PATTERN OF CARDIOVASCULAR DISEASES AMONG ELDERLY PATIENTS ADMITTED IN MEDICAL WARDS AT MUHIMBILI NATIONAL HOSPITAL DAR ES SALAAM TANZANIA

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MSc Cardiology Dissertation

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CERTIFICATION

The undersigned certifies that he has read and hereby recommend for acceptance by Muhimbili University of Health and Allied Sciences a dissertation entitled ***Pattern of Cardiovascular Disease Among Elderly Patients Admitted in Medical Wards at Muhimbili National Hospital Dar es Salaam Tanzania,*** in fulfilment of the requirements for the degree of Master of Science Cardiology (Internal Medicine) of Muhimbili University of Health and Allied Sciences.

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DECLARATION AND COPYRIGHT

I, **Dr Peter Richard Kisenge,** declare that this dissertation is my own original work and that it has not been presented and will not be presented to any other university for a similar or any other degree award.

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DEDICATION

I dedicate this dissertation to the Kisenge's Family

ABSTRACT

Background- Cardiovascular disease is the most frequent cause of death in persons over the age 50 years and most importantly it is responsible for considerable morbidity and large burden of disability in the community. Cardiovascular diseases are an increasing cause of admissions among elderly in Africa, yet little research is available on pattern and magnitude of the problem.

Objective- To determine the pattern of cardiovascular disease in elderly patients admitted in medical wards at Muhimbili National Hospital Dar es Salaam Tanzania.

Methodology- This was a descriptive cross sectional study that was carried our between September 2008 and September 2009. Social demographic information; medical history physical examination; electrocardiographic and echocardiography examination; biochemical and haematological parameters were collected from study patients

Results- One hundred eighty five elderly patients admitted at MNH, medical department, were enrolled into the study, all were of African black race. Majority, 116 (62.7%), were male. Their mean age was 66.1 (SD, 9.3; range, 50-87) years. The mean body mass index (BMI) was 23.9 (SD, 3.9; range, 16.6-40.1) kg/m^2. Hypertension was the most frequent condition encountered affecting both males (67.2%)and females (68.1%). Congestive heart failure was second common condition affecting 37% elderly patients. According to the echocardiogram findings, among 185 elderly patients 68.6% were diagnosed to have cardiovascular disease. There were no significant sex differences in the prevalence of cardiac disease (p>005). The commonest echocardiographic diagnosis were left ventricular hypertrophy (LVH) secondary to hypertension found in 45%, diastolic dysfunction found in 31% and systolic dysfunction 25%.The least common types were septal defect, pulmonary hypertension and calcified mitral valve found in one percent each. The commonest clinical presentations were palpitations, dyspnoea, orthopnoea, pedal oedema and right upper quadrant abdominal pain. Obese patients presenting with cardiovascular abnormalities were 9 (7.1%). Anaemia was the leading co- morbidity affecting 90.3% of the patients

Conclusion

Hypertension, congestive heart failure and left ventricular hypertrophy were the commonest cardiovascular diseases among elderly patients at MNH. Coexistence of anaemia, stroke, renal impairment and diabetes was also frequent.

Recommendation

Elderly patients should be screened for cardiovascular diseases especially hypertension whenever they are admitted to the hospital even if the reasons for admission are not cardiovascular problems.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
AF	Atrial Fibrillation
AVA	Aortic Valve Area
CAD	Coronary Arterial Disease
CHF	Congestive Heart Failure
COPD	Chronic Obstructive Lung Disease
DBP	Diastolic Blood Pressure
DCM	Dilated Cardiomyopathy
EF	Ejection Fraction
EKG	Electrocardiogram
EMF	Endomyocardial Fibrosis
HCM	Hypertrophic Cardiomyopathy
SFC	Society and Federation of Cardiology
LVH	Left Ventricular Hypertrophy
MAC	Mitral Anular Calcification
MAT	Multifocal Tachycardia
MUHAS	Muhimbili University of Health and Allied Sciences
MNH	Muhimbili National Hospital
WHO	World Health Organization
PSVT	Paroxysmal Supra Ventricular Tachycardia
SVT	Supra VentricularTachycardia
SBP	Systolic Blood Pressure
UA	Unstable Angina
NSTEM	Non ST Elevation Myocardial Infarction

1. INTRODUCTION AND LITERATURE REVIEW

1.1 Introduction

Cardiovascular disease (CVD) is the leading cause of morbidity and mortality in developed countries. The problem of CVD is also growing in developing countries.[1] In 2002 it was estimated that 29 percent of deaths worldwide (16.7 million deaths) were due to CVD and that 43 percent of global morbidity and mortality, measured in disability-adjusted life years (DALYs) were caused by CVD. Furthermore, 78 percent of global mortality and 86 percent of morbidity from CVD occurred in developing countries.[2] In most African countries CVD is now the second most common cause of death after infectious diseases, accounting for 11 percent of total deaths and is a major cause of chronic illness and disability.[3]

The most affected individuals are the older people because aging is the most powerful risk factor for cardiovascular disease.[2] It has been shown that CVD is a frequent diagnosis in elderly people older than 65 years of age. [4] This has been attributed to age-related alterations of the cardiovascular structure and function in healthy individuals which result in the increase in incidence of hypertension, atherosclerosis, stroke, left ventricular hypertrophy, chronic heart failure and atrial fibrillation.[5]

In the United States of America (USA), the projections of cardiovascular diseases for people aged 65 years or older indicate that the proportion will increase from 12.4% in the year 2000 to 19.6% in 2030.[6] Projections from the Global Burden of Diseases Project suggest that from 1990 to 2020, the burden of CVD faced by African countries will double.[2]

Studies in USA have shown that increasing age of the populations is associated with an increase in the prevalence of disorders associated with the elderly, such as atrial fibrillation, hypertension, etc.[7] The general trend shows that men and women in the developed world experience CVD events at an older age and die at a much later age than in developing countries.[8]

The observed trend in developed countries is that the elderly population is on the increase. However, demographers predict that by the year 2020, 70 percent of the world's elderly population will be found in developing countries.[9]

Although some studies have pointed out that CVD is predominantly the disease of men, it has been established that there is no significant gender difference in death due to CVD worldwide.[10]. However, it has been shown that, in all but oldest age groups, CVD prevalence, incidence, and mortality rates tend to be higher in men than in women.[11]across countries and regions.[12] It has also been reported that women experience first episode of cardiovascular disease later in life than men.[13]

In the past four decades Africa has witnessed increasing urbanization and changing lifestyles; factors which have, in turn, raised the incidence of non-communicable chronic diseases, especially cardiovascular diseases. At the same time social disintegration and inequality, compounded by the dwindling economy in many countries in Sub-Saharan Africa (SSA), have seriously hindered the response to these diseases.[4]

The prevalence of cardiovascular diseases and associated risk factors for the elderly in Tanzania is not known. Persons aged 60 years and above constituted only three percent of the total population in a year 2003. [14] However, it is expected that the population of elderly will increase due to the improvement of health care services in Tanzania. This population of elderly is prone to getting cardiovascular diseases due to changes in lifestyles associated with urbanisation. [15]

1.2 Literature Review

1.2.1 Epidemiology

Cardiovascular disease is the most frequent diagnosis in elderly people and is the leading cause of death in both men and women older than 65 years of age.[2] CVD pathologies such as hypertension, cardiomyopathies, and coronary artery disease, arrhythmia, and heart failure, increase in incidence with increasing age.[16]

Globally, mortality due to cardiovascular disease (mainly coronary heart disease, stroke, and rheumatic heart disease) was projected to increase from 14.4 million in 1990 to 17.5 million in 2005 and to about 20 million (30% of global deaths) by 2015.[17, 18]

It is anticipated that by 2030, non-communicable diseases will contribute more than 75 percent of deaths worldwide and CVD alone will account for more deaths in low-resource countries than infectious diseases.[19]

Age-adjusted CVD mortality rates are estimated to be higher in low and middle income countries compared to developed countries. For example, age-standardized mortality rates for CVD are over 500 per 100,000 in Russia and Egypt; between 400 and 450 for South Africa, India and Saudi Arabia in contrast it is between 100 and 200 per 100,000 for Australia, Japan, France and the USA.[21]

It has been reported that CVD is the second leading cause of disability among Americans aged 65 years and older. More than 80 percent of all deaths attributable to cardiovascular diseases occur in people older than 65 years with approximately 60 percent of deaths in patients older than 75 years.[23]

A study done in Kenya by Ludenyo *et al.,* at Kenyatta National Hospital between 1991 and 1992 found that 202 patients over 60 years of age were admitted in medical wards because of cardiovascular problems. This formed 7% of the total medical admissions. One hundred and forty six (73%) were between 60 and 75 years of age with only 26 (13%) being over 85 years.[24]

1.2.1 Types of cardiovascular diseases in elderly

CVD include all diseases of the heart and blood vessels which are classified according to the International Classification of Diseases (ICD-10) as.[25] Chronic rheumatic heart disease (I05-I09); Hypertension and Hypertensive heart disease (I10-I15); Ischemic heart disease (I20-I25); andOther forms of heart diseases such as cardiomyopathies, arrhythimias, valvular heart diseases which are non-rheumatic (I30-I52).

1.2.2 Cardiovascular diseases in the elderly

Heart failure

Heart Failure (HF) has become primarily a disorder of the elderly. HF contributes at least 20% of hospital admissions for patients older than 65 years of age with approximately a quarter of HF hospitalisation occurring in patients older than 65 years.[26, 27] The prevalence rates of CVD are increasing exponentially from less than1% in the population under 50 years of age to about 10% in individuals over the age of 80.[26] Consequently, more than 75% of hospitalisations for HF occur in persons older than 65 years of age.[26] The median age for all HF admissions is 75 years[11]. HF was reported as a medical condition affecting 4% of people with 65-75 years old and about 6% of people 75 to 105 years old.[2]

Majority of heart failure cases in sub-Saharan Africa are due to non-ischemic causes; with rheumatic heart disease, hypertensive heart disease, and cardiomyopathy accounting for over 75% of cases in most series. Ischemic heart disease remained an uncommon cause of heart failure with no apparent increase in its contribution to the cases of heart failure over the past 60 years.[4]

Several structural and functional changes contribute to heart failure in elderly patients. These are inclusive of an age-dependent increase in sympathetic nervous activity, left ventricular wall diameter, myocardial fibrosis and apoptosis, micro- and macro vascular coronary sclerosis and aortic stiffness. As a consequence, diastolic, but also systolic heart failure is a frequent finding in elderly patients.[29]

The prevalence of diastolic HF increases with age. Diastolic HF may be seen in 40 to 80 percent of older patients with HF and is almost twice as frequent in women as men. The patho-physiology is primarily attributed to left ventricular (LV) diastolic dysfunction (a leftward and upward shifted end diastolic pressure-volume relationship), in which left ventricular diastolic chamber size is normal or reduced despite elevated filling pressure resulting in decreased stroke volume and cardiac output.[4]

The relation of systolic to diastolic heart failure is clearly shifted towards diastolic heart failure in elderly patients, especially in women. Mortality is increased with systolic dysfunction in elderly patients compared to younger heart failure patients. Mortality is less with diastolic dysfunction, but still higher compared to elderly without heart failure. In addition, morbidity is increased both with diastolic and systolic heart failure in elderly patients.[29]

Hypertension

Hypertension is a common problem in elderly subjects reaching a prevalence as high as 60 to 80 percent.[30] Hypertension occurs in one half to two thirds of people older than 65 years of age.[7] Latest surveys show that, by age above 65 years, the prevalence of hypertension is 30% to 40% in rural West Africa and 50% in semi-urban West Africa, and 50% to 60% in a mixed South African population.[30]

Data from the Framingham Heart Study have shown that systolic pressure rises and diastolic pressure falls after the age of 60 years in both normotensive and untreated hypertensive subjects. Isolated systolic hypertension accounts for 60 percent of cases of hypertension in the elderly. The systolic and pulse pressures may be the major predictors of

outcome in the elderly.[31]. Systolic blood pressure (SBP) shows a continuous increase with age, whereas diastolic blood pressure (DBP) rises early in life, plateaus, and then decrease after the age of 50 years. Data from the Framinghan Heart study suggest that an individual who is normotensive at age 55 has a 90% life-time risk of developing hypertension.[32]

Systolic hypertension in the elderly was considered as a benign phenomenon, it is now recognized as one of the most potent removable risk factor for the development of both cardiovascular and celebrovascular events in the elderly. Framinghan heart study shows a clear and almost linear association between the incidence of CVD and SBP with lower limit down to at least a systolic pressure of 120mmHg. Although the association between isolated hypertension (ISH) and CVDs in the elderly is impressive, treatment decision depends on the demonstration that interventions that decrease SBP will prevent cardiovascular diseases.[32]

Valvular heart disease

Valvular heart diseases continue to be a important cause of morbidity and mortality across the globe with an increasing number of elderly patients being affected by degenerative valvular disease. Although there are no recent population-based data regarding the prevalence of valvular heart disease in elderly, several studies have provided relevant information. Aortic stenosis and ischaemic mitral regurgitation are the most common valvular disorders in the elderly.[33, 34, 35]

In contrast to the developed nations, where valvular disease is largely degenerative in origin, in Africa it is almost always the result of infectious diseases, either directly as in infective endocarditis, or indirectly as in rheumatic heart diseases.[36]

Rheumatic heart disease (RHD) continues to be relatively common in many parts of Africa, predominantly affecting young people. However, most elderly grow with relative insignificance in RHD acquired during childhood. The prevalence of rheumatic heart diseases among elderly in African populations is not known. Various autopsy studies have demonstrated a 2.5%-5.0% incidence of rheumatic mitral valve involvement in older patients. About two-thirds of elderly patients with rheumatic mitral disease have regurgitation. Combination of regurgitation and stenosis is fairly common, along with approximately 75% prevalence of pulmonary hypertension. This pattern is particularly common in women.[37]. Older patients may also exhibit any of the sequelae of rheumatic

disease, including atrial fibrillation (AF), heart failure, thromboembolism and infective endocarditis, which is common in the setting of combined mitral stenosis and regurgiatation.[37]

Coronary heart disease

Coronary heart disease (CAD) is the leading killer of older people in developed countries.[3].

The prevalence and severity of atherosclerotic CAD increase with age in men and women. Autopsy studies show that more than half of people older than the age of 60 years have significant CAD with increasing prevalence of left main or triple-vessel CAD with older age.[32]

The prevalence of coronary disease in women begins to rise sharply after menopause. Coronary disease (CAD) is associated with increased short-term and long-term mortality[38]. In sub-Saharan Africa, the prevalence of CAD is steadily increasing although there are variations in reported prevalence rates within the different regions. A survey that was carried out at the King George V Hospital, South Africa in 1986 found a prevalence rate of CAD (elicited by a questionnaire) of 2.4%. However, on average, 40% of the subjects had ECG abnormalities based on the Minnesota Coding System.[33]

Elderly patients are more likely to have adverse outcomes associated with acute coronary syndrome (ACS), with 60% of myocardial infarction (MI)-related deaths occurring in the population aged 75 years or older.[34] When compared to younger patients with ACS, elderly patients are more likely to have medical and cardiac co-morbidities and atypical symptoms complicating initial diagnosis. Elderly patients are more likely to have adverse outcomes associated with ACS, with 60% of MI- related deaths occurring in the population 75 years of age or older.[38]

Arrhythmias

Arrhythmias cause significant mortality and impairment of quality of life in the elderly. The prevalence of cardiac arrhythmias and disorders of impulse formation and conduction, increase with age.[39,40]. Only very few data are available concerning arrhythmias in Africa and little is known on the pattern of arrhythmias in the elderly. Common arrhythmias,

including atrial fibrillation (AF), sinuatrial node (SAN) dysfunction, atrial flutter, and ventricular fibrillation (VF) continue to outpace elderly population growth.[41]

In clinical practice, the most frequent arrhythmia is atrial fibrillation. Atrial fibrillation is the most common sustained cardiac arrhythmia and increases in prevalence with age. The prevalence of AF is approximately 2-3% in those with age greater than 65 years of age and 6-8% in those over 80 years of age. AF is usually associated with structural heart disease but may occur in those without detectable heart disease. However, true "lone" AF is uncommon in the elderly[42].

Bradyarrhythimias account for approximately one half of pacemaker insertion in the USA, and is associated with an increased prevalence of falls in the elderly.[43,44]. Sick sinus syndrome is manifested through a variety of symptoms (dizziness, fatigue, syncope or pre-syncope episodes) and arrhythmias, such as sinus bradycardia (<40 beats/min).[45] This bradyarrhythimia syndrome is characterized by chronic inappropriate bradycardia accompanied by symptomatic sinus pauses with an inadequate junctional escape rhythm and sinoatrial block.

Other types of arrhythmias which affect elderly people are supraventricular,

Atrial-ventricular nodal re-entrytachycardia (AVNRT and Paroxysmal supra-ventricular tachycardia (PSVT) being the commonest arrhythimias in the elderly, accounting for approximately two –thirds of all cases.[46, 47, 48]

Among elderly patients who presents with supra-ventricular tachycardia (SVT), approximately 10%will have atrial flutter. Ventricular arrhythmias are common in healthy elderly people but are not of clinical or adversely prognostic significance[44,45].

Cardiomyopathy

Cardiomyopathies are diseases of heart muscle. In 1995 WHO/International Society and Federation of Cardiology (ISFC) Task Force defined and classified cardiomyopathies into dilated cardiomyopathy (DCM), hypertrophic cardiomyopathy (HCM), restrictive cardiomyopathy, arrhythmogenic right ventricular cardiomyopathy and unclassified cardiomyopathies.[47, 49]

Hypertrophic cardiomyopathy (HCM) is a familial cardiac disease with autosomal dominant inheritance. Most reports consist predominantly of individuals in the third through fifth decades of life. However, over the last decade, an increasing number of

studies have reported findings in elderly patients with HCM. Although these patients share many common features with younger patients with this disease, in clinical and morphologic differences characterize HCM in the elderly.[50,51]

Hypertrophic cardiomyopathy is recognized in Africans and other populations as an autosomal dominant disorder that is caused by mutations in at least 11 different genes that code for sarcomeric proteins. Most HCM-causing mutations have arisen independently in most families studied, suggesting that the majority occurred relatively recently as new mutations.[50, 52] This finding predicts that HCM is likely to be evenly distributed among different populations worldwide.

1.2.3 Clinical presentation of cardiovascular disease in elderly

The clinical picture of major cardiovascular disease is often different in the elderly. For example, the signs of an infarction are severe chest pain in a young person while the elderly experience stomach ache, nausea and vomiting. Atypical chest pain is more common in elderly compared to young age (33.7% Vs 10.7%: $p<0.001$) [53] Shortness of breath is more common in the elderly than young patients.[54]

Clinical presentation of the valvular disease will present according to the affected valves For example, aortic stenosis characterized by a long latent period during which patients are asymptomatic diagnosis can be made at the time of the routine physical examination[55]. However, advanced aortic stenosis is associated with dyspnoea/congestive heart failure (CHF), angina pectoris, and syncope. Dyspnoea in aortic stenosis can be the result of a combination of systolic and diastolic dysfunction with overt heart failure and in the setting of significant left ventricular dysfunction with overt heart failure is a late finding.

Association of atrial fibrillation (AF) is unusual with isolated aortic stenosis, but can occur in association with heart failure, and its occurrence can trigger significant debilitation.

Syncope can occur for various reasons: hypotension owing to exercise-induced vasodilatation in the setting of fixed obstruction, a tachy- or brady-arrhythmia, and/or an abnormal baroreceptor response.[54]. Effort-related angina can be the result of concomitant CAD (in about 50% of the cases) and/or to other mechanism.

Physical examination is often useful in determining the severity of aortic stenosis and it has been demonstrated that the delay of carotid upstroke, timing and intensity of the murmur and absence of the aortic component of second heart sound correlate with aortic stenosis.[54]

The arterial pulse is characteristically described as *parvus et tardus* i.e., weak and slow rising, best appreciated in the carotid artery and associated with thrill. Age is associated increased central vascular stiffness, however, may result in normal pressure rise in the setting of significant stenosis.

During physical examination, apical impulses are sustained and usually not displaced until late in the course of the disease when left ventricular dilatation occurs. Upon auscultation, S1 is usually normal, the aortic component of S2 is diminished and at times absent. S2 can be paradoxically split when the stenosis is severe or ventricular dysfunction develops. An S4 gallop might also be present. A harsh systolic murmur heard best at the base of the heart with radiation to the carotid is characteristic. The clinical presentation of aortic regurgitation in the elderly and young do not differ much. However, symptoms may be more prominent in elderly than young age. In aortic regurgitation, patient will remain asymptomatic for decades but occasionally may complain of an uncomfortable atypical chest pain induced by mechanical interaction between the heart and the chest wall. Physical findings in the aortic regurgitation result from increased stroke volume leading to an abrupt distension of the peripheral arteries, whereas regurgitation back into the left ventricle lead to quick collapse of the arteries. The result is a wide pulse pressure and water hammer or Corrigan's pulse. Other commonly identified findings related to hyper-dynamic pulse include de Musset's sign (head bob occurring with each heart beat), Trauble's sign (pistol shot pulse heard over the femoral artery partially compressed), Quinckle's pulses (capillary pulsation in the fingertips or lips) and Muler signs (systolic pulsation in the uvula). However, none of these finding are specific for aortic regurgitation. Ascultatory sound include soft S1, variable S2, and an S3. A high-pitched, blowing decrescendo diastolic murmur begins immediately after A2 and may be soft, often appreciated only when the patient is sitting up, learning forward, and holding his or her breath in expiration.

The clinical presentation of mitral regurgitation usually presents as a dramatic event with sudden onset and rapid progression of pulmonary oedema, hypotension, and signs and symptoms of cardiogenic shock.

Heart failure presents with symptoms of exertional dyspnoea, orthopnoea, and lower extremity swelling, these are considered hallmark symptoms of systolic HF; however, older adults often present more subtly. Confusion, somnolence, fatigue, anorexia,

depression, and diminished activity are more typical manifestations of HF in the very elderly[56]. Physical signs of systolic HF typically include elevated jugular venous pressure, hepatojugular reflex, S3 gallop, pulmonary rales, and peripheral oedema. However, older adults' physical signs are often subtle and nonspecific.[56] Heart sounds are more difficult to discern particularly if the patient is confused and unable to lie quietly. Chronic venous insufficiency and pulmonic atelectasis are often present, obscuring the implications of peripheral oedema and pulmonary rales.

Presentation of diastolic HF may be more precipitous, especially when ischemia acutely interrupts calcium sequestration into the sarcoplasmic reticulum, or when atrial fibrillation, infections, hypertension, or other stressors lead to a sudden change in hemodynamics that exceeds the senescent heart's compensatory capacity. The patients often become acutely short of breath, especially in the context of a fever, chest pain, or palpitations.

The typical symptoms of arrhythmia in elderly are palpitations, feeling the heart beat strongly; rapidly or in an irregular manner, and recurrent dizziness, sometimes with fainting (syncope). Elderly patients with arrhythmia might present with signs of irregular pulse, too slow or too fast and sometimes with evidence of shock or heart failure.

1.2.4 Cardiovascular risk factors in the elderly

Dyslipidemia is a potent risk factor for the development of CVD. Although studies have found total cholesterol levels to be a risk for cardiac events in older individuals.[57,58,59] Some studies demonstrate an inverse relationship between cholesterol and mortality, particularly cancer death in the very elderly. This is likely related to serum cholesterol as a marker of frailty, nutritional status and overall health in this age group. [60,61] The Dubbo study of elderly Australians found total cholesterol (TC), low–density lipoprotein (LDL), apolipoprotein B and the TC/high density lipoprotein (HDL) ratio to be significant and equivalent predictor of MI.[61]

Diabetes: The incidence and prevalence of type II Diabetes Mellitus (DM) and insulin-resistance increase with age; an estimated 13.2% of people 75 years and older carry the diagnosis of diabetes and another 5.7% and 14.1% of this age group have undiagnosed diabetes or impaired fasting glucose.[63,64] Diseases of the heart and/or blood vessel account

for at least 75% of the mortality of diabetics; the risk of death from coronary heart disease death is two to four times higher in diabetics than non diabetics.[61,63,64]

Obesity: Observation data from Framinghan cohort indicate that, on average, body mass index increases with age up to approximately age 65 years, at which point it starts to decline[65]. Decreases in metabolism, physical inactivity owing to sedentary lifestyle and co-morbidities such as arthritis, depression, and heart failure contribute to decreased activity levels and lean body mass.

Smoking: The prevalence of smoking decreases with increasing age.[66]. This percentage declines to less than 5% in people over 85 years old. The increase in risk for death or MI continues to be elevated in older current smokers in comparison to age–matched former smokers.[67]

Left ventricular hypertrophy: Probably because of an association with increased left ventricular load in older adults, the prevalence of ECG-defined LVH increases with age.[68]In the Framingham cohort, the prevalence of LVH on ECG was 4.2% and 4.9% for men and women, respectively aged 75-84 years and rose rapidly to 5.9% and 9.4% for men and women, respectively, aged 85-94 years.[69] LVH is a significant risk factor for both primary and secondary CHD events in older adults.

Pre-existing atherosclerosis: The risk factor most correlated with new coronary events is known coronary disease or previous cardiac events. History of previous MI increased the risk of cardiac mortality by a factor of 2.1 in the Bezafibrate Infarction Prevention (BIP) study. A prior cardiac event carried a relative risk of 2.1 in the BIP study while it carried a relative risk of 2.1 for an acute MI in the Dubbo study of the elderly.[68] As in the younger population, concurrent atherosclerosis is evidenced by peripheral or celebrovascular disease, and increased CVD risk.

1.3 Problem Statement

The impact of cardiovascular disease in the elderly in Tanzania has been suggested to be increasing. The changes in demographic and improvement in standard of living, and health

care have increased life expectancy leading to an increase in elderly population. Cardiovascular disease in elderly is among leading cause of admission in Tanzania but it is not clear which type of cardiovascular disease is more common. No previous studies have assessed the prevalence and pattern of cardiac disease in elderly patients in Tanzania.

1.4 Rationale

Elderly are at high risk of developing cardiovascular disease during their life time. Focusing in this age group in determining the pattern of cardiovascular disease will provide an early opportunity for early intervention and hence prevention of the disease. There is no data available in Tanzania regarding the Pattern of cardiovascular disease in elderly. Therefore, the findings of this study could have considerable policy implications for Tanzania in addressing the problem of cardiac disease in elderly.

1.5 OBJECTIVES

1.5.1 Broad Objective

To describe the pattern of cardiac disease (according to age, gender and types) among elderly patients admitted at Muhimbili National Hospital Dar es Salaam.

1.5.2 Specific Objectives

1. To describe the common presenting symptoms and signs of cardiovascular disease in elderly patients admitted in medical wards at Muhimbili National Hospital
2. To determine the types of cardiovascular disease among elderly patients admitted in medical wards at Muhimbili National Hospital
3. To describe echocardiographic findings in elderly patients admitted in medical wards at Muhimbili National Hospital
4. To determine the co morbidities associated with cardiovascular disease in elderly patients admitted in medical wards at Muhimbili National Hospital

2.0 METHODOLOGY

2.1 **Study Design**: Descriptive cross-sectional study

2.2 **Study setting**: The study was conducted in medical wards at Muhimbili National Hospital Dar es Salaam, from September 2008 to August to 2009**.**

Dar es Salaam is the Tanzania's largest city with a population of about 3,500,000. Muhimbili National Hospital (MNH) is a tertiary referral and teaching hospital, situated in Dar es Salaam city. It serves patients referred from the three municipal hospitals (Temeke, Kinondoni and Ilala) as well as patients from other hospitals in the country. It has bed capacity of about 1500 patients and it serves about 1000 outpatients per day.

2.3 **Study subjects**

Study subjects were all consenting patients aged fifty years and above admitted in medical wards at MNH from September 2008 to August 2009 with cardinal symptoms of cardiovascular disease which are chest pain, Dyspnoea, palpitation, fatigue and syncope

Inclusion criteria

- Elderly age above fifty years admitted in a medical ward MNH
- Elderly patients who consented to participate in the study

Exclusion

Elderly who did not consent to the study

2.4. Sample size and sampling procedure

2.4.1 Sample size

To determine the minimum sample size required, the following formula was used (Adapted from Kirkwood, 1988) [81]

$$n = \frac{Z^2 * p * (100 - p)}{\varepsilon^2}$$

Where: n = minimum required sample size.

p = proportion of patients with cardiovascular disease (86%). Obtained from study done in Kenya by [8]

ε = Margin tolerable error (5%)

Z = Standard normal distribution at 5% level of significance (1.96).

$n = \frac{1.96^2 * 86 * (100 - 86)}{} = 185.$

2.4.2 Sampling procedure

Elderly patients meeting inclusion criteria and consenting to participate were consecutively recruited into the study until the desired sample size was reached**.**

2.5 Data collection

Elderly patients admitted everyday during the study period were identified, informed about the aim of the study and asked to participate by the researcher or research assistant. A structured questionnaire was used to collect data from all consented patients. History, physical examination, electrocardiograhy, echocardiography, biochemical and haematological data were collected from study patients. A detailed history of cardiovascular system was taken looking for the presence of palpitation, dyspnoea, orthopnoea, paroxysmal nocturnal dyspnoea, cough, chest pain, ankle oedema, abdominal pain and syncope. A cardiovascular examination as well as examination of other systems was done to all of the study patients.

Blood pressure was measured using a standard mercury sphygmomanometer with an appropriate cuff size. Three sitting BP measurements were taken from the arm of each subject after a 5 min rest and with a two-minute interval between them. Average systolic and diastolic BP readings were calculated for each subject. Weight and height were measured in all studied patients. Body mass index (BMI) was calculated as weight (kg) divided by height squared. From each patient 10 ml of venous blood was collected and sent to the MNH central laboratory for the analysis of total serum cholesterol, random blood sugar, creatinine, blood urea, serum electrolytes and haemoglobin levels.

Echocardiogram evaluation

Echocardiographic evaluation was done to all enrolled patients by principal investigator assisted by experienced cardiologist using a PHILIPS, HP 7550 Echocardiography machine with a 2.5.0MHz transducer. Echocardiographic images of all patients were printed in papers and recorded on Video tapes. Standard views and measurement were

acquired. M-mode, 2D and Doppler studies were used to assess l structural and functional cardiac abnormalities of valves, myocardium pericardium and chamber sizes. Cardiac ejection fractions were calculated automatically by an echocardiograph machine in all patients. Patients with ejection fraction less than 50% were classified as having systolic dysfunction. Diastolic function was assessed using Doppler studies of mitral inflow and annular velocities (E, A and E' velocities) as well as deceleration time

ECG

Twelve leads electrocardiography was done to all patients using a United States of America made Philips ECG model page writer 2002 HP 6550. Interpretation was done by the investigator with assistance of experienced cardiologist.

Definitions used in the study

Patients with cardiovascular disease included those presenting with symptoms and signs mentioned above. Some of the cardiovascular conditions were defined as:

- Hypertension was defined according to criteria of the seventh Joint National Committee on Prevention, Detection, Evaluation and Treatment of high blood pressure (JNC VII) as a systolic blood pressure of 140 mm Hg or greater, diastolic blood pressure of 90 mm Hg or greater or taking antihypertensive medication.[74].
- Heart failure was defined using Framingham criteria based on symptoms and signs of heart failures[75]
- Diastolic dysfunction was defined by Doppler E/A<1, DT>240, or E/E'>15.[76].
- Left ventricular hypertrophy was defined as an increase in the mass of the left ventricle.
  - In males the LV mass of more than 135 g or the mass index > 71 g/m2 [76]
  - In women the values greater than 99 g and 62 g/m2.[76]
- Dilated cardiomyopathy was diagnosed in patients with dilated left ventricular cavities (LV diastolic diameters > 5.9cm in males and 5.3cm in women, associated with decreased global systolic function (ejection fraction < 50%).[76]

BMI was defined as follows:

- Normal weight a BMI of 18.5- 24.9 kg/m^2
- Underweight BMI of less than 18.5. , and
- Overweight BMI of 25 - 29.9 kg/m^2
- Obesity a BMI of $\geq$ 30 kg/m^2
- Other definitions for characteristics of the study subjects were as follows:
- Anaemia as per WHO definition, Men Hb 13-16g/dl, Female 12-14g/dl. [85]
- Elderly- was defined as anybody who is having an age of fifty years and above
- Renal insufficiency was defined by elevated creatinine level, i.e. above 115 µmol/L

2.6 Data Processing and Analysis

Data were entered and analyzed using Statistical Package for Social Sciences (SPSS) computer program Version 13. Data were summarized into frequency tables, charts and cross tabulations. Relationships were tested using the Chi-square test at 5% tolerable error. The odds of occurrences of events were tested using the Odds Ratio (OR) at 95% confidence interval (95% CI).

2.8 Ethical Consideration

Ethical clearance was obtained from the Research and Publications Committee of Muhimbili University and Allied Health Science (MUHAS) and the Ethics department of MNH. Patients were enrolled after informed verbal and written consent was obtained. Patients who did not consent to participate in the study were not deprived of their right to receive medical care.

Confidentiality was adhered to throughout the study and codes instead of names were used for identifying patients. Those diagnosed to have any cardiovascular disease were treated accordingly in the ward and subsequently referred to the cardiac clinic at MNH or to the hospital they were referred from.

3.0 RESULTS

3.1 Characteristics of Study Patients

Between September 2008 to August 2009 a total of 627 patients with cardiovascular diseases were admitted in the medical wards of which 209 (33%) were elderly (older than 50 years of age). Of all admitted elderly patients 185 (88.5%) patients consented and participated in the study. Their mean age was 66 ± 9.2 years with majority (62.7%) being male. Smoking was significantly more common in males (p=0.03). Both male and female patients had elevated serum creatinine but much severe in male patients. Study participants had normal mean serum cholesterol.

Table 1: Characteristics of the study patients at MNH medical ward between September 2008 to August 2009 stratified by sex

Characteristics	Male N =116	Female N =69	P value
Mean age (SD), years	66.3(9.2)	65.8(9.7)	1.00
Age groups			
50-59	24 (20.7)	19 (27.5)	
60-69	47 (40.5)	27 (39.1)	
70+	45 (38.8)	23 (19.8)	0.54
BMI, mean (SD) kg/m2	24.0 (3.9)	23.7 (4.0)	0.57
Hypetension, n (%)	78 (67.2)	47 (68.1)	1.00
Smoking, n (%)	22 (19)	5 (7.2)	0.03
Hb, mean (SD), g/dl	10.0 (2.6)	9.7 (2.6)	0.49
Cholesterol, mean (SD), mmol/L	4.3 (5.3)	4.0 (1.6)	0.65
Creatinine, logmean (SD) µmol/L	2.1 (0.3)	2.1(0.3)	0.48
Sodium, mean (SD) mmol/L	134.1(7.0)	134.8(6.8)	0.55
Potassium, mean (SD) mmol/L	4.3(3.4)	4.3(0.9)	0.98

KEY: Normal blood levels: createnine (log_{10}), 1.79-2.06 µmol/L; sodium -136-145 mMol/L; potassium 3.5-5.5mMol/L; cholesterol, 5.18 mmol/L; Haemoglobin, 12-14 g/dl; log mean, mean calculated after taking logarithms of the actual readings.

Presenting Symptoms and Signs of Cardiovascular Disease in Elderly Patients

The most common symptoms were palpitation and dyspnoea found in 117 (63.2%) and 115 (62.2%) respectively. Least common were abdominal pain right upper quadrant and fainting reported in 21 (11.4%) and 1 (0.5%) patients respectively (Table 2).

Table 2: Distribution of common presenting cardiovascular symptoms in elderly patients (n=185)

Symptom	No. (%)	Male	Female	p-value
Palpitations	117 (63.2)	69 (59.5)	48 (69.6)	0.17
Dyspnoea/breathlessness	115 (62.2)	69 (59.5)	46 (66.7)	0.33
Orthopnoea	79 (42.7)	49 (42.2)	30 (43.5)	0.87
Cough	69 (37.3)	42 (36.2)	27 (39.1)	0.69
Chest pain	58 (31.4)	37 (31.9)	21 (30.4)	0.84
Pedal oedema	52 (28.1)	35 (30.2)	18 (26.1)	0.55
Poroxymal nocturnal dyspnoea	31 (16.8)	23 (19.8)	8 (11.6)	0.15
Abdominal pain (RUQ)	21 (11.4)	12 (10.3)	9 (13.0)	0.58
Fainting	1 (0.5)	1 (0.9)	0 (0.0)	0.44

The common signs were oedema and basal crepitations found in 49 (26.5%) and 47 (25.4%) respectively. Elevated blood pressure greater than 130/85mmHg was found in 125(65%). Least common were cyanosis and diastolic murmurs reported in 3 (1.6%) and 2 (1.1%) patients respectively (Table 3).

Table 3: Distribution of common presenting cardiovascular signs in elderly patients (n=185)

Signs	No. (%)	Male	Female	P value
Oedema	49 (26.5)	33 (28.4)	16 (23.2)	0.43
Basal crepitations	47 (25.4)	27 (23.3)	20 (29.0)	0.39
Hepatomegaly (tender)	38 (20.5)	23 (19.8)	15 (21.7)	0.76
Cachexia and muscle wasting	24 (13.0)	15 (12.9)	9 (13.0)	0.98
Elevated jugular venous pressure	18 (9.7)	9 (7.8)	9 (13.0)	0.24
Ascites	18 (9.7)	10 (8.8)	8 (11.6)	0.51
Displaced apex beat	16 (8.6)	12 (10.3)	4 (5.8)	0.29
Tachycardia	11 (5.9)	8 96.9)	3 (4.3)	0.48
Third heart sound	6 (3.2)	5 (4.3)	1 (1.4)	0.29
Systolic murmurs	5 (2.7)	3 (2.6)	2 (2.9)	0.90
Right ventricular heave	4 (2.2)	2 (1.7)	2 (2.9)	0.63
Cyanosis	3 (1.6)	3 (2.6)	0 (0.0)	0.18
Diastolic murmurs	2 (1.1)	2 (1.2)	0 (0.0)	0.27

N.B. Individual patients could present with more than one symptom/sign

Distibution of clinical diagnosis

Hypertension was the most frequent condition encountered in both males and females patients whereas corpulmonary was the least common (2.6%). There were no significant gender differences on the pattern of clinically diagnosed cardiovascular diseases among studied patients ($p>0.05$). Table 4 shows the results.

Table 4: Distribution of clinical diagnosis of cardivascular conditions among elderly patients by sex

Type of CVS disease	All patients N =185	Male N =116	Female N =69	P value
Hypertension, n (%)	125 (67.6)	78 (67.2)	47 (68.1)	1.00
Congestive Cardiac Failure, n (%)	35(18.9)	22 (18.9)	13 (18.8)	0.13
Stroke , n (%)	31(16.8)	22 (19)	9 (13)	0.30
Valvular Heart Disease, n (%)	27 (14.9)	10 (8.6)	17 (24)	0.32
Atrial Fibrilation, n (%)	9 (4.9)	5 (4.3)	4 (5.8)	0.65
PeripheralVascular Diseases, n (%)	3(1.6)	3 (2.6)	0	0.09

Types of Cardiovascular disease diagnosis by echocardiography

Table 5 shows the relationship between age and echocardiographic abnormalities. Diastolic dysfunction demonstrated significant difference with age ($p=0.03$); elderly patients aged 65 years or older were likely to have diastolic dysfunction than those less than 65 years. Other echocardiographic abnormalities did not exhibit significant difference with age ($p>0.05$**).**

Table 5: Distribution of Echocardiographic findings in the study population by age

Type of echocardiographic abnormalities	All patients N =185	Less than 65 N =86	65 or older N =99	P value
LVH secondary to hypertension, n (%)	83 (44.9)	38 (44.2)	45 (45.5)	0.86
Diastolic dysfunction, n (%)	58 (31.4)	20 (23.3)	38 (38.4)	0.03
Systolic dysfunction, n (%)	47 (25.4)	22 (25.6)	25 (25.3)	0.96
Sclerotic aortic valve, n (%)	25 (13.5)	11 (12.8)	14 (14.1)	0.79
Hypertensive dilated cardiomyopathy, n (%)	17 (9.2)	10 (11.6)	7 (7.1)	0.29
Dilated cardiomyopathy, n (%)	15 (8.1)	9 (10.5)	6 (6.1)	0.27
Pericardial effusion, n (%)	14 (7.6)	10 (11.6)	4 (4.0)	0.09
Mitral regurgitation, n (%)	8 (4.3)	5 (5.8)	3 (3.0)	0.47
Rheumatic mitral stenosis, n (%)	5 (2.7)	1 (1.2)	4 (4.0)	0.37
Aortic regurgitation, n (%)	5 (2.7)	2 (2.3)	3 (3.0)	1.00

Figure 1 shows the distribution of electrocardiographic findings of studied patients. Seventy (37.8%) had normal ECG findings. Left ventricular hypertrophy and sinus tachycardia were the commonest findings.

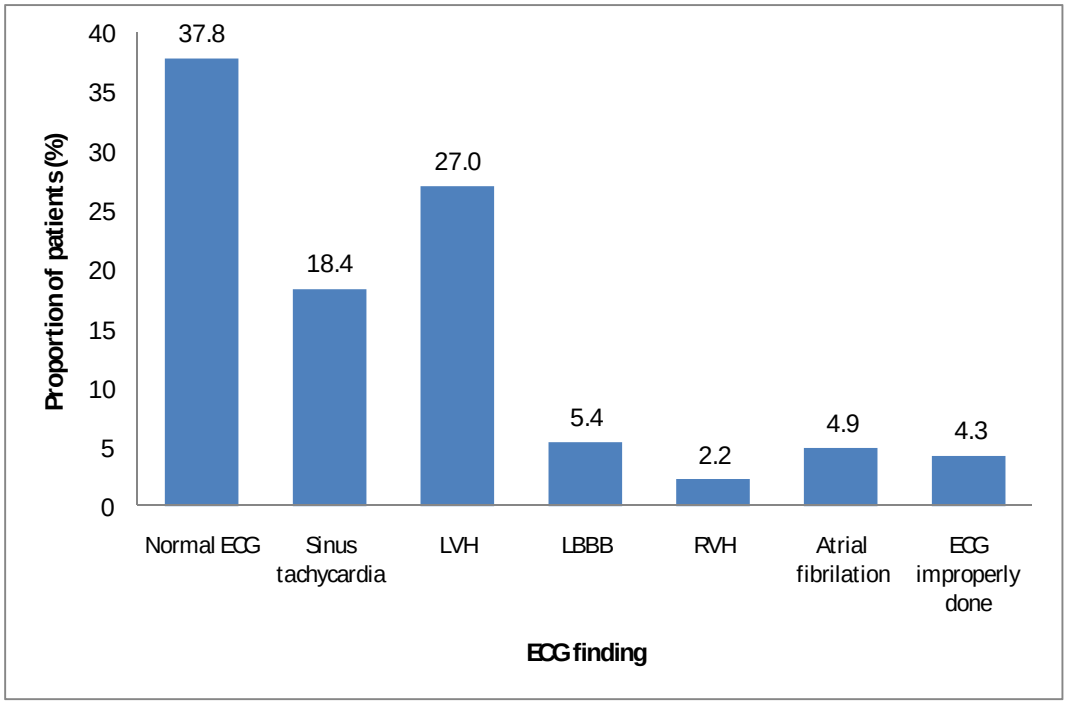

Figure 1: Electrocardiographic findings among elderly with cardiovascular disease (n=185)

LVH - left ventricular hypertrophy; RVH - right ventricular hypertrophy

LBBB - left bundle branch block (partial or complete)

3.3 Co-morbidities condition associated with cardiovascular disease

Table 6 shows the distribution of co-morbid conditions found in elderly patients with cardiovascular disease. The commonest co-morbid conditions were anaemia in 167 (90.3%) and hyponatraemia in 98 (53.0%) respectively. Least common were malaria in 5 (2.7%) and malignancy in 4 (2.2%) respectively**.**

Table 6: distribution of co-morbid conditions in elderly with cardiovascular disease

Co-morbid condition	All N=185	Male N =116	Female N =69
	No. (%)	No. (%)	No. (%)
Diabetes	38 (20.5)	21 (18.1)	17 (24.6)
Stroke	31 (16.8)	22 (19)	9 (13)
Anaemia	167 (90.3)	103 (88.8)	64 (92.8)
Renal insufficiency	66 (35.7)	40 (34.5)	26 (37.7)
Hypernatraemia	9 (4.9)	6 (5.2)	3 (4.3)
Hyponatraemia	98 (53.0)	65 (56.0)	33 (47.8)
Hypercholestremia	36 (19.5)	20 (17.2)	16 (23.2)
Hyperkalemia	12 (6.5)	6 (5.2)	6 (8.7)
Hypokalemia	35 (18.9)	25 (21.6)	10 (14.5)
Malignancy	4 (2.2)	4 (3.4)	0 (0.0)
Hypoglycemia	59 (31.9)	38 (32.8)	21 (30.4)
Malaria	5 (2.7)	3 (2.6)	2 (2.9)

DISCUSSION

Among patients with cardiovascular disease admitted in medical ward at Muhimbili National Hospital for a one-year period, the proportion of elderly patients was 33%. This figure is relatively higher than that reported in the USA (12.4%) in the year 2000. Inconsistency in these figures could be attributed to differences in ages of elderly studied. Thus, in our study elderly patients were taken to have the age at least 50 years while in the USA study, elderly were taken to be at least 65 years of age.

The commonest clinical presentations of the elderly patients with cardiovascular disease were palpitation, dyspnoea and oedema. A similar description was documented in a study done in Kenya.[24] Consistent to the Framingham Heart study, palpitations, dyspnoea/breathlessness, orthopnoea, pedal oedema and right upper quadrant abdominal pain were significantly associated with the presence of cardiac abnormalities.[66] The palpitation was also independently associated with hypertension. Chest pain was reported by 31% of patients with none of them diagnosed to have acute coronary syndrome. This finding are consistent with the prevalence rated which was reported from Kenya in which 2000 admitted patients in Coast Province General Hospital only one case confirmed to have myocardial infarction.[83] Also, dyspnoea has been associated with age-related diastolic dysfunction, lung changes or associated pulmonary disease.[87].Thus, as reported in our study, elderly patients aged at least 65 years were likely to develop diastolic dysfunction and hence higher prevalence of dyspnoea.

In this study about two third of patients (69%) were clinically diagnosed to have cardiovascular disease. This high rate is not surprising because cardiovascular disease is the most frequent diagnosis in elderly people.[2] In this study the prevalence of hypertension was found to be 68%. This was higher than previously reported in a study done in Kenya, where prevalence was 54%.[8] However, this prevalence was similar to that found in America where more than 60% of patients older than 65 years were hypertensive.[6] The variation of this prevalence rate can be explained by difference in diagnostic cut off points for hypertension in different studies. Congestive cardiac failure was the second clinical diagnosis affecting 19% of elderly patients. A similar prevalence was reported in America where heart failure contributed to at least 20% of hospital admissions of patients older than 65 years.[13] However, this prevalence was low compared to that found in Kenya where 39%

of studied patients had congestive cardiac failure. The differences in the prevalence rates can be explained by definition of elderly in these studies. For example, we defined an elderly patient to be older than fifty years while the Kenyan study used patients older than 60 years.[8]

Significant gender differences in prevalence of different types cardiovascular conditions were not exhibited in this study. Similar findings were also demonstrated in the Kenyan study whereby no gender differences in prevalence of cardiovascular disease were observed.[24] Also, this finding concurs with the American study which compared prevalence and incidence of cardiovascular disease between men and women in a long-term health care facility where it was reported that the prevalence of hypertension, CAD, and stroke were similar in male and female. However, they found significantly higher prevalence of atrial fibrillation and PAD in male compared to women.[88] . The differences in findings between our study and the American study could be attributed to the bigger sample size used in the American study (185 for our study vs. 3624 in the American study.

Our study exhibited significant age difference in the prevalence of diastolic dysfunction with elderly aged at least 65 years being likely to develop diastolic dysfunction than their counterparts younger than 65 years. It has been shown that patients with diastolic dysfunction are generally older than 65 years. A history of hypertension has been associated with in more than 60% of elderly patients with diastolic dysfunction.[88] This could be a possible explanation to the observed difference in our study since the prevalence of hypertension was high (68%).

Forty five percent of our patients were diagnosed to have left ventricular hypertrophy using echocardiogram. However, of 125 patients with hypertension, 66% were also diagnosed to have LVH secondary to hypertension. Thus, it is likely that hypertension is the most important cause of their left ventricular hypertrophy. In several studies the prevalence rates of left ventricular hypertrophy have been reported to be 25-48%; which is consistent to our findings.[69] However, in this study there were no gender differences on left ventricular hypertrophy among hypertensive patients as found in Framingham study.[69] Using electrocardiogram (ECG), left ventricular hypertrophy was diagnosed in 27% of our patients. ECG is usually very sensitive but less specific in diagnosing left ventricular

hypertrophy.[82] Left ventricular diastolic dysfunction was diagnosed in 31% of studied patients contrary to the reported rates of 55 to 59 % in other studies.[76,77] These studies used older patients (> 65 years) than our study.

The commonest co-morbid conditions in elderly patients with cardiovascular disease were anaemia and hyponatremia (in 90% and 53% respectively). It has been shown that prevalence of anaemia increases with age and its prevalence varies from 8 to 44 percent with its peak at 85 years or older.[90,91] This has been attributed to prevalence of chronic disease and iron deficiency in elderly.[92]

Hyponatremia has been indicated to be a common condition in elderly, especially those hospitalized or living in long-term care facilities.[93] The possible explanation for this could be that aging process is usually accompanied by maladaptations in different organ systems and physiologic functions including the renal system. This leads to renal insufficiency and hence hyponatremia

Conclusions

Hypertension, congestive heart failure and left ventricular hypertrophy were the commonest cardiovascular diseases among elderly patients at MNH. Coexistence of anaemia, stroke, renal impairment and diabetes was also frequent. No any case identified with coronary artery disease.

Recommendation

Elderly patients should be screened for cardiovascular diseases especially hypertension whenever they are admitted for any reason in our wards.

Study Limitation

Being a hospital based study, our findings cannot be generalized.

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DATA COLLECTION SHEET

Demographics

Date of Admission: ___ ___/ ___ ___ / 200 ___

dd mm yr

Date of Birth: ___ ___ / ___ ___ /___ ___ ___ ___ Sex: □ Male □ Female

Height: ___ ___ ___ □ cm Wt ----------Kg

Code number----------

Pulse rate----------/min

Blood pressure-------mmHg

Race

African

Caucasian

Ward (district)

1. 1-Temeke
2. 2-Ilala
3. 3-Ubungo
4. 4-Kinondoni
5. Ukonga
6. Up country
7. Isles

Education

1. Non
2. Primary
3. Secondary
4. College
5. University
6. Other

Occupation

1. Peasant
2. Businessman
3. Employed
4. House wife
5. Student
6. Others

Marital status

1. Married
2. Single
3. Widowed
4. Divorced
5. Cohabiting

Baseline Characteristics at Time of Admission

1. Diabetes □ yes □ no
   □ diet □ oral □ insulin
2. Hypertension □ yes □ no
3. Hyperlipidemia □ yes □ no
4. Stroke □ yes □ no
5. PVD □ yes □ no
6. Smoking □ yes □ no
7. Malignancy □ yes □ no
8. Depression □ yes □ no
9. Dementia □ yes □ no
10. Atrial Fibrillation □ yes □ no
11. Pacemaker □ yes □ no
12. Ischemic Heart Disease □ yes □ no
    History of MI □ yes □ no
    History CABG □ yes □ no
    History PCI □ yes □ no
    Stable Angina □ yes □ no
    CN Class □ I □ II □ III □ IV
13. Valvular Disease □ yes □ no
    Mitral Stenosis □ yes □ no
    Mitral Regurgitation □ yes □ no
    Aortic Stenosis □ yes □
    Aortic Regurgitation □ yes □ no
    Other _____

Symptom

Palpitation □ yes □ no	Dyspnoea □ yes □ no
Orthpnoea □ yes □ no	Paroxymal n/dypnoea □ yes □ no
Cough/Haemptosis □ yes □ no	Chest pain □ yes □ no
Ankle oedema □ yes □ no	Abdominal pain(RUQ) □ yes □ no
Fanting □ yes □ no	

Signs

Cachexia and muscle wasting □ yes □ no	Tachycardia
Pulsus alternans □ yes □ no	Elevated jugular venous pressure □ yes □ no
Displaced apex beat □ yes □ no	Right ventricular heave □ yes □ no
Crepitations or wheeze □ yes □ no	Third heart sound □ yes □ no
Oedema □ yes □ no	Hepatomegaly (tender) □ yes □ no
Ascites □ yes □ no	Cyanosis □ yes □ no
Systolic murmur □ yes □ no	Diastolic murmur □ yes □ no

Assessment of peripheral circulation

absent pulses in the legs-dorsalis pedal, □ yes □ no

posterior tibial, politeal, femora cold feet □ yes □ no

ulcer-painful on feet, or lower leg □ yes □ no

buregers test positive □ yes □ no

thin hear and loss of hair on top of toe □ yes □ no

intermittent claudication □ yes □ no

NYHA classification: □ I □ II □ III □ IV

NYHA Class	**Symtoms**
I	No symptoms and no limitation in ordinary physical activity, e.g. shortness of breath when walking, climbing stairs etc.
II	Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity.
III	Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g. walking short distances (20-100 m). Comfortable only at rest.
IV	Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients

Framingham criteria for the diagnosis of heart failure

Diagnosis is made in the presence of two major or one major and two minor criteria (provided symptoms are not attributable to any other condition)

Major criteria

1. Paraxysmal nocturnal dyspnoea
2. Neck vein distension
3. Rales
4. Cardiomegaly
5. Acute pulmonary oedema
6. S3-gallop
7. Increased venous pressure
8. Hepatojugular reflux

Minor criteria

1. Ankle oedema
2. Night cough
3. Hepatomegally
4. Pleural effusion
5. Tachcardia

Baseline Labs – First Obtained at Admission					
Lab	**Value**	**Units**	**Lab**	**Value**	**Units**
Creatinine	_____		Cholesterol	_____	
BUN	_____		Triglyceride	_____	
Sodium	_____		LDH	_____	
potassium					
Albumin	_____		HDL	_____	
Glucose	_____		VLDL	_____	
Hemoglobin	_____			_____	
Total WBC	_____			_____	
Lymph %	_____				

EKG at Admission	
Date	
Heart Rate	
Intervals	
PR	
QRS	
Rhythm (beats/minute)	
Normal Sinus	□ yes □ no
Nodal	□ yes □ no
Paced	□ yes □ no
Atrial fibrillation /Flutter	□ yes □ no
VT	□ yes □ no
SVT	□ yes □ no
VF	□ yes □ no
Conduction	
1º AVB	□ yes □ no
2º AVB	□ yes □ no
3º AVB	□ yes □ no
CLBBB	□ yes □ no
LAHB	□ yes □ no
LPHB	□ yes □ no

CRBBB	□ yes □ no	
Other		
LVH	□ yes □ no	
RVH	□ yes □ no	
Ischemia		**Wall ***
ST ↑	□ yes □ no	
ST ↓	□ yes □ no	
T inv	□ yes □ no	

* Wall : Anterior: 1, Inferior 2, Lateral 3, Posterior 4.

Echocardiographic Evaluation	
Date	
Heart Rate	
Left Atrial size (ml)	
Left Ventricular size systole (cm)	
Left Ventricular size diastole (cm)	
Ejection Fraction, Teicholz (%)	
Ejection Fraction, Visual estimations (%)	
Intra Ventricular Septum (Diastole) mm	
Posterior Wall (diastole) mm	
LV mass (by Devereux)	
DIASTOLIC FUNCTION	
Left Atrial size, antero-posterior (cm)	
Left Atrial size, planimetry (cm^2)	
Mitral E-wave (cm/sec)	
E-wave decelaration time (sec)	
Mitral A-wave (cm/sec)	
Mitral A wave (duration)	
Lateral mitral E'(DTI)	
Pulmonary venous flow S wave (cm/sec)	
Pulmonary venous flow D wave (cm/sec)	
Pulmonary venous flow A wave (duration)	
Color M-mode flow propagation velocity (Vp)	

Mitral E-wave (cm/dec)			
Mitral A wave (cm/sec)			
Valvular			
	Mild	**Moderate**	**Severe**
Aortic Stenosis			
Aortic Regurgitation			
Mitral Stenosis			
Mitral Regurgitation			
Tricuspid Regurgitation			
Other			
Other Conditions			

Echocardiography: Diagnosis confirmation

Conclusion	
TYPE OF HEART DISEASE	
Systolic dysfunction	
Diastolic dyfunction	
Dilated CM	
Mital stenosis	
Mitral regurgitation	
Mitral valve leaflets prplapse	
Aortic regurgitatio	
Calcified Aorta/Sclerotic	
Aortic regurgitation	
Triscuspid regurgitation	
Triscuspid stenosis	
Ischemic Heart Disease	
Septal defect	

A/V shunt PDA	
HTN	
Endomycoardial Fibroelastosis	
Other	

APPENDIX I: FOMU YA RIDHAA

Questionnaire number			

Initials of respondent			

UTAFITI KUHUSU UKUBWA WA TATIZO LA MAGONJWA YA MOYO KWA WAZEE WA MIAKA 60 NA ZAIDI KWA WAGONJWA WALIOLAZWA KATIKA HOSPITAL YA TAIFA WODI ZA UTABIBU

Fomu ya ridhaa ya kushiriki katika utafiti itakuwa kwa Kiswahili.

Habari, Mimi ni Dr Peter R Kisenge ni mwanafunzi wa shahada ya uzamili katika magonjwa ya moyo.
Tunafanya utafiti kujua ukubwa wa tatizo la magonjwa ya moyo kwa wazee wenye umri zaidi ya miaka 60.Utafiti huu utajumuisha zaidi ya watu mia mbili.Ningependa kukushirikisha katika utafiti huu kama utatoa ridhaa yako nakama utatimiza masharti ya kushiriki katika utafiti huu

Madhumuni ya utafiti: umekaribishwa kujiunga na utafiti huu kwa sababu wewe ni mzee wa umri wa miaka 50 au zaidi . Madhumuni ya utafiti huu ni kujua ukubwa wa tatizo la magonjwa ya moyo kwa wazee zaidi ya miaka 60.

Kushiriki kunahusisha nini: Kushiriki utafiti huu, utaombwa kwa hairi yako ukubali kujibu maswali utakayoulizwa na mtafiti na kutolewa damu kwa ajili ya kupimwa mafuta

mwilini na ufanyaji kazi wa figo zako. Pia utapimwa mkojo kuangalia kiasi cha protini katika mkojo wako

Usiri: Taarifa zote zitakazokusanywa kwenye fomu hii zitakuwa za siri

Madhara: Hatutarajii madhara yoyote kutokea kwako kutokana na ushiriki wako katika utafiti huu. Wakati wa kuchukua damu kunaweza kukawa na maumivu kidogo tu sehemu utakayochomwa sindano na wakati mwingine kukawa na michubuko na uvimbe. Vyote hivi vinaishi baada ya siku chache.

Haki ya kujitoa katika utafiti: Ushiriki wako ni kwa hiari kabisa na pia unayo haki ya kujitoa katika utafiti huu wakati wowote ule utakapojisikia kufanya hivyo.

faida ya kushiriki: kama utakubali kushiriki katika utafiti huu utaweza kujua kama una shinikizo la damu na pia kupima damu yako ili kujua wingi wa mafuta mwilini.

Mawasiliano: Kama una maswali kuhusiana na utafiti huu, uko huru kuwasiliana na mratibu Utafiti, Dr Peter R Kisenge (0784236502) au Dr Johnson Lwakatare (0754262648)) katika idara ya Tiba ya Chuo Kikuu cha Afya ya Tiba Muhimbili (nambari ya simu ofisini ni 022 2150603, S.L.P 65001, Dar es Salaam).Kama una maswali yoyote kuhusu haki yako ya msingi kama mshiriki katika utafiti huu tafadhari wasiliana na Prof E. Lyamuya, Mwenyekiti wa kamati ya utafiti ya Chuo Kikuu cha Afya ya Tiba Muhimbili kwa simu nambari 2152489 au S.L.P 65001, Dar es salaam.

Je una maswali yoyote?

Mimi _____nimesoma/mimesomewa maelezo yaliyomo kwenye fomu hii. Maswali yangu yamejibiwa na nimepatiwa nakala ya fomu hii ya kukubali.Mimi kwa hiari yangu mwenyewe, bila kushurutishwa na mtu, ninakubali kushiriki kwenye utafiti huu.

Sahii ya mshiriki: _____

Sahihi ya mtafiti: _____

Tarehe: _____

1 APENDIX II: CONSENT FORM

Questionnaire number			

Initials of respondent			

Pattern of Cardiac disease in Elderly patients admitted medical ward Muhimbili National Hospital Dar es Salaam Tanzania

Goodmorning/ afternoon,

My name is is Dr Peter R Kisenge a postgraduate student Msc Cardiology.

We are conducting a study on pattern of Cardiac disease in Elderly in patient who are sixty years old and above. The study will involve more than 200 patients. I would like to involve you in this study if you would consent and fulfill the inclusion criteria.

Study Aim:

To determine the pattern of cardiac disease in elderly patients admitted medical ward Muhimbili National Hospital

Involvement:

You will be asked, by consenting, to answer questions posed to you by a researcher, your blood will also be taken for lipids and serum creatinine to assess your kidney functions.

Confidentiality:

All information collected in this questionnaire will be confidential.

Side effects:

We are not expecting any major effect on your health from your involvement in this study. Venous blood drawing will cause mild pain and swelling at the drawing site. These will subside after a short time.

Withdrawal from the study:

Your participation in this study is voluntary; you therefore have a right to withdraw from the study anytime.

Benefits:

Your participation in the study will enable you to know if you have any cardiac disease

Contacts:

In case of any question regarding this study be free to contact Dr Peter R Kisenge (0784236502) or Dr Johnson Lwakatare He work in the department of Internal medicine of Muhimbili University of Health and Allied Sciences (office landline 022 2150603, P.O BOX 65001, Dar es Salaam).

If you have questions on your rights as a study participant you are asked to consult Prof E. Lyamuya, The Chairman of Ethical and Research committees of Muhimbili University of Health and Allied Sciences (office landline 022 2152489, P.O BOX 65001, Dar es Salaam).

Do you have any question?

I _____I have read/ information have bee read to me from this questionnaire, my questions clearly answered and given a copy of this consent form. I have voluntarily agreed to participate in the study.

Signature of the participant _____

Signature of the researcher: _____

Date: _____