

Rates of Comorbidities Associated with Cardiometabolic Disease among Patients Seen in the Outpatient Department at Kibagabaga Hospital in Rwanda

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Abstract: *Cardiometabolic disease (CMD) comorbidities are the most common cause of death among patients suffering from cardiometabolic diseases. There are no known studies on cardiometabolic disease comorbidities, and their rates remain unknown in Rwanda. This study determined the rate of cardiometabolic disease comorbidities among patients seen in the Outpatient Department at Kibagabaga Hospital in Kigali City, Rwanda. The study used a descriptive, cross sectional design and a coded questionnaire was used to collect data. A convenience sampling technique was used for patients attending Outpatient Department. Data was generated using Statistical Package for Social Sciences (SPSS) program version 21, and the findings presented in the form of frequencies and percentages. Among 384 patients who responded, comorbidity rates were high for those with a cardiometabolic disease, reaching a percentage of 42%. Based on results of this study, it is recommended to the Ministry of Health that steps be taken to reinforce preventative measures against CMD and their comorbidities in hospital and community. Additionally, it is recommended that Kibagabaga Hospital increase their Non-Communicable Disease services in an effort to prevent eventual comorbidities. Other researchers are encouraged to complete this study by running a longitudinal study on cardiometabolic diseases and their risk factors.*

Keywords: Comorbidity; Diabetes; Cardiometabolic Disease; Republic of Rwanda

1. Introduction

Comorbidity is defined as the presence of one or more chronic health related conditions for the same person presenting a certain disease. For example, diabetes is a cardiometabolic disease with many comorbidities such as cardiovascular disease, retinopathy, nephropathy, and diabetic foot. However, diabetic patients do not only have diabetes related comorbidities, but they also present non-diabetes related comorbidities, such as depression and musculoskeletal diseases [1]. CMD rarely occur without comorbid conditions that can be concordant with CMD. These comorbid conditions can lead to CMD, be complications of CMD, or themselves be another type of CMD. The comorbid conditions can also be discordant if there is no relationship between the two. The presence of comorbidities is regarded as an indicator of severity and poor prognosis of the given disease. Thus, the medical management for people with comorbidities is much more complicated and time consuming than for patients with single diseases [2],[3],[4]. Diseases can cluster in individuals, so that several comorbidities can exist at once. At least 35% of men over sixty years of age have been found to have two or more chronic conditions. The number of comorbidities increases progressively with age, with higher levels among women [5]. Patients with cardiometabolic diseases are at high risk of developing complications and comorbidities, which affect their quality of life and contribute negatively to health service utilization, increasing the burden, mortality, and morbidity of CMD. For example, it has been observed that comorbidities in patients with

diabetes mellitus (DM) are linked to consequences for health care delivery and relative costs. It has been shown that comorbidities increase the use of health care services and costs of medical care among patients with diabetes mellitus [1]. Given the high prevalence of cardiometabolic diseases in outpatients department at Kibagabaga Hospital estimated to 41.7% there is a need to find out the rate of comorbidities in regard to these patients. [6]

2. Literature Survey

A study done in the Netherlands regarding diabetes mellitus and its comorbidities showed that 44% of patients with diabetes mellitus had an additional comorbidity condition, while only 56% of patients had no additional comorbidity [1]. Another study, performed in the United States of America among adult diabetic patients, showed that of the 8,604 adult DM patients, 11.4% had only diabetes and 40.5% had diabetes along with a concordant comorbidity. The concordant comorbidities of hypertension and dyslipidemia and discordant comorbidities of depression and arthritis were observed most often [7]. In addition, there was another study performed in the United States of America among patients who have experienced a myocardial infarction. This study showed that 35% of this population had at least a single cardiovascular disease comorbidity, 25% had two comorbidities, 12% had three comorbidities, and 5% had four or more comorbidities. Additionally, the study displayed that the most frequent comorbidity pair was hypertension and diabetes mellitus, which was found in one out of eight patients [8]. A study conducted in South Africa

revealed that 5% of South Africans ages fifteen and above had self-reported diabetes in 2011-2012. The rate of diabetes comorbidities was estimated at 73%, where patients with self-reported diabetes had at least one additional cardiovascular chronic illness [9].

3. Methods

Study design: This study used a descriptive, cross-sectional design using quantitative approach methods. The study was conducted from September 2017 to April 2019.

Study population: The target population for this study was 40,000 adult patients aged 18 years old and older from the Kibagabaga catchment area who attended the outpatient department and this figure was obtained from Kibagabaga Hospital out-patients statistics.

Inclusion criteria: All adult patients attending outpatients department at Kibagabaga Hospital, who are 18 years old and above, fully conscious and mentally able to respond to interview questions were included in this study.

Sampling techniques: A convenience sampling technique, or a non-probability sampling technique, was used regarding patients seeking care in the outpatient department of Kibagabaga hospital as a result of the character of hospital settings. Patients were selected due to their convenient accessibility.

Data collection: A pre-test study was carried out among ten patients to make sure the questionnaire is applicable and reproducible in outpatients' population. Then, data collection was performed using this questionnaire to collect primary data from 384 selected research respondents. Data was entered into the computer for further processing and analysis. Patients were approached one by one according to the sampling techniques and interviewed after their consent and data were recorded confidentially in a questionnaire.

Physiological measurements and biochemical blood analyses: A digital blood pressure machine was used to measure blood pressure. A blood sugar machine, type SD CodeFree, and a biochemistry machine, type Prime EV Automatic Photometer, were used for measuring blood sugar of selected patients. All blood samples were drawn according to infection prevention and control measures. As a result of the Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure and recommendations for blood pressure measurement, systolic and diastolic blood pressures were measured using a digital blood pressure machine. Three readings were taken, each separated by 5 min of rest. The participants were asked to sit in chair with their back supported and the arm at the level of the heart [10]. The average of the three readings was used as the final blood pressure measurement. Based on the questionnaire format, an interview was conducted with each selected patient who fulfilled the inclusion criteria and provided an informed consent.

Determination of comorbidities

Concordant comorbidities were determined using physiological and biochemical analysis. In addition the patients medical files were consulted for confirmation of other comorbidities.

Variable definitions: High blood pressure was defined as a systolic blood pressure equal to or above 140 mmHg and/ or a diastolic blood pressure equal to or above 90 mmHg. Blood sugar measurements were taken on all patients who completed an eight hour fasting period, where values of 75-110 mg/dl were considered normal and values above 110 mg/dl were indicative of high blood sugar.

Sample size: The sample size of this current study was calculated using Fisher's formula, as it has been used by Naing *et al.* [11] stated as $N = \frac{Z_{1-\alpha/2}^2 \cdot P \cdot (1-P)}{d^2}$. Where $Z_{1-\alpha/2}^2$ is the standard normal variate at 5% with a type I error $P < 0.05$, equaling 1.96; P is 50%, as there are no studies showing the prevalence of cardiometabolic diseases in hospital settings in Rwanda to use as reference; D is the absolute error or precision, 5%; N is the sample size. Using this formula, the sample size for our population totaled 384 patients.

Data analysis: Data is presented as frequencies and percentages in the following tables. They have been analyzed using the Statistical Package for the Social Sciences 21st version (SPSS).

Ethical considerations: Upon approval from Mount Kenya University Ethical Review Board, as it has been authorized to review research protocols by Rwanda National Ethics Committee, permission was given to Kibagabaga Hospital that allowed researchers to collect data on outpatients from Kibagabaga District Hospital. Patients received detailed information about the study, and an informed consent form was used. The study was explained to the participating patients, including the right to participate or to withdraw from the study at any time. All procedures were performed in compliance with relevant laws and institutional guidelines. Patients who were found with cardiometabolic diseases were advised to consult specialized NCD services at a hospital for closer follow up. All patient information was recorded in the computer with codes. To ensure confidentiality, all patient information was handled in total secrecy. The questionnaire and consent form given to participants was translated into the local language, Kinyarwanda, as most of the respondents communicate best in this language.

4. Results

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

Rates of cardiometabolic disease comorbidity: The type of comorbidity was considered for respondents having other chronic diseases and was divided into a single comorbidity if the respondent had only one second chronic disease. In turn, a single comorbidity was divided into single concordant if it was a CMD comorbidity and single discordant if it was not a CMD comorbidity. If more than one comorbid condition consisted of concordant, discordant or combined

comorbidities among respondents, they were said to be in the multiple comorbid condition. The data on comorbid

conditions was disaggregated according to the socio-demographic data of respondents.

Table 1: Cardiometabolic disease comorbidity of respondents and sociodemographic characteristics

Variables	Frequency (N)	Percentage (%)
History of comorbid chronic disease(N=160)		
Yes	67	41.9
No	93	58.1
History of comorbid chronic disease and gender(N=160)		
Male	29	18.1
Female	38	23.7
History of comorbid chronic disease and age group(N=160)		
18-27	1	0.6
28-37	6	3.7
38-47	11	6.8
48-57	17	10.6
58 and above	32	20
History of comorbid chronic disease and level of education(N=160)		
No formal education	16	10
Primary school	31	19.3
Secondary	17	10.6
University	3	1.8
History of comorbid chronic disease and marital status of respondents(N=160)		
Not married	1	0.6
Married	42	26.2
Separated	3	1.8
Widowed	21	13.1
History of comorbid chronic disease and employment status of respondents(N=160)		
Employed	19	11.8
Unemployed	48	30

Cardio-metabolic co-morbidities and sociodemographic characteristics: Table 1 shows that among 160 respondents with cardiometabolic diseases, 67 (41.9%) presented with either single or multiple concordant or discordant comorbid conditions. Therefore, the rates of comorbidity among patients with cardiometabolic diseases at the Outpatient Department of Kibagabaga Hospital are 41.9%. Most respondents with comorbidities were females (23.7%), those age 58 years old and older (20%), primary school level respondents (19.3%), married respondents (26.2%) and unemployed respondents (30%).

Table 2: Type of comorbidities among respondents with CMD

	Variable	Frequency (N=67)	Percentage
Category of comorbidity	Type of comorbid chronic disease		
	Multiple combined		
	Diabetes and Hepatitis C	2	3
	Diabetes and HIV	2	3

6. Limitations

This study assessed the rates of cardiometabolic disease comorbidities among patients seen in the Outpatient Department at Kibagabaga Hospital in Rwanda. This is a hospital based research study; therefore, the findings are limited to the Kibagabaga Hospital catchment area and may not be generalized to the whole population of the country.

	Diabetes and Osteoarthritis	4	6
	Hypertension and Hepatitis C	3	4.5
	Hypertension and Osteoarthritis	1	1.5
Multiple concordant	Hypertension and Diabetes	1	1.5
Single concordant	Cardiomyopathy	1	1.5
	Diabetes	17	25.7
Single discordant	Hypertension	23	33.3
	Hepatitis C	3	4.5
	HIV	7	10.6
	Osteoarthritis	3	4.5

Types of co-morbidities: Table 2 displays the categories of comorbidities and the single or multiple types of comorbidities among respondents. For patients with comorbidities, the predominant rate was 33.3%, represented by hypertension as a single concordant comorbidity, followed by a rate of 25.7% for diabetes as single concordant comorbidity.

5. Discussion

Our findings indicated high rates of cardiometabolic disease comorbidity concordant and discordant comorbidities in Kibagabaga Hospital outpatients department population. Cardiometabolic disease comorbidities have been studied by other researchers, and their findings are comparable to the findings of the current study. In the present study, the most common comorbidities were diabetes mellitus and hypertension at the rates of 25.7% and 33.3%, respectively. A study done by Muhit, A. *et al.* [12] in Bangladesh at a tertiary level hospital found the rate of diabetes comorbidity for cardiovascular disease to be 40.39%, which is higher compared to the rates found in the current study. Kendir *et al.* [13] in the Netherlands found a concordant comorbidity to cardiovascular disease at a rate of 10.5%, which is less than the current study, whose concordant comorbidity is higher. On the other hand, Buddeke *et al.* [14], in their study on trends of comorbidities of cardiovascular disease among inpatients in the Netherlands, found an overall comorbidity rate of 38% for cardiovascular disease (CVD) which is less if compared to the current study all-inclusive CMD comorbidity which is 42%. Our results are also comparable to the study done in Vietnam by Nguyen *et al.* [15] who found the overall comorbidity of 42% and 24% for more than one cardiovascular disease comorbidity among patients presenting acute myocardial infarction with predominance of diabetes mellitus and hypertension as comorbid conditions.

The method and sample used provides information limited to the concerned population of the hospital in which the study was conducted and should not necessarily be applied to other populations. However, the study may be a guide to researchers who can extend the study to other populations.

7. Conclusion

Based on the results of the current study, it is supported that the rates of cardiometabolic disease comorbidities are high among patients consulting the Outpatient Department at Kibagabaga Hospital, Rwanda. This high rate impresses upon health planners the need to implement preventative measures for the population and treatment centers for the patients already affected in order to avoid further complications.

Conflict of interest declaration: none declared

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