Original Research Article

Prevalence of Depression and Associated Factors among Adult Diabetic Patients Attending Outpatient Department, at Felege Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia

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ABSTRACT

Background: Diabetes and depression are a highly prevalent, devastating and disabling condition associated with high morbidity, mortality, and healthcare consumption. Co-existing depression in people with Diabetes mellitus results in decreased adherence, poor health outcome, decreased quality of life, increased disability, lost productivity and increase risk of death.
Objective: The aim of this study was to determine the prevalence and associated factors of depression among Diabetes mellitus outpatients.
Materials and Methods: An institution based cross -sectional study was conducted from 01 March to 08 April 2016, by using systematic random sampling technique. Depression status was assessed by Patient Health Questionnaire- 9 (PHQ-9) and data was analyzed by logistic regression at P <0.05 with 95% CI was considered statistically significant.
Result: 416 patients with Diabetes mellitus were participated in the study with an overall prevalence of depression of 40.4% when a cut-off score of PHQ-9 $\geq$ 5 was used. Poor social support (AOR 5.82, 95% CI (2.821, 12.004)); age (AOR: 2.717, 95% CI (1.041, 7.096)); treatment regime (AOR: 2.213, 95% CI 1.174, 4.171)) and fear of complication (AOR 9.129, 95% CI (4.97, 16.769)) were found statistically significant factors.
Conclusion: This study revealed a relatively high prevalence of depression episodes in diabetic outpatients. High perceptions for fear of complication, less level of social support, oral hypoglycemic treatment regime and adult age were found to be the most important risk factors for depressive episodes. Therefore, providing social support and co-morbid depression could help ameliorate some of the deleterious effects of depressive symptoms in Diabetes Mellitus.

Keywords: Diabetes; Depression; Adult patient; Co-morbidity; Factors.

INTRODUCTION

DM (Diabetes Mellitus) is a metabolic disorder of multiple etiologies characterized by chronic hyperglycemia with disturbances of carbohydrate, protein and fat metabolism. [1] DM usually strikes children and young adults, although its onset can occur at any age and the cause is idiopathic (type 1) while type 2 associated with older age, obesity, family history and physical inactivity. [2] It is a major life-threatening condition; world widely 3.2 million deaths every year, 8,700 deaths every day; 6 deaths every minute; and it also a high risk for receiving a non-traumatic lower-extremity amputation and mental

health disorder. [3-5]

In Ethiopia work on non-communicable diseases (NCDs) including DM at government level is in its infancy. [6] Among 42,487.98 Ethiopian adult population (age 20-79) in 2014, diabetic cases were 1,852.23, national DM prevalence was4.36-9.1%, diabetic related deaths were 34,262 and impaired glucose tolerance were 2,915. [7,8]

Depression another condition which is more than just feelings of unhappiness, more than just feeling the 'blues' or having a 'down 'day; affect a day-to-day activities be harder to perform self-management of lifelong conditions like diabetes. [4,9] Serious depression is common in people with diabetes; more frequent, more pertinent to be severe and more liable to be recurrent and difficult to treat; one of every three people with diabetes experiences symptoms of depression and also affects about 20-25% of DM patients. [10-12] Depression and DM are causally related and deserves attention from clinicians to ensure better management. [13,14] Depression in DM is high prevalence and responsible for high burden of associated with non-fatal health outcomes in chronic medical illnesses in general DM in particular. [15,16] Even though depression is common, it is often ignored, undiagnosed or untreated in DM patients. [17,18] Recognition and treatment for depression is below ideal, particularly most DM patients receive care which end up with depressions that lead to poor lifestyle decisions. [19-24]

In most cases, chronic disease management focuses on only single conditions like diabetes; coronary artery disease but does not meet the needs of patients with multi-morbidities and opportunities are missed to improve health outcomes when mental illness is under recognized and under treated.

Not only the above problems but also the prevalence and contribute factors were varies from pace to place in Ethiopia (13-40.6%) which needs further investigation. Data on depression in the diabetes patients in Ethiopia are scarce particularly in the study area. Therefore, the major aim of this study was to investigate the prevalence and associated factors leading to depression among adult DM patients.

Significance of the Study

This study would be helpful to provide basic information for diabetes educator and other health care practitioners those who might be aimed to inquiring the relationship between depression & DM. It might be also helped heath care provider to initiate early screening, diagnosing and management of depression in diabetic patient based on the finding.

Additionally it could be contributed to a body of knowledge to further study that might be to conduct a study on related topic and also for organizations working with diabetes patients. Finally it could be aided support the patients and their families in the encouraging early recognizing, screening and managing depression symptoms in DM patient.

REVIEW OF LITERATURE

1. Depression and diabetes mellitus

Difference study reported that prevalence of depression in patients with diabetes varies widely. A study conducted in Bahrain and a General hospital based, was 5.7% and 33.3% respectively; in Iran; 43.4% met the diagnostic criteria for depression; 36.3% were minor, 5.8% moderate and 1.3% severe depression; in Bangladesh it was 34.8%-36% and a five year follow up cohort study identified among 158 patients, 99 of them 62.7% ≥10, 20.3% 5 to 9 and only 17.0%<5 had a PHQ score of respectively. [25-31]

Study on in Malaysia, the prevalence of depression was 12.3% [32] and randomized controlled trial by Ell W. et al identified that 545(30.2%) met criteria for major depressive disorder. [33] In Ethiopia, the prevalence of depression among people with diabetes was range13%- 43.6%. [34,35]

2. Factors Associated with Co-morbid depression in diabetic patient

Demographical factors: Depression was most strongly associated with demographical factors. Demographic variables that found statistically significant were low level of education, [21,29-32,36,37] marital status, [28,29,31,34] being housewife, [29] having no current job, [21] sex, [21,25,26,29,31,34] low income, old age, urban residence. [30,34,37] On the contrary younger age and female gender were not associated with higher Hospital Anxiety and Depression Scale score. [28,36]

Medical factors: Depression was most strongly associated with physical factors and functional impairment. Such as duration of DM, [28] fewer exercise sessions, FBS results, higher number of medical co-morbidity [30,33,37] and DM complications like retinopathy, a macrovascular event /coronary procedures, diabetic foot; [21,27,29,30,32,36,37,39] type of DM; [26] treatment regime. [30,31,38]

Psychosocial factors: As with demographic and medical associated factors, the effect of psychosocial factor on co-morbid depression in patients with DM supported in different studies by different scholars; such as low social functioning, [28,33,37,40-46] quality of life and self-care, [34,42] worry about medication cost [33] and medication burden. [43]

Objectives of the study
General objective:
➢ To assess the prevalence of depression and associated factors among adult diabetic patients, outpatient department at Felege Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia.
  Specific objectives:
1. To determine the prevalence of depression among adult diabetic patients
2. To identify factors associated with depression among adult diabetic patients

MATERIALS AND METHODS
Study area
A study was conducted at Felege Hiwot Referral hospital which is found in Bahir Dar city administration, Northwest Ethiopia. Bahir Dar is a capital city of Amhara region and located 550 kms (Tana high-level forum on security in Africa; Bahir Dar city profile: 2015) from Addis Ababa, the capital city of the country. Currently, Felege Hiwot referral hospital is the only public hospital in Bahir Dar city and it serves the population in the region and those from Beneshangul Gumuez population as referral center and opens for 24 hours for emergency service. It provides promotive, preventive, curative and rehabilitative services to those populations.

The service was rendered by physician and nurses and around 1484 patients were registered for follow-up in the previous year. Those diabetic patients were used to collect their medication on every two to three month basis. In outpatient chronic follow up department approximately 300 adult diabetes mellitus patients were seen weekly.

Study design and period: A facility-based cross sectional study was conducted from 01 March to 08 April 2016.

Source population: All adult diabetes out-patients who had follow up treatment at Felege Hiwot referral hospital.

Study population: Randomly selected adult diabetic patients on follow up treatment during study period.

Inclusion and Exclusion criteria
Inclusion criteria: All diabetic patients aged 18 years and older who had been on regular follow up treatment for DM regardless of ethnicity and religion were included in the study.

Exclusion criteria: seriously ill and newly diagnosed, mentally ill patients during data collection were excluded in the study.

Study variables
Dependent variable: Depression in diabetes patients
Independent variables

• **Demographic factors:** age, sex, ethnicity, educational and marital status and monthly income;
• **Medical factors:** DM complication and type, FBS level, physical

activity and co-morbid disease, Pill burden, duration of illness and treatment, diagnostic age and number of co-morbidity.

- **Psychosocial factors:** social support, pills burden and fears of diabetic complication.

Operational definition

No depression: Patient Health Questionnaire 9 score was 0

Minimal depression: Patient Health Questionnaire 9 score was 1-4

Mild depression: Patient Health Questionnaire 9 score was 5-9

Moderate depression: Patient Health Questionnaire 9 score was 10-14

Moderately severe depression: Patient Health Questionnaire 9 score was 15-19

Severe depression: Patient Health Questionnaire 9 score was 20-27

Sample size determination and Sampling procedure

The sample size was calculated by assuming 5% marginal error (d), 95% CI (alpha=0.05) and 43.6 the proportion of depression among DM patients. [34]

Based on this assumption, the sample size was calculated by single population proportion formula:

n = $(Z1-\alpha/2)2$ p (1-p)/d2; this yields an initial sample size (n) of 378. By considering 10% non-response rate, 416 diabetic patients were planned and included in the study.

A list of diabetic patients was obtained to identify the participants from the outpatient follow up department and used as a sampling frame. The patients' records were listed in follow up appointment order. Then, the respondents were selected by using systematic random sampling technique. Based on the decision to collect data over the course of one month, the sampling interval was determined by dividing the expected number of diabetic patients per month (1320) into the sample size (416) which gives a sampling interval of three. Thus, every three patient coming to a follow-up service was interviewed until the total sample size was reached.

Method of data collection

Patients were interviewed using structured questionnaires. The questionnaire of socio demographic related information was assessed using a structured questionnaire developed by reviewing similar related articles. Other independent variables that could affect the occurrence of depression among patient with diabetes were also included to the questionnaire by reviewing other similar studies. Patients with established diabetes mellitus were evaluated for depression by administering nine-item Patient Health Questionnaire- 9 (PHQ -9) adapted from Pfizer Inc. using local language (Amharic). It was an easy depression screening tool which was a brief questionnaire that scores each of 9 DSM-IV criteria for depression as "0" (not at all) to "3" (nearly every day).

PHQ-9 score >=10 had a sensitive of 88% and specificity of 88% for major depression. [47] PHQ-9 scores of 5, 10, 15, and 20 represent mild, moderate, moderately severe and severe depression, respectively. Since the questionnaire was prepared in English, it was translated in to Amharic language for appropriate and easiness in interviewing the study subjects in Amharic language. Then back translation was done to check the consistency of meaning by language experts.

Data quality assurance

Two weeks prior to the actual data collection, the questionnaire was pre-tested on 5% (20) of the sample among diabetes patient who were not included in the main study area, in Debre-Markos hospital. Amendments were made accordingly after the pre-test. Data were collected by four trained diploma nurses and two supervisors (BSc nurse). Additionally, on each data collection day, the collected data was reviewed and checked for its completeness by principal investigator. Data processing and analysis

Data were entered and edited in to EPI-data version 3.1, and cleaned and analyzed by using SPSS for windows program version 20. The data were checked

for its distribution and outliers before analysis. It was processed by using descriptive analysis, including frequency distribution, cross tabulation and summary measures. Association was investigated to assess the association between dependent and explanatory variables using binary logistic regression. All explanatory variable with p-value <=0.20 in bivariate logistic analysis were fitted in to multivariate logistic regression to identify independently associated factors in the final model; the degree of association was interpreted by using ORs with 95% CI and P-value <0.05 was considered statistically significant.

Ethical considerations

After followed the ethical and legal standards of scientific investigation, ethical clearance was secured from ethical institutional review board of Addis Ababa University College of health science. Permission and supportive letter was obtained from respective hospital medical director before data collection. Participation was voluntary and information was collected anonymously after obtaining written consent from each respondent by assuring confidentiality throughout the data collection period and also after the study. Individuals who were unwilling to participate from the beginning or any part of the interview were allowed to do so. There was no any risk of danger or hazardous procedure putting the participants at harm. Patients found to have severe depression were referred to psychiatry clinic for further assessment and treatment.

RESULTS

1. Socio-demographic characteristics

Table 1: socio-demographic characteristics of study participant at Felege Hiwot referral hospital, Bahir Dar, Northwest Ethiopia, 2016(n=416).

Variable	Category	Frequency	Percent
Sex	Male	242	58.2
	Female	174	41.8
Current age	18-34	124	29.8
	35-44	81	19.5
	45-54	82	19.7
	>=55	129	31.0
Residency	Urban	316	76.0
	Rural	100	24.0
Age at diagnosis in year	<18	39	9.4
	18-34	137	32.9
	35-44	82	19.7
	45-54	85	20.4
	>=55	73	17.5
Marital status	Single	65	15.6
	Married	290	69.7
	Divorced	32	7.7
	Widowed	6	1.4
	Separated	23	5.5
Educational status	Can't read and write	124	29.8
	Read and write	47	11.3
	Primary school(1-8)	52	12.2
	Secondary school(9-12)	84	20.2
	College/University	109	26.2
Occupational status	Farmer	103	24.8
	Civil servant	120	28.8
	Private worker	55	13.2
	Merchant	64	15.4
	House wife	55	13.2
	Others	19	4.6
Monthly income	<=650	113	27.2
	651-1400	99	23.8
	>=1401	204	49.0

Four hundred and sixteen study participants were interviewed with the response rate of 100%, 290 (69.7%) were married, 242 (58.2%) were male, and 120

(28.8%) were governmental employees. Regarding age distributions, the mean and Standard Deviation (SD) of age and age at diagnosis of the participants were 45.5 ± 16.7 and 39.2 ± 16.3 years, respectively. Besides, more than two third of respondent 316 (76%) lived in urban. Likewise, the median of family monthly income of the study participant was 2000 ETB (>=1401 ETB); and around 109 (26.2%) of the respondents attended college/university level (table 1).

2. Clinical characteristics

About 178 (42.8%) and 238 (57.2%) patients were found to have type-I and type-II DM respectively. Regarding to their diabetes medication, types of comorbidity and DM complication; all patient with type-I DM were on injectable form (insulin) and 60 (14.4 %) were on oral hypoglycemic and insulin treatment regime; and 70 (16.8%) were with cardiovascular diseases (hypertension and heart failure), 60 (14.4%) were with sexual dysfunction, and 53 (12.7%) were with diabetic retinopathy respectively. Among respondent who had co-morbid, 92 (22.1 %) were reported that they had 1-2 co-morbid disease which was evidenced by review of patients' card and their reports. Similarly, 35 (8.4%) of the respondents were reported physical disability; and 319 (76.7%) and 321 (77.2%) were living with diabetes mellitus and taking physician prescribed medication at least for 8 years respectively. Regarding the laboratory reported fasting blood glucose level, 268 (64.7 %) was within 101 to 126 mg/dl (table 2).

Table 2: clinical characteristics of study participant at Felege Hiwot referral hospital, Bahir Dar, Northwest Ethiopia, 2006 (n=416).

Variable	Category	Frequency	Percent
Types of diabetes mellitus	Type 1	178	42.8
	Type 2	238	57.2
Diabetes treatment regime	Oral hypoglycemic and insulin	60	14.4
	Oral hypoglycemic agent only	124	29.7
	Insulin only	232	55.8
Duration of DM (years)	<=8	319	76.7
	9-16	80	19.2
	>=17	17	4.1
Duration of DM Rx(years)	<=8	321	77.2
	9-16	75	18.0
	>=17	20	4.8
Comorbid disease	Cardiovascular disease	70	16.8
	Respiratory disease	9	2.2
	Neurological disease	12	2.9
	Renal disease	11	2.6
	Others disease	13	3.1
Complication of diabetes	Diabetic retinopathy	53	12.7
	Diabetic nephropathy	8	1.9
	Diabetic neuropathy	14	3.4
	Sexual dysfunction	60	14.4
Fasting blood glucose level	<=100 mg/dl	90	21.3
	101-126 mg/dl	268	64.7
	>=127 mg/dl	58	14.0
Number of co-morbidity	0	316	76.0
	1-2	92	22.1
	>=3	8	1.9
Number of prescribed medication admi. per day	<=2	346	83.2
	3-5	58	13.9
	>=6	12	2.9
Number of DM complication	0	316	76.0
	1-2	92	22.1
	>=3	8	1.9
Physical disability	Yes	35	8.4
	No	381	91.6

Rx =treatment, admi=administration, DM=diabetes mellitus

3. Psychosocial Attributes

From study participant, about 214 (51.4 %) of study subjects had gotten adequate/relevant information about anti diabetic medication administration technique from both nurses and physicians.

Regarding to social support out of the study respondents, 345 (82.9 %) and 71 (17.7%) had good and poor social support respectively; and 346 (83.2%) had relatively low burden of medications. While 108 (26%) of respondents' had fear of complication for their future life due to their DM disease burden like worry about long term of complication, losing eye sight, increase the chance of heart disease, kidney transplantation, foot problems and stroke.

Table 3: psychosocial characteristics of study participants at Felege Hiwot referral hospital, Bahir Dar, Northwest Ethiopia, 2016(n=416).

Variables	Categories	Frequency	Percent
Social support	Good	345	82.9
	Poor	71	17.1
Fear of complication	High	108	26.0
	Low	308	74.0
Adequate and relevant information from health worker	Physicians only	79	19.0
	Nurses only	110	26.0
	Physician and Nurse	214	51.4
	Others	3	0.7
	No information	10	2.4
Burden of medication	≤ 3	346	83.2
	≥ 4	70	16.8

4. Prevalence of Depression

The overall prevalence of depression among patients with diabetes was 40.4% [95% CI: 35.3%- 44.7%] when a cut-off score of PHQ -9 ≥ 5 was used. From the total participants; 25.72% fulfilled the criteria for mild, that was, PHQ9 score 5-9, 6.73% for moderate, that was, PHQ 9 score 10-14, 5.53% for moderately severe, that was, PHQ9 score 15-19, and 2.4% for severe, that was, PHQ 9 score 20-27 form of depression two weeks prior to the study period respectively. Among governmental employees, farmers, merchants and private employees; 50 (30.0%), 49 (29.2%), 28 (16.7%) and 20 (11.9%) were found to be depressed respectively.

Regarding the age distribution of depression, 52 (31.0%) of 18-34, 43 (25.6%) of 45-54, and 36 (21.4%) of ≥ 55 years old were depressed. Concerning educational status, the prevalence of depression was 48(28.6%) for who cannot write and read; 19(11.3%) for both those able to only read and write, and primary school (1-8) and 35(20.8%) for those secondary school (9-12) education.

5. Factors associated with depression

In the binary logistic regression analysis; sex, age at diagnosis, physical disability, fasting blood sugar level from 101-126 and >=127 (mg/dl) and getting adequate and relevant information from Physician were found to have statistically greater risk factor of depression among diabetic patients. In the final multivariate logistic regression analysis after controlling the potential confounders; age 45-54 (AOR: 2.72, 95% CI (1.04, 7.09)), oral hypoglycemic treatment regime (AOR: 2.21, 95% CI 1.17, 4.17)), high fear of complication (AOR 9.13, 95% CI (4.97, 16.78)) and poor social support (AOR 5.82, 95% CI (2.82, 12.00)) were found to be independent predictors of depression among diabetic patients (table 4).

Age of respondents 45- 54 years were 2.7 times greater to have depression than those aged >=55 years old; and participant who have taken oral hypoglycemic treatment regime were 2.2 times risk to have depression than those who have taken injection (insulin) hypoglycemic treatment regime, high feels for fear of complication had 9.1 times greater to be having depression than those who did less feels for fear of complication; and poor social support were 5.8 times had risk to develop depression than those who had good social support (table 4).

Table 3: logistic regression examining the associations between demographic, clinical and psychosocial factors; and depression symptoms among diabetic outpatients at Felege hiwot referral, Bahir Dar, Ethiopia, 2016(n=416)

Variable and Categories	Depression(n)		COR (95% CI)	AOR (95% CI)
	Yes	No		
Sex				
Male*	147	95	1.00	1.00
Female	101	73	1.72(1.12, 2.60)	1.50(0.89, 2.50)
Current age category				
18-34	52	72	1.88(1.10,3.15)	3.20(0.94, 10.88)
35-44	37	44	2.17(1.21, 3.88)	2.45(0.77, 7.77)
45-54	43	39	2.85(1.59, 5.08)	2.72(1.04, 7.09)
≥55*	36	93	1.00	1.00
Age at diagnosis				
<18	18	21	2.62(1.15, 5.97)	1.27(0.72, 5.99)
18-34	55	82	2.05(1.08, 3.85)	1.13(0.29, 4.38)
35-44	41	41	3.06(1.54, 6.06)	1.69(0.46, 6.13)
45-54	36	49	2.25(1.13, 4.45)	1.99(0.24. 5.36)
>=55*	18	55	1.00	1.00
Physical disability				
Yes	9	26	2.05(0.94, 4.54)	1.14(0.44, 2.93)
No*	159	222	1.00	1.00
Diabetes treatment regimen				
Insulin only*	79	153	1.00	1.00
Insulin + oralhypoglycemic	24	36	1.29(0.72, 2.31)	1.275(0.600, 2.707)
Oral hypoglycemic	65	59	2.13(1.37, 3.33)	2.21(1.17, 4.17)
Fasting blood sugar (mg/dl)				
<=100mg/dl*	27	61		
101-126	113	155	2.11(1.06, 4.18)	0.565(0.295, 1.082)
>=127	28	30	1.65(0.98, 2.75)	1.01(0.47, 2.17)
Social support				
Good *	111	234	1.00	1.00
Poor	57	14	18.75(9.48, 37.08)	5.82(2.82, 12.00)
Fear of complication				
Low fear*	80	228	1.00	1.00
High fear	88	20	12.54 (7.25, 21.69)	9.13(4.97, 16.78)
Adequate and relevant information				
No information	6	4	0.75(0.05, 11.31)	1.17(0.22, 6.23)
Physicians and nurses*	91	123	1.00	1.00
Physicians only	22	57	0.52(0.29, 0.90)	0.58(0.28, 1.18)
Nurse only	47	63	0.19(0.02, 2.24)	0.86(0.47, 1.56)
Others	2	1	0.37(.033, 4.24)	0.87(0.04, 17.76)

*=Reference category; p-value=significant, <0.05; COR= Crude Odds Ratio; AOR=Adjusted Odds Ratio

DISCUSSION

1. Prevalence of depression

The aim of medical care in chronic disease such as DM is not only physical treatment, but also to ameliorate of quality of life and decrease mental health consequences. However, in spite of the huge impact of comorbid depression and diabetes on the individual and its importance as a public health problem, little is known about the existence of depression in people with diabetes in Ethiopia especially in the study area. This study had tried to address this issue. The purpose of this study was to assess prevalence and associated factor of comorbid depression in a random sample of outpatients with diabetes mellitus in Felege Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia.

In this study, among 40.4% respondents who were depressed, 25.7% of them to be needed watchful waiting (actively following with a PHQ-9 once a month) and 14.7% of them to be needed both watchful and active treatment with medication and/or psychotherapy and/ or refer to specialty mental health care; and 28.4% of patients were reported minimal depression symptoms (1-4 of PHQ-9) but not eligible for watchful waiting and/ or clinical interventions; and 31.3% of patients did not report any of depressive symptoms. In our study the overall prevalence of depression was 40.4% when a cut-off score of PHQ 9 ≥ 5 was used.

This finding was comparable with the result from a cross-sectional study done in Islamic Republic of Iran, Palestine, Bangladesh, Jimma and Addis Ababa using

on Beck Depression Inventory Score (BDIS), Hospital Anxiety and Depression Scale (HADS) and PHQ-9 psychometric tool, depicted that the prevalence of depressive symptoms using BDIS (score ≥ 15) and PHQ-9 (score ≥ 5) was 43.4%, 40.2% , 34%-34.8%, 43.6% and 49.4% respectively; when a cut-off value (PHQ-9≥10) indicative of moderate to severe depression was used; the prevalence in Bangladesh and Addis Ababa and others was to be 16.5% , 13% as respectively. [21,29-31,35]

This similarity could be explained by the path of physiological (biological) similarities of DM across the countries. Since depression involves physiological changes of neuroendocrine system; the underlying cause of depression is thought to be related to changes in the neurotransmitters in the brain such as serotonin (5-HT), dopamine (AD), and norepinephrine (NE) which affect mood and behavior. [48] There might be psychological stress counter regulatory hormones are activated and biological pathways through which depression might be impact in diabetes and its complications including abnormalities, alteration in glucose transport function, and increased immune inflammatory activation.

On the other hand this finding relatively lower than a cross-sectional study conducted in South East of Iran from 100 patients full filled the criteria 38% for mild depression, 30% for moderate depression and 13% for severe depression and also the total prevalence of depression (40.4%) in our study was a bit higher than the studies done in Spain (30.2%). In contrast to the above studies, this finding was relatively higher than a cross-sectional study conducted in Saudi Arabia, Malaysia and China ; the prevalence of depression from those countries were 33.3%, 12.3%, and 5, 7% respectively. [25,28,32,33] These discrepancies of prevalence might be due to variation in attributes of study participants, use of different psychometric scale, study design and setting, time frame, health care

inequities and the level of country development. Since they did not used PHQ-9, small sample size (<290), used retrospective clinical study and relatively good health care delivery systems in those study setting.

2. Associated factors and depression

Our study revealed that depression was most strongly associated with age 45-54 years, oral hypoglycemic treatment agent, poor social support and high fear of DM complications. A study conducted in different setting by different scholars found that sex, residence and employment status had no significant association with the development of co-morbid depression among diabetic patient. [26,29,32,41] Those were in agreement with our study that was the above variables were no significant association in this study; but in our study a univariate logistic regression analysis result showed that; being female, age (18-44 and >=55) and age at diagnosis were a greater risk factors of depression in diabetic patients, even though they are not statistically significant (i.e. means the observed association occurred by chance).

However, handful of earlier published articles reported the prevalence rates of depression were significantly higher in females than males but not in our study. [21,25,29,34,37] The difference based on sex with specific type of DM might be due to gender difference in both social and economic related activities among countries and hormonal difference among sex. Other demographic risk factors were significantly associated in varying degree such as older age, [31] less education; [21,32] being unmarried [28,29] and having no current job. [21] In this study only age adult age was found to be independent predictors of depression among diabetic outpatient. The difference could be due to the screening psychometric scales and the sample size, ways of health care delivery system in DM patient and attention of screening depression in DM patients during follow up visits. Since they did not used PHQ-9, used small sample size (<290), used cross-sectional

retrospective clinical Study and relatively good health care delivery systems in those study setting.

Regarding the clinical characteristics of participants, earlier studies conducted in different setting revealed that depression was most strongly associated with physical factors; functional impairment includes: diabetic treatment regimen; insulin or combined insulin and oral treatment, [25,29] and fasting blood sugar level [37] which was in agreement with our study; hypoglycemic treatment regime and results of fasting blood sugar level 101-126 and > =127 (mg/dl) were risk factors associated in bivariate analysis but not statically significant. On the other hand oral hypoglycemic treatment regime (AOR: 2.213, 95% CI 1.174, 4.171)) was found to be clinically independent predictors of depression statically significant. This similarity could be due to pathophysiological, clinical feature and path of biological similarities of DM across the countries. It might be also depression creates barriers to the management of diabetes; and the presence of behavioural disturbance might be associated with difficulties adhering to the complex self-management of diabetes.

Another earlier studies conducted in different setting revealed depression was most strongly associated with present diabetic complications and its number; [30, 32,34] neuropathy, [33,41] nephropathy, [25] co-morbid disease; [21,25,26,30,33] heart disease; [25] duration of DM; [26] but in our study, only physical disability was risk factors associated with presence of high depressive symptoms in diabetic outpatients, but not statistically significant. This means the observed association occurred by chance, the likelihood of depression was increased in those populations with the presence of the factor but the relation was not casual. This discrepancy might be due to health care inequalities, high prevalence and low addressed of these risk factors; behaviors that can cause chronic diseases, such as tobacco and excessive alcohol use, exposure to secondhand smoke, ways of life style (physical inactivity, diets low in fruits, vegetables and high in sodium and saturated fats).

Regarding of psychosocial characteristics of participants, high fear of complication (AOC: 9.129, 95% CI 4.970, 16.769)) and poor social support (AOC: 5.820, 95% CI 2.821, 12.004)) were a statistically significantly associated risk factor for depression. These were in line with the studies reported that factors had a significant association with co-morbid depression comprise; increased health care costs poor social support [37,44-46] experience chronic stressors or fear of complications, [33] medication burden. [42] In contrast to the above studies, higher level of emotional and social support; and high level social network were a protective factor for depression. [29,46] These difference might be social support increased or harnessed as a strategy for improving self-management for chronic conditions like DM, and such strategies might be focused on lifestyle aspects of self-management, or an attempt to remedy supporters' barriers to influencing patients medical self- management behaviors.

STRENGTH AND LIMITATION
Strength
The study could be considered as base for further similar and large scale and similar study. The strengths of this study also a significant contribution to the body of knowledge in general and more specifically for health professional and the patients themselves. Additionally, rather than having to rely on self-report, we were able to use information from patients' medical diaries to gather information about the presence of diabetes complications, co-morbidity and FBS levels. Also, we were used a reasonable sample size.

Limitation
Due to lack of sophisticated screening tests, diabetes complications addressed in this study were not confirmed by respective specialists instead only by patient's subjective response and their chart

review was used. Not only this but also it did not use control or comparison group which also limit this study.

CONCLUSION AND RECOMMENDATION

Conclusion

Our study revealed a relatively high prevalence of depression episodes in diabetic outpatients in comparison with other findings and most of the study subjects suffered from moderate form of depression. High fear of complication, less level of social support, oral hypoglycemic treatment regime and adult age were found to be the most important risk factors for depressive episodes. This had been worsening by a weak linkage between diabetic and psychiatric clinic facility visit for depression episodes. Hence, providing social support to patients with DM could be helped ameliorate some of the deleterious effects of depressive symptoms; by helping them identify sources of social support or serving as a source of social support particularly for individuals at highest risk for depression with less social support.

Recommendation

We recommend for the hospital that strong referral linkage between diabetes and psychiatry clinic has to be set functional and further integration of mental health care in to diabetes clinic has to be considered. Continuous health information, education and communication towards raising awareness about the possibilities of co-morbidities and early sign and symptoms of depression has to be delivered for patients with diabetes in regard to promoting early detection and treatment of the co morbidities for better health and quality of life, prognosis of DM and the nature of its consequence. Researchers should be further investigated and repeat the study with a comparison or control group to see the difference and the direction of relation of social support, DM treatment regime and fear complications.

List of Acronyms and Abbreviations

BDI- Beck Depression Inventory;
CI - Confidence Interval;
DM- Diabetes Mellitus;
DSM - Diagnostic Statistical Manual of Mental Disorders;
ETB - Ethiopian Birr;
FBS- Fasting Blood Sugar;
HADS- Hospital Anxiety and Depression Scale;
IDF- International Diabetic Federation;
NCD- Non-Communicable Diseases;
OR- Odds Ratio;
PHQ- Patient Health Questionnaire;
SD- Standard Deviation;
SPSS- Statistical Package for Social Science;
WHO- World Health Organization.

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