COLLEGE OF MEDICINE AND HEALTH SCIENCES
SCHOOL OF MEDICINE AND PHARMACY

PREVALENCE AND DETERMINANTS OF DEPRESSION AMONG PATIENTS LIVING WITH DIABETES MELLITUS AND/OR HYPERTENSION AT BYUMBA DISTRICT HOSPITAL AND ITS HEALTH CENTERS, RWANDA.

Thesis submitted in partial fulfillment of the requirement for the Award of Master of Medicine in Psychiatry in the College of Medicine and Health Sciences, University of Rwanda.

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DECLARATION

I, Dr. Marie Assumpta AYINKAMIYE, hereby certify that the present dissertation **"Prevalence and determinants of depression among patients living with diabetes mellitus and/or hypertension at Byumba District Hospital and its health centers"** is entirely original and has been approved by an anti-plagiarism program. In supplementary, I declare that all references are indicating the sources of information.

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This dissertation has been submitted with our permission as supervisors, we hereby announce

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LIST OF ABBREVIATIONS

BDH : Byumba District Hospital

CMD : Common Mental Disorders

C.I :Confidence Interval

DM : Diabetes Mellitus

DSM-V : Diagnostic and Statistical Manual of Mental Disorders, (Fifth Edition criteria)

GP :General Practitioner

HbA1C : Higher glycated hemoglobin

HBP : high blood pressure

HPA : Hypothalamic–Pituitary–Adrenal axis

IDMPS : International Diabetes Management Practices Study

IRB :Institutional Review Board

LMIC : Low- and middle -income countries

MHPG : 3-methoxy-4-hydroxyphenylglycol

MTUTH : Mizan-Tepi University Teaching Hospital

NCDs : Non-Communicable Diseases

NE : norepinephrine

OGTT : Oral Glucose Tolerance Test

OR : Odds ratio

P :p value

PHQ-9 : Patient Health Questionnaire-9 scale

SD : Standard Deviation

SNS : Sympathetic Nervous System

TGH : Tepi General Hospital

T2DM : Type 2 diabetes mellitus

UR : University of Rwanda

WHO : World Health Organization

ABSTRACT

Background: The largest cause of disability worldwide and a chronic illness that can strike anyone at any time is depression. Studies have found that depression is two to three times more common in those with diabetes than in those without it, and that one- third of adults worldwide have hypertension, with 75% of those cases occurring in developing countries while depression is common in hypertensive patients.

Methods: A cross-sectional study, where 357 participants were recruited from June 15th 2022 to July30th 2022, using a consecutive sampling and a structured questionnaire for data collection using PHQ-9 instrument to evaluate depressive symptoms. Scores of 0-4,5-9,10-14,15-19 and 20-27 were classified as non-depressive, mild, moderate, moderately severe and severe depression respectively. 27% (n=97) participants with scores of ≥10 were referred to mental health department for better management. To investigate the connection between the outcome (presence of depression and determinants), we used the logistic regression analysis. The threshold for statistical significance for relationships was set at $p< 0.05$.

Results: Out of 357 participants, the mean age was 59.4 years. A total of 81% (n=290) of patients were hypertensive patients, 10% (n=36) were living with DM and 8.7%(n=31) were suffering from both diseases. The overall prevalence of depression was 66%, in which, 35%, 17%, 11.2%, and 2.8% had mild, moderate, moderately severe and severe depression respectively. Almost 34% were screened for non depression. 97 patients (27.17%) who participated in the study had scores equal to or above 10. Low socioeconomic category (OR=3.11; 95% CI: 1.72-5.59; p<0.001), uncontrolled hypertension (OR=6.05; 95% CI: 2.52-14.6; p<0.001), personal history of depression (OR=7.43; 95% CI: 4.08-13.52; p<0.001), family history of depression(OR= 3.78; 95% CI: 1.29-11.06; p=0.015), having other chronic diseases(OR=4.47; 95% CI: 1.85-10.82; p=0.001), having both chronic illness(DM+HBP: (OR=4.15; 95% CI: 1.3-13.28; p=0.016), occasional mobility impairment (OR=4.75; 95% CI: 2.60-8.66; p<0.001), sporadic visual impairment(OR=2.37; 95% CI: 1.5-3.74; p<0.001), perception that the waiting time of consultation is longer(OR=2.04; 95% CI: 1.24-3.35; p=0.005), the self-esteem (OR=0.34;95% CI: 0.13-0.85; p=0.021) and peer acceptance (OR=2.58; 95% CI: 1.35-4.94; p=0.004) were the determinants of depression among study participants.

Conclusion: DM and hypertension are frequently linked to depression, thus treating both illnesses concurrently may be more beneficial.
Keywords: depression, determinants, diabetes mellitus, hypertension.

CHAPITER I: INTRODUCTION

1.1. Background

Depression is a chronic illness and the biggest cause of disability worldwide, that can strike anyone at any time (1). About 350 million people around the world are suffering from depression and it is globally expected to become the main cause of disability by the year 2030. According to the current estimates, people with diabetes mellitus are more likely to experience depression than people without the condition, and 75% of them live in low- and middle-income nations (1)(2). According to some studies, diabetes mellitus may be responsible for more than 9.5 million of the world's instances of depression. Patients living with diabetes mellitus worldwide have been projected to increase to 642 million by 2040 and are estimated to rise to 700 million by 2045 (1). This will highly increase the number of people suffering from depression by 2040 and by the year 2045.

Globally, one-third of adults are living with hypertension, of whom 75% are distributed in low- and middle-income countries (LMICs) and studies reported that depression is common among patents with hypertension (3)(4)(5)(6)(7)(8).

The Latin root of the term "depression" is to sink. The person feels as though their existence is burdened and sinking. Depression is referred to in three different ways :as a symptom when it occurs in conjunction with other psychiatric disorders, as a syndrome when depressive symptoms such as sadness, inhibition, guilt, incapacity, and loss of vitality are present, and as a disease when it is defined as a disorder (9)(8).

Depression is among common mental disorders (CMD). It is defined as a multi-factorial disorder in which motor symptoms, cognitive symptoms, social symptoms and biological symptoms are present; and might cause the affected individual the impairment of the body system and loss of his/her daily activities (9).

Social symptoms include avoiding the recreational and social interaction and being more dependent on others. Biological symptoms include restlessness, muscular and joint pains, asthenia, diffuse body discomfort, altered sexual functioning, loss of energy and appetite, fatigue, hyper insomnia or insomnia, weight decrease or weight increase without any voluntary diet to increase or to decrease personal weight (10)(11)(8)(12)(13).

The Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-V) states that five or more symptoms during the previous two weeks period with observed change from the daily activities functioning is the criteria condition to diagnose depression (14),(13).

The co-morbid of depression and diabetes or hypertension could impair all domains of quality of life, including emotional, social and physical dysfunction and lead to massive medical costs (10)(6)(15).

1.2. Problem statement'

Based on the fact that this comorbidity is linked to significant healthcare expenses, a poor quality of life and disability. All of those elements have contributed to the individuals' ongoing poverty and can harm the country's development. Although NCD (Non-Communicable Diseases) and mental health services have been developed in Rwanda,but there are no clear guidelines or one-stop centers for services to screen, prevent, or treat people who have these comorbid conditions. Additionally, there hasn't been any research of this kind conducted at Byumba District Hospital (BDH), and many people, including medical professionals, are unaware of these challenges.

1.3 Research questions

● What is the prevalence of depression among those who have diabetes mellitus, hypertension, or both at Byumba DH and its health centers?

● What are the determinants (risk and protective variables) of depression among patients at Byumba DH and its health centers who have diabetes mellitus and/or hypertension?

1.4. Objectives

1.4.1. Main objectives

●To determine the prevalence and determinants of depression among diabetic and hypertensive patients at Byumba DH and its health centers.

1.4.2. Specific objectives

●To determine the prevalence of depression among patients with diabetes and hypertension at Byumba DH and its health centers.

● To determine the risk and protective variables for depression in patients diagnosed with diabetes and Hypertension at Byumba DH and its health centers.

1.5. The importance of this research

The findings of this study, along with those of other similar studies done previously or who might be done in the future, in LMICs help the decision makers to improve, monitoring, planning and elaborating policies.

The physicians might consider the burden of depression among patients living with diabetes and hypertension and reinforce regular screening of depression among patients living with Diabetes Mellitus and hypertension.

CHAPITER II: LITERATURE RIVIEW

As these comorbid are large and complex health conditions, this chapter will globally focus on the epidemiology as well as the prevalence; one of the measures commonly used in epidemiology to estimate the frequency of a disease or a condition in given well- defined population in a given time (15),(16),(17),(18); the determinants of depression that are responsible to the prognosis of the disease,(18),(19),(20),(21)(22) and the links between those comorbidities. It will also review a little about recommendations for screening and management of depression.

2.1 Epidemiology of the co-morbid of depression and Diabetes Mellitus.

Numerous research carried out in many nations throughout the world have revealed that people with diabetes mellitus are more likely to experience depression (23)**,**(1)**,**(24)**,**(25) and some of them are documented as well as below.

In Uganda, in 2015 **,**34.8% was the prevalence of depression from 437 diabetic patients sampling from 3 diabetic clinics (26).

In Guinea, In 2015, 58.7% were reported to have depressive symptoms from 491 patients with T2DM (27). In Cameroon, in 2016 a study among 261 diabetes mellitus has shown that 92.0% (n=240) of participants had depressive symptoms and 60% of whom had clinically significant symptoms of depression (2).

The rate of depression among 400 study participants with T2DM in Ghana in 2018 was 31.3% (1). The prevalence of depression was found to be 37% in Ethiopia according to a study done among 398 diabetes patients between July 1 and July 31, 2018 in two hospitals (6).

A study of 350 people with type 2 diabetes in Eastern Sudan revealed a prevalence of depression of 35.6%, with mild depression accounting for 24.3% of cases, moderate depression for 7.4%, moderately severe depression for 2.2%, and severe depression for 1.7% of cases (28).

In Rwanda, in 2019, out of 339 patients with T2DM, 83.8% (n=284%) was the overall prevalence of depression with 8.9% (n=223) for mild to moderate depression and 17.9% (n=61) for moderately to severe depression and 16.2% (n=55) participants were screened not having depression. Study participants were selected from three District Hospitals (Nyamata, Kibagabaga and Masaka) (29).

In Nepal in 2019, patients with T2DM had a prevalence of depression of 22.7%. (30).

In a study of 2955 people with type 2 diabetes conducted in Spain, the prevalence of depression was 20.03% (n=592)(31). According to a study done in Turkey with 171 DM patients between December 2016 and January 2017, the prevalence of depression overall was 29.2%; including 31.6% (n=54) for mild depression, 26.9% for moderate depression, 2.3% for severe depression, and 39.2% for no depression (32).

In China, a study was conducted from May-October 2017 among 110 elderly diabetic patients and has shown 86 patients of mild depression, 14 patients of moderate depression and 10 patients with severe depression (22). Among 9,865 diabetic patients from different countries in South Asia, the Middle East (United Arab Latin America, Eurasia, and Africa, they reported a depression prevalence of 30.7%, of which 20.4%, 8.9%, and 1.3% were observed for mild, moderate, and severe depression, respectively, among patients with type 1 DM (33).

A meta-analysis study that included 248 studies on prevalence of depression in people with T2DM and identified 83,020,812 study participants revealed that 28% (n= 23,245,827) of those patients had the condition (24). Another systematic review analysis was conducted from 96 papers in South Asia (India, Bangladesh, and Pakistan) and found that 40% of people with diabetes mellitus experience depression (12). All of these researches provide scientific evidence of the disease burden on society caused by the co-occurrence of depression and diabetes mellitus.

2.2. Epidemiology of the co-morbid of depression and Hypertension.

Studies have shown that depressive symptoms are more frequent among hypertensive patients and have predicted that about 1.56 billion adult persons will suffer from hypertension by 2025(34)(35) which may increase the prevalence of depression worldly. Some researchers have been done and shown the prevalence of depression among hypertensive patients in developed and Low-middle income countries.

In South Asia (India, Bangladesh and Pakistan), a systematic review study was done from 96 studies and have observed 38% of the prevalence of depression among individuals living with hypertension (12). Another meta-analysis study in which 11 studies were included with 5299 adults with hypertension from South Africa, Nigeria, Ghana, Ethiopia and Burkina Faso and found that 33.3% of the prevalence of depressive symptoms, of whom 7.8% for major depressive symptoms (36). In China (Shenzhen), a study had shown the prevalence of depressive symptoms of 10.7% from 1046 hypertensive patients and a meta -analysis study was done from 41 studies of china population and other countries of Africa among 30796 patients living with hypertension and

found that 26.8% of them are presenting symptoms of depression (34). Still in Northwest China, a study was done among 1856 adult hypertensive patients (≥18 years) from primary health care to screen depression between April and October 2019 and the prevalence of depression was observed at 13.7% (3).

A study done in India between January 2018 and June 2018 on 100 hypertension patients receiving follow-up in the outpatient department revealed a 40% prevalence for depression (37).

In Dammam, Kingdom of Saudi Arabia, a study conducted among 342 patients with hypertension, has shown the overall depression prevalence of 19.6% with 4.97%, of mild depression, 11.69% and 2.94% for moderate and severe depression respectively (6).

In Pakistan (Karachi), a study among 411 patients with hypertension was conducted and shown that the prevalence of depression was 40.1% (38).

2.3. Determinants of depression in people living with hypertension and /or diabetes mellitus.

Studies conducted across the globe in uncountable number of nations identify risk factors for depression, more probable stressful life events, more likly diabetes and or hypertension, low social class, low income, divorce, widowhood, and unemployment, Mobility issues, vision issues, advanced age, drinking and smoking habits, lower level of education, history of hypertension, and other conditions, type of diabetes mellitus, physical inactivity, more chronic somatic conditions, more medication, high cost of healthcare, lengthy wait times for medical consultation,Brief consultation times and female gender (13)(29)(6),(34),(1),(30),(39),(28),(8),(40),(41),(27),(1), (36),(10).

The most protective characteristics included self-esteem, close followup, peer acceptance, a positive relationship with one's family, physical activity, and social support (19).

2.4. Links Between depression and diabetes mellitus

Diabetes mellitus is among Non-Communicable Diseases (NCDs)(36),(13). As review, NCDs is defined as a medical condition which cannot be transmitted to each other, naturally progressive and chronic. Its persistence among affected individual for at least three months, is additional criteria to confirm NCD according to WHO (42). DM is commonly known as a chronic metabolic disease in which blood sugar levels is out of the common normal range (hyperglycemia) for a prolonged period in human body, due to a dysregulation of insulin action or insulin secretion or

both. There three independently known based evidences to conclude to hyperglycemia known as DM in additional to the contributive clinical features or not with the persistence or recurrence of hyperglycemia in the plasma:

- Fasting plasma concentration: 7.0 mmol/l (126 mg/dl)
- OGTT plasma concentration: 11.1 mmol/l (200 mg/dl) two hours after 75 g of oral glucose; or
- HbA1C (higher glycated hemoglobin) of 6.5 or above (16).

The relationship between depression and DM had been found to be bi-directional. The vulnerability factors for depression contribute to the onset of diabetes and vice versa. Those with depression are more likely to have a diabetes due to the pathophysiology and some behaviors as alcohol or drugs abuse for coping with depression, which can lead to diabetes or to aggravate the condition; while those with diabetes are more likely to experience depression (43),(1),(8),(20),(10)(42).

According to studies, T2DM is associated with 37% higher incidence of depression and a 60% higher chance of getting type 2 diabetes in patient with depression (43).

Problems related to DM as well as uncontrolled blood sugar, increased weight, poor compliance to medication use, higher healthcare costs can contribute to the disturbance of mood while untreated depression worsen the prognosis of both conditions (44). Research suggests that depression and DM share biological origins, based on the fact that both conditions are stressful.

When a person experiences a stressful situation, immediately the HPA axis and the sympathetic nervous system (SNS) are activated and increase the hormone and neurotransmitters (cortisol, noradrenalin, adrenalin). The chronic hypercortisolemia and chronic activation of SNS are resulting to glucose transport alterations which can induce insulin resistance and to another related metabolic syndrome and to T2DM (45),(43),(46).

Still based on research, if the stressful condition is persistent, the production of inflammatory cytokines is increased resulting to the immune dysfunction which induce function disorder in pancreas β-cells and then to insulin resistance. The risk of type 2 DM increases at the point of insulin resistance .

On the other hand, the increased proinflammatory cytokines are suspected to damage the pathophysiological areas linked with depression (plasticity of synapse, metabolism of neurotransmitter and the function of neuroendocrine) and might resulting to depression among some of patients with T2DM.

Regarding the pathophysiology of the comorbid depression and type 1 DM, there is evidence that high cytokines level in the circulation may disturb neurogenesis and neurotransmitter metabolism then cause a disorder of insulin action or secretion. Also, chronic hyperglycemia resulting to chronic overactivation of HPA axis, which may increase depression among type 1 DM with prolonged uncontrolled glycemia (43),(45).

2.5. Links between depression and Hypertension

Based on the mean of two or more measured seated blood pressure readings taken with the patient's arm at the level of the heart and readings from two or more office visits, hypertension is defined as the blood pressure of the arteries that becomes elevated, where the systolic blood pressure and the diastolic blood pressure start to increase over 130-139 mmHg and 80-89 mmHg, respectively for an adult of ≥ 18 years old (34)(35).

There is evidence that depression and hypertension share common pathophysiology and each one could influence onset of another, based on that are stressful stimuli of the shared mechanisms.

Theories said that depression is associated with a deficiency of monoamines. In additional, there is evidence that neurotransmitters particularly dopamine act as antihypertensive, reason why decreased level of dopamine in the brain may resulting to high blood pressure and/or depression (46).

2.6. Depression screening recommendations for people with diabetes mellitus and/or hypertension.

More research demonstrates that screening rates for depression among DM patients and hypertension patients are still poor, at less than 50%.

Given that depression is widespread among such individuals and that they often feel shame or stigma associated with their chronic health condition, researchers recommend routine screening among patients with DM and hypertension. They find it difficult to get the mental health or emotional treatment they need because of stigma and embarrassment. The regular screening could aid in the early diagnosis of depression and improve the patients' prognosis (47).

2.7. Management of comorbid depression and diabetes and/ or hypertension

According to research, treating both disorders concurrently using an integrated care management approach will be far more successful. The suggested approach must include healthcare professionals who specialize in treating people with mental disorders and people with chronic

physical illnesses, working together as a permanent team, as well as non-pharmacological interventions that combine individual and family psychosocial education, the stronger provider-patient relationship, and, if necessary, pharmacological interventions(48),(49). Based on the outcome from depression screening by using PHQ-9 instrument, people with scores between 0 to 4 may not need the treatment, those with scores between 5 and 10, the health care is due to the judgment of physicians according to the clinical features and the duration of symptoms, those with the scores of 10 and more, meaning from moderate to severe depression the psychotherapy and /or antidepressant are indicated(29).

CHAPTER III: METHODOLOGY

3.1. Study description

The purpose of this cross-sectional study, which was conducted at Byumba District Hospital and its health centers, was to identify the prevalence and determinants for depression among patients with diabetes mellitus and hypertension. Data were gathered between June 15 and July 30, 2022.

3.2. Study design

This study was designed as a cross-sectional study.

3.3. Study site

In the Gicumbi District's Byumba District Hospital, this study was carried out. Gicumbi District is bordered to the North-East by the Republic of Uganda, to the south by Rulindo District ,to the North by Burera District, and to the west by the Gasabo District of Kigali City. The Byumba District Hospital is specifically located in Mukeri Village, Nyarutarama Cell, Byumba Sector, Gicumbi District, Northern Province.

Byumba District hospital is the one of the oldest hospitals in Rwanda, it was built in 1947 during the colonial period by Belgians and nowadays it has the assistance of the Government of RWANDA.

Byumba District Hospital serves about 445 .589 people of 24 Health Centers, 1Medicalised Health center, 1Dispensary (Gicumbi Prison), 62 Health Postcenters and 3Private Clinics. On this population, 50 000 additional residents from the Burera, Rulindo, and Gasabo Districts should be added. My motivation for studying psychiatry is the basis for the decision to use Byumba District Hospital for this project. Since I was a GP (general practitioner) at Byumba District Hospital from January 2010 to January 2019, I faced many difficulties with patients who had vague and nonspecific symptoms, especially those who had chronic somatic diseases. As a result, I started to consider psychological conditions, most likely depression or another common mental disorder that may be related. Finally, I made the decision to pursue psychiatry with the goal of understanding mental problems, their management, and their preventive techniques. I am pursuing my degree at Byumba District Hospital, which is where I first found inspiration for psychiatry.

3.4. Study population

Participants were adults, 18 years of age, who had been diagnosed with diabetes, hypertension, or both conditions and who visited the non-communicable diseases department at Byumba District Hospital and its health centers for follow-up care.

3.5. Inclusion and exclusion criteria

3.5.1. Inclusion criteria

The following were chosen as the inclusion criteria:

- Diagnosis of diabetes, hypertension or both
- Age of 18 and above
- Ability to understand the relevant information
- Capacity to give the informed consent

3.5.2. Exclusion criteria

- Diagnostic other than diabetes or hypertension
- Inability to understand the relevant information
- Incapacity to give the informed consent (those who will refuse to sign the consent form or having ambivalent decision to sign informed consent form due to different personal understanding after clear explaination)
- Age bellow 18

3.6 Sampling method

A consecutive sampling method was used for this study until the targeted sample size is reached.

3.7. Sample size

The sample size is calculated according to Slovin's formula:

$n = N / (1+ Ne^2)$

n: number of samples

N: Total population

e: margin of error

In our study, N= 3396 (total number of the patients on follow up from diabetes mellitus and hypertension at Byumba District Hospital and its health centers recoded from medical data of those health services) and the margin error=5%

$n = 3396/1+ (3396. (0.05)^2) = 3396/1+8.49 = 3396/9.49 = 357$

The calculated minimum sample size was 357 study participants and we recruited the same number and we used consecutive sampling.

3.8. Procedure at enrolment

Enrolled study participants were selected from non-communicable diseases patients who consult the non-communicable diseases department for follow up of Byumba District Hospital and its health centers during the data collection period. They were only approached after receiving the services they have requested. The informed consent was signed by participants prior to data collection.

3.9. Data collection and management

Data were collected by using a questionnaire-based interview; presented in Kinyarwanda language. This questionnaire was made of two parts: The first one aiming at collecting the determinants which are gender, age using group of ages, marital status, schooling, occupation, smoking and alcohol consumption, the number of drugs currently used by the participants was coded in three categories: none, one to two drugs, three to four and more than two drugs.Number of NCDs suffering from, name of chronic disease suffering from (diabetes, hypertension or both), socioeconomic class (icyiciro cy'ubudehe) =1 ,2, 3, 4, sporadic mobility impairment,occasional vision impairment, personal and family history of mental illness, personal and family history of diabetes or hypertension, physical inactivity and physical activity, the duration with diabetes or hypertension, the long waiting time of consultation compared to the short duration of consultation, self-esteem, closely follow up, peer acceptance, family relationship, and social support from the family, the private or the public sectors.

The second one was used to collect the information related to depressive symptoms and the Patient Health Questionnaire-9 scale (PHQ-9) was used to asses depression; as our study concern screening of depression and PHQ-9 is a validated screening tool for depression and used by many researchers for screening depression (29),(1),(37),(8),(23),(38),(36). PHQ-9 scores of 0-4, 5–9,

10–14, 15–19, and 20-27 were classified of non depression, mild, moderate, moderately severe, and severe depression respectively.

In statistical analysis, two categories were used with the cut-off of 5 based on the 5 depression severity classifications of PHQ-9, where a score less than 5 was taken as no depression and scores of 5 and above was considered for having depression.

Before enrollment, the researcher or trained research assistants were used to explain the following conditions to the study participants:

- ✓ Explain the questionnaire to people who accepted to participate in our study;
- ✓ Explain the time needed to complete the questionnaire which was at least fifteen minutes at the end of the whole program of his or her medical visit;
- ✓ Explain that there is no cost for participation;
- ✓ Explain the reason of the study.

Every study participant has to fill out a written, informed consent form. When an adult study participant expressed interest in the study but did not know how to read or write, the researcher or a research assistant helped that individual.

A questionnaire and written consent form were provided to each participant in the study, who completed the questionnaire once upon enrollment and once throughout the duration of data collection. Those who scored 10 or above on the depression scale were directed to the mental health division.

Oral explanations of the written documents were accessible from a researcher or a trained research assistant.

3.10. Data analysis

The collected data were entered into Epidata version 3.1 for database creation and then exported to stata version 13 for analysis. Descriptive analysis is presented as follow: categorical data is presented using frequencies and percentages in tables and continuous data is summarized by mean and median values depending on their distribution and the distribution is tested using Shapiro Wilk test. Chi-square test and logistic regression analysis were used to study the relationship between the outcome (presence of depression) and possible predictors/risk factors among patients with Hypertension and/or diabetes. Statistical significance for associations was taken at the level $P < 0.05$.

3.11. Ethical considerations

3.11.1. Confidentiality

In the process of data collection and analysis, study participants' names were not used. Instead only questionnaires numbers were used. The study participants' information was confidentially kept and used for research purpose only.

3.11.2. Informed consent

Study participants were individually given a consent form by the researcher or the trained research assistants after clearly explaining to them the nature of the research project. The content of the consent was read aloud to each participant by the data enumerator in the local language. The participation in this research was entirely voluntary, and there are not negative effects from being a part of this study and all the services they receive at this hospital have been to continue without any change. However, there are not any consequences for someone who does not want to participate. After satisfactory explanations by the researcher or trained research assistants, those who meet the criteria and agree to participate in the study, affix their signature or fingerprint on the consent form.

3.11.3. Ethical approval

Prior to performing the study, the Institutional Review Board (IRB) of the University of Rwanda's College of Medicine and Health Sciences was consulted, and approval was granted. The Byumba District Hospital Ethics' Committee was also consulted before data collecting.

3.12. Distribution of responsibilities

Under the guidance of the thesis supervisors, the principal investigator has performed her obligation to conduct and coordinate every phase of the study. The researcher and trained research assistants collected the data, and a statistician assisted with the statistical analysis.

CHAPTER IV: RESULTS

The study recruited 357 participants from Byumba Hospital and its catchment area and the mean age of all the participants was 59.4 (SD=14.0) years ranging from 18 years to 98 years, the majority (50.4%) was above 60 years. 71% of the participants were female and 63.9% of the participants were married and 29.5% were widows. 52% of the participants were illiterate and 38% attended primary school and only one participant attended university. The majority (89%) were farmers and there was almost an equal distribution of participants in the first three economic categories apart from one participant who was in the fourth category (Table 1).

Table 1: Social and demographic characteristics of study participants

Characteristics	Frequency	%
Age (Mean ± SD)	**59.4 ± 14.0**	
Age group		
18-30	10	2.8
31-40	29	8.12
41-50	51	14.29
51-60	87	24.37
>60	180	50.42
Sex		
Male	100	28.01
Female	257	71.99
Marital status		
Married	228	63.87
Widowed	106	29.69
Single	16	4.48
Divorced	7	1.96
Education level		
Illiterate	187	52.38
Primary	136	38.1
Secondary	33	9.24
University	1	0.28
Occupation		
Farmer	318	89.08
Unemployed	12	3.36
Self-employed	11	3.08
Retired	10	2.8
Employed	5	1.4
Student	1	0.28
Economic category		
Category 1	111	31.09
Category 2	123	34.45
Category 3	122	34.17
Category 4	1	0.28

Of the participants who were recruited, 81.2% were diagnosed with hypertension, 10% were diagnosed with diabetes mellitus and 8.7% were diagnosed with both hypertension and diabetes mellitus. Of those who were diagnosed with diabetes mellitus, 50.7% were living with DM for more than 5 years and 69% were diagnosed with T2DM. Fifty percent of the patients with DM

were on insulin treatment followed by 45% who were on oral antidiabetic medications and three participants were on diet control.

Of the patients who were diagnosed with hypertension, 64.4% were living with hypertension since more than three years and 95% were on antihypertensive medications. Of the total patients who were diagnosed with hypertension, 79.8% had their hypertension controlled (Table 2).

Table 2: Clinical characteristics related to chronic diseases

Variables	n	%
Chronic somatic disease		
Hypertension	290	81.23
Diabetes	36	10.08
Both	31	8.68
Duration of diabetes diagnosis		
<5 years	33	49.25
6 to 10years	27	40.30
>11years	7	10.45
Type of diabetes		
Type 1	19	28.36
Type 2	48	71.64
Type of diabetes mellitus treatment		
Insulin	33	49.25
Oral antidiabetic agents	30	44.78
Only diet	3	4.48
Oral antidiabetics + Insulin	1	1.49
Number of medications for diabetes		
None	2	2.99
One to two	64	95.52
Three to four	1	1.49
Smoking behavior	11	3.08
Alcohol consumption	76	21.29
Mobility impairment	110	30.81
Cognitive impairment	201	56.30
Sexual dysfunction	100	28.01
Visual impairment	233	65.27
Physical activity	78	21.85
Duration of HTN		
<3 years	116	35.91
≥3 years	205	63.47
On antihypertensive medication	306	94.74
Hypertension control		
Controlled HTN	257	80.06
Uncontrolled HTN	64	19.94
Other Chronic disease		
Yes	51	14.33

Of the total participants, 38.1% had personal history of depression and 8.6% had positive family history of depression while 3% had personal history of other mental illnesses 4% of the participants had positive family history of other mental illness. Ten percent of the participants had family history of diabetes and 34.7% had family history of hypertension. Eighty percent of the participants reported peer acceptance, 89.6% reported self-esteem, 94.9% reported good/regular medical follow up and 72.8% reported to have good social support. Of the total number of participants, 33% perceived that the consultation waiting time is long while 46.2% expressed that consultation waiting time is short (Table 3).

Table 3: Prevalence of factors that are associated with depression

Variables	n	%
Personal history of depression		
Yes	136	38.1
No	221	61.9
Family history of depression		
Yes	31	8.68
No	326	91.32
Personal history of other mental illness	11	3.08
Family history of other mental illness	17	4.76
Family history of diabetes	38	10.64
Family history of hypertension	124	34.73
Peer acceptance	288	80.67
Self esteem	320	89.64
Regular follow up	339	94.96
Social support	260	72.83
Short consultation time	**165**	46.22
≤5 minutes	86	47.25
>5 minutes	96	52.75
Long consultation time	**118**	33.05
<3 hours	9	7.50
3-5 hours	106	88.33
>5 hours	5	4.17

Of the total participants,66% were found to have depression; in which 35% were found to have mild depression, 17% were found to have moderate depression, 11.2% were found to have

moderately severe depression and 2.8% were found to have severe depression. 33.8% were found to have no depression (Chart 1 and 2).

Considering the PHQ-9 scores, 97 patients (27.17%) scored ≥10 meaning that they were referred in mental health department for management and the remaining 260 patients (72.83%) scored <10 meaning that they did not require treatment of depression (Chart 3). When screening for depression, we found that 86.83% had the thoughts that they would be better off dead or of hurting themselves in some way, 8.12% reported to have those thoughts several times, 3.92% reported to have these thoughts for more than a half the days and 4 patients (1.2%) reported to have these thoughts every day.

Figure 1 :Prevalence of depression among patients with Diabetes mellitus and/or hypertension

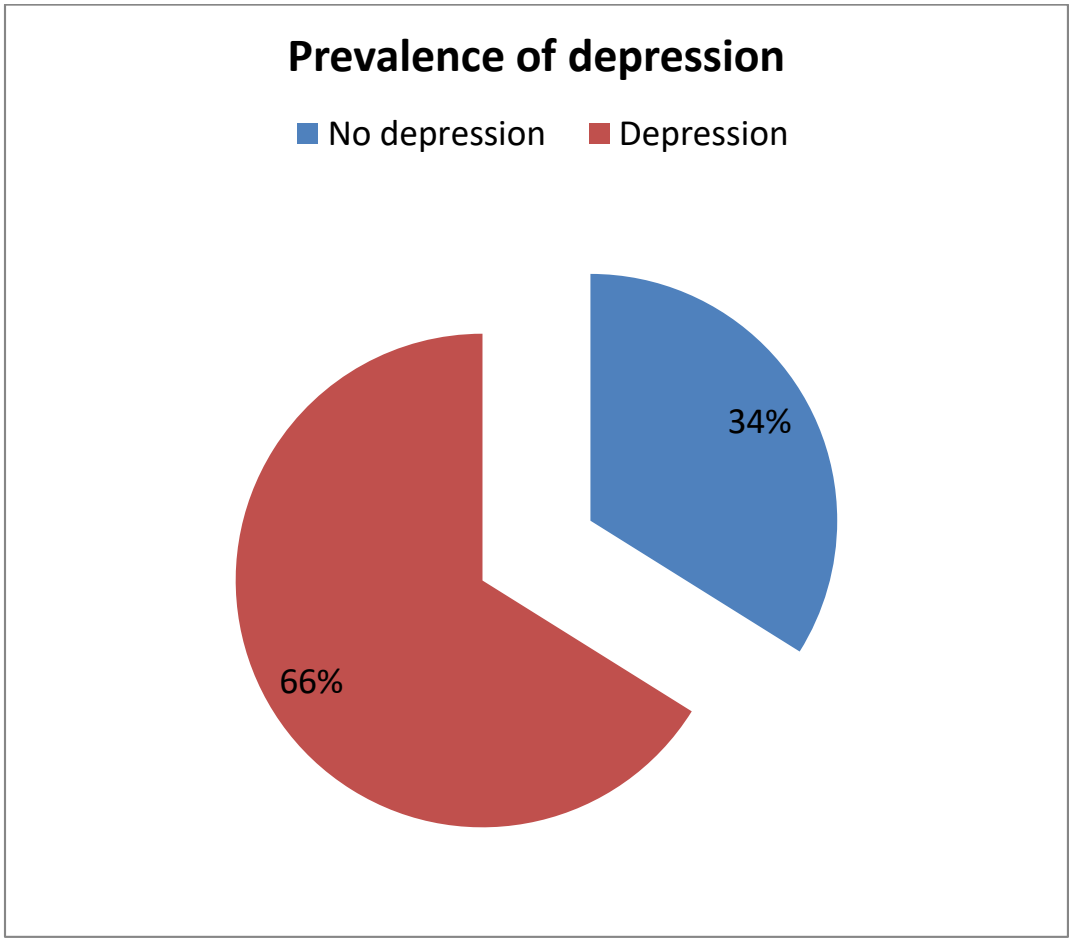


Figure 2: The rate of depression severity according to the results of PHQ-9 screenoing among patients with diabetes mellitus and hypertension

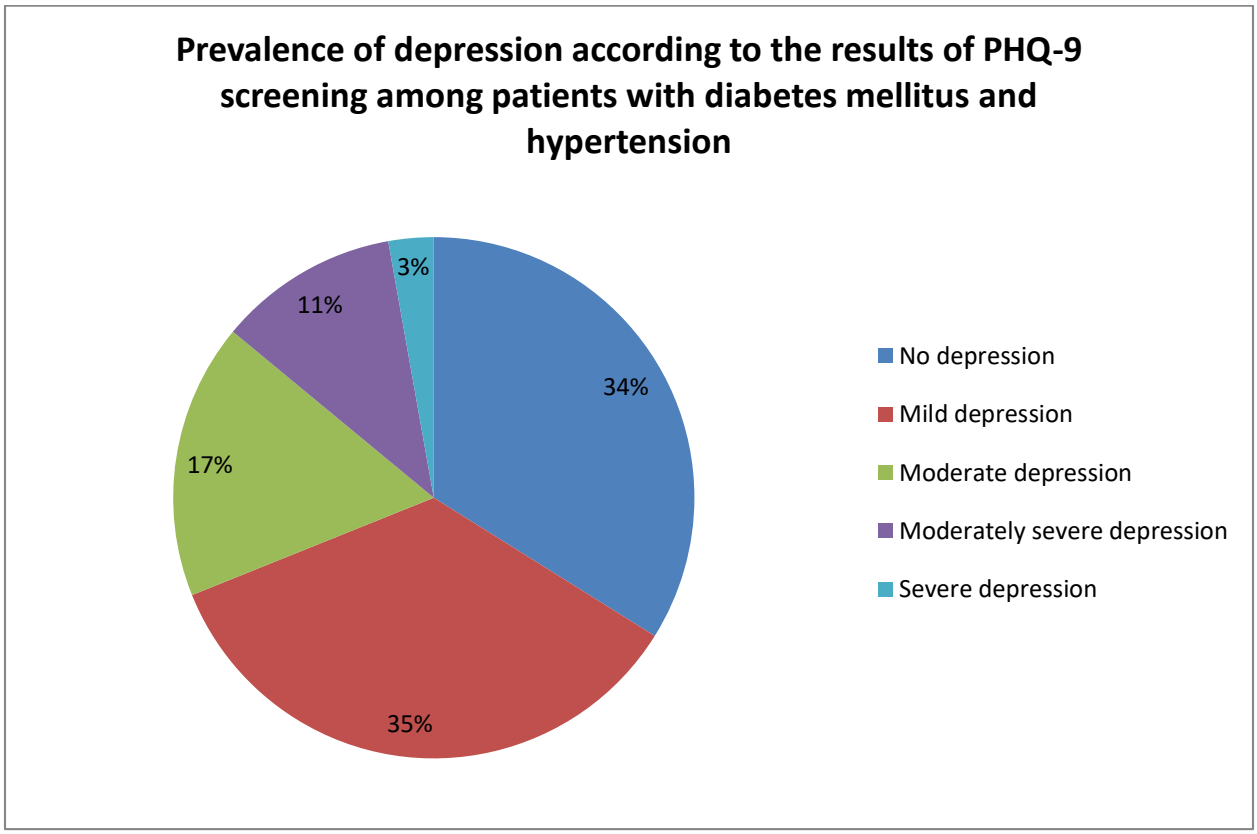
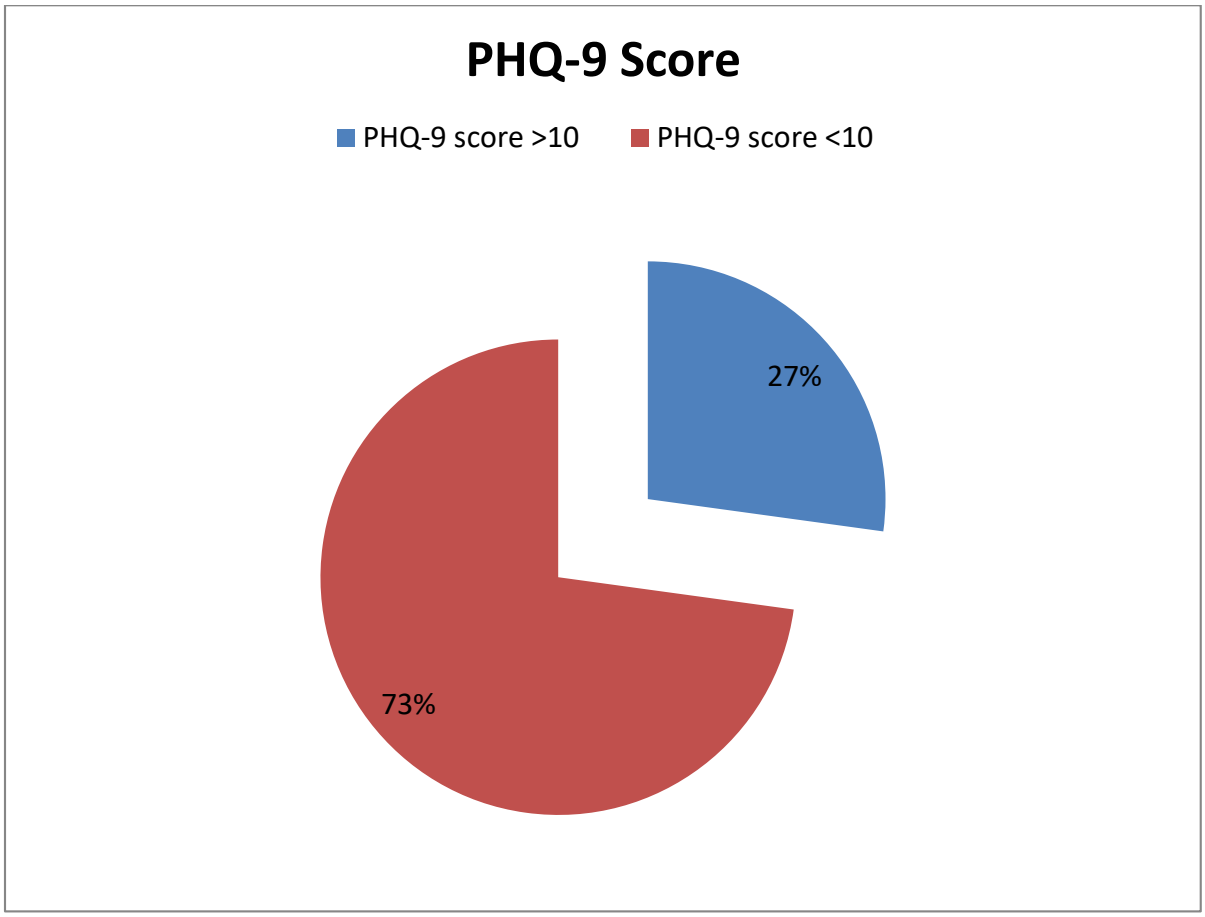


Figure 3: Frequency of patients who were fit for treatment of depression



Association of different risk factors and having depression among study participants

Economic category was found to be significantly associated with having depression where participants in category 3 were less likely to have depression compared to other economic categories and the analysis showed that patients in first economic category were 3.1 times more likely to have depression as those in third economic category (OR=3.11; 95% CI: 1.72-5.59; p<0.001). Age, gender, education, employment status, smoking and alcohol intake were not found to be associated with having depression (table 4).

Table 4: Association of socio-demographic factors and having depression among study participants

Predictors	PHQ-9 score		OR (95% CI)	P value
	No depression	Depression		
Age				
18-30	6 (60.00%)	4 (40.00%)	Ref	
31-40	9 (31.03%)	20 (68.97%)	3.33 (0.75-14.78)	0.113
41-50	20 (39.22%)	31 (60.78%)	2.32 (0.58-9.28)	0.232
51-60	27 (31.03%)	60 (68.97%)	3.33 (0.86-12.78)	0.079
>60	59 (32.78%)	121 (67.22%)	3.07 (0.83-11.32)	0.091
Gender				
Male	38 (38.00%)	62 (62.00%)	Ref	
Female	83 (32.89%)	174 (67.70%)	1.28 (0.79-2.07)	0.307
Marital status				
Single	4 (25.00%	12 (75.00%)	Ref	
Married	99 (43.42%)	129 (56.58%)	0.43 (0.13-1.38)	0.159
Widowed	17 (16.04%)	89 (83.96%)	1.74 (0.50-6.06)	0.381
Divorced	1 (14.29%)	6 (85.71%)	2.00 (0.18-22.05)	0.571
Education				
Illiterate	59 (31.55%)	128 (68.45%)	1.59 (0.75-3.40)	0.224
Primary	47 (34.56%)	89 (65.44%)	1.39 (0.64-3.03)	0.400
Secondary	14 (42.42%)	19 (57.58%)	Ref	
University	1 (100%)	0 (0.0%)		
Employment				
Unemployed	3 (23.08%)	10 (76.92%)	1.74 (0.46-6.44)	0.407
Employed	118 (34.30%)	226 (65.70%)	Ref	
Economic category				
Category 1	22 (19.82%)	89 (80.18%)	3.11 (1.72-5.59)	<0.001
Category 2	45 (36.59%)	78 (63.41%)	1.33 (0.79-2.22)	0.274
Category 3	53 (43.44%)	69 (56.56%)	Ref	
Category 4	1 (100%)	0 (0.00%)		
Smoking				
Yes	1 (9.09%)	10 (90.91%)	5.28 (0.66-41.81)	0.114
No	120 (34.69%)	226 (65.41%)		
Alcohol consumption				
Yes	26 (34.21%)	50 (65.79%)	0.98 (0.57-1.68)	0.963
No	95 (33.81%)	185 (66.07%)		

Participants with uncontrolled hypertension were 6 times more likely to have depression compared to those with controlled hypertension with a statistically significant difference where 90% of the patients with uncontrolled hypertension were found to have depression compared to 61% of the participants with controlled hypertension (OR=6.05; 95% CI: 2.52-14.6; p<0.001).

Patients with other chronic diseases were 4.5 times more likely to have depression compared to participants without other chronic diseases with a statistically significant difference (OR=4.47; 95% CI: 1.85-10.82; p=0.001) and participants with family history of depression were 3.8 times more likely to have depression compared to participants without history of depression (OR= 3.78; 95% CI: 1.29-11.06; p=0.015). Participants with personal history of depression are 7.4 times more likely to have depression as those without personal history of depression (OR=7.43; 95% CI: 4.08-13.52; p<0.001). Patients with both hypertension and diabetes mellitus were 4.1 times more likely to have depression compared to patients with only diabetes (OR=4.15; 95% CI: 1.3-13.28; p=0.016)

Table 5: Association of clinical factors and having depression among study participants

Predictors	Presence of depression (PHQ-9 score)		OR (95% CI)	P value
	No depression	Depression		
Type of chronic disease				
Diabetes	16 (44.44%)	20 (55.56%)	Ref	
Hypertension	100 (34.60%)	190 (65.52%)	1.52 (0.75-3.06)	0.241
Both	5 (16.13%)	26 (83.87%)	4.15 (1.30-13.28)	0.016
Duration diabetes				
≤5 years	7 (21.21%)	27 (79.41%)	Ref	
6-10 years	12 (44.44%)	14 (53.85%)	0.30 (0.09-0.94)	0.039
>10 years	2 (28.57%)	5 (71.43%)	0.65 (0.10-4.07)	0.644
Number of medications for diabetes				
None	1 (50.0%)	1 (50.0%)	Ref	
One to two	20 (31.75%)	44 (68.75%)	2.20 (0.13-36.9)	0.584
Three to four	0 (0.00%)	1 (100%)		
Duration of hypertension				
<3 years	35 (30.43%)	81 (69.83%)	1.20 (0.73-1.95)	0.466
≥3 years	70 (33.63%)	135 (65.85%)	Ref	
State of Hypertension				
Controlled	99 (38.37%)	158 (61.48%)	Ref	
Uncontrolled	6 (9.23%)	58 (90.63%)	6.05 (2.52-14.6)	<0.001
Antihypertensive medication				
Yes	99 (32.14%)	207 (67.65%)	1.39 (0.48-4.02)	0.539
No	6 (40.00%)	9 (60.00%)	Ref	
Other chronic disease other than DM and HTN				
Yes	6 (11.76%)	45 (88.24%)	4.47 (1.85-10.82)	0.001
No	115 (37.38%)	191 (62.62%)	Ref	
Family history of depression				
Yes	4 (12.90%)	27 (87.10%)	3.78 (1.29-11.06)	0.015
No	117 (35.89%)	209 (64.11%)	Ref	
Personal history of depression				
Yes	15 (11%)03	121 (88.97%)	7.43 (4.08-13.52)	<0.001
No	106 (47.96%)	115 (52.04%)	Ref	

Participants with mobility impairment were 4.7 times more likely to have depression compared to those without mobility impairment where 86% of the participants with mobility impairment were found to have depression compared to 57% of those without mobility impairment with a statistically significant difference (OR=4.75; 95% CI: 2.60-8.66; p<0.001).

Participants with vision impairment were 2.3 times more likely to have depression compared to those without vision impairment where 72.9% of the participants with vision impairment were found to have depression compared to 53% of those without vision impairment (OR=2.37; 95% CI: 1.5-3.74; p<0.001).

Participants without peer acceptance were 2.58 times more likely to have depression compared to those with peer acceptance (OR=2.58; 95% CI: 1.35-4.94; p=0.004). Participants with self-esteem were less likely to have depression compared to those without self-esteem (OR=0.34;95% CI: 0.13-0.85; p=0.021). Patients who perceived that waiting time was longer were 2 times more likely to have depression as those who did not perceive that waiting time is longer, where 76% of the participants who perceived that the waiting time for consultations is longer were found to have depression compared to 61% of those who did not perceive that waiting time is longer who had depression (OR=2.04; 95% CI: 1.24-3.35; p=0.005) [table 6].

Table 6: Association of social and behavior factors with having depression among study participants

Predictors	Presence of depression (PHQ-9 score)		OR (95% CI)	P value
	No depression	Depression		
Mobility impairement				
Yes	15 (13.64%)	95 (86.36%)	4.75 (2.60-8.66)	<0.001
No	106 (42.91%)	141 (57.09%)	Ref	
Vision impairment				
Yes	63 (27.04%)	170 (72.96%)	2.37 (1.50-3.74)	<0.001
No	58 (46.77%)	66 (53.23%)	Ref	
Physical activity				
Yes	26 (33.33%)	52 (66.67%)	1.03 (0.60-1.75)	0.906
No	95 (34.05%)	184 (65.95%)	Ref	
Sexual dysfunction				
Yes	27 (27.00%)	73 (73.00%)	1.56 (0.94-2.61)	0.083
No	94 (36.72%)	163 (63.28%)	Ref	
Peer acceptance/good family relations				
Yes	108 (37.50%)	180 (62.50%)	Ref	
No	13 (18.84%)	56 (81.16%)	2.58 (1.35-4.94)	0.004
Self-esteem				
Yes	115 (35.94%)	205 (64.06%)	0.34 (0.13-0.85)	0.021
No	6 (16.22%)	31 (83.78%)	Ref	
Regular follow up				
Yes	114 (33.63%)	225 (66.37%)	1.25 (0.47-3.32)	0.647
No	7 (38.89%)	11 (61.11%)	Ref	
Perceive that waiting time is longer				
Yes	28 (23.73%)	90 (76.27%)	2.04 (1.24-3.35)	0.005
No	92 (38.50%)	147 (61.50%)	Ref	
Perceive that consultation time is short				
Yes	57 (34.55%)	108 (65.45%)	0.96 (0.62-1.49)	0.864
No	64 (33.68%)	128 (66.32%)	Ref	

Multivariable logistic regression analysis of independent predictors of depression

The type of chronic disease especially having both diabetes mellitus and hypertension, personal history of depression, mobility impairment and perceiving that waiting time is longer were identified as the true independent predictors of depression among patient with chronic diseases namey diabetes mellitus and hypertension.

Table 7: Multivariable logistic regression analysis of independent predictors of depression among patients with chronic diseases.

Predictors	AOR	95% CI	SE	z	P value
Type of chronic disease					
Diabetes			Ref		
Hypertension	1.14	0.49-2.61	0.484	0.3	0.766
Both	6.68	1.74-25.59	4.577	2.77	0.006
Personal history of depression					
No			Ref		
Yes	9.61	4.95-18.65	3.252	6.68	<0.001
Mobility impairement					
No			Ref		
Yes	4.77	2.48-9.14	1.583	4.71	<0.001
Perceive that waiting time is longer					
No			Ref		
Yes	2.01	1.13-3.59	0.594	2.38	0.018

CHAPTER V: DISCUSSION

5.1. Prevalence of depression among study participants

Our study found that out of 357 participants, 81.2% (n=290) were hypertensive patients, 10% (n=36) were living with DM and 8.7% (n=31) were on follow up for both chronic somatic diseases. The overall prevalence of depression among study participants was 66%. The majority (35%) was screened for mild depression, 17% , 11.2% , 2.8% and 33.8% were screened for moderate, moderately severe, severe and not having depression respectively.

5.1.1. Prevalence of depression among participants with DM

The present study showed that 55.56% (n=20) and 44.44% (n=16) had mild to severe depression and no depression respectively among patients with DM.

Some similarities are noted from the study conducted by Adane Asefa et al (Ethiopia) but with low prevalence of depression compared to our finding, where among 398 patients with DM they reported the overall depression prevalence of 37% in which 44.7% and 2% were experienced mild and severe depression respectively (40).

The overall depression (55.56%) shown by the present study among individuals with DM is comparable with the result reported by Kirsty.K.Hall et al from a stuy done mong 261 of six facilities of DM in Yahounde (2).

Tesfa Dejenie Habtewold et al from Ethiopia have reported 44,7% of depression from 264 patients with type 2 DM. The percentage found is low compared to the present study (55.56%) but the common is there as well as the presence of untreated depression among DM clients (37). The Percentage may be different due to the given determinants available among study partipants.

A study done in 2019 by Azeze G. et al (Ethiopia) among 410 clients on follow up from DM, depression was prevalent at 29.3% of which 50% were presenting mild depression (8). Their findings are comparable to the finding from the present reseach where depression among patients living with DM was prevalent at (55.56%).

Saeed M.Omar et al from Sudan had reported that depression was prevalent at 35.6% in which 24.3% were presenting mild depression, 7.4% for moderate, 2.2% for moderately severe and 1.7% for severe depression (28). Also their result are comparable with the present findings where mild to severe depression represent (55.56%).

5.1.2. Prevalence of depression among hypertensive patients

The present study has shown that among hypertensive patients, 65.52% (n=190) were found to having mild to severe depression and 34.60% (n=100) were participants without depression.

Samar Mahmood et al (Pakistan) in their study of 411 hypertensive patients from January - April 2017, at the Civil Hospital Karachi Outpatient Department to screen depression and found 40.1% of depression where the majority (37%) were in mild depression, 27% in moderate depression, 10% in moderately severe depression and 14 participants had severe depression (38). Their findings are comparable to our findings, based on their high prevalence of mild to moderate depression and the few people of having severe depression.

Our results are in accordance with the finding from Vinod G Kulkarni et al in India who reported that depression prevalence was at 40% where 18 prticipants had mild depression, 13 had moderate and 9 patients had severe depression from 100 hypertensive study participants (35).

Endomba FTet al(in African)were done a systemtic and matanalysis study among 5299 people with hypertension and the prevalence of depression was 37.3%(36).This is comparable with our findings due to the common similarity of having depression among hypertensive individuals.

Alberto Francisco Rubio Guerra et al (Mexico) were conducted a study among 40 hypertensive persons and found that 23 of them were depressed.From their findings the common similarity is there of having depression among hypertensive patients (4).

Haitao Li et al (2017,in china) done a similar study from 977 hypertensive participants and 10.7% were reported of having ymptomes of depression (34).Still, their findings are comparable with ours but with low prevalence. The variabilities of depression prevalence from different studies is not an alert issues because it depends on the determinants among study participants. As conclusion to the prevalence of depression for the present study, there is approval that depression is common among people with DM like hypertensive patients.

5.1.3. Prevalence of depression among participants suffering from both (DM+hypertenion)

From the present study, the majority 83.87% (n=26) of patients suffering from both diseases were having mild to severe depression while 16.13%(n=5) were found not having depression. Our results are almost similar to the findings fron the study by AlSharbati et al in the study done on 456 individuals with NCDs from five health centers where diabetes mellitus followed by hypertension were the most NCDs and mild and moderate to severe depression were found in 71 (15.6%) and 53 (11.6%) individuals respectively (50).

5.2. Determinants of depression among study participants

In our study, there were determinants found to be significantly associated with depression as well low socio- economic category, where patients in first economic category were 3.1 times more likely to have depression (OR=3.11; 95% CI: 1.72-5.59; p<0.001), compared to other economic categories; uncontrolled hypertension of which patients with the condition were 6 times more likely to have depression (OR=6.05; 95% CI: 2.52-14.6; p<0.001),having other chronic disease than DM or HTN, were 4.5 times more likely to have depression,having family history of depression were 3.8 times more likely to have depression, personal history of depression were 7.4 times associated with depression, having DM and hypertension were 4.1 times more likely to have depression,occasional mobility impairment were 4.7 times more associatd with depression (OR=4.75; 95% CI: 2.60-8.66; p<0.001), occasional visual impairment were 2.3 times more associated with depression(OR=2.37; 95% CI: 1.5-3.74; p<0.001), peer acceptance were 2.58 times more assocated with depression (OR=2.58; 95% CI: 1.35-4.94; p=0.004), self-esteem were associated with depression (OR=0.34;95% CI: 0.13-0.85; p=0.021) and the perception that the waiting time was longer were 2 times more likely to be associated with depression.

Other determinants such as age, gender, education, employment status, marital status,smoking and alcohol intake,duration of diabetes, duration of HTN,number of medications used for diabetes, sexual dysfunction, physical activity,the perceiption that the consultation time is short and regular follow up were not found to be associated with having depression.

Our results are supported by the findings reported by AlSharbati et al and by Albasara et al, who reported that depression was significantly associated with low income (p = 0.02) and personal history of mental illness. Alsharbati et al found that depression was associated with marital status which is different from the present foundings where marital status was not associated with depression (50)(6). Other studies reported the same findings as those in the current study (33)(3).

The present study show the difference with the study done by Adane Asefa et al among Ethiopian patients with DM, where being single, and being divorced/widowed were more likely associated with having depression compared to married participants (p<0.001) (40).

Ou findings are also supported by the findings from the study by Samar Mahmood et al who reported that low socioeconomic condition is highly associated with depression among the patients with both depression and hypertension in their study (38).

With the present study, uncontrolled hypertension was associated with having depression(OR=6.05; 95% CI: 2.52-14.6; p<0.001). This is similar to the results from the study done by Alberto Francisco Rubio-Guerra et al in Mexico who reported that patients with uncontrolled hypertension were more likely depressed (4).

The present study shown that the longer waiting time for consultations was associated with depression((OR=2.04; 95% CI: 1.24-3.35; p=0.005). There is a similarity with the results from the sudy done by Jerome Wright et al who reported that long waiting time as five hours was associated with having depressive symptoms (10).

Alexander Maier et al reported that occasional vision impairment(OR=4.75; 95% CI: 2.60-8.66; p<0.001)occasional mobility impairment(OR=2.37; 95% CI: 1.5-3.74; p<0.001) and more chronic diseases are moreliky to be associated with depression (20) and their findings are similar to the findings from the current study.

The results of the current study showed that having other chronic dsease was associated with having depression among the study participants and our results are in accordance with the Avinash et al who reported that having an additional chronic illness increases the risk of depression among people with DM (30). The current study found that occasional mobility and vision impairment are significantly associated with depression and this finding is in accordance with the results from the study done by Ewelina et al in Poland reported that neuropathy and retinopathy were associated with depression among DM patients (51).

Mohanraj.Rani et al found that self-esteem (P<0.000) and peer acceptance(P<0.000) to be protective factors of depression (19). Their results are similar to the findings of the present study where participants with peer acceptance((OR=2.58; 95% CI: 1.35-4.94; p=0.004), and self esteem (OR=0.34;95% CI: 0.13-0.85; p=0.021) are less likely to be diagnosed from depression.

Our resuts showed that sexual dysfunction was not associated with having depression and the duration of diabetes were not ssociated with having depression. The present result are different from the findings reported by Asefa et al who reported that the duration of DM around 5 years and above and having sexual impairment were associated with depression (40).

In our study, some determinants such as gender, age, number of medications currently used, educational level, employment status, smoking and alcohol behavior, physical inactivity and sexual dysfunctional were not identified as significant preditors of depression among patints with gypertension and diabetes mellitus wich is different from the findings of other similar studies.

This can be justified by different reasons: protective factors (peer acceptance, self-esteem) are observed at a high level in our study participants, gender-based balance is highly improved in our country, culture is against gender violence, NCDs services are improved with continuous training and regular mentorship among NCDs providers, which prevent NCDs medications abuse and good adherence to medications. Smoking and alcohol behaviors could be taken as coping mechanism regarding culture but they were not found to be associated with depression in the present study. The findings from previous researchers are in accordance with our finding (41)(28).

CHAPTER VI: CONCLUSION AND RECOMMENDATIONS

6.1. Conclusion

According to the current study, 66% of study participants had depression. Of those, the majority (35%) had mild depression, 17% had moderate depression, 11.2% had moderately severe depression, 2.8% had severe depression, and 33.8% had non-depression on their screenings. Low socioeconomic status, uncontrolled hypertension, lengthy consultation wait times, sporadic mobility and vision issues, having more chronic diseases, and having a personal or family history of depression were found to be risk factors for depression, while self-esteem and peer acceptance were found to be protective factors for depression among study participants.

The results of the current study demonstrate that DM and hypertension are frequently linked to depression.

6.2. Recommendations

To health providers

- Improve teamwork so that mental health and somatic illness clinicians can offer a multidisciplinary health care package to patients with NCDs (mainly diabetes mellitus and hypertension) and depression.
- Enhance communication between patients and medical professionals to the point where people can talk about the emotional problems that may arise from having a chronic illness.

To Byumba District Hospital

- Increase the knowledge and abilities of healthcare professionals providing NCD services by providing frequent training in the diagnosis and management of prevalent mental disorders.
-Include regular depression assessment for people being monitored for chronic illnesses

To Ministry of health

- Create a healthcare strategy for integrating common mental health services for people with diabetes and/or hypertension.

REFERENCES

1. Akpalu J, Yorke E, Ainuson-Quampah J, Balogun W, Yeboah K. Depression and glycaemic control among type 2 diabetes patients: A cross-sectional study in a tertiary healthcare facility in Ghana. BMC Psychiatry. 2018;18(1):1–7.
2. Hall KK, Tambekou J, Penn L, Camara A, Balde NM, Sobngwi E. Association between depression, glycaemic control and the prevalence of diabetic retinopathy in a diabetic population in Cameroon. South African J Psychiatry. 2017;23(1):1–7.
3. Wang L, Li N, Heizhati M, Li M, Pan F, Yang Z, et al. Prevalence and predictive nomogram of depression among hypertensive patients in primary care. 2021;0(January):1–10.
4. Facp AFR, Rodriguez-lopez L, Vargas-ayala G, Mc SH, Serna DC, Lozano-nuevo JJ, et al. Depression increases the risk for uncontrolled hypertension. 2013;18(1):10–2.
5. A M, SM K, A V, Stefanadis C, Papageorgiou C, A D. Anxiety and Depression Prevalence in Essential Hypertensive Patients is there an Association with Arterial Stiffness? J Depress Anxiety. 2018;07(02).
6. Albasara SA, Haneef MS, Zafar M, Moinuddin KG. Depression and associated risk factors among hypertensive patients in primary health care centers in dammam, kingdom of saudi arabia. Pan Afr Med J. 2021;38.
7. Gulzar A, Shahid MA, Muazzam F, Farrukh H, Siddiqui MF, Mahmood N. Prevalence of general anxiety disorders in patients with hypertension. Pakistan J Med Heal Sci. 2019;13(2):421–3.
8. Azeze GA, Adema BG, Adella GA, Demissie BW, Obsa MS. Factors associated with untreated depression among type 2 diabetic patients at halaba kulito hospital, South Ethiopia: A cross-sectional study. Diabetes, Metab Syndr Obes Targets Ther. 2020;13:2189–98.
9. Rondón Bernard JE. Depression: A Review of its Definition. MOJ Addict Med Ther. 2018;5(1):7–8.
10. Wright J, Mazumdar P, Barua D, Lina S, Bibi H, Kanwal A, et al. Integrating depression care within NCD provision in Bangladesh and Pakistan: A qualitative study. Int J Ment Health Syst [Internet]. 2020;14(1):1–13. Available from: https://doi.org/10.1186/s13033-

020-00399-y

11. Hasler G. Pathophysiology of depression: Do we have any solid evidence of interest to clinicians? World Psychiatry. 2010;9(3):155–61.
12. Uphoff EP, Newbould L, Walker I, Ashraf N, Chaturvedi S, Kandasamy A, et al. A systematic review and meta-analysis of the prevalence of common mental disorders in people with non-communicable diseases in Bangladesh, India, and Pakistan. J Glob Health. 2019;9(2).
13. Deischinger C, Dervic E, Leutner M, Kosi-Trebotic L, Klimek P, Kautzky A, et al. Diabetes mellitus is associated with a higher risk for major depressive disorder in women than in men. BMJ Open Diabetes Res Care. 2020;8(1).
14. Of M, Disorders M. No Title.
15. Herman J. On prevalence and incidence. Scand J Prim Health Care. 1995;13(3):161–2.
16. WHO. SURVEYS: handbook. Tuberculosis. 2011;
17. Spronk I, Korevaar JC, Poos R, Davids R, Hilderink H, Schellevis FG, et al. Calculating incidence rates and prevalence proportions: Not as simple as it seems. BMC Public Health. 2019;19(1):1–9.
18. EMA. Points to consider on the estimation and reporting on the prevalence of a condition for the purpose of orphan designation. 2019;31(June):1–8.
19. Mohanraj. Risk and Protective Factors to Depressive Symptoms in School-Going Original Article Risk and Protective Factors to Depressive Symptoms in School-Going Adolescents. Researcg gate. 2014;(May):1–20.
20. Maier A, Riedel-Heller SG, Pabst A, Luppa M. Risk factors and protective factors of depression in older people 65+. A systematic review [Internet]. Vol. 16, PLoS ONE. 2021. 1–38 p. Available from: http://dx.doi.org/10.1371/journal.pone.0251326
21. Samhsa. Substance Abuse and Mental Health Services Administration: Risk and Protective Factors. 2021;1–4. Available from: https://www.samhsa.gov/sites/default/files/20190718-samhsa-risk-protective-factors.pdf
22. Chen F, Wei G, Wang Y, Liu T, Huang T, Wei Q, et al. Risk factors for depression in elderly diabetic patients and the effect of metformin on the condition. BMC Public Health. 2019;19(1):1–9.
23. Briganti CP, Silva MT, Almeida JV De, Bergamaschi CDC. Association between diabetes

mellitus and depressive symptoms in the Brazilian population. Rev Saude Publica. 2019;53:5.

24. Khaledi M, Haghighatdoost F, Feizi A, Aminorroaya A. The prevalence of comorbid depression in patients with type 2 diabetes: an updated systematic review and meta-analysis on huge number of observational studies. Acta Diabetol [Internet]. 2019;56(6):631–50. Available from: http://dx.doi.org/10.1007/s00592-019-01295-9
25. Chireh B, Li M, Arcy CD. Diabetes increases the risk of depression : A systematic review , meta-analysis and estimates of population attributable fractions based on prospective studies. Prev Med Reports [Internet]. 2019;14(February):100822. Available from: https://doi.org/10.1016/j.pmedr.2019.100822
26. Akena D, Kadama P, Ashaba S, Akello C, Rejani L, Okello J, et al. HHS Public Access. 2015;7–12.
27. Camara A, Baldé NM, Enoru S, Bangoura JS, Sobngwi E, Bonnet F. Prevalence of anxiety and depression among diabetic African patients in Guinea: Association with HbA1c levels. Diabetes Metab. 2015;41(1):62–8.
28. Omar SM, Musa IR, Idrees MB, Adam I. Prevalence of depression and associated factors among patients with type 2 diabetes mellitus in eastern Sudan. 2021;1–8.
29. Mukeshimana M, Chironda G. Depression and Associated Factors Among the Patients with Type 2 Diabetes in Rwanda. Ethiop J Health Sci. 2019;29(6):709–18.
30. Sunny AK, Khanal VK, Sah RB, Ghimire A. Depression among people living with type 2 diabetes in an urbanizing community of Nepal. PLoS One. 2019;14(6):1–11.
31. Salinero-fort MA, Andrés-rebollo FJS, Cárdenas-valladolid J, Abánades-herranz JC, Carrillo E, Pau DS, et al. Prevalence of depression in patients with type 2 diabetes mellitus in Spain (the DIADEMA Study) : results from the MADIABETES cohort. 2018;1–11.
32. Eker S. Prevalence of Depression Symptoms in Diabetes Mellitus. 2018;6(2):340–3.
33. Ramachandran A, Mbanya JC, Shestakova M, Bourhis Y. High Prevalence of Depressive Symptoms in Patients With Type 1 and Type 2 Diabetes in Developing Countries : Results From the International Diabetes Management Practices Study. 2021;44(May):1100–7.
34. Li H, Xia H, Yi S, Rao L. Social capital, depressive symptoms, and perceived quality of care among hypertensive patients in primary care. Health Qual Life Outcomes [Internet]. 2020;18(1):1–8. Available from: https://doi.org/10.1186/s12955-020-01630-7

35. Kulkarni VG, Lingappa SH. Prevalence of depression in patients attending general medicine outpatient department for hypertension. 2019;8(2):105–9.
36. Endomba FT, Mazou TN, Bigna JJ. Epidemiology of depressive disorders in people living with hypertension in Africa: A systematic review and meta-analysis. BMJ Open. 2020;10(12):1–8.
37. Habtewold TD, Alemu SM, Haile YG. Sociodemographic, clinical, and psychosocial factors associated with depression among type 2 diabetic outpatients in Black Lion General Specialized Hospital, Addis Ababa, Ethiopia: A cross-sectional study. BMC Psychiatry [Internet]. 2016;16(1):1–7. Available from: http://dx.doi.org/10.1186/s12888-016-0809-6
38. Mahmood S, Hassan SZ, Tabraze M, Khan MO, Javed I, Patel MS, et al. Prevalence and Predictors of Depression Amongst Hypertensive Individuals in. 2017;9(6).
39. Chireh B, D'Arcy C. Shared and unique risk factors for depression and diabetes mellitus in a longitudinal study, implications for prevention: an analysis of a longitudinal population sample aged ⩾45 years. Ther Adv Endocrinol Metab. 2019;10:1–15.
40. Asefa A, Zewudie A, Henok A, Mamo Y. Depression and Its Associated Factors among Diabetes Mellitus Patients Attending Selected Hospitals in Southwest Ethiopia : A Cross-Sectional Study. 2020;2020.
41. Cakmak S, Gen E. Relationship between quality of life, depression and anxiety in type 1 and type 2 diabetes. Dusunen Adam. 2020;33(2):155–69.
42. O'Neil A, Jacka FN, Quirk SE, Cocker F, Taylor CB, Oldenburg B, et al. A shared framework for the common mental disorders and Non-Communicable Disease: Key considerations for disease prevention and control. BMC Psychiatry. 2015;15(1):1–6.
43. Chowdhury SR, Barua S, Kamal AHM. The Relationship Between Diabetes and Depression. Chattagram Maa-O-Shishu Hosp Med Coll J. 2018;17(1):50–4.
44. Joshua JJ, Sherita HG. Cortisol dysregulation: the bidirectional link between stress, depression and type 2 diabetes mellitus. Ann N Y Acad Sci [Internet]. 2017;1391(1):20–34. Available from: file:///C:/Users/Carla Carolina/Desktop/Artigos para acrescentar na qualificação/The impact of birth weight on cardiovascular disease risk in the.pdf
45. Korczak D, Pereira S, Health M, Koulajian K. Type 1 diabetes mellitus and major depressive disorder : evidence for a biological link. 2011;(July).

46. Scalco AZ, Scalco MZ, Batista J, Azul S, Neto FL, Az S, et al. REVIEW HYPERTENSION AND DEPRESSION. 2005;60(3):241–50.
47. van der Feltz-Cornelis C, Allen SF, Holt RIG, Roberts R, Nouwen A, Sartorius N. Treatment for comorbid depressive disorder or subthreshold depression in diabetes mellitus: Systematic review and meta-analysis. Brain Behav. 2021;11(2):1–25.
48. Owens-Gary MD, Zhang X, Jawanda S, Bullard KMK, Allweiss P, Smith BD. The Importance of Addressing Depression and Diabetes Distress in Adults with Type 2 Diabetes. J Gen Intern Med. 2019;34(2):320–4.
49. Darwish L, Beroncal E, Sison MV, Swardfager W. Depression in people with type 2 diabetes: Current perspectives. Diabetes, Metab Syndr Obes Targets Ther. 2018;11:333–43.
50. Alsharb W, Bucheeri S, Alkawari M, Alromaihi N, Algarf R. Journal of the Bahrain Medical Society Prevalence of Depression and Anxiety Among Patients with Noncommunicable Diseases in The Kingdom of Bahrain. 2020;(April).
51. Bąk E, Marcisz C, Krzemińska S, Dobrzyn-Matusiak D, Foltyn A, Drosdzol-Cop A. Relationships of sexual dysfunction with depression and acceptance of illness in women and men with type 2 diabetes mellitus. Int J Environ Res Public Health. 2017;14(9):1–14.

APPENDICES

Appendix I: CONSENT FORM (English language)

This informed consent form is intended for all adults 18 years of age and older, of either gender who are receiving follow-up care at the Byumba District Hospital (BDH) and its health centers for either diabetes, hypertension, or both.

I'm inviting you to take part in a study on "Depression in NCDs (Diabetes and Hypertension): Prevalence and Determinants in Patients Undergoing Follow-Up in the NCDs Department of Byumba District Hospital and its health centers.

PART I: Information Sheet

Introduction

I am Marie Assumpta AYINKAMIYE, Medical Doctor, a postgraduate student in Masters of medicine in psychiatry at the University of Rwanda. I am doing research on "Prevalence and determinants of depression among patients living with Diabetes and Hypertension at Byumba District Hospital and its health centers, Rwanda. "in order to get information, the status of depression and the same time providing mental health services. I am going to give you information and invite you to be part of this research. You do not have to decide immediately whether you will participate in the research. Before you decide, you can talk to anyone you feel comfortable with about the research.

Purpose of the research

The overall aim of this study is to identify undiagnosed and untreated depression and associated factors in patients living with diabetes and hypertension at Byumba District Hospital and its health centers.

Voluntary participation

In this study, the participation is entirely voluntary. It is your choice whether to participate or not. Whether you choose to participate or not, all the services you receive at this hospital will continue and nothing will change. You may change your mind later and stop participating even if you agreed earlier. Each participant will receive the questionnaire.

Description of the Process

During the research you will have one interview with the researcher or with the assistant research on the day of your organized appointment.

Duration

The research will take one month and a half in total, from June to 16th to 30th jully 2022. You will be available once.

Benefits

There may not be any direct benefit for you, but your participation is likely to help us find the answers to the research questions. There may not be any direct benefit to the society at this stage of the research, but future generations are likely to benefit. Additionally, the participant who receives a score of 10 or higher will be given the proper treatment in a mental health unit.

Reimbursements

You will not be given any other money or gifts to take part in this research.

Confidentiality

It is possible that if others in the community are aware that you are participating, they may ask you questions. We will not be sharing the identity of those participating in the research. The information that we collect from this research project will be kept confidential. Information about you that will be collected during the research will be put away and no-one but the researchers will be able to see it. Any information about you will have a number on it instead of your name. Only the researchers will know what your number is and we will lock that information up with a lock and key. It will not be shared with or given to anyone except the principal researcher.

Sharing the Results

The knowledge that we get from doing this research will be shared with you through one group meeting with all participants. After this meeting, we will publish the results, and then other interested people may learn from our research.

Right to Refuse or Withdraw

Example: You do not have to take part in this research if you do not wish to do so. You may also stop participating in the research at any time you choose. It is your choice and all of your rights will still be respected.

Who to Contact

If you have any questions you may ask us now or later, even after the study has started. If you wish to ask questions later, you may contact the institutional review board of University of Rwanda college of medicine and health sciences (**at Tel: +250788813414**) You can ask me any more questions about any part of the research study, if you wish to.

PART II: Certificate of Consent

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and got answers to my satisfaction. I consent voluntarily to participate as a participant in this research.

Name of Participant _____

Signature of Participant _____Date _____

Appendix II: Informed consent form (Ikinyarwanda language)

Dr AYINKAMIYE Marie Assumpta

Resident in psychiatry

College of medicine and health sciences

University of RWANDA

E-mail: chryso21@yahoo.fr

Tel: +250784049295

URUHUSHYA RWO KWITABIRA UBUSHAKASHATSI (mu rurimi rw'ikinyarwanda)

Uru ruhushya rwo kwitabira ubushakashatsi rugenewe abantu bivuza muri servisi y'indwara zo mu mubiri zitandura kandi zidakira mu bitaro by'akarere bya Byumba bihereye mu Karere ka Gicumbi no mu bigonderabuzima bishamikiye ku bitaro bya Byumba.

Turabahamagarira kwitabira ubushakashatsi kubijyanye n' uko indwara y'agahinda ihagaze mu barwayi bivuza indwara y'igisukari(diyabete) n'indwara y'umuvuduko w'amaraso ukabije.

IGICE CYA MBERE: AMAKURU KU BUSHAKASHATSI

INTANGIRIRO

Ndi Ayinkamiye Marie Assumpta, ndi umuganga , umunyeshuri mu cyiciro cya gatatu mu buvuzi bw'indwara zo mu mutwe muri Kaminuza y'u Rwanda. Ndimo gukora ubushakashatsi kubijyanye n' indwara y'agahinda gakabije mu barwayi bivuza muri servisi y'indwara zo mu mubiri zitandura kandi zidakira mu bitaro by'akarere bya Byumba bihereye mu karere ka Gicumbi ,bizatuma tumenya umubare w'abafite indwara y'agahinda gakabije bityo tubonereho kubaha servisi z'ubuzima bwo mu mutwe. Tugiye kubaha amakuru abafasha kwitabira ubu bushakashatsi. Si ngobwa gufata icyemezo aka kanya cyo kwitabira ubushakashatsi. Mbere yo kwitabira ubushakashatsi, mushobora kwiyambaza undi muntu wese mushaka mukamusobanuza iby'ubu bushakashatsi.

Icyo ubushakashatsi bugamije

Ubu bushakashatsi bugamije cyane cyane kureba umubare w'abarwayi bafite indwara y'agahinda gakabije, mu barwayi bivuza indwara y'igisukari n'umuvuduko w'amaraso ukabije.

. Uwemeye kwitabira wese azahabwa urutonde rw'ibibazo agomba gusubiza.

Kwitabira k'ubushake

Kwitabira ubu bushakashatsi ni k'ubushake busesuye. Ni uguhitamo kwa buri wese. Wahitamo cyangwa ukanga kwitabira ubu bushakshatsi, serivisi uhabwa mu bitaro zizakomeza ukozagenwe ari nta gihindutse. Ushobora guhindura icyemezo ukisubiraho nyuma n'ubwo waba wari wemeye kwitabira ubushakashatsi ku ikubitiro.

Uko ubushakashatsi buzagenda

Mugihe cy'ubushakashatsi uzabazwa ibibazo namuganga uzaba uri muri gahunda y'ubushakashatsi. Uwo muganga ashobora kuba umushakashatsi mukuru cg abamufasha. Uwitabira ubushakashatsi azasubiza ibibazo ku munsi afitiyeho gahunda isanzwe yo kubonana na muganga nyuma yo guhabwa ubuvuzi bwamuzanye.

Igihe ubushakashatsi buzamara

Ububushakashatsi buzamara ukwezi n'igice. Muri rusange, muzasabwa kuboneka incuro imwe gusa.

Inyungu

Kuri uru rwego rw'ubushakashatsi hashobora kutaboneka ibisubizo kumuryango rusange ariko ejo hazaza abanyarwanda bafite inyungu muri ubu bushakashatsi.

Ikindi,uwo bizagaragara ko afite indwara y'agahinda gakabije azahabwa ubuvuzi buteganyirijwe ubwo burwayi, muri servise ishinzwe ubuzima bwo mu mutwe, mu bitaro bya Byumba.

Kwishyurwa

Nta mafaranga cyangwa izindi mpano muzahabwa kugirango mwitabire ububushakashatsi.

Ibanga

Birashoboka ko abantu bamwe nibumva ko mwitabiriye ubu bushakashatsi bazaza kutubaza ibibazo. Nta na rimwe tuzagaragaza amazina n'ibiranga abitabiriye ubushakashatsi. Amakuru twegeranya muri ubu bushakashatsi azagirwa ibanga, abikwe neza ku buryo nta we ushobora kuyageraho uretse twe turi gukora ubushakashatsi. Amakuru yose aberekeye azashyirwaho nomero aho kuba amazina yanyu kandi azafungiranywa ahantu mu buryo bwizewe. Aya makuru ntazahabwa umuntu n'umwe wundi uretse umuganga urimo gukora ubu bushashatsi.

Gutangaza ibyavuye mu bushakashatsi

Ubumenyi tuzavana muri ubu bushakashatsi muzabumenyeshwa mu nama izategurirwa abitabiriye ubushakashatsi bose. Nyuma y'iyo nama, tuzatangaza kumugaragaro ibyavuye mu bushakashatsi kugirango n'abandi babishaka bagire icyo bigira kuri ububushakashatsi.

Uburenganzira kubirebana n'ubu bushakashatsi.

Mufite uburenganzira bwo kwemera cyangwa kwanga kwitabira ubu bushakashatsi. Mushobora kandi guhagarika kubwitabira igihe cyose mushakiye. Ni uburenganzira bwanyu kandi buzubahirizwa.

Ni nde mwakwiyambaza

Igihe mufite ikibazo ubu ngubu cyangwa nyuma, n'iyo ubushakashatsi bwaba bwararangiye, mushobora kwiyambaza ubuyobozi bukuriye ikigo gitanga uruhushya rwo gukora ubushakashatsi (**kuri Tel: +250788813414)** Mushobora kumbaza ikibazo icyo ari cyo cyose kuri ubu bushakashatsi igihe mushakiye, kuri telephone +250784049295 cyangwa kuri email: chryso21@yahoo.fr

IGICE CYA KABIRI:

Icyemezo cyo kwitabira ubushakashatsi

Maze guhabwa ayamakuru. Nahawe umwanya wo kubaza ibibazo kuribyo kandi nahawe ibisubizo bishimishije. Niyemeje, ari nta gahato gaturutse kubandi kwitabira ububushakashatsi.

Izina ry'uwitabiriye ubushakashatsi: …….

Umukono cyangwa igikumwe…….

Itariki……

Appendix III: Data collection tool (English language)

SOCIO-DEMOGRAPHIC CHARACTERISTIC OF RESPONDERS

Participant's number: ……

Participant's telephone: ……

1. Gender: Male: □ Female: □

2. Date of birth…….

2.a. Age group: 18 -30: □ 31 -40 □ 41-50□ 51 -60: □ > 60 □

3. Marital status**:**

Single: □ married □ Widowed □ Divorced □

Living from different address with your patterner? Yes: □ No □

Do you have children Yes: □ No □

4. Education level**:** Illiterate □ Primary: □ Secondary: □ University: □

5. Occupation: Unemployed: □ Farmer: □ Student: □ Employed: □

self-employed: □ Retired: □

6. Economic social class**:** 1: □ 2: □3: □ 4: □

7.Chronic somatic disease on follow up**:** Diabetes: □ HTA: □ Both: □

8.How long do you know the diagnosis of diabetes (duration with diabetes)?

≤5 y.o: □ 6-10 y.o: ≥11 y.o□

9.Type of diabetes do you have**?**

Type 1: □ Type 2: □

10.Types of diabetes treatment? Only diet □ Oral antidiabetic agents □ Insulin□

Oral antidiabetic agents +Insulin □

11. Number of medications do you use for diabetes:

None: □ one to two: □ Tree to four: □ >four(polypharmacy) □

12. Smoking behavior t**:** Yes**:** □ no**:** □

13. Alcohol consumption: Yes: □ No: □

14. Sporadic mobility impairment: Yes: □ No: □

15. Sexual dysfunctional**:** Yes: □No: □

16. Occasional visual impairment: Yes: □ No: □

17. Physical activity**:** Yes: □ No: □

18. How long do you know the diagnosis of HTA (duration with HTA)?

<3 y.o: □ ≥3 y.o□

19. Antihypertensive medication: Yes: □ No: □

20.Controlled HTA: □ Uncontrolled HTA: □

21. Other chronic disease than diabetes and hypertension? Yes: □ No □

If yes, which one? …….

22. Personal history of depression? Yes: □No: □

23. Personal history of other mental illness? Yes: □ No: □

24. Family history of depression? Yes: □ No: □

25. Family history of other mental illness? Yes: □ No □

26. Family history of diabetes? Yes: □ No: □

27. Family history of HTA: Yes: □ No: □

28. Peer acceptance/good family relationship: Yes: □ No: □

29. Self-esteem: Yes: □ No: □

30.Closely follow up (regularly visit the Doctor): Yes: □ No: □

31. Social support: Yes: □ No: □

32. The waiting times for consultation is too longer on the appointment day? Yes: □ No: □

If yes, <3 hours: □ 3-5hours: □ 5 hours: □ > 5hours

33. The duration of consultation is too short? Yes**:** □ No: □

If yes, <5 minutes: □ 5 minutes: □ >5 minutes

B. PATIENT HEALTH QUESTIONNAIRE (PHQ)-9

Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Depressive symptoms	Not at all	Several days	More than half the days	Nearly every day
a	Little interest or pleasure in doing things	**0**	**1**	**2**	**3**
b	Feeling down, depressed, or hopeless	**0**	**1**	**2**	**3**
c	Trouble falling or staying asleep, or sleeping too much	**0**	**1**	**2**	**3**
d	Feeling tired or having little energy	**0**	**1**	**2**	**3**
e	Poor appetite or overeating	**0**	**1**	**2**	**3**
f	Feeling bad about yourself—or that you are a failure or have let yourself or your family down				
g	Trouble concentrating on thinks,as reading the Newspaper or watching television or other daily habit	**0**	**1**	**2**	**3**
h	Moving or speaking so slowly that other people could have noticed? Or the opposite, being so fidgety or restless that you have been moving around a lot more than usual	**0**	**1**	**2**	**3**
i	Thoughts that you would be better off dead or of hurting yourself in some way.	**0**	**1**	**2**	**3**
	Total				

Appendix IV: IBIBAZO MU KINYARWANDA

IBIBAZO BIBAZWA UMURWAYI WITABIRIYE UBUSHAKASHATSI KUBURWAYI BW'AGAHINDA MU BARWAYI BA DIYABETE N'UMUVUDUKO W'AMARASO UKABIJE BIVURIZA MU BITARO BYA BYUMBA NO MU BIGONDERABUZIMA BIKURIWE N'IBYO BITARO.

Inomero y'umurwayi……

Inomero ya telefone: ……

1.Igitsina: Gabo: □ Gore: □

2.Igihe yavukiye…….

2.Imyaka: 18-30: □ 31 -40: □ 41-50: □ 51-60: □ >60: □

3. Irangamimerere: Ingaragu □ Arubatse □ Twaratandukanye □

Tuba ukubiri n'uwo twashakanye□ Umupfakazi: □

Ufite abana? Yego: □ Oya: □

4. Amashuri wize:

Ntayo: □ Abanza: □ Ayisumbuye: □ Kaminuza: □

5. Umurimo: Umushomeri: □ Umuhinzi mworozi: □ Umunyeshuli: □

Umukozi wa Leta/ikigo kigenga: □ Uwikorera ku giti cye: □

Uri mu kiruhuko cy'izabukuru: □

6. Icyiciro cy'ubudehe: Icyiciro cya 1: □ Icyiciro cya 2: □ Icyiciro cya 3: □ Icyiciro cya4: □

7.Indwara yivuza**:** Diyabete:□ Umuvuduko w'amaraso ukabije:□ Byombi:□

8.Uburwayi bw'igisukari umaze igihe kingana iki ubumenye?

≤ imyaka 5 :□ imyaka 6-10:□ ≥ imyaka 11: □

9.Waba ufite ubuhe bwoko bw'igisukari?

Ubwoko bwa mbere:□ ubwoko bwa kabiri:□

10. Ubwoko bw'imiti y'igisukari uhabwa: ibinini □ urushinge rwa insilini□ Byombo □

11.umubare w'imiti ufata kuburwayi bw'igisukari: Ntayo: □1-2: □3-4:□ >4(myinshi)□

12. Waba unywa itabi: Yego**:**□ Oya**:**□

13. Waba unywa inzoga: Yego**:**□ Oya**:**□

14.Aho umenyeye ko ufitiye ubu burwayi, hari imbogamizi zo gukoresha ingingo z'amaboko n'amaguru uhura nazo ?Yego:□ Oya:□

15. Aho umenyeye ko ufitiye ubu burwayi, hari imbogamizi zo gukora imibonano mpuzabitsina uhura nazo? Yego: □ Oya: □

16 . Aho ufitiye ubu burwayi waba ugira imbogamizi mukureba?Yego:□ Oya:□

17. Waba ukora imyitozo ngororamubiri izwi nka siporo itari imirimo rusange y'amaboko n'amaguru? Yego: □ Oya: □

18. Uburwayi bw'umuvuduko w'amaraso ukabije umaze igihe kingana iki ubumenye?

< imyaka 3: □ ≥ imyaka 3 □

19. Ufata imiti y'umuvuduko w'amaraso ukabije? Yego: □ Oya: □

20.Umuvuduko w'amaraso waba warasubiye ku bipimo byiza? yego □ oya: □

21. Waba ufite ubundi burwayi budakira usibye diyabete cg umuvuduko w'amaraso ukabije? Yego: □ Oya: □

.Niba ari yego, ubwo burwayi ni ubuhe? …….

22. Waba warigeze kugira uburwayi bw'agahinda? Yego□ Oya □

23.Waba warigeze kugira ubundi burwayi bwo mu mutwe? Yego□ Oya □

24. Mu muryango hari abagize uburwayi bw'agahinda: Yego□ Oya □

25. Mu muryango hari abagize ubundi burwayi bwo mu mutwe? Yego□ Oya □

26. Mu muryango hari abafite uburwayi bwa Diyabete? Yego□ Oya □

27. Mu muryango hari abafite uburwayi bw'umuvuduko w'amaraso ukabije? Yego: □ Oya: □

28. Aho ugiriye ubu burwayi, abo mu muryango mubanye uko byari bisanzwe**?** Yego: □ Oya: □

29. Aho ugiriye ubu burwayi waba wifitiye icyizere? Yego: □ oya: □

30. Aho ugiriye ubu burwayi ukurikiza neza gahunda zo kubonana na muganga**?** Yego: □Oya**:** □

31. Aho ugiriye ubu burwayi hari ubufasha nyunganizi ubona bwaba ubw'umuryango , ubwa leta cg ubw'abagiraneza? Yego: □ Oya: □

32. Igihe umara uhabwa ubuvuzi ku munsi wahawe wo kubonana na muganga kikubera kinini cyane? Yego: □ Oya: □

Niba ari yego, < amasaha 3: □ Hagati ya 3 na 5: □ amasaha 5: □Hejuru ya 5: □

33.Umwanya uganira na muganga ubona ari muto cyane ugereranyije n'umwanya umutegereza**?** Yego: □ Oya: □

Niba ari yego, < iminota 5: □ iminota 5: □ Hejuru y'iminota 5: □

B. IBIBAZO 9 BIJYANYE N'IBIMENYETSO KU BURWAYI BW'AGAHINDA.

Mu byumweru bibiri bishize, ni kangahe waba waribonyeho ibimenyetso bikurikira:(shyira akamenyetso kugisubizo kiboneye).

Ibimenyetso by'agahinda		Nta na rimwe	Rimwe na rimwe	Birenze iminsi 7	Hafi ya buri munsi	
a	Kudashishikarira ibyo ukora cyangwa ntushimishwe nabyo	0	1	2	3	
b	Kumva ubabaye, ufite ishavu cyangwa wihebye	0	1	2	3	
c	Kubura ibitotsi, kubicikiriza hagati mu ijoro bikakugora kongera gusinzira cyangwa gusinzira bikabije	0	1	2	3	
d	Kugira umunaniro udashira cyangwa ukumva ufite imbaraga nkeya cyane	0	1	2	3	
e	Kumva udashaka kurya cyangwa kurya cyane bidasanzwe.	0	1	2	3	
f	Kwitekerezaho cyane kandi nabi, kumva nta kamaro ufite, kumva ntacyo wimariye cyangwa umariye umuryango wawe	0	1	2	3	
g	Kumva udashishikajwe n'ibintu, cyangwa se imirimo wari usanzwe ukora, nko kwita ku muryango wawe, guteka, kumesa, kuganira n'abo mubana, n'ibindi	0	1	2	3	
h	Kugenda cyangwa kuvuga buhoro kuburyo budasanzwe bikagaragarira abandi, cyangwa kugendagenda, ntugume hamwe nk'ibisanzwe	0	1	2	3	
i	Gutekereza ko gupfa byakurutira byose cyangwa ukumva wakwigirira nabi	0	1	2	3	
	Umwanzuro ku burwayi bw'agahinda	Ntako	Gake	Karinganiye	Gakabije	Gakabije cyane

Appendix V: Study approval from IRB of UR-CMHS

UNIVERSITY of RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 6th /June /2022

Dr Ayinkamiye Marie Assumpta
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 352/CMHS IRB/2022

Your Project Title ***"Prevalence and Determinants of Depression among Patients Living with Diabetes and Hypertension at Byumba District Hospital and Its Health Centers, Rwanda"*** has been evaluated by CMHS Institutional Review Board.

		Involved in the decision		
		Yes	No (Reason)	
Name of Members	**Institute**		**Absent**	**Withdrawn from the proceeding**
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Stefan Jansen	UR-CMHS	X		
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS		X	
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district	X		
Prof Gishoma Darius	UR-CMHS	X		
Prof Donatilla Mukamana	UR-CMHS	X		
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS	X		
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 6th June 2022, **Approval has been granted to your study.**
Please note that approval of the protocol and consent form is valid for **12 months**.

Email: researchcenter@ur.ac.rw P.O Box 3286 Kigali, Rwanda www.ur.ac.rw

You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.
3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 6th June 2022

Expiration date: The 6th June 2023

Prof Stefan JANSEN
Ag. Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate Studies, UR

Appendix VI: Study approval from Byumba District Hospital

REPUBLIC OF RWANDA

GICUMBI DISTRICT
BYUMBA HOSPITAL

Gicumbi, 14/6/2022

N°20/840/BYDH/DG/2022

Director General's Office

Dr AYINKAMIYE Marie Assoumpta

Tel:0784049295

Impamvu: Igisubizo cy'ibaruwa

Dr,

Nshingiye ku ibaruwa yawe yo kuwa 09 Kamena wanditse usaba gukorera ubushakashatsi burebana no kumenya uko indwara y'agahinda gakabije ihagaze mu barwayi bakurikiranwa ku burwayi bw'isukari n'umuvuduko w'amaraso mu mu bitaro bya Byumba no mu bigonderabuzima byo mu karere ka Gicumbi;

Nejejwe no kukwandikira ngira ngo nkumenyeshe ko ubusabe bwawe bwemewe.

Ugire amahoro.

MINISTRY OF HEALTH - BYUMBA DISTRICT HOSPITAL

Dr. UWIZEYE Marcel

Umuyobozi mukuru w'ibitaro bya Byumba

E-MAIL: hopbyumba@yahoo.fr, byumba.hospital@moh.gov.rwP.O BOX 4 Byumba, Rwanda