Nigeria despite restrictive abortion laws. Massive UGIH can complicate septic abortion. A high index of suspicion is needed to ascertain if this is due to NSAID-induced gastropathy and not the commoner presentation of DIC. A past history of use of NSAID and other related drugs should be sought in every patient with upper GI haemorrhage irrespective of the clinical presentation.

REFERENCES

1. Okonofua FE. Preventing unsafe abortion in Nigeria. *Afr J Reprod Health.* 1997; **1:** 25–36.
2. Farris S. *Massive gastrointestinal bleeding CDEM self-study module* available at www.org/ssm/gi/gib/gib.phb accessed on 6/12/14
3. Buka NJ, Whelton JA, Tenney B. "Upper gastrointestinal hemorrhage after septic abortion." *Am J Obstet Gynecol* 1965; **91:** 504–508.
4. Nuki G, Pain control and the use of non-steroidal anti-inflammatory drugs. *British Medical Bulletin,* 1990; **46:** 262–278.
5. Smalley WE, Ray WA, Daugherty JR, Griffin MR, Non-steroidal anti-inflammatory drugs and the incidence of hospitalizations for peptic ulcer disease in elderly persons. *AM J Epid.* 1995; **141:** 539–45.
6. Say L, Souza JP, Pattison RC. WHO Working Group on Maternal Mortality and Morbidity Classifications. Maternal near-miss – towards a standard tool for monitoring quality of maternal health care. *Best Pract Res Clin Obstet Gynaecol.* 2009; **23:** 287–96.
7. Rana A, Pradhan N, Gurung G, Singh M. Induced septic abortion: A major factor in maternal mortality and morbidity. Journal of Obstetrics and Gynaecology Research. 2004;30: 3–8.doi: 10.1111/j.1341-8076.2004.00146.x
8. Smith R, Smith L, Tenney B. Soap Induced Abortion: report of 5 cases. *Obstet Gynecol.* 1962; **20:** 211–5.

WEST AFRICAN JOURNAL OF MEDICINE

LETTER TO THE EDITOR

Renal Failure and Haemolysis in a Two-Year-Old Child due to Black Water Fever Or Naphthalene Poisoning

Insuffisance Rénale et Hémolyse chez un Enfant de 2 ans: Fièvre de l'eau Noire ou Empoisonnement au Naphtalène?

Malaria remains a major public health problem in the world, with sub-Saharan Africa accounting for about 80% of malaria cases.[1] Black water fever (BWF) is one of the severe forms of malaria. [2, 3] It is a clinical syndrome characterized by severe intravascular haemolysis, haemoglobinuria and acute renal failure, commonly seen after receiving quinine. [2,] There have been reports of haemolysis occurring in patients treated with artemether-lumefantrine combination therapy.[3] There is also a strong association of haemolytic anaemia with naphthalene poisoning, first described in 1949,[4] . In this initial report four Negro infants with mothballs poisoning, presented among others with severe intravascular haemolysis, haemoglobinuria and acute renal failure.

Our patient, BJK, a 2-year- old male child presented with complaints of fever, diarrhoea, vomiting and passage of dark coloured urine associated with reduced urine output for three days. Child was treated with artemether–lumefantrine and paracetamol. His mother gave a history of accidental mothball ingestion, for which vomiting was induced by administering palm oil, peak milk and abdominal compression; the child vomited one ball of the naphthalene. Examination revealed an acutely ill looking child who was conscious with a temperature of 38.5°C. He was pale and jaundiced but other vital signs were stable. His urine coca-cola coloured.

A diagnosis of severe malaria presenting as severe anaemia and black water fever was made. The differential diagnosis was haemolytic anaemia secondary to naphthalene poisoning. The patient's packed cell volume (PCV) was 18% and malaria parasite was positive. Urine microscopy showed no red blood cells or red cell cast. Urine culture showed no bacterial growth. The results of a full blood count were as follows: haemoglobin, 5.8 g/dl; WBC, 9.0×10^9/L; platelets, 220×10^9/L; reticulocytes, 1.5%; neutrophils, 61%; lymphocytes, 30%; monocytes, 2%; and eosinophils 7%. His G6PD activity was within normal limits. The liver function tests were normal except for high bilirubin. The patient was also negative for hepatitis B and C screening. Serial serum electrolytes and urinalysis results are shown in the Table. The index patient improved tremendously after he was transfused with blood and was placed on artesunate.

Table 1: Serial Results of Serum Biochemistry and Urinalysis

	Day 1	Day 3	Day 5
Serum Electrolytes			
Sodium mmol/l	145	150	140
Potassium mmol/l	5.8	5.l	4.2
Chloride mmol/l	110	100	100
Bicarbonate mmol/l	15	20	25
Urea mmol/l	20	8.8	3.8
Creatinine µmol/l	135	87	44
Urinalysis			
Specific Gravity	1.030	1.020	1.020
pH	6.5	7.0	8.0
Glucose	Negative	Negative	Negative
Protein	+++	++	+
Ketone	+++	Negative	Negative
Haemoglobinuria	++	+	Negative
Nitrite	Negative	Negative	Negative
Leucocyte esterase	Negative	Negative	Negative
Bilirubin	+	+	Negative

Protein +, 30 mg/dl; bilirubin +, 15 mg/dl; haemoglobinuria +, 10 mg/dl.

The clinical presentation of BWF is typically with intravascular haemolysis[2] associated with fever, headache, vomiting, malaria parasitaemia and later passage of coca-cola coloured urine, jaundice and renal failure. Our patient had similar presentation except that he never had quinine, halofantrine or mefloquine. The most likely trigger in our patient might be the artemether-lumefantrine he was given on outpatient basis. This corroborates with a report by Aloni *et al*[3] where haemolytic crisis of BFW followed artemether-lumefatrine intake.

The index patient improved tremendously after he was transfused with blood and was placed on artesunate. Oguche *et al* [2] had similarly treated their patients with BWF using artesunate. Our patient's early signs of renal failure were reversed by renal challenges. It is conceivable that other drugs and chemicals can trigger intravascular haemolysis with subsequent development of haemoglobinuria, jaundice and renal failure especially if they are G6PD deficient.[4, 5] This may be the case in our patient, since he had ingested naphthalene ball, but G_6PD activity was within normal limit. However, the laboratory report suggesting normal G6PD activity may not be unusual in the black African type G_6PD deficiency where, false negative G_6PD assay may occur.

The challenge here is that we had no reagents to do the susceptibility test of the blood of index patient to naphthalene to see wither the haemolysis could be attributed to naphthalene or not. Massive haemolysis and haemoglobinuria had been reported in a patient with SCA, [5] however the index patient's genotype was AA. Haemoglobin precipitation in the kidney can lead to renal impairment. This might have been the case in the index patient.

It is very important for physicians who manage cases of malaria to be aware that severe intravascular haemolysis can follow artemether-lumefanthrine administration; and that naphthalene poisoning may mimic BWF and G6PD deficiency.

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REFERENCES

1. WHO: World Health Organization; 2011. http://www.who.int/malaria/world_malaria_report2011/en/website
2. Oguche S, Mava Y, Watila IM, Molta NB. Black Water Fever (BWF)? A Case report from the Semi-arid North Eastern Nigeria. *Nig J Clin Pract.* 2010; **13:** 103–105.
3. Aloni M, Nsangu M, Kunuanuna T, Kadima B, Manda F. Haemolytic Crisis of Black water fever following Antemether-Lumefatrine intake. *Bull Soc Pathol Exot* 2010; **103:** 296–298.
4. Zuelzer WW, Apt L. Acute haemolytic anaemia due to Naphthalene Poisoning. *JAMA* 1949; **141:** 185.
5. Djibo A, Souna-Adamou A, Brah Bouzou S. Black water fever in adults with sickle cell anaemia. Two fatal cases. *Med Trop.* 2000; **60:** 156–8.

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SUBJECT INDEX TO VOLUME 1, NO. 1, 2017

COLLEGE NEWS

by Dr. Stephen A. Anzaku, *Department of Obstetrics and Gynaecology*

CM&HS Bingham University: Historical Perspectives

The College of Medicine and Health Sciences of Bingham University, Karu took off in 2006 in Jos with 44 medical students before moving to Karu, Nasarawa State the Faculty of Basic Medical Sciences of the Bachelor of Medicine, Bachelor of Surgery (MBBS) programme is currently located. The first provost of the college was late Professor F.I Anjorin who pioneered the progress of the college and the vision is been carried on by the current provost Professor A.M Yakubu. Out of the 44 students admitted, 20 arrived Jos in April 2011 for their clinical training at Bingham University Teaching Hospital, Jos (Former Evangel Hospital, Jos). The clinical section of the College currently based in Jos has two faculties; Faculty of Basic Clinical Sciences and Faculty of Clinical Sciences with 16 departments.

The college's MBBS program has full accreditation by the Medical and Dental Council of Nigeria (MDCN) and interim accreditation by National University Commission (NUC).

Pioneer Medical Graduates

The College has proudly contributed 64 medical doctors to the health system of Nigeria. The first batch of 19 doctors was inducted by the Registrar of the Medical and Dental Council of Nigeria in March 2015 consisted of the following:

1. Dr ACHEMA, Timothy Ataguba
2. Dr ACHIMUGU, Glory Ojonugwa
3. Dr AGELAGA, Dooshima Deborah
4. Dr BAMSA, Emmanuel Gbenga
5. Dr CHINYIO, Damai
6. Dr DIDAMSON, Pfongkazah Daniel
7. Dr Dike, Boniface Obinna
8. Dr DOMA, Sophia Sheamui
9. Dr EVBOROKHAI, Ezra Ojeikhoba
10. Dr IKECHUKWU, Iwuchukwu
11. Dr JEREMIAH, Olushola Emily
12. Dr MUSA, Gloria Danladi
13. Dr OLAYEMI, Victor Olushola
14. Dr OLOGUN, Olufemi M. D.
15. Dr ONUWE, Adavize Adinoyi
16. Dr SAMUELSON, Keneolisa Chibuzor
17. Dr TIZHE, Nuhu Wankwanje
18. Dr UBANYI, Tina Onyekachukwu
19. Dr ZORTO, Nanisi Umare

The First Set of Doctors from the College of Medicine &Health Sciences, Bingham University. To the left, Professor A. M. Yakubu, Provost of the College administering the Oath of Office to the Graduants.

The Second Set of Doctors from College of Medicine & Health Sciences, Bingham University

Participants at the workshop *on Performance-based Trainee Assessment* under the auspices of the College in June 2016.

The second set of 45 doctors consisted of the following medical graduants:

1. Dr ABAYA, Jummai Grace
2. Dr ABO, I. Isabella
3. Dr ABUNIKE, Sarah Adamma
4. Dr ACHUKOH, Chioma Princess
5. Dr ADEYEFA, Adewole Ameh
6. Dr AGUIYI, Ivan Okechukwu
7. Dr AJAH, Ekene Simon
8. Dr AKANDE, Eunice Opeoluwa
9. Dr ALELE, Jolomi Yvonne
10. Dr ALU, Vivian Ojoma
11. Dr AMUTA, Wilson Ehi
12. Dr ANOM, Ogisa Ibia Timothy
13. Dr ATTAH, Benjamin Ugbede
14. Dr AYENI, Victoria Emike
15. Dr CHIKEREZE, Collins Chukwuebuka
16. Dr DAVID, Abraham Enejoh
17. Dr DUROJAIYE, Justina Ayobola
18. Dr EDION, Sandra Omozele
19. Dr EJIMADU, Ifeatu Amanda
20. Dr EMODI, Chukwuemeka Chinweikpe
21. Dr EVBUOMWAN, Osasumwen Vanessa
22. Dr HARUNA, Musa Kereng
23. Dr ICHEME, Ojogbane David
24. Dr IDI, Ishaku Ishaya
25. Dr IKO, Alamce Gladys
26. Dr IPINERA, Abayomi
27. Dr JAMES, Kurgnam Pisagih
28. Dr JIMBA, Matayebi Ruth
29. Dr KANTIYOK, Jesse Peter
30. Dr MUSA, Naomi Shepuya
31. Dr MUSA, Ojone
32. Dr ODUNAIKE, Ibukunoluwa Mary
33. Dr OFFIAH, Nneka Valeria
34. Dr OGHENEJIVWE, David Ese
35. Dr OGU, Ivy Arikpi
36. Dr OKEKE, Francis Chibueze
37. Dr OLABODE, Opeyemi Oluwaseun
38. Dr OLAOSEBIKAN, Oluranti Mojisola
39. Dr OLORUNFUNMI, Joshua Seye
40. Dr OMALE, Ojonide D.
41. Dr SAM-MBOK, Nenkang
42. Dr SOLANKE, Anuoluwapo Opeyemi
43. Dr SOLA-OJO, Obabusiyimi
44. Dr TULE, Teryima Ikyaan
45. Dr UMEANAEDOBE, Nonso Arinze

Death of Foundation Provost and Former Vice-Chancellor, Professor F. I. Anjorin

On a sad note the College lost its first Provost and former Vice-Chancellor of Bingham University, Professor Felix Idowu Anjorin in March 2015. The death created a huge vacuum in the acade-mic and pofessional progress of the Medical School. He was exteremely dedi-cated to the cause and growth of the College. He was passionate about mentoring the young professionally as well as spiritually. May his soul rest with his maker.

Professor Felix Idowu Anjorin

Medical Education Workshop

The College has as one of its principal goals excellence in medical education. To this end it organized a medical education workshop in Jos with the theme "***Workshop on Performance-based Trainee assessment using OSCE, OSPE & PACES"*** from 2nd – 6th June 2016.

The workshop was directed by Professor Ohwovoriole and was attended by participants from medical schools in the Northern part of Nigeria.