

**Systolic Blood Pressure on Admission, Clinical Characteristics and
Mortality in Patients Hospitalised for Acute Coronary Syndrome at
Charlotte Maxeke Johannesburg Academic Hospital.**

Dr Muhammad Nazir Shehu

A dissertation submitted to the Faculty of Health Sciences, University of
the Witwatersrand, Johannesburg, in fulfilment of the requirements for the degree of Master
of Science in Medicine

Johannesburg, 2014

DECLARATION

I, Muhammad Nazir Shehu, hereby declare that this dissertation is my own work. It is being submitted for the degree of the Master of Science in Medicine in the division of Cardiology University of Witwatersrand, Johannesburg. It has not been submitted for any degree at this or any other university before.

Signature:



Date: 14-10-2014

DEDICATION

I dedicate this work to my late father, Alhaji Muhammad Abua, to my mother, Hajiya Hasiya Muhammad, to my late grandfather, Alhaji Shehu Kurfi and to my late uncle, as well as guardian, Alhaji Sirajo Shehu, for their support and assistance in my career.

ABSTRACT

INTRODUCTION

Ischaemic heart disease has been regarded as one of the most common causes of hospital admission and mortality worldwide. In Africa, it has been estimated as the eighth most common cause of death, a continent that was previously said to have immunity from the disease. In order to make an informed decision with regard to the appropriate and necessary therapy for patients presenting with acute coronary syndrome (ACS), an assessment of common and easily identifiable poor prognostic factors of the disease is advocated. Studies done mostly outside Africa have identified the clinical parameters such as: increased heart rate and lower systolic blood pressure on admission among others as poor prognostic factors of mortality among patients admitted with ACS. This study aimed to determine the relationship of SBP on admission, clinical characteristics and mortality among patients admitted with ACS at Charlotte Maxeke Johannesburg Academic Hospital (CMJAH).

METHODS

Patients aged 18 years and above admitted at the Cardiology Division CMJAH, with the diagnosis of ACS between the period of January 2010 and December 2012 were recruited for this study. All data with regard to clinical characteristics, investigations, medical as well as interventional therapies done to the patients were obtained from the database unit of the Cardiology Division. Those patients with missing information from the database had their record retrieved from the main Records department of the hospital. Patients were classified into 4 quartiles based on admitting systolic blood pressure (SBP) as follows: SBP <100mmHg, SBP 100-129mmHg (Normal), SBP 130-139 mmHg (pre-hypertension) and SBP $\geq$ 140mmHg (hypertension).

RESULTS

A total of 658 consecutive patients with the diagnosis of ACS admitted to the cardiology division of CMJAH were recruited during the two-and-half year study period with a prevalence of 21.8%. However, only 613 patients had completed data retrieved from their records and were used for this study. The patients consisted of 451 males (73.6%) and 162 females (26.4%), with male-to-female ratio of 2.8:1. The mean age of patients in this study was 58.88 ± 12.52 , with the mean age of 57.39 ± 11.96 and 63.01 ± 12.62 for male and female respectively. Females were significantly older than males in this study ($p < 0.0001$). Four racial groups consisting of Black, Coloured, White and Indian were identified from the study. The White group dominated the racial groups with 334 patients (55%) followed by Black group with 134 patients (22%).

Patients who presented with higher SBP on admission were more likely to be smokers, hypertensives and had higher serum lipid. Those with SBP < 100 mmHg had significantly higher frequency of Killip class ≥ 3 and higher mean heart rate. Admitting SBP was not significantly different among the 4 racial groups, gender and presenting age.

Of the 613 patients, 27 died, contributing a mortality rate of 4.4%. After multiple logistic regression analysis, patients with SBP ≤ 100 mmHg and those > 65 years of age had more than 2/double the times risk of death compared to others. The risk of death was more than 4 to 5 fold higher among those with Killip class 3-4 and those in atrial fibrillation (AF) respectively. Those with heart rate (HR) ≥ 96 bpm and Haemoglobin (Hb) level of < 11.4 mg/dl had more than 2 and 4 times risk of death respectively. On the other hand, those that received higher number of drugs, with a proven medical benefit (Optimal medical therapy) had a better chance of survival compared to those who did not receive such optimal medical therapy.

CONCLUSION

In this study, there were more male than female, with females being significantly older. Patients who presented with lower SBP levels were more likely to be in higher Killip class and had higher mean heart rate, while those with higher SBP levels were more likely to be hypertensives, smokers and had higher serum lipid levels. Lower SBP, advanced age, higher Killip class, AF, higher HR and lower Hb level were found to be positive predictors of mortality, while optimal medical therapy was positive predictor of survival.

ACKNOWLEDGEMENTS

All gratitude belongs to the Almighty Allah, who spares my life and made it possible for me to undergo this training. My profound appreciation goes to Professor Pravin Manga, for his continued thorough supervision, support and guidance throughout this work and my training in general. I extend my special thanks to Professor Sarala Naicker, and Dr A. Vachiat for their contributions in making this project a reality.

My gratitude goes to all the doctors and other staff of Cardiology Division Medicine Department of CMJAH for their encouragement and support during the course of my training and in carrying out this work. I gratefully acknowledge Dr R. Garda, Dr L. Mkhwanazi, Dr T. Kalk, Dr K. McCutcheon, Dr R. Ramjee, Dr J. Moosa, and Dr N. Tsabedze for their support and critical contributions to my training and this dissertation.

I extend my thanks also to all of the people that assisted me in doing this work, in particular, Vivienne, Hazel and Mr Mathew, staff of Cardiology database and Health Records Department at CMJAH. Equally appreciated are the administrative and nursing staffs of the Cardiology Division CMJAH for their assistance in data collection and compilation.

I am especially indebted to my sponsors and employers, Katsina State Government of Nigeria through the Health Services Management Board (HSMB), Katsina. My thanks go to the Board Chairman, Dr Salisu Banye, the General Manager, Dr Kabir Dara and the Director Medical Services, Dr Bashir Abdullahi.

I wish to express my sincere gratitude to my wife, Hadiza, my children, Bashir and Fadimatu, my elder brother, Sunusi and the entire extended family members for their support and patience during the period of my training.

TABLE OF CONTENTS	PAGE
Declaration	ii
Dedication	iii
Abstracts	iv
Acknowledgement	vii
Table of contents	viii
List of figures	xii
List of tables	xiii
Abbreviations	xiv
1.0 INTRODUCTION AND LITERATURE REVIEW	1
1.1. Background	2
1.2 Epidemiology	4
1.2.1 Prevalence and incidence	4
1.3 Aetiology and risk factors	7
1.3.1 Male gender	8
1.3.2 Family History	8
1.3.3 Hypertension	9
1.3.4 Dyslipidaemia	9
1.3.5 Smoking	10
1.3.6 Diabetes mellitus	10
1.3.7 Age	10
1.3.8 Lack of Physical activity	10
1.3.9 Obesity	11
1.3.10 Psychosocial well-being	11
1.3.11 Poor Nutrition	11
1.3.12 Ethnicity	12
1.3.13 Non atherosclerosis causes of MI	13
1.4 Pathogenesis	13
1.5 Clinical presentation	15

1.6	Investigations	16
1.6.1	Electrocardiography	16
1.6.2	Cardiac enzymes	17
1.6.3	Echocardiography	19
1.7	Diagnosis	19
1.8	Management	22
1.8.1	Relieve of pains and anxiety	23
1.8.2	Assessment of haemodynamic abnormality	23
1.8.3	Reperfusion strategy	23
1.8.4	Bypass Surgery	27
1.8.5	Adjunctive therapy	28
1.8.6	Antiplatelet therapy	26
1.8.7	Adjunctive anticoagulation and antiplatelet after fibrinolysis	29
1.8.8	Medical therapy	30
1.8.8.1	ACE-I/ARBs	30
1.8.8.2	Aldosterone blockade	31
1.8.8.3	Calcium antagonist	31
1.8.8.4	Statin therapy	31
1.8.8.5	Antiplatelet and anticoagulants combination	32
1.8.9	Management of NSTEMI/UA	32
1.8.9.1	Early reperfusion and revascularisation	33
1.9	MI with normal coronary	35
1.10	MI in special population	35
1.10.1	Elderly patients	35
1.10.2	Cocaine associated MI	36
1.11	Prognosis	37
1.12	Outcomes predictors	39
1.12.1	Demographic prognostic risk factors	39
1.12.2	Medical history	40

1.12.3	Haemodynamic and infarct site	41
1.12.4	ECG features	43
1.12.5	Serum biomarkers	44
1.12.6	Glycaemic control	45
1.12.7	White blood cell count	45
1.12.8	Anaemia	46
1.12.9	Impaired renal function	46
1.12.10	Modifiable factors	46
1.13	Risk stratification	46
1.14	Justification for the study	48
1.15	General objective	49
1.15.1	Specific objectives	49
2.0	MATERIALS AND METHODS	50
2.1	Study site	50
2.2	Study design	50
2.3	Study population	50
2.3.1	Inclusion criteria	50
2.3.2	Exclusion criteria	50
2.4	Methods	50
2.5	Definition of terms	51
2.5.1	Acute coronary syndrome	51
2.5.2	Acute MI	51
2.5.3	Unstable angina	51
2.5.4	Systolic blood pressure on admission	51
2.5.5	Dyslipidaemia	52
2.5.6	Diabetes mellitus	52
2.5.7	Renal impairment	52
2.5.8	Hypertension	52
2.5.9	Alcohol drinking	52

2.6	Data analysis	53
3.0	RESULTS	54
3.1	Socio-demographic characteristics of the patients	54
3.2	Baseline characteristics of the patients and the SBP quartiles	55
3.3	Coronary angiographic findings of the patients	55
3.4	Types of acute coronary syndrome	56
3.5	Medication and interventional procedure received by the patients	56
3.6	Clinical parameters and the in-hospital mortality	57
3.7	Predictors of in-hospital mortality	57
4.0	DISCUSSION	74
4.1	Demographic characteristics	74
4.2	Clinical characteristics and risk factors of ACS	76
4.3	Predictors of in-hospital mortality	78
4.4	Limitations	82
5.0	CONCLUSION AND RECOMMENDATION	83
5.1	Conclusion	83
5.2	Recommendation for clinical practice	84
5.3	Recommendations for future research	84
5.4	References	85
5.5	Appendix A Data collection sheet	116
5.6	Appendix B Ethics clearance certificate	118

LIST OF FIGURES

FIGURE		PAGE
1	Acute coronary syndrome	4
2	Reperfusion strategies	27
3	The frequency of ACS by year of study	59
4	Six month frequency of ACS in each year of study	60
5	Age-sex distribution of the study patients	61
6	Racial group among the patients	62
7	Major risk factors of ACS	63
8	Type of ACS	64
9	Types of PCI	70

LIST OF TABLES

TABLE		PAGE
I	Grading of angina pectoris according to CCS classification	16
II	Universal Classification of Myocardial Infarction	21
III	Clinical parameters by systolic blood pressure on admission	65
IV	Demographic parameters by systolic blood pressure	66
V	Laboratory parameters by systolic blood pressure	67
VI	Coronary angiographic findings by SBP on admission	68
VII	Medication/intervention by systolic blood pressure	69
VIII	Clinical parameters and in-hospital mortality	71
IX	Laboratory parameters and in-hospital mortality	72
X	Predictors of in-hospital mortality among the study patient	73

LIST OF ABBREVIATIONS

ACC	American College of Cardiology
ACE-I	Angiotensin converting enzyme inhibitors.
ACS	Acute coronary syndrome
AF	Atrial fibrillation
AHA	American Heart Association
AIDS	Acquired immune deficiency syndrome
AMI	Acute myocardial infarction
AO	Aorta
ARBs	Angiotensin receptor blockers
BMI	Body mass index
BNP	Brain natriuretic peptide
BUN	Blood urea Nitrogen
CABG	Coronary artery bypass graft
CAD	Coronary artery disease
CCS	Canadian Cardiovascular Society
CCU	Coronary care unit
CHD	Coronary heart disease
CK-MB	Creatinine kinase myocardial band
CMJAH	Charlotte Maxeke Academic Hospital
COX-2	Cyclo-oxygenase inhibitors
CRP	C-reactive protein
cTnI	Cardiac troponin I
cTnT	Cardiac troponin T

CVD	Cardiovascular disease
DM	Diabetes mellitus
ECG	Electrocardiography
EF	Ejection fraction
ECS	European Society of Cardiology
EUCR	Electrolyte urea and creatinine
FPG	Fasting plasma glucose
Hb	Haemoglobin
HDL	High density lipoprotein cholesterol
HF	Heart failure
HR	Heart rate
HTN	Hypertension
INR	International normalize ratio
IV	Intravenous
IVSDd	Interventricular septal diameter in diastole
IVSDs	Interventricular septal diameter in systole
JVP	Jugular venous pressure
LA	left atrium
LAD	Left anterior descending artery
LDL	Low density lipoprotein cholesterol
LCx	Left circumflex artery
LMT	Left main trunk coronary artery
LVIDd	Left ventricular internal diameter in diastole
LVIDs	Left ventricular internal diameter in systole
LVPWDd	Left ventricular posterior diameter in diastole

LVPWDs	Left ventricular posterior diameter in systole
MI	Myocardial infarction
NSAID	Non steroidal anti inflammatory drugs
NSTEMI	Non ST-segment elevation myocardial infarction
PCI	Percutaneous coronary intervention
RCA	Right coronary artery
SBP	Systolic blood pressure
SCr	Serum creatinine
SPSS	Statistical package for social sciences
SSA	Sub-Saharan Africa
STEMI	ST-segment elevation myocardial infarction
TC	Total cholesterol
TIMI	Thrombolysis in myocardial infarction
UK	United Kingdom
US	United States
USSR	United Soviet States of Russia
VF	Ventricular fibrillation
VT	Ventricular tachycardia
WBC	White blood cell count
WHO	World health organization