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Prevalence of Cardiometabolic Disease and Its Risk Factors among Patients Seen in Outpatients Department at Kibagabaga Hospital, Rwanda

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Abstract: ***Cardiometabolic disease is the crucial cause of death and morbidity globally. In Rwanda, prevalence and associated risk factors of cardiometabolic diseases in hospital populations remain unknown. This study determined the prevalence and associated risk factors of cardiometabolic diseases among patients seen in outpatients department at Kibagabaga hospital. It used a descriptive, cross sectional design. The target population was 40, 000 adults from Kibagabaga catchment area and the sample size was 384. A convenience sampling technique was used and data collected using a coded questionnaire. Data was analyzed using SPSS programme version 21 and findings presented in forms of frequencies and percentages in tables. The prevalence of cardiometabolic disease was found to be 41.7%. The risk factors independently associated to cardiometabolic disease are age group of 38-47, 48-57 and 58 and above (AOR=5.081, 12.89, 24.055; CI: 1.832-14.089, 4.029-41.242, 6.546-88.4; P-Value=0.002, 0.000, 0.000), second hand tobacco smoking for respondents always and often exposed to passive smoking (AOR=11.815, 10.015, CI: 1.639-85.175, 1.243-80.669, P-Value=0.014, 0.030) and raised blood total cholesterol (AOR=2.445, CI: 1.057-5.657, P-value=0.037). In conclusion, based on the results, it is recommended to health institutions in Rwanda to reinforce preventative measures against CMD and their risk factors in hospital and in community.***

Keywords: Cardiometabolic disease, Risk factors, Prevalence, Kibagabaga, Rwanda

1. Introduction

Cardiometabolic diseases (CMD) refer to all disorders implicating cardiovascular and metabolic diseases like diabetes mellitus, cerebrovascular accidents, hypertension and coronary heart diseases. They are the first biggest diseases responsible for higher number of deaths and complications in the world. The global increase of cardiometabolic diseases is fully imputed to the phenomenon known as epidemiological transition characterized by the modification of the causes of deaths and health conditions in the world where factors such as industries development, urbans development and acquired new diets and modes of life among all population of the world are involve in this process [1], [2].

In Rwanda, the prevalence of cardiometabolic diseases is increasing. Studies on cardiometabolic diseases in Rwanda are limited. However, the prevalence and associated risk factors of cardiometabolic diseases in hospital populations remain unknown in Rwanda. This study determined the prevalence of cardiometabolic diseases and associated risk factors among patients seen in outpatients department at Kibagabaga hospital, in Gasabo district, in Kigali city, Rwanda.

2. Literature Survey

According to the World Health Organization, cardiometabolic diseases and their risk factors are responsible for the rise of mortality and morbidity figures. For instance, data of deaths causality show that high blood pressure is accredited 13%, physical inactivity is attributed 6%, and tobacco smoking is assigned 9%, high blood sugar, overweight and obesity are respectively credited 6%, and 5% of total source of mortality [3].

Countries with high income are among countries where cardiometabolic diseases and their risk factors are contributing to the hike of Disability Adjusted Life Years (DALY) where 801, 000 persons in the United States of America are dying from heart conditions, cerebrovascular acute conditions and cardiovascular incidents [4].

In Africa, cardiometabolic disorders and their risk factors including hypertension, diabetes, dyslipidemia, obesity, coronary heart disease and stroke have been found to be major contributors to the burden of disease, disability, and mortality. Projections show that the populations of most of sub-Saharan countries with CMD and risk factors will increase at least five fold by 2100 [5], [6].

In Rwanda, as for the World Health Organization and Common Wealth, respectively 13% and 12% of total deaths are due to cardiovascular diseases [7], [8].

According to the Ministry of Health report in Rwanda, non-communicable diseases are responsible for 36% deaths, of which cardiovascular diseases have 13% and cardiovascular disease (CVD) are the third most common cause of death responsible for 8% of nationwide deaths [9].

Given the increasing statistics of deaths and morbidities secondary to cardiometabolic diseases and their risk factors, a study has been run in District Hospital of Rwanda to determine the prevalence of cardiometabolic

diseases and their risk factors among patients seeking care in outpatients department.

3. Methods

Study and sample design

This study used a descriptive, cross-sectional design using quantitative approach methods. Details of the patient like age, sex, education level, marital status, work status, tobacco use, alcohol consumption, fruits, vegetables, salt and oil consumption, physical activity, history of hypertension, diabetes, raised total cholesterol and CMD, measurements of blood pressure, BMI and waist/hip circumference ratio were determined in order to determine risk factors of CMD in patients seeking care in Outpatients Department at Kibagabaga hospital. The target population was adults estimated to 40, 000 patients aged of 18 years and above, from Kibagabaga catchment area attending outpatients department. The sample size was calculated using the Fisher's formula as it has been used by Naing et al. (2006) [10] stated as $N=Z_{1-x2}^2$. P. (l-P)/d^2. Z_{1-x2}^2: Standard normal variate at 5% type I error P<0.05, it is 1.96. P: 50 % as no studies showing the prevalence of cardiometabolic diseases in hospital settings in Rwanda to use as reference. D: absolute error or precision 5% N: sample size. From this formula, the sample size for our population is 384 patients in total. A convenience sampling technique was used to select participants. Data collection was performed using a pre-tested and pre-coded questionnaire to collect primary data from 384 selected research respondents. Data were entered into the computer for further processing and analysis. Patients have been approached one by one according to the sampling techniques explained and interviewed after their consent and data were recorded confidentially in questionnaire.

Data collection instruments

Data collection was performed using a pre-tested questionnaire. The data collection form was established based on validated and standardized questionnaires that include WHO STEPS instrument guideline for non-communicable diseases [11] and International Physical Activity Questionnaire [12]. The questionnaire has been adapted so that it could contain questions related to the current study objective. A stadiometer was used for measuring height, an electronic scale was used for measuring weight, a tape meter was used for measuring waist and hip circumference and a digital blood pressure machine used for measuring blood pressure. A blood sugar machine type SD code free and a biochemistry machine type Prime EV automatic photometer were used for measuring blood sugar and total cholesterol of selected patients, blood sample was drawn respecting infection prevention and control measures.

Administration of data collection instruments

Basing on a questionnaire, an interview was conducted for each selected patient fulfilling inclusion criteria. Assessment of tobacco consumption, alcohol consumption, dietary habits, physical activity and inactivity was based on questions to the patients. The assessment for obesity, the height and weight was performed using standardized techniques, based on the recommendations of NHANES (National Health and Nutrition Examination Surveys) anthropometry and physical activity monitor procedures manual [13]. Individuals were weighed bare feet using an electronic scale. Height was measured without shoes using portable stadiometer. Body Mass Index (BMI) was indicated as weight and height in square meters (kg/m^2). BMI is classified as normal when it is 18.5-24.9 kg/m^2, overweight when it is 25-29.9 kg/m^2 and obesity when it is 30 kg/m2 and above. Waist and hip circumferences were measured using a tape meter according to WHO [14].

The hip reference point was the widest portion of the buttocks and waist reference point being midpoint between the lower margin of the last palpable rib and the top of iliac crest. The normal values of waist circumference are >94 cm for men and >80 cm for women. The normal values of waist/hip ratio are 0.90 for men and 0.85 for women. Based on the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) recommendations for blood pressure measurement, systolic and diastolic blood pressures were measured for three readings with a digital blood pressure machine, each separated by 5 min of rest in between. The participants were asked to sit in chair with the back supported and the arm at the level of the heart [15]. The average of the readings was calculated and used as the final blood pressure measurement. High blood pressure was defined as a systolic blood pressure equal to or more than 140 mmHg and/ or diastolic blood pressure equal to or more than 90 mmHg. The total cholesterol has been measured and all values below <200 mg/dl have been considered normal total cholesterol and all values equal and above 200mg/dl have been considered abnormal total cholesterol values. The blood sugar has been only measured for all patients who passed 8 hours fasting period and normal values have been considered for 75-110 mg/dl and high blood sugar have been considered for all values above 110 mg/dl. The presence of CMD has been assessed by measuring fasting blood sugar, measuring blood pressure and it has been also considered the medical files documentation of diagnosis.

Data analysis procedures

Data was analyzed using the Statistical Package for the Social Sciences 21st version (SPSS). Statistical analysis for significance of association was done using chi-square test for cross-tabulated variables and P-values that were less than 0.05 were considered as statistically significant in both bivariate and multivariate analysis. Data was presented in tables.

Ethical consideration

Upon an approval from Mount Kenya University Ethical Review Board as it has been authorized to review research protocols by Rwanda National Ethics Committee,

permission has been requested to Kibagabaga Hospital to collect data on outpatients from Kibagabaga District hospital to get data from patients seeking care in Outpatients Department. All procedures have been performed in compliance with relevant laws and detailed information about the study was given to the patients and an informed consent form was used.

4. Results

A total of 384 respondents consented to participate in the study making a response rate of 100%.

Socio-demographic characteristics of respondents

Table 1. below shows characteristics of socio-demographic data from respondents and these data include the gender of respondents, age group of respondents, level of education of respondents, marital status of respondents and employment status of respondents.

Table 1: Socio-demographic characteristics of respondents

Variables	Frequency (N=384)	Percentage
Gender		
Male	153	39.8
Female	231	60.2
Age group		
18-27	89	23.2
28-37	104	27.1
38-47	75	19.5
48-57	51	13.3
58 and above	65	16.9
Level of education		
No formal education	45	11.7
Primary school	153	39.8
Secondary	130	33.9
University	56	14.6
Marital status		
Not married	102	26.6
Married	225	58.6
Separated	9	2.3
Widowed	48	12.5
Employment status		
Employed	174	45.3
Unemployed	210	54.7

As indicated in Table 1, most respondents were female 231 (60.2%) while majority of the participants were between 28-37 years of age 104 (27.1%) and most had attained primary level of education 153 (39.8%). Majority were also married 225 (58.6%) and unemployed 210 (54.7%).

Prevalence of cardiometabolic diseases among respondents

Table 2: Prevalence of CMD among respondents

Variables	Frequencies	Percentage
Presence of CMD (N=384)		
Yes	160	41.7
No	224	58.3
Type CMD (N=160)		
Hypertension	90	56.3
Diabetes	68	42.5
CVA	1	0.6
Myocardial Infarction	1	0.6

Table 2. above indicates that 160 (41.7%) respondents have cardiometabolic diseases. Therefore the prevalence of cardiometabolic diseases among outpatients seen at Kibagabaga Hospital is 41.7%. Among these respondents with cardiometabolic diseases, most of them have hypertension at the rate of 56.3% followed by diabetes 17.7%.

Behavioural characteristics of respondents

Behavioral characteristics of respondents assessed include tobacco smoking, alcohol consumption, dietary habits status which corresponds to fruits consumption, vegetables consumption, excess salt consumption, type of oil used for food preparation and consumption of processed food consumption high in salt and physical activity of respondents. For dietary intake, the fruits and vegetables consumption adequacy were considered for respondents having eaten 5 servings and above for 7 days over seven and oil consumption was divided into two types being vegetable cooking oil from plant sources such as olive oil, palm oil, soybean oil, corn oil, and peanut oil. Non vegetable oil being animal-based oils like butter/ cow milk oil and lard. For physical activity, the whole physical activity has been classified as the adequate or not physical activity among respondents according to the world health organization recommended duration of regular physical activity per week.

The details of behavioral characteristics of respondents are presented in the table 3, 4 and 5.

Table 3: Tobacco and alcohol consumption status of respondents

Variable	Frequency (N)	Percentage
Tobacco consumption (N=384)		
Yes	58	15.1
No	326	84.9
Current tobacco consumption (N=58)		
Yes	42	72.4
No	16	27.6
Daily consumption of tobacco (N=58)		
Yes	42	72.4
No	16	27.6
Second hand tobacco smoking (N=384)		
None	341	88.8
Rarely	18	4.7
Sometimes	5	1.3
Often	10	2.6
Always	10	2.6
Alcohol consumption (N=384)		
Yes	104	27.1
No	280	72.9
Current alcohol consumption (N=103)		
Daily	10	9.7
5-6 days per week	13	12.6
1-4 days per week	33	32
1-days per month	23	22.3
Less than once a month	24	23.3
Heavy drinkers (N=384)		
Yes	25	6.5
No	359	93.5

Table 3 above indicates the status of tobacco smoking and alcohol consumption among respondents, only 58 (15.1%)

of respondents have been smokers; among them 42 (72.4%) are current smokers and daily smokers. Second hand smoking was only found in 18 (4.7%) participants. It was also found that 104 (27.1%) respondents had history of alcohol use, among them 103 (26.8%) were current drinkers while only 25 (6.5%) were heavy drinkers taking more than 4-5 standard drinks at least on one occasion per month.

Dietary habits of respondents

Table 4: Dietary habits of respondents

Variable	Frequency (N)	Percentage
Adequate fruits consumption (N=384)		
Yes	22	5.7
No	362	94.3
Adequate vegetables consumption (N=384)		
Yes	79	20.6
No	305	79.4
Salt consumption by respondents (N=384)		
Never	273	71.1
Rarely	14	3.6
Sometimes	59	15.4
Often	17	4.4
Always	21	5.5
Consumption of processed food high in salt (N=384)		
Never	134	34.9
Rarely	24	6.3
Sometimes	139	36.2
Often	26	6.8
Always	61	15.9
Type of oil consumption (N=384)		
Vegetables	326	84.9
Non Vegetables	58	15.1

Table 4 above indicates the adequate consumption of vegetables in only 79 (20.6%) respondents who eat five and above servings of vegetables on a daily basis.

About excess salt consumption status of respondents it was found that 21 (5.5%) respondents always add salt to their meals while 273 (71.1%) never add salt to their meals. Sixty one (15.9%) participants reported eating processed food high in salt regularly. The majority, 326 (84.9%) of participants reported using vegetable oil while a small number of respondents 58 (15.1%) use non vegetable oil for cooking.

Physical activity status of respondents

The physical activity has been classified as adequate physical activity for the respondents having totalized the recommended duration of physical activity per week.

Table 5: Total regular physical activity adequacy

Variable	Frequency (N)	Percentage
Total regular physical activity adequacy per week (N=384)		
Yes	358	93.2
No	26	6.8

Most of respondents 358 (93.2%) met the regular physical activity recommendations by WHO that is to say more than 75 minutes per week for vigorous intensity physical activity and more than 150 minutes per week for moderate intensity physical activity. A small number of 26 (6.8%) respondents were not compliant with recommendations.

Metabolic risk factors of respondents

Table 6: Metabolic risk factors of respondents

Variable	Frequency (N)	Percentage
History of high blood pressure (N=384)		
Yes	99	25.8
No	285	74.2
History of high blood sugar (N=384)		
Yes	74	19.3
No	310	80.7
Blood Pressure (BP) measurement of respondents (N=384)		
Normal blood pressure	300	78.1
Raised blood pressure	84	21.9
Body Mass Index (BMI) of respondents (N=364)		
Normal Body Mass Index	209	57.4
Overweight	104	28.6
Obesity	51	14
Fasting Blood sugar measures of respondents (N=384)		
Normal blood sugar	291	75.8
Raised blood sugar	93	24.2
Total cholesterol measures of respondents (N=384)		
Normal total cholesterol	333	86.7
Raised total cholesterol	51	13.3
Females WHR (N=211)		
Normal WHR	9	4.3
Raised WHR	202	95.7
Males WHR (N=153)		
Normal WHR	36	23.5
Raised WHR	117	76.5
Male waist circumference (N=153)		
Normal waist circumference	92	60.1
Raised waist circumference	61	39.9
Females waist circumference (N=211)		
Normal waist circumference	12	5.7
Raised waist circumference	199	94.3

Table 6 above shows metabolic risk factors of respondents, 99 (25%) respondents had history of high blood pressure, 74 (19.3%) had history of high blood sugar, 84 (21.9%) presented high blood pressure, 51 (14%) respondents are obese, 93 (24.2%) respondents have raised blood sugar, 51 (13.3%) respondents have raised total cholesterol, Waist Hip Ratio (WHR) is raised in both females and males with respective rates of 202 (95.7%) and 117 (76.5%) respondents. Waist circumference is raised in females 199 (94.3%) than in males 61 (39.9%).

Bivariate analysis of risk factors associated with cardiometabolic disease

Bivariate analysis was performed to assess association between cardiometabolic disease and selected variables. The presence of cardiometabolic disease was dichotomized (yes versus no), and cross-tabulated against sociodemographic and behavioural variables (dichotomized as adequate or inadequate). The association was determined using Odd Ratio and a P-value (<0.05) was considered significant at 95% Confidence Interval (CI).

Relationship between sociodemographic characteristics of respondents and cardiometabolic disease

Table 7: Relationship between sociodemographic factors and cardiometabolic disease of respondents

Variable	Presence of cardiometabolic disease				OR	95% CI		P-Value
	Yes		No					
	N	%	N	%		Lower	Upper	
Gender of respondents								
Male	63	41.20	90	58.80	Ref			
Female	97	42.00	134	58.00	1.034	0.683	1.565	0.874
Age group of respondents								
18-27	10	11.20	79	88.80	Ref			
28-37	22	21.20	82	78.80	2.12	0.944	4.759	0.069
38-47	37	49.30	38	50.70	7.692	3.461	17.094	**<0.001**
48-57	37	72.50	14	27.50	20.879	8.484	51.381	**<0.001**
58 and above	54	83.10	11	16.90	38.782	15.399	97.671	**<0.001**
Level of education of respondents								
No formal education	32	71.10	13	28.90	10.07	4.005	25.32	**<0.001**
Primary school	72	47.10	81	52.90	3.636	1.749	7.559	**0.001**
Secondary	45	34.60	85	65.40	2.166	1.021	4.593	**0.044**
University	11	19.60	45	80.40	Ref			
Marital status of respondents								
Not married	11	10.80	91	89.20	Ref			
Married	105	46.70	120	53.30	7.239	3.674	14.263	**<0.001**
Separated	6	66.70	3	33.30	16.545	3.617	75.694	**<0.001**
Widowed	38	79.20	10	20.80	31.436	12.325	80.18	**<0.001**
Employment status of respondents								
Employed	56	32.20	118	67.80	Ref			
Unemployed	104	49.50	106	50.50	2.067	1.362	3.139	**0.001**

Table 7 above shows that age was found to be significantly associated with CMD. Respondents in the age group 38-47 had statistically significant link with cardiometabolic disease (83.1%)[OR=7.692, CI: 3.461-17.094, P-Value<0.001], respondents in this tranche of age were 8 times more likely to have cardiometabolic disease compared to the age group of 18-27 (11.20%) while those in age group 48-57 were 21 times more likely to have cardiometabolic disease (83.1%)[OR=20.879; CI: 8.484-51.381; Pvalue<0.001]. respondents aged of 58 and above had the highest risk to cardiometabolic disease (83.1%)%)[OR=38.782; CI: 15.399-97.671; P-value<0.001]. Low education level showed a statistically significant association with CMD where respondents with no formal schooling were at least 10 times more likely to have CMD (71.10%)[OR=10.07; CI: 4.005-25.32, P-value <0.001] compared to those with university level of education. Being widowed had statistically significant association with cardiometabolic disease (79.20) %) [OR=31.436; CI: 12.325-80.18, P-value<0.001]. Unemployment was also found to be associated with cardiometabolic disease (49.50) %) [OR=2.067; CI: 1.362-3.139; P-value<0.001] compared with employed respondents (32.20%).

Relationship between behavioural risk factors and cardiometabolic disease

Table 8: relationship between behavioural risk factors and cardiometabolic disease

Variable	Presence of cardiometabolic disease				OR	95% CI		P-Value
	Yes		No					
	N	%	N	%		Lower	Upper	
Tobacco consumption by respondents								
Yes	39	67.20	19	32.80	3.478	1.923	6.29	**<0.001**
No	121	37.10	205	62.90	Ref			
Second hand tobacco smoking by respondents								
None	135	39.60	206	60.40	Ref			
Rarely	7	38.90	11	61.10	0.971	0.367	2.567	0.953
Sometimes	2	40.00	3	60.00	1.017	0.168	6.168	0.985
Often	8	80.00	2	20.00	6.104	1.277	29.181	**0.023**
Always	8	80.00	2	20.00	6.104	1.277	29.181	**0.023**
Heavy alcohol consumption								

Yes	13	52.00	12	48.00	1.562	0.693	3.52	0.282
No	147	40.90	212	59.10	Ref			
Adequate fruits consumption								
Yes	9	40.90	13	59.10	Ref			
No	151	41.70	211	58.30	1.034	0.431	2.48	0.941
Adequate vegetables consumption								
Yes	35	44.30	44	55.70	1.145	0.695	1.887	0.594
No	125	41.00	180	59.00	Ref			
Salt consumption by respondents								
Never	135	49.50	138	50.50	4.158	1.364	12.675	**0.012**
Rarely	4	28.60	10	71.40	1.7	0.346	8.344	0.513
Sometimes	9	15.30	50	84.70	0.765	0.208	2.807	0.686
Often	8	47.10	9	52.90	3.778	0.889	16.054	0.072
Always	4	19.00	17	81.00	Ref			
Consumption of processed food high in salt by respondents								
Never	72	53.70	62	46.30	2.059	1.104	3.839	**0.023**
Rarely	13	54.20	11	45.80	2.095	0.804	5.461	0.13
Sometimes	41	29.50	98	70.50	0.742	0.392	1.403	0.358
Often	12	46.20	14	53.80	1.519	0.599	3.857	0.379
Always	22	36.10	39	63.90	Ref			
Type of oil consumption by respondents								
Vegetables	149	45.70	177	54.30	3.597	1.801	7.183	**<0.001**
Non Vegetables	11	19.00	47	81.00	Ref			
Regular physical activity adequacy per week								
Yes	143	39.90	215	60.10	Ref			
No	17	65.40	9	34.60	2.84	1.232	6.547	**0.014**

Table 8 above shows relationship between behavioral risk factors and cmd. tobacco smoking and CMD have statistically significant association with patients who smoke having 3 times more risk to have CMD (67.20%)[OR=3.478, CI: 1.923-6.29, P-value<0.001] compared to those who do not smoke (37.10%).

Second hand smoking is also associated with CMD with statistical significance for respondents classified as always exposed to second hand smoking (80%)[OR=6.104, CI: 1.277-29.181, P-value=0.023] compared to those who were never exposed to second hand smoking (39.60%). The same findings have been found for respondents who often are exposed to second hand tobacco smoking with statistical significance for those classified as often exposed to second hand smoking (80%)[OR=6.104, CI: 1.277-29.181, P-value=0.023] compared to those who were never exposed to second hand smoking (39.60%). Paradoxically, respondents who never add salt (49.5%)[OR=4.158, CI: 1.364-12.675, P-value=0.012] and who never eat processed food rich in salt (53.7%)[OR=2.059, CI: 1.104-3.839, P-value=0.023] have been found with CMD with respectively 2 and 4 times higher risk compared to respondents who always add salt (19%) and eat processed food high in salt (36.1%). Vegetable cooking oil is also associated to CMD with statistical significance [OR=3.597, CI: 1.801-7.183, P-value=0.000]. lastly, absence of adequate total physical activity has statistically significant link with CMD with respondents who do not perform adequate physical activity at 3 times higher risk to have CMD [OR=2.84, CI: 1.232-6.547, P value= 0.014].

Relationship between metabolic risk factors and cardiometabolic diseases

Table 9: Relationship between metabolic risk factors and CMD

Variable	Presence of cardiometabolic disease				OR	95% CI		P-Value
	Yes		No					
	N	%	N	%		Lower	Upper	
History of high blood pressure								
Yes	98	99.00	1	1.00	352.484	48.186	2578.441	**<0.001**
No	62	21.80	223	78.20	Ref			
Total cholesterol measures of respondents								
Normal total cholesterol	125	37.50	208	62.50	Ref			
Raised total cholesterol	35	68.60	16	31.40	3.64	1.935	6.846	**<0.001**

Table 9 above indicates relationship between metabolic risk factors and CMD. It has been found that history of blood pressure and raised total cholesterol are statistically linked with CMD with great significance [OR=352.484, 3.64; CI: 48.186-2578.441, 1.935-6.846; P-value<0.001, <0.001].

Multivariate analysis of risk factors for cardiometabolic diseases

A multivariate analysis was performed for statistically significant variables associated with cardiometabolic disease. Adjusted Odds Ratios (AOR) used to measure the significance of risk to have cardiometabolic disease and P-Value less than 0.05 considered. This multiple logistic

analysis was applied to identify the factors which were independently associated with cardiometabolic disease among outpatients of Kibagabaga Hospital. Table 10 below shows the details of results for multivariate analysis.

Table 10: Multivariate analysis of factors associated to cardiometabolic diseases among respondents

Variable	AOR	95% CI		P-Value
		Lower	Upper	
Age group of respondents				
18-27	Ref			
28-37	1.954	0.754	5.065	0.168
38-47	5.081	1.832	14.089	**0.002**
48-57	12.89	4.029	41.242	**<0.001**
58 and above	24.055	6.546	88.4	**<0.001**
Second hand tobacco smoking by respondents				
None	Ref			
Rarely	1.124	0.277	4.566	0.87
Sometimes	0.538	0.052	5.588	0.604
Often	11.815	1.639	85.175	**0.014**
Always	10.015	1.243	80.669	**0.03**
Total cholesterol measures of respondents				
Normal total cholesterol	Ref			
Raised total cholesterol	2.445	1.057	5.657	**0.037**

Table 10 above indicates the multivariate analysis of statistically significant variables found in bivariate analysis and it found that age group of 38-47 years is statistically significant with increased risk to have cardiometabolic disease [AOR=5.081, CI: 1.832-14.089; P-Value=0.002]. Respondents corresponding to age group of 48-57 years were 13 times more likely to have cardiometabolic disease [AOR=12.89; CI: 4.029-41.242; P-Value<0.001] compared to 18-27 years age group of respondents. Respondents included in age group of 58 years and above were 24 more likely to have cardiometabolic disease [AOR=24.055; CI: 6.546-88.4; P-Value<0.001] compared to 18-27 years age group of respondents. Second hand tobacco smoking in respondents who often are exposed to passive smoking was associated to cardiometabolic disease with statistically significant link [AOR=11.815, CI: 1.639-85.175, P-Value=0.014] and they were 12 times more likely to have cardiometabolic disease compared to respondents who were never exposed to second hand smoking. Second hand tobacco smoking in respondents who always are exposed to passive smoking was associated to cardiometabolic disease with statistically significant link [AOR=10.015, CI: 1.243-80.669, P-Value=0.030]. Raised total cholesterol has statistically significant link with CMD where the risk is two times higher in respondents with raised total cholesterol [AOR=2.445, CI: 1.057-5.657, P-value=0.037] compared to respondents who have normal total cholesterol values.

5. Discussions

The current study was conducted to explore the prevalence of cardiometabolic diseases and assess their associated risk factors in outpatients department of Kibagabaga Hospital, Rwanda. The results are comparable to the findings of other authors as it is shown below.

Kendir et al (2018) [16] in Netherlands found the prevalence of single cardiovascular disease of 26% and 10.5% for multiple cardiovascular diseases which if combined are relatively closer to the prevalence of 41.7% found in current study. Prevalence of cardiometabolic disease for current study has been estimated to 41.7% of outpatients consulting at Kibagabaga hospital and hypertension was found in 23.4% of respondents. The study done in Bangladesh by Muhit et al (2012) [17] found a prevalence of hypertension of 28.05% which is higher compared to this current study.

Concerning age group and its association with CMD, in current study it has been observed that age groups from 37 and over are statistically associated to CMD. Similar findings have been found in USA by Yazdanyar et al (2009) [18] study that showed the increase of CVD prevalence including high blood pressure, stroke and heart failure in men and women of 40-59 years and 70-75 years of age, the estimated increase of 40% and these tranches of age fall in the ones of current study in outpatients of Kibagabaga Hospital. Another study done in USA showed the increase of diabetes and pre-diabetes prevalence in subjects aged 65 years and over [19].

A nationwide survey done in Korea found that hypertension was more common in women who never smoked with high daily second hand smoke exposure [20] and this is compliant with the results of current study showing the association of second hand smoking among respondents who were always exposed to second hand smoking and cardiometabolic disease.

Current study finds raised cholesterol being independent factor contributing to prevalence of cardiometabolic disease. The results are similar to the one done by Rhee et al. (2017) [21] in Korea where during the follow-up period, 3.4% of the participants with raised total cholesterol had developed diabetes. And another study done in Japan by Sakurai et al. (2011) [22] established the relationship between high level of total cholesterol and high blood pressure.

Conflict of Interest Declaration: None declared

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