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Cardiovascular Diseases and the Common Risk Factors Presented by Patients at Kitwe Teaching Hospital

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Abstract: Cardiovascular disease (CVD) refers to any disease that affects the cardiovascular system, such as cardiac disease, vascular diseases of the brain and kidney and peripheral arterial diseases. CVDs are among the leading causes of morbidity and mortality in Zambia. A case-control study was conducted among 74 patients suffering from cardiovascular disease (CVD) at Kitwe Teaching Hospital (KTH) and 74 controls (patients without CVD). All participants completed a questionnaire regarding socio-demographics, risk factors of CVD and Knowledge based questions of CVD. Chi-square test was used to determine significant associations and a result yielding a p value of less than 5% was considered statistically significant. Independent factors associated with development of CVD were established using a Binary Logistic Regression. Unadjusted odds ratio (OR) and Adjusted odds ratios (AOR) and their 95% confidence intervals (CI) are reported. The independent risk factors which were significantly associated with the development of CVD were hypertension (OR 59.143, 95% CI 20.122-173.833; AOR 97.289, 95% CI 24.479 -386.662), diabetes mellitus (OR 3.725, 95% CI 1.722 – 8.057; AOR 6.033, 95% CI 1.630 -22.332), family history (OR 2.504, 95% CI 1.242-5.050; AOR 0.862, 95% CI 0.244 -3.041), smoking (OR 1.587, 95% CI 0.731-3.448; AOR 0.746, 95% CI 0.164 -3.403), alcohol consumption (OR 1.387, 95% CI 0.725 -2.654; AOR 3.392, 95% CI 0.833 – 13.823), high blood cholesterol (OR 4.364, 95% CI 0.894 – 21.293; AOR 4.482, 95% CI 0.242- 82.888) and increased age (P value: 0.039). Three factor were significantly associated with reduced risk of developing CVD. These were physical activity (OR 0.575, 95% CI 0.287-1.150; AOR 1.849, 95% CI 0.507 – 6.751), balanced diet (OR 0.890, 95% CI 0.456 – 2.195; AOR 1.451, 95% CI 0.404 – 5.214) and regular weight check and control (OR 0.897, 95% CI 0.471 – 1.710; AOR 0.593, 95% CI 0.177 – 1.990). Interventions such as proper control of hypertension and diabetes pharmacologically or non – pharmacologically, as well as providing health education on life style risk factors that are associated with CVD may significantly reduce morbidity and mortality due to the disease.

Keywords: Kitwe Teaching Hospital, Cardiovascular Disease, Non-Communicable Disease

1. Introduction

Non-Communicable Diseases, particularly cardiovascular diseases have become a major public health problem across the world. Developing countries, including Zambia, are currently undergoing an epidemiological transition, from "Communicable or Infectious" to "Non-Communicable" diseases, these are rapidly growing with major consequences on morbidity and mortality [1]. At Kitwe teaching hospital morbidity and mortality due to CVD and hypertension is on the increase. In 2016, 494 cases of CVD were recorded of which 261 patients were admitted. In the same year, 120 deaths due to CVD alone were recorded. In 2017, the number of cases recorded increased to 583 and so did the number of deaths due to the disease (168 deaths were recorded). The 2012 Annual Health Statistical Bulletin by Zambia's Ministry of Health, revealed that there was a 22% increase in the total number of NCDs cases between 2010 and 2012 in all age groups (MOH, 2014) as cited [2]. The burden of cardiovascular disease is estimated to be twice as high in

2020 as it was in 1999 with severe negative impact on the economic development [3]. In Kuwait, it was found that the most common risk factors of CVD known by more than three-quarters of respondents were smoking, obesity and unhealthy diet. Age, family history of CVD, regular eating of healthy food and BMI were significantly and positively associated with knowledge level about risk factors of CVD [4]. In addition, majority of adolescents do not have sufficient knowledge about major cardiovascular diseases risk factors [5]. Stroebele et al. (2011) were of the view that Knowledge of CVD risk factors is necessary for making informed decisions regarding participation in or maintaining behaviors that may reduce the risk of CVD [6]. Bandura (2004) also noted that Knowledge of health risks and benefits creates the precondition for change [6]. All these studies showed that assessment of common risk factors and patients' knowledge about CVD is needed for effective CVD treatment and prevention strategies.

2. Methodology

The study site was Kitwe Teaching Hospital (KTH) which is found along Kuomboka drive, in Parklands, Kitwe, Zambia. The target population was persons aged 18 years or older who presented to Kitwe Teaching Hospital's internal medicine or surgical department for medical services. This included both inpatients and outpatients who may or may not have had cardiovascular disease. This study was carried out after approval had been given by the Ethics Review Committee at Tropical Disease Research Centre of Ndola, the Public Health Team at CBU and The Management at Kitwe Teaching Hospital. Furthermore, verbal consent was obtained from respondents before collecting data. Also, confidentiality was maintained by omitting the names of the respondents. Lastly, the questionnaire was interpreted in the patient's own language for those who were not able to read, write and speak English language. A standardized questionnaire that had both closed and open ended questions was used to collect data from cases (patients with cardiovascular disease) and controls (patients with no cardiovascular disease). The questionnaire had three parts. Part A consisted of questions on demographics, Part B had questions that were assessing cardiovascular risk factors and Part C had questions that assessed the level of knowledge of cardiovascular disease. Cleaned data was entered into the Statistical Package for Social Sciences (SPSS) version 16.0 were all the statistical analysis were performed. The Pearson Chi-square test was used to determine associations in bivariate analyses at the 5% significance level. Likewise, independent factors associated with cardiovascular disease were established using the Binary logistic regression analysis. The unadjusted odds ratios (OR) and Adjusted odds ratios (AOR) were calculated and the confidence interval (CI) was set at 95%.

3. Results

A total of 148 people participated in the study comprising 74 cases (those with cardiovascular disease) and 74 controls (those with no cardiovascular disease). The mean age of the respondents (both cases and controls) was 45.9 years with a range of 20 to 83 years and standard deviation of 14.66. 40 and 50 years were the modes.

Table 1. *Frequency distribution of age group, gender, level of education and occupation for cases and controls.*

Age group	Participant classification		Total	Chi-square	P value
	Cases	Controls			
18-25	1	7	8		
26-45	33	41	74		
46-60	25	16	41	8.340	0.039
Above 60	15	10	25		
Total	74	74	148		
Gender					
Male	29	39	64	0.991	0.319
Female	45	35	84		
Total	74	74	148		
Level of education					
No formal education	9	1	10		
Primary school	28	36	64	7.400	0.060
Secondary school	18	18	36		
Tertiary Education	19	19	38		
Total	74	74	148		
Occupation					
Employed	15	18	33		
Self employed	12	23	35		
Unemployed	34	18	52	8.796	0.032
Other	13	15	28		
Total	74	74	148		

The table above (Table 1) shows that most participants were aged between 26 and 60 for both cases (78%, within cases) and controls (77%, within controls) with a chi-square and p value of 8.340 and 0.039 respectively showing that there was a significant relationship. The table also reviews that there were more females than the males for both cases and controls. Females were 61% within cases and 53% within controls and the overall amounted to 57%. Chi-square and p value for gender distribution were 0.991 and 0.319 in that order. The level of education as tabulated above evinces that an overall of 43.2% participants had education up to primary school level which they either completed or dropped out, 34.3% had attended secondary (both completed and drop outs), 26% had tertiary education and 7% had no formal education. Pearson Chi – square: 7.400 and P – value: 0.060. Table 1 further shows concludes that35.1% of the participants were unemployed while 18.9% (Others) were either retired or students currently in school. Pearson Chi – square: 8.796 and P – value: 0.032.

Table 2. *Risk factors exposure rate calculated using odds ratio (OR) n=148.*

No	Risk factor	Casesf	Controlf	OR	CI-95% L/U limit	P value
1	Age (year)					
	18 – 25	1	7			0.039
	26 – 45	33	41			
	46 – 60	25	16			
	Above 60	15	10			
2	Family History of CVD					
	Yes	56	41	2.504	1.242/ 5.050	0.009
	No	18	33			
3	Smoking			1.587	0.731 / 3.448	0.241
	Yes	20	14			
	No	54	60			
4	Alcohol Consumption			1.387	0.725 / 2.654	0.322
	Yes	37	31			
	No	37	43			
5	Hypertension			59.143	20.122/ 173.833	0.00
	Yes	60	5			
	No	14	69			
6	High blood cholesterol			4.364	0.894/ 21.293	0.049
	Yes	8	2			
	No	66	72			
7	Diabetes Mellitus			3.725	1.722/ 8.057	0.001
	Yes	31	12			
	No	43	62			
8	Regular exercise			0.575	0.287/ 1.150	0.116
	Yes	20	29			
	No	54	45			
9	Balanced diet			0.890	0.456 / 2.195	1.738
	Yes	46	48			
	No	28	26			
10	Regular weight check			0.897	0.471/ 1.710	0.742
	Yes	35	37			-.027
	No	39	37			

Table 3. *Knowledge score.*

		Knowledge Score Classification			Total
		Low	Average	High	
Participant Classification	Cases	4	34	36	74
	Controls	8	50	16	74
Total		12	84	52	148

Table 3 shows the knowledge score of participants of both cases and controls. Knowledge was assessed by use of two questions, the first question was about the risk factors of cardiovascular diseases patients know. This question had 9 sub-questions. Question 2 assessed the participants on the signs and symptoms of cardiovascular diseases they know and had 10 sub-questions. This summed up to 19 questions of assessing the knowledge of participants. A score of 0-9 was classified as low, 10-14 as average score and those that scored 15-19 were classified to have a high score. Only 35% overall had a high knowledge score. The remaining 65% either had a low or average score. Within cases only 49% had high knowledge score, 46% average and 5% low score. Within controls only 22% had high knowledge score, 68% average and 10% low score. Pearson Chi Square 12.073 and P value 0.002.

Table 4. *Cross tabulation between knowledge score and age group.*

		Knowledge Score Classification			Total
		Low	Average	High	
Age Group	18 - 25	1	6	1	8
	26 - 45	4	43	27	74
	46 - 60	2	19	20	41
	Above 60	5	16	4	25
Total		12	84	52	148

The above table (table 4) shows that 19% of those within the age group 18 to 45 had high knowledge score, while 33% had an average score and 3% had a low knowledge score. 16% of those within the age group 46 to 83 had high knowledge score, while 24% had an average score and 5% had a low knowledge score. The Pearson Chi value 13.236, P value 0.039.

4. Discussion

This study had a total of 148 participants comprising 74 cases (those with cardiovascular disease) and 74 controls (those with no cardiovascular disease). The mean age of the

respondents (both cases and controls) was 45.9 years with age range of 20 to 83 years and standard deviation of 14.66. The mode ages were 40 and 50 years.

The majority of the participants were aged between 26 and 60 years for both cases (78%, within cases) and controls (77%, within controls). This result shows that CVDs are more prevalent in this age group and among females. However, several studies [7] have revealed that the disease is more prevalent in the older adults (those above 50) which is partially true when compared to the findings of this study. Several reasons could contribute to the increased prevalence of CVD in this age group and among females in Kitwe. For one thing, individuals aged between aged between 26 and 45 years usually engage in risk behaviours such as smoking, drinking, lack of physical exercise and poor eating habits. The last two are especially true for women who are mostly not employed and mostly housekeepers. For another, genetic predisposition makes these individuals susceptible to CVDs. This study found that 65.5% of the participants had a family history of CVDs. The lower prevalence of CVD in those above 60 years could be due to the fact that individuals who get sick between the ages of 26 and 60 do not survive long enough because of the fatality of the disease.

With regard to marital status, most of the participants were married (61.5% overall) while the minority (11.5%) belonged to the group Other (Separation, widow and widower). The Pearson Chi – square and P values were 1.686 and 0.640 respectively. Furthermore, 43.2% of the participants had education up to primary school level which they either completed or dropped out, 34.3% had attended secondary (both completed and drop outs), 26% had tertiary education and 7% had no formal education. Pearson Chi – square: 7.400 and P – value: 0.060. The low levels of education could explain while most of the participants are unemployed (35.1%). However, this could also be due to most participants being female and hence housekeepers. High unemployment levels among females was attributed to them being housekeepers [8]. In this study, there was a significant relationship between level of education and occupation. Pearson Chi square: 64.191 and P value: 0.000.

This study showed that the following factors were independently associated with cardiovascular disease: age, family history of CVDs, smoking, alcohol consumption, hypertension, high blood cholesterol, diabetes mellitus, lack of physical exercise, lack of balanced diet and inability to control weight. These factors have also been identified in several studies that have been conducted across the world [4, 9-12].

Age group was significantly associated with developing CVD, P value: 0.039. The age group 26 – 60 within cases was strongly associated with CVD (78%). When divided into two smaller groups, CVD was more common in the age group 26 – 45 (46%, within cases) than in the group 46 – 60 (34%, within cases). This finding is closely similar to what was found, were the largest number of patients with CVD (cases) were present in the age group of 51-60 years (40%), followed by 41-50 years (27.4%) [13].

Hypertension and diabetes are the leading risk factors for atherosclerosis, heart attacks, and strokes [14]. Another study was conducted and it was identified that diabetes mellitus and hypertension as the major risk factors for cardiovascular disease [15]. This study has also observed that hypertension and diabetes mellitus were significantly associated with the risk of developing CVD. High blood pressure was prevalent among 44% of the patients included in this study (81% of the cases and only 7% of the controls). Similar results have been produced by Smith, were a total of 43.7% of patients included in their study (72.3% of cases and 32.8% of controls) were hypertensive [6]. Reference [11] also found that hypertension was present in 62% of cases and 20% in the controls. However, the odds ratios of a hypertensive patient developing CVD that were reported in these studies were lower than those found in this study. The former study reported an odd of 7 while the latter reported an odd of 6.5. In the current study, the odds of a person who had hypertension having CVD was 59.143 times more than a person without hypertension (OR 59.143, 95% CI 20.122-173.833 and adjusted odds ratio was AOR 97.289, 95% CI 24.479 -386.662). Likewise, diabetes was prevalent among 29% of the patients (42% within cases and 16% within controls). This is slightly lower than what kapoor et al [11] found (50%). The odds of a diabetic patient developing CVD was 3.725 times (OR 3.725, 95% CI 1.722 – 8.057; AOR 6.033, 95% CI 1.630 -22.332) more than a non – diabetic patient. This is similar to the findings of kapoor [11] in which diabetic patient had an odd of 4.5 (OR; 4.5, 95% CI; 2.4-8.7) of developing CVD. These finding are scary and clearly highlights the need to conduct a prospective study to assess patients' adherence to antihypertensive and antidiabetic medication and whether this is related to decreasing risk of developing CVDs.

Family history of CVD, smoking and alcohol consumption were also significantly associated with risk of developing cardiovascular disease. 66% (76% within cases and 55% within controls) of the patients had a positive family history of CVD, 23% (27% within cases and 19% within controls) admitted to smoking and 46% (50% within cases and 42% within controls) consumed alcohol. These findings are similar to the findings of Rohit and Atul [13]. In this study a person with a family history of CVD was 2.504 times more likely to develop the disease than a person within family history (OR 2.504, 95% CI 1.242-5.050; AOR 0.862, 95% CI 0.244-3.041). Individuals who smoked and consumed alcohol were 1.587 times (OR 1.587, 95% CI 0.731-3.448; AOR 0.746, 95% CI 0.164 -3.403) and 1.387 times (OR 1.387, 95% CI 0.725 -2.654; AOR 3.392, 95% CI 0.833 – 13.823) more likely to develop CVD when compared to those who neither smoked nor drank alcohol. These finding are lower than those found by kapoor [11], in which the odds ratios were: alcohol consumption (OR; 14.6, 95% CI; 6.4-33.3), smoking (OR; 13.6, 95% CI; 6.6-27.8), and family history (OR; 5.3, 95% CI; 2.8-9.9). In this study it was found that 27% and 50% of CVD patients smoke and consume alcohol respectively, is a serious source of concern. Thus health workers still have a lot of work to do in educating patients

about CVD risk factors, and consequences of smoking and drinking on their health.

In addition, the study revealed that having high blood cholesterol was also associated with high odds of developing CVD, 4.364 times (OR 4.364, 95% CI 0.894 – 21.293; AOR 4.482, 95% CI 0.242- 82.888) when compared with a person who has normal blood cholesterol. Overall 7% (11% within cases and 3% within controls) of the patients had high blood cholesterol. Reference [16] identifies high cholesterol levels as a risk factor for CVD. In their study, they observed that participants who were overweight were more likely to have raised cholesterol levels. A 2007 study reported from the Women's Health Study that high levels of total cholesterol is significantly associated with an increased risk for ischemic stroke, even in women who are otherwise healthy [16]. Thus, cholesterol levels should be controlled in individuals who have abnormal levels so as to reduce their chances of developing CVD or its complications.

Over and above, this study found that physical exercise, having a balanced diet and regular weight checks (and weight control) were significantly associated with smaller odds of developing CVDs. A person who was active physically (physical exercise) and had a balanced diet had odds of 0.575 times (OR 0.575, 95% CI 0.287-1.150; AOR 1.849, 95% CI 0.507 – 6.751) and 0.890 times (OR 0.890, 95% CI 0.456 – 2.195; AOR 1.451, 95% CI 0.404 – 5.214). An individual who regularly checked his/her weight and controlled it also had slim odds of 0.897 (OR 0.897, 95% CI 0.471 – 1.710; AOR 0.593, 95% CI 0.177 – 1.990) of developing the disease. Several studies have highlighted the benefits on physical exercise, balanced diet and weight control [14-8]. Physical activity is necessary for the metabolic and cardiovascular benefits [8]. Physical activity can slow the initiation and development of diabetes and the sequence of CVD through its effect on body weight, insulin sensitivity, glycaemic control, blood pressure, fibrinolysis, endothelial function and inflammatory defence systems. Diet plays a vital role in human health [14]. However, (Allison and Mattes 2009), warns that over-consumption of food may lead to excessive energy intake and result in overweight and obesity, which is closely associated with the onset of diabetes mellitus [14].

Apart from the considered aspects, this study also assessed the patients' level of knowledge of CVDs risks factors, signs and symptoms. The study revealed that Only 35% overall had a high knowledge score. The remaining 65% either had a low or average score. Within cases only 49% had high knowledge score, 46% average and 5% low score. Within controls only 22% had high knowledge score, 68% average and 10% low score (Pearson Chi Square 12.073 and P value 0.002). Similar findings have been reported in other parts of the world [9, 17, 4]. This finding is alarming because at this stage, patients should be well informed of the disease, in order for them to know how to protect themselves.

The study also revealed that there was a significant relationship between Age and Level of knowledge (Pearson Chi 13.236, P value 0.039). 19% of those within the age group 18 to 45 had high knowledge score, while 33% had an average score and 3% had a low knowledge score. 16% of those within the age group 46 to 83 had high knowledge score, while 24% had an average score and 5% had a low knowledge score. This result is almost similar to Al-Nafinsi's [4] findings. Gender was also significantly related to the level of knowledge (P – value 0.007). However, level of education did not show a significant relationship with knowledge score (P value: 0.276).

5. Study Limitation

One of the major limitation in the study was financial as the study was not funded. Another one was time. The study was conducted during school, therefore not enough time was left to collect data.

6. Conclusion

The study has identified the major risk factors for CVD at Kitwe Teaching Hospital and these are increased age, hypertension, diabetes mellitus, family history of CVD, high blood cholesterol, smoking, alcohol consumption, physical inactivity, lack of balanced diet and lack of body weight control. Of these, hypertension and diabetes were associated with increased odds of developing CVDs. Furthermore, physical activity, having a balanced diet and body weight control were associated with reduced chances of developing the disease. This study also revealed that there was poor knowledge of CVDs risk factors as well as its signs and symptoms among patients.

The results of this study provide important information for policy makers, to introduce educational programs both at health facilities and within the community that aim to educate patients and members of the community about CVDs and other non – communicable diseases.

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