ORIGINAL ARTICLE

HEALTH RELATED QUALITY OF LIFE AMONG PATIENTS WITH CHRONIC MEDICAL DISEASES AND COMORBID DEPRESSION

Habtamu Kerebih[1]*, Sewbesew Yitayih[1], Endale Bekele[2], Behailu Eshetu[2], Wondale Getinet[1]

ABSTRACT

Background: *Health related quality of life has been affected to a greater extent by chronic medical conditions, neurological and psychiatric illnesses. Medical conditions comorbid with psychiatric illnesses have increased negative effect on the health related quality of life of the affected individuals. However, there is a dearth of data in Ethiopia in this aspect. Therefore, the current study assessed the health related quality of life among patients with chronic medical diseases and comorbid depression.*

Method*: An institutional based cross-sectional study was conducted from May1-June 30/2020 among 377 patients with chronic medical conditions comorbid with depression. Consecutive sampling technique was used to select study participants. World Health Organization Quality of Life (WHOQOL-BREF) questionnaire was used to measure the health related quality of life (HRQOL). Depression was assessed using patient health questionnaire (PHQ-9) whereas perceived stigma was measured using the perceived devaluation and discrimination scale (PDD). The Oslo social support scale (OSSS-3) was used to measure the level of social support. The diagnoses of patients' chronic medical conditions were extracted from medical charts. Multiple Linear Regression analysis with P-value 0.05 was used to measure the statistically significant association between Quality of life and independent variables.*

Result*: Out of the 4 domains, the psychological domain of Health related quality of life (HRQOL) had the lowest mean score 39.73±13.44 and the social domain of HRQOL had the highest score 50.13±18.77. Socio-demographic factors including single and divorced marital status, private employed, merchant, farmer and house wife in occupation, unable to read and write, able to read and write and primary school in educational status were significantly associated with one or more of the HRQOL domains. Diagnosis of epilepsy, history of admission, frequency of follow up treatments, history of medication discontinuation, and personal history of mental illness, depression score, perceived stigma score, moderate social support and history of suicidal ideation were the clinical factors significantly associated with various domains of HRQOL.*

Conclusion*: The mean score of HRQOL domains among chronic medical patients comorbid with depression was low. This could be due to the chronic medical condition and depression had negatively affected quality of life. Every two month treatment follow up frequency, PHQ-9 and stigma score were statistically significant to the four domains of quality of life. Thus, using integrative medical and psychosocial intervention approach emphasizing on factors affecting HRQOL is paramount importance for better outcome.*

Keywords: *Health, quality of life, chronic medical conditions, depression, comorbidity*

BACKGROUND

According to 2019-2020 world health organization (WHO) report, global prevalence of chronic medical conditions including hypertension(1), diabetes (2, 3), epilepsy(4) and asthma (5) have continued increas-

ing. It was indicated that 80% of deaths related to chronic diseases occurred in low and middle income countries (6, 7). The prevalence of these diseases is increasing in Ethiopia (8-10). Similarly a recent WHO report has shown that 322 million people are affected by depression globally (11) and it remained to be the leading cause of disability a major contribu-

[1] *Department of psychiatry, school of medicine, college of medicine and health sciences, University of Gondar, Gondar, Ethiopia,* [2] *University of Gondar Comprehensive specialized hospital, Psychiatry clinic, Gondar, Ethiopia*
Corresponding author*: *Habtamu Kerebih, Department of psychiatry, school of medicine, college of medicine and health sciences, University of Gondar, Gondar, Ethiopia P.O.BOX; 196, Email:* habtishk@gmail.com

tor to the overall global burden of disease(12). Higher prevalence and burden of depression was reported in Ethiopia (13).

The relationship between chronic medical conditions and depression is bidirectional(14). Depression has been found to be more prevalent among patients with chronic medical conditions than in the general population(15). Depression is known to increase the risk for chronic diseases and worsen the course of these diseases(16). On the other hand presence of one or more chronic diseases could lead to depression or increases the prevalence of current and lifetime depression (17). Chronic diseases restrict the individual's ability to live, worsened general health of patients and limit activities and reduce quality of life (18, 19). Likewise, depression leads to lack of interest, reduced energy, restricted personal care and social interaction resulting in functional impairment and reduced quality of life (20).

Quality of life is affected in a complex way by a person's physical health, psychological state, personal beliefs, social relationships and their relationship to salient features of their environment(21). Health related quality of life (HRQOL) is the value assigned to duration of life as modified by the impairments, functional states, perceptions and social opportunities that are influenced by diseases, injury, treatment or policy (22).

When depression is comorbid with chronic medical conditions, the synergetic effect resulted in deteriorated HRQOL, and increased healthcare costs(23, 24). Patients with either current depressive disorder or depressive symptoms in the absence of disorder tended to have worse physical, social, and role functioning, worse perceived current health, and greater

bodily pain than did patients with no chronic conditions (25). Patients with asthma and depression were found to have reduced HRQOL than asthma alone (26, 27). Diabetic individuals with depressive symptoms also had a severely lower diabetes specific quality of life (28-30). Epilepsy and depression comorbidity have lower HRQOL than alone for each illness (31, 32).

The level of education and the patient health questionnaire (PHQ-9) depression scores were powerful predictors of QOL (31). Diagnosis of diabetes and having severe depression were significantly associated with decreased social relation domain of QOL (30). Older age, lower level of education, lower income, unemployment, obesity and mental health struggles were found to be significantly associated with low QOL in depressive individuals (33).

Considering the years lost due to disability with chronic medical non-communicable diseases and depression, it is worth studying the HRQOL associated with them. Non-communicable diseases (NCDs) related to physical, neurological and mental conditions are the most urgent threat to public health and well-being facing the world today. They are responsible for approximately two-thirds of all global deaths and half of all disability. These diseases, their shared risk factors and associated morbidity, mortality and disability also impacts the achievement of social equity, economic growth and environmental sustainability (34). NCDs which were once considered "diseases of affluence" have now infringed on developing countries where roughly four out of five NCD deaths occurred in low- and middle-income countries (35).

Moreover, NCDs are having an effect throughout the

age distribution – already, one-quarter of all NCD-related deaths are among people below the age of 60 (36). NCDs also account for 48% of the healthy life years lost (Disability Adjusted Life Years–DALYs) (37).

However, such data lack in Ethiopia though there are study results indicating high prevalence of depression among chronic medical patients. Pooled prevalence of depression among diabetes patients in Ethiopia was indicated 39.73% (38) whereas the pooled prevalence of depression in epilepsy in Sub-Saharan Africa was 32.71% (39) and similarly prevalence of depression was high in hypertension patients 24.7% (40) in Ethiopia. High figure (45.2%) of depression was also reported among epilepsy patients particularly from the current study area (41) and depression in asthmatic patients was 21%(42).

Therefore, the current study aimed to assess HRQOL among chronic medical patients comorbid with depression and associated socio-demographic, clinical and psychological factors. This would help as an input for evidence based future integrative medical and psychosocial intervention in this group of patient population. The result helps for service providers about the impact of depression and chronic medical conditions in compromising HRQOL patients and treating both illnesses is paramount importance during service provision.

METHOD

Study design and setting: This was an institutional based cross-sectional study at University of Gondar Comprehensive Specialized Hospital located in Gondar town. Gondar is one of the ancient and historical cities found in Amhara region and center for central Gondar zone. The town is located 727kms Northwest of Addis Ababa, the capital of Ethiopia. The Hospital is located at the heart of the historic Gondar city providing healthcare services for about five million people. This study was conducted at chronic illness follow-up outpatient clinic from May 1-June 30, 2020.

Source and study population: All adult patients with diabetes, hypertension, epilepsy and asthma who had treatment follow up at the chronic illness follow up outpatient clinic were source population. Study population were chronic medical patients who screened positive for depression based on PHQ-9 depression score of ≥10 and from whom data was obtained for the HRQOL

Eligibility: All adult (18+ years) patients attending follow up treatment at chronic clinic for their chronic medical condition and who had PHQ-9 depression score of ≥10 were included in the study. Participants who had other known psychiatric and neurocognitive disorders were excluded.

Variables: The dependent variable is HRQOL. The independent variables included were socio-demographic characteristics, clinical factors including medical diagnosis, history and number of admission, frequency of follow up treatment, history of medication non-adherence and history of mental illness and psychological factors including perceived stigma, social support and suicidal ideation.

Sample size determination and sampling technique: The minimum sample size required for this study was determined by using the formula to estimate single population mean. Since there was no prior study for patients with chronic medical conditions comorbid with depression, standard deviation was used from pre-test result of the current study. A

pilot study was conducted among 30 participants who fulfill the inclusion criteria. In the pilot result, means and Standard deviations were calculated for the four domains. Standard deviation from the social domain (±9.97) was the highest. Using the assumptions of error rate (E = 1); standard deviation of mean social quality of life score 9.97; Z—value at 95%CI to be 1.96 and adding 10% non-response rat. The total sample size was 410. Participants who screened positive for PHQ-9 depression score of ≥10 were consecutively interviewed for quality of life measures.

Data collection tools and procedures: Data was collected by face to face interviews (with critical considerations of the WHO COVID-19 prevention protocol(43)) using a piloted questionnaire prepared in Amharic language. The questionnaire consists of; socio-demographic variables, clinical characteristic, substance use behaviors and questionnaire to assess depression status, HRQOL, stigma and social support. Initially the study participants were interviewed to provide their socio-demographic information. Then they were screened for their depression status using PHQ-9. Participants with PHQ-9 score of ≥10 were included for further interviews on HRQOL and other important variables. The PHQ-9 is a 9-item self-administered questionnaire designed to evaluate the presence of depressive symptoms during the prior two weeks.

But it can be interviewer administered for people who are not able to read. The nine items of the PHQ-9 are based directly on the nine diagnostic criteria for major depressive disorder in the Diagnostic and Statistical Manual Fourth Edition (DSM-IV). The scale has the potential to serve as a dual-purpose instrument that may both screen for the presence of depres-

sive disorder and assess the severity of symptoms. It has measurement ranges from zero to three within the items. The sum of all questions has 0 to 27 score ranges. The PHQ-9 has been validated in Ethiopia with sensitivity of 88% and specificity of 78.1%m (44), however, for a different cut off with the current study. The cut of 10 and more was u in the current study because it is the most commonly used cut off. A cut off ranging from 8-11 is generally recommended, but there are also different cut off for this tool depending on the setting and participants.

The current study setting is hospital based and the participants were patients with chronic medical conditions. It is known that these groups of patients have so many somatic symptoms related to the medical condition which mimic symptoms for depression. Thus a moderate cut off should be used than using a lower cut off to offset false positive results for depression.

The World Health Organization Quality of Life – Brief (WHOQOL-BRFE) was used to assess HRQOL. It was developed by WHOQOL group on 4500 respondents in 15 international field centers which is cross culturally validated tool and used to assess the patients' quality of life. The WHOQOL-BREF includes 26 items measuring the following domains: physical health, psychological health, social relationships, and environment. Two further items evaluate the individual's overall perception of quality of life and the individual's overall perception of their health. Domain scores are scaled in a positive direction (i.e. higher scores correspond to better quality of life. HRQOL raw scores are transformed in to a range between 0-100.

The overall quality of life will be computed as the average of the score of four domains. The higher

mean score the better the quality of life and the lower mean score the poorer the quality of life. This tool was validated in Ethiopia (45, 46).

Perceived stigma was measured using the perceived devaluation and discrimination scale (PDD). Perceived devaluation and discrimination is a 12-item tool that measures the extent to which a person believes that most people will devalue or discriminate against someone with a mental illness. PDD was measured on a 4 point Likert scale with scores ranging from 1 to 4 (1 = strongly disagree, 2 = disagree, 3 = agree, and 4 = strongly agree). A higher score indicates a higher level of perceived stigma. This scale has been widely used around the world including low-income countries (47). The Oslo social support scale (OSSS-3) was used to measure the level of social support. It consists of three items assessing the level of social support.

The sum score ranges from 3 to 14, with high values representing strong levels and low values representing poor levels of social support. Level of social support is as follows, 3–8 poor social support 9–11 moderate social support 12–14 strong social support. It has been recommended for epidemiological and population-based surveys.

Data on substance use (alcohol, khat, cigarette and cannabis) was collected using a question "have you used the substance (specific) in the last 1 year?" The data was collected by trained nurses working at chronic medical illness outpatient follow up treatment clinic. Clinical data including medical diagnosis of patients' and treatment duration were extracted from patients' charts.

Data analysis: The collected data was checked for completeness, coded and entered to Epi-Info Version 7 Software and then exported to Statistical Package for Social Science (SPSS) Version 20 for further analysis. Negatively framed questions (items 3, 4 and 26) were transformed into positively framed ones. Descriptive statistics, such as frequency, mean and standard deviations were computed. The transformed scores were considered for the outcome variables. Model assumptions (normality, equal variance/homoscedasticity, multicollinearity and linearity) were checked. Normality was checked using histogram, linearity assumptions were checked by scatter plot, homogeneity of variances was checked by scatter plots, and there was no heteroscedasticity. Simple linear regression analysis was done to identify factors associated with each domain of HRQOL independently at a P-value < 0.25. Variables with p-value < 0.25 were considered as a candidate for multiple regression.

In the multiple linear regression analysis, variables with P-values of < 0.05 were considered statistically significant. Un-standardized Beta (β) coefficients with 95% confidence interval (CI) were computed to assess the level of association and statistical significance in multiple regression analysis.

Data quality control: A half day training was given for the data collectors on the assessment tools and procedure of assessment. A pilot study was conducted among chronic medical patients two months before the actual data collection. This was due to the COVID-19 related closure of major services and many patients remained home. Close supervision was made on a daily basis by investigators to ensure all necessary data were collected. One of the investigators was delivering the daily collected data to the data clerk for entry. Data on the filled questionnaires and in the entered dataset is properly stored by investigators.

Ethical considerations: Ethical approval was obtained from University of Gondar Ethical Review committee. Formal written letter submitted to the University of Gondar Specialized Comprehensive Hospital and to school of medicine and permission obtained. Information about the aim of the study was provided with attached information sheet and read by data collectors to each patient. Oral informed consent was obtained from patients to participate in the study. They were informed that participation is only in voluntary basis and they have the right to refuse. They were also informed that all data obtained from them would be kept confidentially by using code instead of any personal identifier and is meant only for the purpose of the study. Interviews was conducted with critical considerations of the WHO COVID-19 prevention protocol (43).

At the end of the data collection, individual patients positive with depression based on PHQ-9 score were contacted by one of the investigators and informed the availability of services for mental health at psychiatry clinic, incase they have no information, for intervention.

Patient and public involvement statement: Patients were not involved in the study design, recruitment and conduct of the study. The results will be disseminated to study participants and the general public through local mass medias and through publication of results.

RESULT

Socio demographic characteristics of chronic medical patients with comorbid depression: A total of 377 chronic medical patients with comorbid depression participated in the study indicating a response rate of 92%. The mean age of participants

was 45.7 years (SD±14.60) with minimum and maximum of 15 and 77 years respectively. More than half of the participants 220(58.4%) were females and married 231(61.3%). About one third, 113(30%) of them reported that they were able to read and write. Majority 125(33.2%) were house wives. Only 33 (8.8%) of participants reported that they were living alone (Table 1).

Table 1: Socio-demographic characteristics of study participants (n=377)

Variables		Frequency	Percentage
Sex	Male	157	41.6
	Female	220	58.4
Marital status	Single	84	22.3
	Married	231	61.3
	Divorced	24	6.4
	Widowed	38	10.01
Religion	Orthodox	319	84.6
	Muslim	49	13.0
	Protestant	9	2.4
Educational status	Unable to read and write	113	30.0
	Able to read and write	78	20.7
	Primary school	49	13.0
	Secondary school	48	12.7
	College and above	89	23.6
Occupation	Government Employed	74	19.6
	Private employed	37	9.8
	Merchant	30	8.0
	Farmer	66	17.5
	House wife	125	33.2
	Jobless	45	11.9
Residence	Rural	117	31.0
	Urban	260	69.0
Living Condition	Living alone	33	8.8
	Living with family	344	91.2

Clinical characteristic of chronic medical patients with comorbid depression: From the 377 chronically medical patients, 132(35%), 76(20.2%), 117 (31%) and 27(7.2%) were having diabetes, hypertension, epilepsy and asthma respectively. Cardiac problems were 25(6.6%). Other comorbidity reported than the primary chronic medical illness was 84

(22.3). This could be considered as multi-morbidity among the primary diagnosis, other chronic medical condition and depression. Majority 205(54.4%) and 144(38.2%) of participants had history of one admission and attended their follow up treatment every two months respectively. More than one fourth, 107 (28.4%) of the participants, reported history of medication discontinuation against medical advice believing that they were getting better (Table 2).

Table 2: Clinical characteristic of chronic medical patients with comorbid depression (n=377)

Variables		Freq-uency	Perce-ntage
Diagnosis	Diabetes	132	35.0
	Hypertension	76	20.2
	Epilepsy	117	31.0
	Asthma	27	7.2
	Cardiac problem*	25	6.6
Other comorbidity **	Yes	84	22.3
	No	293	77.7
Number of history of admission	No admission	117	31.0
	One time	205	54.4
	Two times	35	9.3
	Three or more times	20	5.3
Frequency of follow up treatment	Every one month	142	37.7
	Every two months	144	38.2
	Three or more months	91	24.1
History of medication discontinuation	Yes	107	28.4
	No	270	71.6
History of mental health problems	Yes	34	9.0
	No	343	91.0
Family history of mental health problem	Yes	33	8.8
	No	344	91.2

Cardiac problems*= *Arrhythmias, atherosclerosis, Cardiomyopathy, Coronary artery diseases*

Other comorbidity*= *comorbidity among the chronic medical conditions (example DM+HTN, Asthma +DM etc)*

Substance use behavior and psychosocial conditions of chronic medical patients with comorbid with depression: Current substance use behavior of participants indicated that 41(10.9% used alcohol, 7 (1.7%) used tobacco, 13(3.4%) used khat and 3 (0.8%) reported using cannabis (weed). More than one fifth 81(21.5%) of participants reported having suicidal ideation in the past 12 months but they reported that they did not have it currently. Majority 210(55.7%) reported moderate level of social support (Fig 1).
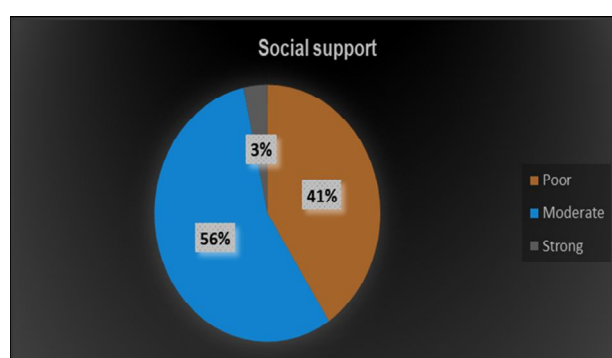

Figure 1: *level of social support among chronic medical patients comorbid with depression at University of Gondar Specialized Comprehensive hospital*

Perceived health related quality of life and health satisfaction: The study participants were asked to provide their perception of their quality of life and health Satisfaction. The majority 154(40.8%) and 160 42.4%) rated neutral in both measures. Only 64 (17.0%) of the participants rated their quality of life as good, and 57(15.1%) were satisfied with their current health status (Table 3).

Health-related quality of life: In this study, the respondents' mean score of their overall quality of life was 46.10 ± 13.16. Among them 180 (47.7%) of participants scored above the mean and 197(52.2%) scored below the mean of the overall quality of life. Out of the 4 domains, the psychological domain HRQOL had the lowest mean score 39.73±13.44. In contrast, the social domain of HRQOL had the highest score 50.13±18.77 (Table 4).

Table 3: Perceived HRQOL and health status satis-
faction of the participants (n = 377)

Perceived HRQOL		Satisfaction with health status	
Response	Frequency (%)	Response	Frequency (%)
Very poor	21(5.6%)	Very dissatisfied	19(5.0%)
Poor	131(34.7%)	Dissatisfied	133(35.3%)
Neutral	154(40.8)	Neutral	160(42.4%)
Good	64(17.0%)	Satisfied	57(15.1%)
Very good	7(1.9%)	Very satisfied	8(2.1%)
Total	**377(100%)**	**Total**	**377(100%)**

Table 4: HRQOL domain score of study participants (n=377)

Domains	Mean ±SD	Range (minimum-maximum)
Physical domain	49.55±16.13	7.14-92.86
Psychological domain	39.73±13.44	7.14-85.71
Social domain	50.13±18.77	8.33-100
Environmental domain	45.01±17.99	3.13-100
Overall quality of life	46.10±13.16	14.73-89.29

Quality of life domains among chronic medical conditions: The quality of life among chronic medical conditions indicated that the psychological and environmental domains of HRQOL were more affected particularly for patients with epilepsy. Except for patients with epilepsy, the social domain of the HRQOL was above 50% for other chronic medical conditions (Table 5).

Factors associated with health-related quality of life: In the multiple linear regression analysis some socio-demographic and clinical variables were statistically significant determinants of each domain of HRQOL at a p-value of < 0.05. Every two month treatment follow up frequency, PHQ-9 and stigma score were statistically significant to the four domain of quality of life.

Being single (β=-3.31(-6.53, -0.09)) unable to read and write (β=-5.97 (-10.27, -1.68)) cardiac problem medical diagnosis (β=-5.01(-9.87, -0.16)), history of one time admission (β=3.18 (0.47, 5.88)), every one month treatment follow up (β=-4.47 (-7.70, -1.80)), every two months treatment follow up (β=-4.23 (-7.08, -1.37)), history of medication discontinuation (β=-3.37 (-6.06, -0.68)), PHQ-9 score (β= -2.56 (-2.93, -2.19)), stigma score (β=-1.58 (-1.96, -1.21)) and suicidal ideation (β=-4.18 (-7.14, -1.24)) were statistically significant with the physical domain of quality of life.

In the psychological domain, private employed (β=11.72 (7.07, 16.37)), merchant (β=8.02 (2.99, 13.04)), farmer (β=6.44 (1.51, 11.38)), housewife (β=6.23(2.02, 10.44)), unable to read and write (β=-6.83 (-11.44, -2.22)), primary school (β=-7.03 (-11.51, -2.54)), epilepsy diagnosis (β=-4.11 (-7.60, -0.63)), every two months treatment follow up (β=-6.10 (-9.19, -3.00)), PHQ-9 score (β=-1.22 (-1.61, -0.83)) and stigma (β=-0.85 (-1.25, -0.45)) were significantly associated.

(β=-3.31(-6.53, -0.09)), divorced (β=-7.78 (-14.36, -1.22)), private employed (β=23.75 (17.34, 30.16))), merchant (β=9.39 (2.65, 16.13)), farmer (β=12.07 (5.66, 18.48)), housewife (β=7.89 (2.18, 13.60)), unable to read and write (β=-7.13 (-13.21, -1.05)), epilepsy diagnosis (β=-6.14 (-11.08, -1.19)), three and more times history of admission (β=12.86 (4.84, 20.87)), every two months treatment follow up (β=-5.40 (-9.62, -1.17)), personal history of mental illness (β=7.66 (1.12, 14.20)), PHQ-9 score (β=-0.92 (-1.46, -0.37)), stigma score (β=-0.83 (-1.38, -0.27)) and moderate social support (β=9.47 (0.70, 18.23)) were statistically significant with social domain of quality of life.

24

Variables including private employed (β=15.60 (9.51, 21.69)), merchant (β=14.64 (8.23, 21.06)), farmer (β=9.88 (3.57, 16.20)) housewife (β=9.14 (3.73, 14.55)), unable to read and write (β=-17.42 (-23.14, -11.70)), able to read and write (β=-9.12 (-14.44, -3.79)), primary school (β=-8.95 (-14.70, -3.21)), secondary school (β=-7.74 (-13.12, -2.36)), epilepsy diagnosis (β=-6.81 (-11.28, -2.35)), history of one time admission (β=-6.96 (10.66, -3.26)), history of two times admission (β=-6.53 (-12.39, -0.67)), every one month treatment follow up (β=-5.96 (10.04, -1.89)), every two month treatment follow up (β=-6.32 (-10.28, -2.36)), PHQ-9 score (β=-0.99 (-1.50, -0.48)) and stigma score (β=-0.98 (-1.50, -0.45)) were statistically associated with environmental domain of quality of life (Table 6).

Table 5: The HRQOL domain mean scores among chronic medical conditions (n=377)

	Physical Mean±SD	Psychological Mean±SD	Social Mean±SD	Environmental Mean±SD	Overall QOL Mean±SD
Diabetes	51.41±15.56	41.21±13.44	52.02±17.35	48.39±16.37	48.26±12.29
Hypertension	41.13±16.90	40.98±13.24	52.52±17.37	47.86±19.07	47.12±14.11
Epilepsy	50.24±16,17	36.69±13.87	45.16±21.39	37.90±17.51	42.50±13.26
Asthma	49.87±15.89	41.67±11.34	50.62±18.48	47.92±17.88	47.52±13.16
Cardiac problem	43.57±16.13	40.28±13.18	55.67±12.66	48.62±16.93	47.04±11.53

DISCUSSION

The current study aimed to assess health related quality of life among chronic medical patients comorbid with depression who attended follow up treatment at chronic illness outpatient clinic of University of Gondar Specialized Comprehensive Hospital. To the investigators' knowledge this is the first study of HRQOL focusing in patients who had both chronic medical condition and depression. There were studies conducted but they were conducted separately for the medical conditions and for depression alone.

In the current study, the mean of overall quality of life score among study participants was found to be (46.10±13.16) and the maximum and minimum scores were related with social and psychological domains. The overall QOL was lower than a study conducted among diabetic patients in Mizan Tepi University Teaching Hospital, Southwest Ethiopia 51.50±15.78 (48) and the mean scores of all the four domains were lower than another study on QOL among diabetes patients conducted 3 years ago in the current study area (49). Generally the HRQOL mean scores in the current study were lower than mean scores among hypertensive patients (50), and patients with epilepsy(51).

But scores in all domains were higher than a study among patients with major depressive disorders (MDD) at a specialized mental hospital in Ethiopia (52). This is due to patients with severe depression were used in the latter study in which major areas of patients' functions are thought to be impaired but the current study included patients positive for depression using PHQ-9 screening tool. The lower mean scores in the current study than mean scores from

QOL from chronic medical conditions indicated that comorbid depression has contributed in reducing the HRQOL.

Multiple linear regression analysis depicted that unable to read and write educational status, every two months treatment follow ups, PHQ-9 score, perceived stigma score had significant association with the four domains of quality of life. Privately employed, merchant, farmer and housewife in educational status, and having diagnosis of epilepsy were significantly associated with three of the domains of quality of life.

The association of socio-demographic variables with each domain of HRQOL indicated that being single in marital status was significantly and negatively associated with the physical and social domains whereas divorced marital status was significantly and negatively associated with the social domain alone. Chronic medical patients who reported their occupation as privately employed, merchant, farmer and housewife had significant and positive association with psychological, social and environmental domain of HRQOL. Unable to read and write educational status was significantly associated with all domains.

Primary school completed educational status was associated with psychological domain while the able to read and write and secondary school educational status were associated with the environmental domain of HRQOL. Similar results were reported from previous studies in which HRQOL was significantly influenced by marital status and level of education of study participants (49). Being divorced and having no formal education was significantly inversely associated with physical health domain of quality of life (53). Higher education was positively correlated with

QOL among asthmatic patients (54) and chronic obstructive pulmonary diseases (55). Regarding occupation prior evidences indicated employed participants had significantly higher overall quality of life than the unemployed (56) but the type of occupation was not emphasized. But participants who had reported to be privately employed, merchants, farmers and housewives have better QOL and this might be due to the fact that working by their own without being influenced and probably with a relatively higher incomes might be reasons (57).

Many clinical factors were associated with HRQOL across the various domains. Diagnosis of epilepsy was negatively associated with all domains except with the physical domain whereas others* diagnosis was associated with only the physical domain. History of one and two times admission were negatively associated with the physical and environmental domains but history of three or more times admission were positively associated with the social and environmental domains. Results showed an increase in quality of life during hospitalization among patients with affective disorders(58)

Every one month treatment follow up has associations with physical and environmental domains and every two months treatment follow ups was associated with all domains. Both follow up frequencies had negative association with HRQOL. History of medication discontinuation against medical advice for various reasons had negative association with the physical domain of QOL. Similarly, it was reported that low Medication adherence and poor diabetic self-care activity had a negative direct effect on QOL (59)

Both PHQ-9 depression measure and perceived stigma score were significantly and negatively associated with all the domains. Similar results were reported among patients with MDD in Ethiopia (52). It was indicated that depression had a direct negative effect on all domains of HRQOL in diabetic and non-diabetic patients (59-61) and significant reverse correlation was found between the patient's quality of life and depression's severity among type-II diabetes (62). This indicated that as depression severity increases, the QOL is compromised. This is also true that depression comorbid with chronic medical conditions contributed a lot in deteriorating HRQOL (23, 24). Presence of perceived stigma was also found to invariably worsen QOL in various diseases (63-65).

This is due to patients start to restrict their functional role at work, and social interaction due to fear of being stigmatized because of having an illness. Moderate level of social support was positively associated with the social domain. It was in agreement with a study which stated that the amount of social support remained positively correlated with quality of life (58).

However, in another study social support was strong predictor which was negatively correlated with all QOL domains, except environmental(52). This could be due to the difference in study population in which the previous study was conducted among patients with MDD. In this group of patients all domains of function are considered to be affected by the illness. But the current study population was patients with chronic medical condition comorbid with depression and the severity of comorbid depression might not be as severe as that of the previous. Suicidal ideation was negatively associated with the physical domain in the HRQOL. This was similar with a study conducted on quality of life of depressed and suicidal

patients seeking services from traditional and faith healers in rural Kenya. The study reported reduced QOL among patients with suicidal ideation (66). Other study result also showed that some suicidal-related behaviors increase the probability of a lower QOL(67).

Limitations of the study: One of the limitations is the study was conducted among patients who had both chronic medical condition and depression which have both inverse relation with HRQOL and it is difficult to determine which contribute how much on the outcome variable. The other limitation to consider is patients with different types of chronic medical condition were taken which makes it difficult to make generalizations.

A major limitation of this study is lack of control group, patients with chronic medical condition but screened negative for depression were not included. This could have added more clarity on the effect of depression might have on HRQOL among this group of patients. A further limitation could be the study was a single center study and participants were recruited from a comprehensive specialized hospital. The fact that important variables like the duration of chronic medical conditions were not considered due to poor patients chart documentation and patients' difficulty of recalling illness onset could add to the drawback of the study.

CONCLUSION

The mean score of the overall HRQOL and its domains among chronic medical patients comorbid with depression was lower indicating the comorbidity had negatively affected quality of life. Every two month treatment follow up frequency, PHQ-9 and

stigma score were statistically significant to the four domain of quality of life. Thus, integrative medical and psychosocial intervention emphasizing on the contributing factors has paramount importance.

Abbreviations: CI: confidence interval, **COVID-19**: Corona virus diseases-19, **DALYs**: Disability Adjusted Life Years, **DSM-IV**: Diagnostic and Statistical Manual Fourth Edition, **HRQOL**: health related quality of life, **NCDs**: Non-communicable diseases **OSSS**: Oslo social support, **PDD**: perceived devaluation and discrimination scale, **PHQ**: patient health questionnaire, **SD**: standard deviation, **SPSS**: Statistical software for social sciences, **WHO**: world health organization, **WHOQOL-BRIEF**-World Health Organization Quality of Life

Declaration

Ethics approval and consent to participate: Ethical approval for this study was obtained from institutional review board of University of Gondar and written consent was obtained from study participants each study participants. Verbal consent to participate was also obtained from those who is not able to write.

Consent to participate: Verbal and written consent to participate was obtained from study participants. Since only adults were included as study participants, no parental consent was needed.

Consent for publication: Not applicable

Availability of data and materials: The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Authors' contributions: HK, WG and SY researched the literatures and conceived the study, developed the proposal, gain ethical approval. EB and BE recruit study subjects and facilitate the data collection and entered the data. HK analyzed the data, wrote the manuscript. All authors reviewed and edited the manuscript and approved the final version.

REFERENCE

1. world health organization. Hypertension. https://www.who.int/news-room/fact-sheets/detail/hypertension. 2019.

2. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, Unwin N, et al. Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. Diabetes research and clinical practice. 2019;157:107843.

3. world health organization. Diabetes. https://www.who.int/news-room/fact-sheets/detail/diabetes. 2020.

4. world health organization. Epilepsy. https://www.who.int/news-room/fact-sheets/detail/epilepsy#:~:text=Rates%20of%20disease&text=The%20estimated%20proportion%20of%20the,diagnosed%20with%20epilepsy%20each%20year. 2019.

5. world health organization. Chronic respiratory diseases: Asthma. https://www.who.int/news-room/q-a-detail/asthma. 2020.

6. Organization WH. Preventing chronic diseases: a vital investment: WHO global report: World Health Organization; 2005.

7. Organization WH. Chronic diseases in low and middle income countries. Geneva: WHO. 2005.

8. Misganaw A, Mariam DH, Ali A, Araya T. Epidemiology of major non-communicable diseases in Ethiopia: a systematic review. Journal of health, population, and nutrition. 2014;32(1):1.

9. Prevett M. Chronic non-communicable diseases in Ethiopia-a hidden burden. Ethiopian journal of health sciences. 2012;22(Spec Iss):1.

10. Girum T, Mesfin D, Bedewi J, Shewangizaw M. The Burden of Noncommunicable Diseases in Ethiopia, 2000–2016: Analysis of Evidence from Global Burden of Disease Study 2016 and Global Health Estimates 2016. International Journal of Chronic Diseases. 2020;2020.

11. Organization WH. Depression and other common mental disorders: global health estimates. World Health Organization; 2017.

12. world health organization. Dpression. https://www.who.int/news-room/fact-sheets/detail/depression. 2020.

13. Bitew T. Prevalence and risk factors of depression in Ethiopia: a review. Ethiopian journal of health sciences. 2014;24(2):161-9.

14. Seo J, Choi B, Kim S, Lee H, Oh D. The rela-

tionship between multiple chronic diseases and depressive symptoms among middle-aged and elderly populations: results of a 2009 korean community health survey of 156,747 participants. BMC public health. 2017;17(1):1-10.

15. Clarke DM, Currie KC. Depression, anxiety and their relationship with chronic diseases: a review of the epidemiology, risk and treatment evidence. Medical Journal of Australia. 2009;190:S54-S60.

16. Moussavi S, Chatterji S, Verdes E, Tandon A, Patel V, Ustun B. Depression, chronic diseases, and decrements in health: results from the World Health Surveys. The Lancet. 2007;370 (9590):851-8.

17. Cassen N. Depressed Patients Handbook of General Hospital Psychiatry. Boston, MA: Mobsy. 1997:35-68.

18. Megari K. Quality of life in chronic disease patients. Health psychology research. 2013;1(3).

19. Cao Y, Tang X, Yang L, Li N, Wu Y, Fan W, et al. Influence of chronic diseases on health related quality of life in middle-aged and elderly people from rural communities: application of EQ-5D scale on a Health Survey in Fangshan, Beijing. Zhonghua liu xing bing xue za zhi= Zhonghua liuxingbingxue zazhi. 2012;33(1):17.

20. Brenes GA. Anxiety, depression, and quality of life in primary care patients. Primary care companion to the Journal of clinical psychiatry. 2007;9(6):437.

21. Organization WH. WHOQOL: measuring quality of life [Internet]. Geneva: WHO. 1997.

22. Erickson P, Patrick D. Health status and health policy: quality of life in health care evaluation and resource allocation: Oxford University Press New York; 1993.

23. Rocha NSd, Fleck MP. Evaluation of quality of life in adults with chronic health conditions: the role of depressive symptoms. Brazilian Journal of Psychiatry. 2010;32(2):119-24.

24. Nkporbu AK. Impact of Chronic Medical and Neuropsychiatric Illnesses on Quality of Life and Life Expectancy Among Patients at the University of Port Harcourt Teaching Hospital (UPTH). Aging-Life Span and Life Expectancy: IntechOpen; 2020.

25. Wells KB, Stewart A, Hays RD, Burnam MA, Rogers W, Daniels M, et al. The functioning and well-being of depressed patients: results from the Medical Outcomes Study. Jama. 1989;262 (7):914-9.

26. Krauskopf KA, Sofianou A, Goel MS, Wolf MS, Wilson EA, Martynenko ME, et al. Depressive symptoms, low adherence, and poor asthma outcomes in the elderly. Journal of Asthma. 2013;50(3):260-6.

27. Al-kalemji A, Petersen KD, Sørensen J, Sherson D, Thilsing T, Schlünssen V, et al. Factors influencing quality of life in asthmatics–a case–control study. The clinical respiratory journal. 2013;7(3):288-96.

28. Schram MT, Baan CA, Pouwer F. Depression and quality of life in patients with diabetes: a systematic review from the European depression in diabetes (EDID) research consortium. Current diabetes reviews. 2009;5(2):112-9.

29. Derakhshanpour F, Vakili MA, Farsinia M, Mirkarimi K. Depression and quality of life in patients with type 2 diabetes. Iranian Red Crescent Medical Journal. 2015;17(5).

30. Mishra SR, Sharma A, Bhandari PM, Bhochhibhoya S, Thapa K. Depression and health-related quality of life among patients with type 2 diabe-

tes mellitus: a cross-sectional study in Nepal. PloS one. 2015;10(11):e0141385.

31. Siarava E, Hyphantis T, Katsanos AH, Pelidou S-H, Kyritsis AP, Markoula S. Depression and quality of life in patients with epilepsy in Northwest Greece. Seizure. 2019;66:93-8.

32. Alsaadi T, Kassie S, El Hammasi K, Shahrour TM, Shakra M, Turkawi L, et al. Potential factors impacting health-related quality of life among patients with epilepsy: Results from the United Arab Emirates. Seizure. 2017;53:13-7.

33. Cho Y, Lee JK, Kim D-H, Park J-H, Choi M, Kim H-J, et al. Factors associated with quality of life in patients with depression: A nationwide population-based study. PloS one. 2019;14 (7):e0219455.

34. Sharp D, Millum J. The post-2015 development agenda: keeping our focus on the worst off. The American journal of tropical medicine and hygiene. 2015;92(6):1087-9.

35. Bloom DE, Cafiero E, Jané-Llopis E, Abrahams-Gessel S, Bloom LR, Fathima S, et al. The global economic burden of noncommunicable diseases. Program on the Global Demography of Aging; 2012.

36. Organization WH. Noncommunicable diseases country profiles 2018. 2018.

37. Alwan A. Global status report on noncommunicable diseases 2010: World Health Organization; 2011.

38. Teshome HM, Ayalew GD, Shiferaw FW, Leshargie CT, Boneya DJ. The prevalence of depression among diabetic patients in Ethiopia: a systematic review and meta-analysis, 2018. Depression research and treatment. 2018;2018.

39. Dessie G, Mulugeta H, Leshargie CT, Wagnew F, Burrowes S. Depression among epileptic pa-

tients and its association with drug therapy in sub-Saharan Africa: A systematic review and meta-analysis. PloS one. 2019;14(3):e0202613.

40. Gebre BB, Deribe B, Abeto M. Magnitude and Associated Factors of Depression Among Hypertensive Patients Attending Treatment Follow Up in Chronic OPD at Hawassa University Comprehensive Specialized Hospital, Hawassa, Southern Ethiopia. Integrated Blood Pressure Control. 2020;13:31.

41. Bifftu BB, Dachew BA, Tiruneh BT, Tebeje NB. Depression among people with epilepsy in Northwest Ethiopia: a cross-sectional institution based study. BMC research notes. 2015;8 (1):585.

42. Woledesenbet MA, Shumet Mekonen S, Sori LM, Abegaz TM. Epidemiology of depression and associated factors among asthma patients in Addis Ababa, Ethiopia. Psychiatry journal. 2018;2018.

43. WORLd health organization. Coronavirus disease (COVID-19) advice for the public. https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public. 2021.

44. Degefa M, Dubale B, Bayouh F, Ayele B, Zewde Y. Validation of the PHQ-9 depression scale in Ethiopian cancer patients attending the oncology clinic at Tikur Anbessa specialized hospital. BMC psychiatry. 2020;20(1):1-7.

45. Tesfaye M, Olsen MF, Medhin G, Friis H, Hanlon C, Holm L. Adaptation and validation of the short version WHOQOL-HIV in Ethiopia. International Journal of Mental Health Systems. 2016;10(1):1-10.

46. Reba K, Birhane BW, Gutema H. Validity and reliability of the Amharic version of the World Health Organization's quality of life question-

naire (WHOQOL-BREF) in patients with diagnosed type 2 diabetes in Felege Hiwot referral hospital, Ethiopia. Journal of diabetes research. 2019;2019.

47. Barke A, Nyarko S, Klecha D. The stigma of mental illness in Southern Ghana: attitudes of the urban population and patients' views. Social psychiatry and psychiatric epidemiology. 2011;46(11):1191-202.

48. Gebremedhin T, Workicho A, Angaw DA. Health-related quality of life and its associated factors among adult patients with type II diabetes attending Mizan Tepi University Teaching Hospital, Southwest Ethiopia. BMJ Open Diabetes Research and Care. 2019;7(1).

49. Aschalew AY, Yitayal M, Minyihun A. Health-related quality of life and associated factors among patients with diabetes mellitus at the University of Gondar referral hospital. Health and Quality of Life Outcomes. 2020;18(1):1-8.

50. Abdulwahed A, Yimam I, Seid A. Health Related Quality of Life and Associated Factors among Adult Hypertensive Patients on Jimma University Specialized Hospital, South West Ethiopia, 2014 GC. J Hypertens (Los Angel). 2018;7(252):2167-1095.1000252.

51. Abadiga M, Mosisa G, Amente T, Oluma A. Health-related quality of life and associated factors among epileptic patients on treatment follow up at public hospitals of Wollega zones, Ethiopia, 2018. BMC research notes. 2019;12(1):679.

52. Angaw DA, Abady GG, Ayalew GD. Quality Of Life and Associated Factors among Patients with Major Depression on Follow Up At Amanuel Mental Specialized Hospital, Addis Ababa, Ethiopia. 2019.

53. Desalegn D, Girma S, Abdeta T. Quality of life and its association with psychiatric symptoms and socio-demographic characteristics among people with schizophrenia: A hospital-based cross-sectional study. Plos one. 2020;15 (2):e0229514.

54. Uchmanowicz B, Panaszek B, Uchmanowicz I, Rosińczuk J. Sociodemographic factors affecting the quality of life of patients with asthma. Patient preference and adherence. 2016;10:345.

55. Rosińczuk J, Przyszlak M, Uchmanowicz I. Sociodemographic and clinical factors affecting the quality of life of patients with chronic obstructive pulmonary disease. International journal of chronic obstructive pulmonary disease. 2018;13:2869.

56. Blalock AC, Mcdaniel JS, Farber EW. Effect of employment on quality of life and psychological functioning in patients with HIV/AIDS. Psychosomatics. 2002;43(5):400-4.

57. Kefale B, Alebachew M, Tadesse Y, Engidawork E. Quality of life and its predictors among patients with chronic kidney disease: A hospital-based cross sectional study. PloS one. 2019;14 (2):e0212184.

58. Zdun-Ryżewska A, Basiński K, Majkowicz M, Podolska M, Landowski J, Walden-Gałuszko K. Association between social support and quality of life in patients with affective disorders. The European Journal of Psychiatry. 2018;32(3):132-8.

59. Tusa BS, Geremew BM, Tefera MA. Heath related quality of life and associated factors among adults with and without diabetes in Adama city East Shewa, Ethiopia 2019; using generalized structural equation modeling. Health and Quality of Life Outcomes. 2020;18:1-13.

60. Goldney RD, Phillips PJ, Fisher LJ, Wilson DH.

Diabetes, depression, and quality of life: a population study. Diabetes care. 2004;27(5):1066-70.

61. Jing X, Chen J, Dong Y, Han D, Zhao H, Wang X, et al. Related factors of quality of life of type 2 diabetes patients: a systematic review and meta-analysis. Health and quality of life outcomes. 2018;16(1):189.

62. Timar R, Velea I, Timar B, Lungeanu D, Oancea C, Roman D, et al. Factors influencing the quality of life perception in patients with type 2 diabetes mellitus. Patient preference and adherence. 2016;10:2471.

63. Tsutsumi A, Izutsu T, Islam AM, Maksuda A, Kato H, Wakai S. The quality of life, mental health, and perceived stigma of leprosy patients in Bangladesh. Social science & medicine. 2007;64(12):2443-53.

64. Kim S-Y, Kim J-M, Kim S-W, Kang H-J, Lee J-Y, Bae K-Y, et al. Perceived stigma and quality of life in patients following recovery from delirium. The Journal of clinical psychiatry. 2017;78(7):744-9.

65. Holubova M, Prasko J, Ociskova M, Marackova M, Grambal A, Slepecky M. Self-stigma and quality of life in patients with depressive disorder: a cross-sectional study. Neuropsychiatric disease and treatment. 2016;12:2677.

66. Musyimi CW, Mutiso VN, Nayak SS, Ndetei DM, Henderson DC, Bunders J. Quality of life of depressed and suicidal patients seeking services from traditional and faith healers in rural Kenya. Health and quality of life outcomes. 2017;15(1):95.

67. Hidalgo-Rasmussen C, Martín AH-S. Suicidal-related behaviors and quality of life according to gender in adolescent Mexican high school students. Ciencia & saude coletiva. 2015;20:3437-45.