



Prevalence of Cardiovascular Disease and Risk Factors Among Residents of Tanga City

Samwel Jacob Rweyemamu¹, Tatizo waane¹, Happy Nchimbi², Kaushik Ramaiya², Andrew Swai² and Henry Anselmo Mayala¹

¹Jakaya Kikwete Cardiac Institute, P.O.Box 65141, Dar es Salaam, Tanzania

²Tanzania NCD Alliance, P.O.Box 65201, Dar es Salaam, Tanzania

Received 14 September 2020; Accepted 24 September 2020; Published 10 October 2020

ABSTRACT

Cardiovascular diseases are defined as the group of diseases which are affecting the heart and blood vessels.

We conducted a cross-sectional community-based study that consecutively enrolled 355 consenting adults who came for a health check at Nguvumali Hospital ground Tanga, in 2018. A structured questionnaire was used to obtain demographic data, gather co-morbid information such as record blood pressure, body weight and BMI. A 12 lead ECG and Transthoracic Echo were done to determine the structural and ischemic heart changes from the participants. Out of 355 participants, 75.6% were male while the female was 24.4%. Furthermore, female participants had more hypertension and diabetes mellitus compared to male (HTN 45% vs. 12.9%) (DM 21% vs. 6%).

The study determined that most prevalent risk factor for cardiovascular disease was hypertension in both males (12.9%) and females (45.5%). Few of the participants were smokers, 2% of all males and 1% of females. The study also found that 6% of females were diabetic and most of these females were obese with a body mass index (BMI) of 30 or above

INTRODUCTION

Cardiovascular disease is defined as the group of diseases affecting the heart and blood vessels. Nevertheless, cardiovascular disease is a broad term which encompasses hypertension, cerebral vascular events (stroke and transient ischemic attack -TIA), atherosclerosis /arteriosclerosis of coronary artery diseases and peripheral blood vessels (1). WHO has included aortic aneurysm/ dissection, deep venous thrombosis (DVT), pulmonary embolism (PE) and heart tumors like myxomas in the definition of CVDs (2). Most of the cardiovascular diseases are caused by well-known and preventable traditional risk factors. There are modifiable and non-modifiable risk factors for CVDs (3). The modifiable risk factors include high blood pressure,

Physical inactivity, dyslipidemias, tobacco use, Diabetic Mellitus, obesity and unhealthy diet. High blood pressure is the top risk factor for coronary artery disease and stroke (4). Physical inactivity alone increases the risk of CAD and stroke by 50%. Unhealthy diet, famously called fast foods or

take away is an emerging risk factor for CVDs in developing countries. About 30% of CAD and 11% of stroke patients globally are due to low fruit and vegetable diets. High saturated fat diets also contribute to dyslipidemias and thrombosis (4). None traditional risk factors for CVDs, some of which are preventable are; low socioeconomic status (SES), mental ill-health like depression, psychosocial stress (risk for stroke), heavy alcohol drinking (associated with dilated cardiomyopathy and hypertension), contraception and anti-retroviral (ARV) therapies which are used for the treatment of HIV. (4). None modifiable risk factors for CAD include advanced age, genetic inheritance, race and gender (5). The risk of CVDs increases exponentially with age. After the age of 55, the risk doubles after every 10 years. It is also recognized that advanced age is an independent risk factor for hypertension and atherosclerosis (6, 7). Genetic factors also play a big role in the occurrence of CVDs. The family history is the strong predictor for CAD and stroke in the first degree relative before the age of 55 in male relative or age 65 female relative(4). Additionally, the male gender is also associated with CAD. Studies have shown that the prevalence

rate of ischemic heart disease is higher in men compared to premenopausal women. Moreover, there were no differences in the rates for stroke among the comparable groups (4,8). Ethnicity/ race play a great role in CVDs. Stroke and death from CVDs have been found to be common in American blacks and South Asians (4). The study which was done in Uganda found that the most common risk factors for CVD in young individuals were excessive alcohol consumption (31.7 %), elevated systolic blood pressure (14 %) and excessive salt intake (13 %) (Nyombi et al.2016). In Tanzania, a cross-section study found that the prevalent risk factors for hypertension were, male gender, males had 10 times more fold increase than females, age equal or above 50 years had 2-fold increase risk. Also, the study documented that overweight (51%) and obese (94%) were the main risk factors for hypertension (10). The risk for development of CVDs can be anticipated since the adolescent stage. Therefore, it is an indolent disease which is developing slowly. About 32% of all adolescents in the world are overweight and obese (11). Obesity and increased Body Mass Index (BMI) in adolescent is associated with morbidity and mortality in adult wood(12). Therefore, early adulthood measures for the primary and secondary prevention of CVDs is very crucial. Furthermore, the review demonstrated that each one-unit increase in BMI is associated with a higher risk of systolic BP (SBP) greater than 130 mmHg (13). Overweight and hypertension contribute to 13% of mortality during adulthood worldwide. In May 2012, world leaders committed to reducing global mortality from non-communicable diseases (NCDs) by 25% by 2025 (Go et al. 2013). With this notation, Tanzania joins the world to provide health education and create awareness of NCDs among the community. The aim of this study was to determine the prevalence of CVDs among the residents of the Tanga city during the commemoration of the world hypertension day in May 2018. Also, the study aimed at creating the database of the risk factors of CVDs in Tanga city. The findings of this study also intended to help the policymakers to know the current status of NCDs and propagate the preventive measures in Tanzania.

METHODOLOGY

Study population: 355 consenting adults were recruited, who came for a health check at Nguvumali Hospital ground, Tanga in 2018 during the world Hypertension day.

Study design: A cross-sectional community-based study

Study tools: 12 lead Electrocardiogram and a 2D, M mode Trans Thoracic Echocardiogram were used to determine the structural and ischemic heart changes from the participants. A structured questionnaire was used to obtain demographic data and gather co-morbid information such as record blood

pressure and Body weight and BMI

Statistical analysis Software: The statistical analysis was done using IBM SPSS Statistics for Windows, Version 20.0. Armonk, NY: IBM Corp, U.S.A

Ethical Consideration

The ethical clearance was obtained from Jakaya Kikwete Cardiac Institute Review Board Publications committee. A comprehensive informed consent form was signed by the participant or a close relative of a patient. The issue of autonomy, beneficence and justice were explained in the form in a language that the patient understood.

This clinical study was conducted according to the revised declaration of Helsinki concerning biomedical research in using patient information. All authors agreed for this manuscript to be published

RESULTS

A total of 355 people attended the outreach of which 86 (24.4%) male and 269 (75.6) female.

Table 1 shows that female participants suffered from diabetes and hypertension by 6.2% and 45.5% respectively while 2% of male participants were smokers, which is one percent higher as compared to female smokers (1%).

Table3 shows that most of the female participants had a past medical history which was suggesting cardiac disease; the main presenting symptoms were dizziness, fainting, chest pain and shortness of breath as compared to male participants by 34.6%, 38.2% and 34.8% respectively.

Figure1 shows that most of the female participants were overweight and obese as compared to male participants but there is no significant association between gender and BMI

Figure 2 shows that female participants who had obesity and overweight were aged between 21 years and above, the trend of overweight and obesity showed the tendency of increasing with ageing, hence there is a statistical significance between age and BMI level of Tanga participants.

Figure3 shows a 12 lead electrocardiogram diagnosis of the participants. Most of the participants (60.56%) had a normal electrocardiogram and of all, 31.11% had left Ventricular Hypertrophy (LVH).

Figure 4 shows that 53.95% of all participants had a normal echocardiogram finding, 28.81% had LVH and 9.89%, 4.24% had Mitral regurgitation (MR) and Cardiomyopathy respectively.

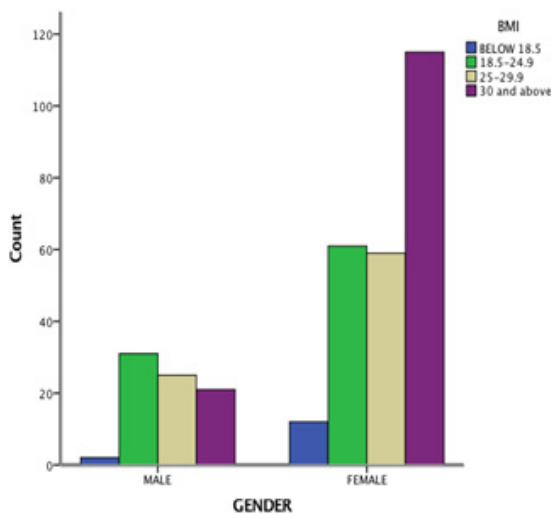
	Diabetes Mellitus		Hypertension		Smoking	
	Male	Female	Male	Female	Male	Female
Yes	6(1.6%)	21(6.2%)	46(12.9)	155(45.5%)	8(2.0%)	5(1.0%)
No	62(17.4%)	199(55.8%)	30(8.0%)	84(23.6%)	78(22.9%)	264(74.1%)
Don't Know	18(5.1%)	49(13.8%)	10(2.0%)	30(8.0%)	0	0
Total	86(24.1)	269(75.9%)	86(22.9%)	269(77.1%)	86(24.9%)	269(76.1)

Table1. Distribution of risk factors for cardiovascular disease among participants by gender (N=355).

	Cardiac diseases		Dizziness/fainting		Chest pain/DIB	
	Male	Female	Male	Female	Male	Female
Yes	22(6.1%)	123(34.6%)	27(7.6%)	136(38.2%)	39(10.9%)	124(34.8%)
No	62(17.4%)	141(39.6%)	57(16.1%)	127(35.7%)	45(12.6%)	140(39.3%)
Don't Know	2(0.01%)	5(1.0%)	2(0.01%)	4(1.1%)	2(0.01)	5(1.0%)
Total	86(24.8)	269(75.2%)	86(25%)	269(75%)	86(24.9%)	269(76.1)

Table 2: Distribution of past medical history of Cardiac disease and presenting symptoms among the participants by gender(N=355)

GRAPH SHOWING BMI LEVEL IN ACCORDING TO GENDER FOR PARTICIPANTS WHO ATTENDED TANGA OUTREACH IN MAY 2018



GRAPH SHOWING ASSOCIATION BETWEEN AGE AND BMI AMONG PARTICIPANTS THAT ATTENDED TANGA OUTREACH IN MAY 2018

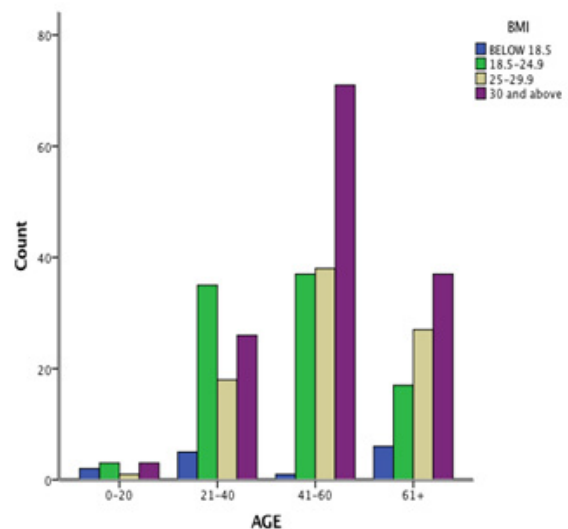


Figure 1: Distribution of BMI among participants by gender

Figure 2: Distribution of BMI among the participants by age

PIE CHART SHOWING ECHOCARDIOGRAM OF THE HEART RESULTS AMONG PATIENTS THAT ATTENDED TANGA OUTREACH IN MAY 2016

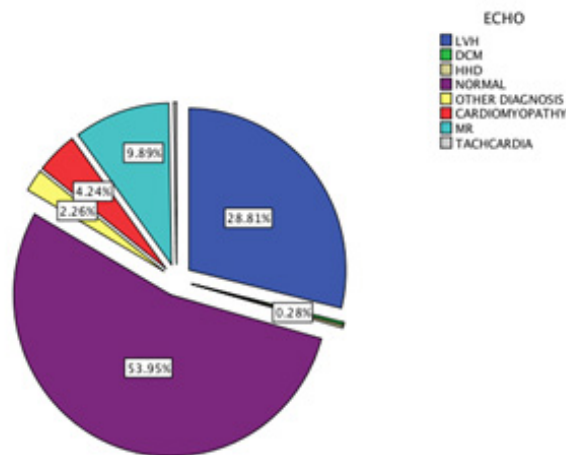


Figure 4: pie chart showing echocardiogram diagnosis among the participants

DISCUSSION

A total of 355 participants were studied to determine the prevalence of cardiovascular diseases, clinical presentation and the risk factors. More than half of the participants were females. Predominant risk factors for cardiovascular disease that were found in participants were diabetes mellitus, hypertension, smoking habits and overweight or obese.

Risk Factors For Cardiovascular Disease:

Hypertension

The study determined that the most prevalent risk factor for cardiovascular disease was hypertension in both males (12.9%) and females (45.5%). This result is different from the study which was conducted in rural Maasai Communities in Simanjiro,

Tanzania. In this rural community, the prevalence of hypertension in males was higher than in females at the rates of 22.3% and 21% respectively. This difference can be explained by the demographic variations of the participants and the nature of their lifestyles(15). However, the results are similar to the meta-analysis which was published in 2007 which showed that the prevalence of hypertension in Sub-Saharan Africa urban areas was higher in females than males(16,17). Also, the study which was done in our capital city indicated that male patients had 10% increased risk of hypertension compared to female patients(10).

Studies have documented a close association between blood pressure levels and the risk of cardiovascular events, strokes, and kidney disease regardless of gender. The blood pressure above 115/75 mm Hg, for each increase of 20 mmHg in systolic blood pressure or 10 mm Hg in diastolic blood pressure, the risk of cardiovascular diseases and stroke doubles(18).

Smoking habits

Few of the participants in our study were smokers, 2% of all males and 1% of females. The results are similar to the study which was conducted in Simanjiro Masaai Tanzania in which smoking habit was more in males (23%) as compared to females (4.4%)(15). Also, our results are like to that which was reported by

TDHS 2015/16 in which tobacco smoking was common in men (14%) than in women (1%), and among men who smoke daily, 41% smoke <5 cigarettes/day and 30% smoke 5–9 cigarettes/day(19). Increase tendency of smoking among men indicated by our study is also similar to that which was documented by the latest national STEP survey (2012) which showed that 28% of male use tobacco as compared to lower rates among women(20). However, the smoking tendency among the participants in our study is lower than that found in Mafia Island Cost region of Tanzania (8.1%). The difference could be the small sample size of our study and social demographic variation between the two groups (21). Regardless of residence, a smoking habit is more common in males than females. This can be further extrapolated into an increased risk of non-communicable diseases which are associated with tobacco use among men than in women(21,22).

Diabetic and overweight or obesity

Overweight and obesity are defined as a body mass index of ≥ 24.9 and ≥ 29.9 kg/m², respectively (19,23). The study found that 6% of females were diabetic and most of these females were obese with a body mass index (BMI) of 30 or above.

Increased prevalence of diabetes found in our study among women is similar to the earlier global report in 2014 which indicated a higher burden of diabetes in adult women (15%) compared to adult men (11%)(19). Also in the year 2012, a Nationwide survey in Tanzania reported that more women (10%) aged above or 25 years are suffering from diabetes than men (8%) of the same age (20) Similarities of our results and these two earlier big reports indicates that, more women share similar social demographic characteristics which are statically attributing to the pathogenesis of diabetes. Previous studies showed a lower prevalence rate of diabetes (2%) (24) in a rural area but with the subsequent studies indicated an increasing trend of diabetes in rural areas of Tanzania (22%)(25). Diabetes is associated with increased rates of dilated cardiomyopathy, stroke, hypertension, coronary artery disease and attributes to increased mortality(23,26).

Increased weight in women which found in our study is similar to that which was reported in 214 among world adults population aged 18 years in which 40% of women were overweight as compared to 38% of men (27)

The results differ from that found in rural Simanjiro in which the majority of men (57%)and females (63%) had a normal

BMI (15). The difference may be attributed to their differences in social and demographic characteristics.

Our results resemble that reported by the Tanzania STEPS survey of 2012 which found that the most group which is affected by overweight is adult women aged over 18 years (37% of women versus 15% of men)(28). The similarities can be due to the big coverage of the STEPS survey with the ability to represent all adult population in Tanzania including the region where our study was conducted.

Our findings are different from that which was reported by an earlier study which was conducted in Dar es Salaam capital city. In Dares salaam, the prevalence of overweight was found to be more in men (28%) than in women (27%). However, the difference was at the lower marginal range with an overall of women being more obese than men(29).

Increased weight and obese is the second most common traditional risk factor for cardiovascular disease and increased mortality (9,30). Our findings and other earlier reported studies are an eye-opener that more females are suffering from an increased weight/obese and thus are highly vulnerable for none communicable disease.

Prevalence of Cardiovascular Diseases by Electrocardiogram, Echocardiogram and Clinical Symptoms/ Signs

The results of this study indicated that more females had a past history of cardiac disease (35%), features of heart failure, coronary artery disease and presyncope such as dizziness /fainting attacks (38%), chest pain and shortness of breathing (35%). The results are similar to that which was conducted in Dar es Salaam, at tertiary Hospital which found that more females had heart failure/cardiac disease (51%) unlike to their comparative group of Sweden where males had more heart failure (60%)(31). The implication of this similarity is that probably more females than males are suffering from cardiovascular disease or more females than males attends at hospital/health assessment programs.

By the time a patient is found to have Hypertension, end organ changes is already visible by the finding evidenced by investigations whereby of all clients who did a 12 Electrocardiogram study, 32% found to have left ventricular hypertrophy. ECG-Left ventricular hypertrophy rates are higher than that which was found in the USA in which among the patients with hypertension the prevalence of ECG-LVH was 6.7%(32). The differences in rates could be due to the variations in social demographic characteristics of the patients, rates of hypertension and other comorbidities which cause LVH not picked by either of these two studies. LVH is the highest predictor of CVD events, morbidity, mortality and heart failures and is classified as heart failure stage A by AHA/ACC guideline(33,34).

Also, an ECG was characterized by features of Ischemic Heart disease, arrhythmias, Left Bundle Branch Block and tachycardia. ECG characteristics are similar to that which

was found in Dar es Salaam tertiary hospital that was characterized by ischaemic heart disease (9%) and atrial fibrillation (AF)(23). The similarity of the results between these two studies is that natural history is almost similar all over the settings. The differences in rates due to variation of the setting, community vs. tertiary hospital-based study

Additionally of all who did Echocardiogram, 29% were found to have Left Ventricular hypertrophy and had features which were suggesting dilated cardiomyopathy, mitral valve regurgitation (10%), other cardiomyopathies (4%) and other structural heart diseases.

The study is different from the previous study which was conducted in Dar es Salaam tertiary hospital in which echocardiography findings were cardiomyopathy (28%), rheumatic heart disease (12%) and ischemic heart diseases (9%)(23). However, some of the results differ from that of our study only by rates but otherwise are similar. The difference in rates is due to the fact that a tertiary hospital receives mostly sick patients with various cardiovascular diseases. Our study was a community-based study with the likelyhood of receiving normal participants.

CONCLUSION AND RECOMMENDATIONS

The rates of cardiovascular diseases and modifiable risk factors were found to be high. Most of the participants had heart failure stage A, some were symptomatic, and therefore, regular health check at a community level is highly recommended.

Declarations

Ethical approval and consent to participate: The clinical protocol and the informed consent forms were approved by the ethics committee of Jakaya Kikwete Cardiac Institute. All patients read and signed the published. informed consent. This clinical study was conducted according to the revised declaration of Helsinki concerning biomedical research in using patient information. All authors agreed for this manuscript to be published.

Consent for publication

Not applicable

Availability of Data and materials

Data and materials are available upon request to the authors

Competing Interests

The authors declare that they have no competing interests

Authors Contribution

Drafting of manuscript was done by: DR samwel Jacob Rweyemamu and DR. Tatizo Waane. Critical revision and correction were done by. All authors read and approved the final manuscript.

Acknowledgements

We thank the Staffs and management of Nguvumali Hospital for granting permission to conduct this study. And we thank all patients who participated in the study

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