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DECLARATION

I, **Jere Methuselah**, declare that this Dissertation is my own work and that all the sources I have cited have been indicated and acknowledged using complete references. I further declare that this Dissertation has not been previously submitted for a diploma, a degree or for any other qualifications at this or any other university. It has been written according to the guidelines for Master of Science in Human Physiology Degree dissertations of the University of Zambia.

Signature..... **Date**.....

CERTIFICATE OF COMPLETION OF DISSERTATION

I, **Dr. Fastone M. Goma**, having supervised and read this dissertation is satisfied that this is the original work of the author under whose name it is being presented. I confirm that the work has been completed satisfactorily and approve it for final submission.

Signature.....**Date**.....

Head of Department

Signature.....**Date**.....

Department of Physiological Sciences, School of Medicine, University of Zambia

CERTIFICATE OF APPROVAL

This dissertation of **JERE METHUSELAH** on **CLINICAL FACTORS ASSOCIATED WITH ATRIAL FIBRILLATION IN CONGESTIVE HEART FAILURE PATIENTS ADMITTED AT THE UNIVERSITY TEACHING HOSPITAL** has been approved in partial fulfillment of the requirements for the award of the Degree of Master of Science in Human Physiology by the University of Zambia.

Examiner I

Signature.....**Date**.....

Examiner II

Signature.....**Date**.....

Examiner III

Signature.....**Date**.....

ABSTRACT

Introduction: Atrial fibrillation (AF) and congestive heart failure (CHF) have emerged as major global epidemics. These two conditions share common risk factors and frequently coexist. Each condition predisposes to the other, and the concomitant presence of the two has additive adverse effects. This study examined the clinical factors associated with AF in CHF patients admitted at the University Teaching Hospital (UTH), Lusaka, Zambia.

Methods: A hospital-based cross-sectional study was conducted at UTH adult medical wards. The data and anthropometric measurements were collected from patients who consented for enrolment from June 2014 to August 2014. A structured interview schedule was used to capture the socio-demographic and related historical data; and an Omron HEM 780 automated Blood Pressure machine was used to measure Blood Pressure and pulse. Then all patients had a standard 12-lead ECG done on them using Schiller AT-102 ECG machine to detect the presence or absence of atrial fibrillation. Those participants whose standard 12-lead ECG results did not show the presence of AF, had 24-hours ECG DR180+ Digital Recorder applied to try to pick-up paroxysmal atrial fibrillation. Then finally all participants with any form of AF were assessed for clinical factors such as NYHA class, age, obesity, coronary heart disease, coexistence with non-cardiovascular diseases (e.g. chest diseases, diabetes mellitus), and smoking. Pearson chi-square of independence of the data was carried out using IBM® SPSS® Statistics for Windows version 20.0 to determine clinical factors of atrial fibrillation in congestive heart failure patients.

Results: A total of 49 patients were included in the study and out of these, 13 (26.5%) had atrial fibrillation. The prevalence of atrial fibrillation in congestive heart failure was found to be strongly associated with age 65 years and above, obesity, smoking, excessive alcohol intake, hypertension, dilated cardiomyopathy, diabetes mellitus and chronic lung disease. These findings suggest the need for clinicians taking care of the congestive heart failure patients to consider full scale use of ambulatory ECG monitors in all congestive heart failure patients with the above conditions.

Keywords: ECG DR180+ Digital Recorder, smoking, cardiomyopathy, diabetes, lung disease

DEDICATION

This dissertation is dedicated to the atrial fibrillation patients who have experienced unsound health and death due to the disorder.

ACKNOWLEDGEMENTS

This dissertation would not have been possible without the support of various people. My heartfelt gratitude goes to my research supervisors, Dr. F. M. Goma and Dr. B. Andrews, whose diligence and unwearingly guidance saw me through the research process. My sincere thanks also go to the Medical Education Partnership Initiative (MEPI) program, for sponsoring my studies. Special thanks to the Dean, School of Medicine; Assistant Dean, Postgraduate; and Department of Physiological Sciences for their encouragement and support throughout my period of study.

Thanks to the Senior Medical Superintendent, University Teaching Hospital; the Head, Internal Medicine; unit 1 Medical Doctors, Nurses and Support staff in the medical wards and staff in the ECG room for availing me with the data which I needed from the patients.

And finally, thanks to my family (especially Mrs. Violet Mengo Jere and Mr. & Mrs. Maxwell P. Malunga) for their continued support, understanding and encouragement throughout my period of study. To my colleagues, Emmanuel Musenge, Dr. Lukubi Lwiindi, Dr. Festus Mushabati, Longa Kaluba, Charity Kapenda, and Lumba Siachingili I also say thank you for the encouragement, moral support and academic sharing which I needed. I would also like to thank the participants for their cooperation and openness as without them this study would have been impossible.

Above all I thank the almighty God for showing me the way throughout my period of study.

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LIST OF ACRONYMS AND SYMBOLS

AF	-	Atrial Fibrillation
ATRIA	-	Anticoagulation and Risk Factors in Atrial Fibrillation
AV	-	Atrioventricular
BP	-	Blood Pressure
CAD	-	Coronary Artery Disease
CHF	-	Congestive Heart Failure
CI	-	Confidence Interval
COPD	-	Chronic Obstructive Pulmonary Disease
CPAP	-	Continuous Positive Airway Pressure
ECG	-	Electrocardiography
FEV₁	-	Forced Expiratory Volume in one second
HCM	-	Hypertrophic cardiomyopathy
HF	-	Heart Failure
IHD	-	Ischemic Heart Disease
LV	-	Left Ventricle
LVEF	-	Left Ventricular Ejection Fraction
MEPI	-	Medical Education Partnership Initiative
MI	-	Myocardial Infarction
NYHA	-	New York Heart Association
OAC	-	Oral Anticoagulation
OSA	-	Obstructive Sleep Apnea
SA	-	Sino-atrial Node
UTH	-	University Teaching Hospital

DEFINITION OF TERMS

Atrial Fibrillation	known as AF or Afib is an irregular and often very fast heart rate causing symptoms like heart palpitations, fatigue, and shortness of breath (www.medtronic.com).
Chronic Lung Disease	also known as chronic obstructive lung disease is a progressive lung disease characterized by chronically poor airflow (www.nlm.nih.gov).
Congestive Heart Failure	is a clinical syndrome that results when the heart is unable to provide sufficient blood flow to meet metabolic requirements or accommodate systemic venous return (Kemp & Conte, 2011).
Coronary Artery Disease	refers to the failure of coronary circulation to supply adequate circulation to cardiac muscle and surrounding tissue (www.nhlbi.nih.gov).
Diabetes mellitus	is a group of metabolic disorders characterized by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both (Green, Flatt and Bailey, 2006).
Dilated Cardiomyopathy	is a progressive disease of heart muscle that is characterized by ventricular chamber enlargement and contractile dysfunction with normal left ventricular (LV) wall thickness (http://emedicine.medscape.com).
Electrocardiogram	is a simple, painless test that records the heart's electrical activity (http://www.nhlbi.nih.gov).

Holter monitor

also known as ambulatory electrocardiography device is a portable device for continuously monitoring various electrical activity of the cardiovascular system for at least 24 hours (<http://www.patient.co.uk>).

Hypertension

is persistent (sustained) elevation of blood pressure with the systolic pressure of equal or above 140 mmHg and diastolic of equal or above 90 mmHg, affecting one or both pressures based on two or more consecutive readings (www.merckmanuals.com).

Sleep Apnoea

is a sleep disorder characterized by pauses in breathing or instances of shallow or infrequent breathing during sleep (www.ncbi.nlm.nih.gov).

APPENDIX I
PARTICIPANT INFORMATION SHEET

1. Self-Introduction

My names are Jere Methuselah a student at the University of Zambia, School of Medicine; Department of Physiological Sciences. I am currently studying Master of Human Physiology and I am the principal researcher in this study.

2. Title of Research being done

“Clinical factors associated with Atrial Fibrillation in Congestive Heart Failure at University Teaching Hospital, Lusaka, Zambia”

3. Purpose of the Research

The purpose of this study is to determine the factors associated with increased contractility of the two upper chambers (atrial fibrillation) of the heart in patients a failing heart (heart failure) admitted to UTH.

4. Procedure

To achieve the above mentioned objective I ask you some few simple questions just to get your demographic data. I am also going to check your Blood Pressure and pulse rate using a small machine, so that I can check the way your heart is pumping blood and how the blood is moving in your body. I will then check the way your heart is functioning using a standard 12-lead ECG.

Depending on the results of the standard 12-lead ECG, I may apply a small machine called holter monitor on you (preferably on the hand) so that I may monitor your heart for 24hours. This will help me pick up any abnormalities of your heart functioning which may have not been picked at the time I was doing a standard 12-lead ECG.

Efforts will be made to treat any abnormality detected and were I cannot, you will be referred to appropriate physician/ or department.

5. Voluntariness

Your participation in this research is entirely voluntary and you do not have to participate if you do not wish to do so. Be assured that your refusal to take part will not in any way result in penalty or loss of services to which you are otherwise

entitled. If you decide to take part, you are still free to withdraw at any time without giving a reason for your withdrawal.

6. Guarantee of Confidentiality

Be assured that the information collected from you in this research will be kept strictly confidential and all the data collection tools used will be destroyed thereafter.

7. Risk/Benefits

The procedures of checking your Blood Pressure and pulse rate, and getting an ECG as well as application of a holter monitor are all considered safe and relatively painless procedures since they are all non-invasive procedures. The benefits of doing all these procedure are that once done a correct diagnosis is likely to be made and that you will be able to receive appropriate treatment.

8. Compensation/Reimbursement

The participation in this research has no provision for compensation/reimbursement.

9. Consequences of Injury

In the event that you get injured during the procedure, I will take full responsibility of the consequences to correct the situation.

10. Contact Details of Principal Investigator

Methuselah Jere
The University of Zambia
School of Medicine
Department of Physiological Sciences
P.O. Box 50110
Ridgeway Campus
LUSAKA
Phone number: +260950220001

11. Contact Details of Ethics Committee

The Chairperson

ERES CONVERGE
33 Joseph Mwilwa Road, Rhodes Park
Lusaka.
Phone number: +260955155634

APPENDIX II
TRANSLATED PARTICIPANT INFORMATION SHEET (NYANJA)
CHIPEPARA CHAOTENGA KO MBALI

1. KUDZIDZIWITSA

Dzina langa ndine Jere Methuselah mwana wastukulu pa sukulu lapamwamba la University of Zambia, sukulu la zaumoyo.

Palipano ndicita maphunzilo yakuya ya zaumoyo. Ndine mwini kafukufuku pa nkhani iyi.

2. MUTU WA NKHANI

Zisonyezo zogwirizana ndi matenda yothamanga kwamutima muli odwla matenda yoletsa mutima kusewendza bwino kuwotsungidwa pacipatala ca University Teaching Hospital Lusaka Zambia.

3. CIFUKWA CA KUFUKUFUKU

Cifukwa cakafukufuku uyu ndiku peza zogwiridzana ndi matenda othamanga mutima muli odwla matenda yoletsa mutima kusewendza bwino kuwotsungidwa pacipatala ca University Teaching Hospital Lusaka Zambia.

4. NDONDOMEKO

Kuti tikwaniliktse zofunika pakafukufuku uyu ndizamufunzani mafunso ango odzavuta kuti ndi ndiziwe za inu.

Ndizapimanso kuthamanga kwa mwazi wanu kusewenzesa kacitsulo kang'ono kuti ndione momwe mutima wanu ukukankhila mwazi ndiponso kudziwa momwe mwazi ukuyendela muthupi lanu.

Ndizapimanso momwe mutima ukutsewenzela kutsewenzesa citsulo copimila mutima cecedwa (Standard 12 `Lead ECG). Kufanana ndimomwe citsulo ici chizasonyesela ndiza sewenzesanso citsulo cina comwe cicedwa (Water Monitor) tsiku lonse lathunthu.

Ici cizandithandiza kupeza zovuta zakasewezedwa ka mutima wanu komwe sikapezeke pomwe ndimasewenzesa citsulo ca (Standard 12 Lead ECG). Ndisayesa-yesa kupelaka thandizo pazovuta zakatsewenzedwa kamutima pomwe ndalephela ndizamutuma kwa omwe adziwa zamatenda awa amaphuzilo akuya.

5. KUDZIPELEKA

Kutolako mbali mukafukufuku uyu ndikozipeleka ndiponso simungatengeko mbali ngati simukufuna. Khalani osimikidza kuti ngati mukana kutengako mbali mukafukufuku uyu palibe cilango cili conse kapena kukanidwa kulandila thandizo yomwe ifunikidwa pa inu. Ngati mwalola kutengako mbali muli omasuka kuleka nthawi ili yonse opanda kupeka cifukwa.

6. KUTSIMIKIDZA CISINSI

Khali osimikiza kuti zomwe takambilana ndi inu mukafukufuku uyu zizankhala zacisinsi ndiponso mapepala onse omwe tizagwiritsa nchito mukafukufuku uyu adzaocedwa.

7. ZIOPYEZO NDI KUKOMA

Ndondomeko yopima kakankhidwe ka mwazi, kathangidwe kamwazi ndi kasewenzedwe kamutima kusewenzesa (Standard 12 Lead ECG) ndi (Water Monitor), zonsezi ndizosaopsya ndiponso ndizo sawawa cifukwa zonse ndizosalowa muthupi. Kukoma kwa kucita ndondomeko zonsezi ndi kwakuti pomwe zacitidwa matenda yeniyeni yadzadziwika ndipo muzalandila thandizo loyenela.

8. DIPO NDI KUBWEZELA

Kutengako mbali mukafukufuku uyu kulibe dipo kapen kubwezela.

9. ZOSATI LA NGATI MWAPWETEKEDWA

Mwasoka ngati mwapwetekedwa mukati mwa ndondomeko ndizatenga zonse zotsatila kuti zinthu zikhale bwinoso.

10. KEYALA YA OFUFUZA WAMUKULU

Methuselah Jere
The University of Zambia,
School of Medicine,
Department of Physiological Sciences,
P.O. Box 50110,
Ridgeway Campus,
Lusaka
Phone number: +260950220001

11. KEYALA YA BUGWE YOONA PA ZAKAFUKUFUKU (ETHICS)

The Chairperson
ERES CONVERGE
33 Joseph Mwilwa Road, Rhodes Park
Lusaka.
Phone number: +260955155

APPENDIX III

VOLUNTARY CONSENT FORM

DECLARATION

I have read (or have been explained to) and understood the nature of the research in which I have been requested to participate as explained in the information sheet. I have had the opportunity to ask questions about the research and have been answered to my satisfaction.

I therefore agree to participate.

Participant's name (Print):

Participant's right thumb print if unable to write:

Participant's signature: Consent date:

Researcher conducting voluntary consent (Print):

Signature of researcher: Date:

APPENDIX IV
TRANSLATED VOLUNTARY CONSENT FORM (NYANJA)
CIPEPALA COZIPELEKA

KUDZIPELEKA

Ndawerenga (kapena andimasulila) ndiponso ndavetsetsa ndondomeko yakafukufuku uyu momwe andipempha kuti nditengeko mbali monga momwe amtsulila mupepela la ciziwitso. Ndapeza umwai ofunsa zakafukufuku uyu ndiponso andiyankha kofikapo.

Motelo ndavomela kutengako mbali.

Dzina la otengako mbali (Lemba)

Cala cadzanja lamanja ca otengaka mbali (ngati sakudziwa kulemba)
.....

Sainani..... Tsiku

Ofufuza (saina) Tsiku

APPENDIX V



**THE UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE
DEPARTMENT OF PHYSIOLOGICAL SCIENCES**

STRUCTURED INTERVIEW SCHEDULE

**TOPIC: CLINICAL FACTORS ASSOCIATED WITH ATRIAL FIBRILLATION
IN CONGESTIVE HEART FAILURE ADMITTED AT UNIVERSITY
TEACHING HOSPITAL, LUSAKA, ZAMBIA**

DATE OF INTERVIEW.....

PLACE OF INTERVIEW.....

NAME OF INTERVIEWER.....

SERIAL NUMBER

INSTRUCTIONS TO INTERVIEWER

1. Introduce yourself to the respondent
2. Explain the purpose of the interview
3. Get written consent from the respondent
4. Reassure the respondent that all responses will be held in strict confidence
5. Individual names and addresses should not appear on the interview schedule
6. Ensure that all questions are answered and indicate response by ticking in the appropriate box (e.g. √) or filling in the space (s) provided
7. Thank the respondent at the end of each interview.

SECTION A: SOCIO-DEMOGRAPHIC DATA

FOR OFFICIAL use only

1. Sex

- a) Male []
- b) Female []

2. Age

- a) Less than 35 Yrs []
- b) 35 - 44 Yrs []
- c) 45 - 54 Yrs []
- d) 55 - 64Yrs []
- e) 65 and above []

3. Weight (in kilograms)

.....

4. Height (in centimeters)

.....

5. Body Mass Index [weight (Kg) divided by height² (M)]

- a) Below 18.5 []
- b) 18.5 – 24.9 []
- c) 25 – 29.9 []
- d) 30 & above []

6. Blood Pressure (in mmHg)

.....

7. Pulse rate per minute

.....

8. Smoking

- a) Yes []
- b) No []

9. If yes to question 8, what type of tobacco are you smoking?

- a) Manufactured cigarettes []
- b) Hand rolled cigarettes []
- c) Pipe full of tobacco []

d) Cigars []

e) Others []

FOR OFFICIAL use only

10. If yes to question 8, how often are you smoking?

a) 5 times or more per day []

b) 2 – 4 times per day []

c) Once a day []

11. If yes to question 8, for how long have you been smoking?

a) 10 years or more []

b) 5 – 9 years []

c) Less than 5 years []

12. Alcohol consumption

a) Yes []

b) No []

13. If yes to question 12, what type of alcohol are you using?

a) spirits/kachasu []

b) Clear beer []

c) Opaque beer []

14. If yes to question 12, how often are you drinking?

a) Every day []

b) 3 – 5 times a week []

c) Once a week []

d) Only on special occasions []

15. If yes to question 12, for how long have you been drinking?

a) 10 years or more []

b) 5 – 9 years []

c) Less than 5 years []

SECTION B: ATRIAL FIBRILLATION TESTING

16. Is there atrial fibrillation on standard 12-lead ECG?

a) Yes []

b) No []

17. Is there atrial fibrillation on 24-hours ECG Holter Monitor?

FOR OFFICIAL use only

a) Yes []

b) No []

SECTION C: MEDICAL DATA

18. Heart failure class using NYHA classification

a) class 1 []

b) class 2 []

c) class 3 []

d) class 4 []

19. Symptoms of Atrial Fibrillation

a) Heart palpitations []

b) Light-headedness []

c) Fatigue []

d) Dyspnea on exertion []

20. Drug history

.....
.....
.....

21. Cardiovascular disease comorbidities

a) Hypertension []

b) Coronary Heart Disease []

c) Other, specify

22. Non-Cardiovascular disease comorbidities

a) Chest diseases []

b) Diabetes Mellitus []

c) Other, specify.....

END OF INTERVIEW

THANK YOU!

APPENDIX VI

The University of Zambia
School of Medicine
Department of Physiological Sciences
P. O. Box 50110
Ridgeway Campus
LUSAKA

24th February, 2014

The Senior Medical Superintendent
University Teaching Hospital
P/B RW1
LUSAKA

UFS: The Head - Department of Physiological Sciences

Dear Sir / Madam,

RE: PERMISSION TO CONDUCT RESEARCH

I am a postgraduate student pursuing Master of Science in Human Physiology (MSc. PGY) degree programme at the University of Zambia, School of Medicine, Department of Physiological Sciences. As part of the programme requirements I have to undertake a dissertation. It is in this premise that I write to seek permission to undertake a research at your institution. The title of the research is “**clinical factors of atrial fibrillation in congestive heart failure patients admitted at the University Teaching Hospital (UTH), Lusaka, Zambia**”. I intend to carry out the study from April, 2014 to June, 2014 in the medical wards.

It is my hope that the findings will help in strengthening the detection and management of atrial fibrillation in congestive heart failure patients at UTH and the country as a whole.

Your favourable response to my request will highly be appreciated.

Yours faithfully,

Jere Methuselah (Computer No. 512807079)
Contacts: Email: jeremethuselah@gmail.com
Cell: +260950220001