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Research Article

Prevalence and Factors of Cognitive Impairment and Depression among Elderly People with Type 2 Diabetic Mellitus Attending in Governmental Hospital

Haymanot Zeleke[1] and Birtukan Assefa[2]*

[1]Department of Nursing, College of Medicine and Health Sciences, Debre-Markos University, Ethiopia

[2]Department of Pediatrics, College of Medicine and Health Sciences, Debre-Markos University, Ethiopia

Abstract

Introduction: Age is a predictor of cognitive impairment and depression, in people aged 65 and up. Comorbid cognitive impairment and depression reduce a person's quality of life, and daily activity, rendering successful treatment of diabetes. Diabetes, cognitive impairment and depression are all worldwide tsunamis that feed off of one another. The prevalence and contributing factors of cognitive impairment and depression in elderly type 2 diabetic patients in Ethiopia, however, are not well understood. Thus, the current study addressed these late-life problems.

Method: All older adults with type 2 diabetes who attended public hospitals in the East and West Gojjam Zones of the Amhara region served as sources of population for the study, which ran from May 1 to June 30, 2022, at four randomly selected district hospitals and two referral hospitals. The sample size was 421 patients with type 2 diabetes aged 65 and up, and data were collected using consecutive sampling methods. Card reviews, interview questions, and physical examinations were used to collect data. The Mini Mental State Examination, Cornell Scale, and Neuropathy Disability Score were all validated tools. After the data were collected and processed into Epi Data 4.1, statistical analysis was carried out using the SPSS 20.0 software package. Finally, statistical significance was determined with a P value less than 0.05 and expressed using odds ratio and 95% confidence intervals.

Result: Approximately 77 (19.3%) of the patients in this study had cognitive impairment, while 236 (59%) had moderate to severe depression. Cognitive impairment was linked with age 70 and older AOR 6.86, CI (3.26-14.40), alcohol uses AOR 2.51, CI (1.11-5.67), receiving familial help AOR 0.29, CI (0.08, 0.98), chronic complications AOR 11.25, CI (5.33-23.73), and adherence AOR 3.55, CI (1.65-7.65). People whose partners drink AOR 3.00, CI (1.45- 6.20), lipid profile AOR 3.26, CI (1.33-7.98), education status AOR 2.46, CI (1.28-4.70), and adherence AOR 0.16, CI (0.09-0.27) were variables associated with moderate or severe depression.

Conclusion and recommendation: Elders with type 2 diabetes require immediate treatment for depression, as well as a diligent follow-up for those factors that contribute to depression and cognitive impairment. Future research focusing on the routed causes of poor adherence, substance use, and family support is highly encouraged.

Keywords: Cognitive Impairment; Depression; Type 2 diabetic mellitus; Elders and Ethiopia

Abbreviations

AOR: Adjusted Odds Ratio; BMI: Body Mass Index; CI: Confidence Interval; COR: Crude Odds Ratio; CSD: Cornell Scale for Depression; DM: Diabetic Mellitus; MMSE: Mini Mental State Examination

Introduction

Diabetes Mellitus (DM) is defined as "a group of diseases characterized by elevated blood glucose levels due to defects in insulin synthesis, action, or both"[1] Numerous physiological changes caused by aging can render people more vulnerable to diseases and associated complications, such as diabetes [2]. DM cases in 2013 increased from 382 million to 592 million by 2035, with 4 million deaths every year. Currently, 80% of people with diabetes live in low-income nations, and by 2035, the number of people with diabetes in Africa will increase by 107%, but only by 22.4% in Europe [3]. By 2045, there will be approximately 41 million diabetes patients in Africa. In Ethiopia, there were 2.567.900 cases of adult diabetes in 2015, with a prevalence rate of 5.2% [4].

In addition to diabetes, elderly individuals frequently suffer from depression and cognitive decline. Diabetes increases the risk of concomitant depression in elderly persons [5]. Depression is a serious mental illness that inhibits one's ability to function, as well as their quality of life and interpersonal connections. In this age bracket, cognitive impairment is also fairly prevalent.

Age was found to be a predictor of cognitive impairment, with people aged 65 and up being four times more likely to suffer from it. Comorbid cognitive impairment and depression reduce a person's quality of life, hasten cognitive deterioration compared to when depression is absent, and make self-care activities difficult [6-8]. Depression impairs one's ability to work, communicate, and think clearly. As a result, successfully treating diabetes may become more difficult [5,9]. Similarly, patients with cognitive impairment were three times more likely to have another hypoglycemic episode.

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***Correspondence:** Haymanot Zeleke, Department of Nursing, College of Medicine and Health Sciences, Debre-Markos University, Debre-Markos, Ethiopia

Cognitive ability and the risk of hypoglycemia are linked in type 2 diabetes patients. Several cross-sectional population-based studies in patients with type 2 diabetes have found a link between a history of severe hypoglycemia and impaired cognitive function later in life [10,11].

Diabetes, cognitive impairment and depression are all worldwide tsunamis that feed off of one another. A comprehensive review and meta-analysis conducted in Ethiopia revealed that depression was extremely common (39.73%) among diabetic patients [12]. Cognitive impairment is 4 times more common in older age groups and is made worse by depression [13]. Similar research indicates that patients with cognitive impairment are more likely to experience depression [14-16].

The prevalence and contributing factors of cognitive impairment and depression in elderly type 2 diabetes patients in Ethiopia, however, are not well understood. The current study's objectives therefore include determining the prevalence of late-life depression and cognitive impairment as well as exploring the connections between the two illnesses and their underlying factors.

Method

Ethiopia has 1,391,339 males and 1,701,740 women over the age of 65, accounting for approximately 2.94% of the total population [17]. In the East and West Gojjam Zone, there are three public referral hospitals and eight district or primary hospitals. These include the district or primary hospitals at Bichena, DebreWerq, Motta, Yejube, Liben, Merto Lemariam, Lumame, Shebel Berenta, Finoteselam, Bure, and Durbete as well as the referral hospitals in Debre Markos, Tebebe Ghionand Felegehiwot. The study was taken from May to June 2022 from randomly selected hospitals that had diabetic follow up care departments. These selected hospitals were 4 district hospitals; Bichena, Motta, Lumame and Finoteselam, and two referral hospitals; Debre Markosand Felegehiwot (Figure 1).

All elderly people with type 2 diabetes who visited the Governmental Hospital East and West Gojjam Zone in the Amhara region were taken into account as sources of population. The study population was made up of everyone who was randomly chosen from these source populations.

The inclusion criteria of this study included all willing volunteers who were 65 years of age or older with type 2 diabetes. However, people with communication difficulties brought on by hearing loss, deafness and documented psychiatric illnesses were excluded.

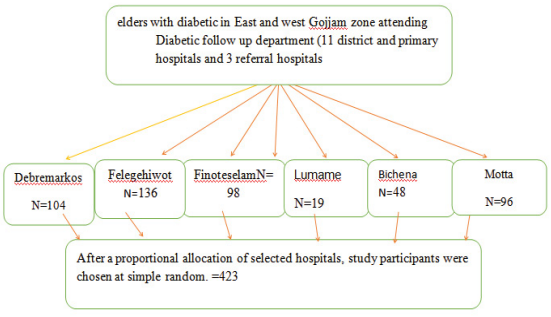

Figure 1: Sampling procedure for prevalence and factors of cognitive impairment and depression among elderly people with type 2 diabetic mellitus attending in governmental hospital at East and West Gojjam, Ethiopia 2022.

By using the proportion of cognitive impairment and depression among DM patients and the odds ratio of associated factors of cognitive impairment and depression among DM patient studies, the sample size with a 5% margin of error and a 95% confidence interval was computed. A study on cognitive impairment among patients with type 2 DM at Jimma University specialized hospital in Southwest Ethiopia conducted by Baye Dagnew in 2017 [18] found that the highest sample size which was 383. Finally, 10% of respondents who did not respond were taken into account, and the needed sample size was 421 elderly DM patients.

Data Collection Procedure

Instrument

Levels of cognitive impairment and depression, and their factors were collected at a follow-up period through consecutive the sampling techniques until sample size was fulfilled. A card review was performed to assess clinical characteristics such as diabetic complications, medication types, adherence, and so on, as well as interview questions to assess socio-demographic variables, cognitive impairment and depression, and a history of substance use, as well as physical examinations to assess things like peripheral neuropathy and foot ulcers.

After examining the literatures, the questionnaire was created, translated into Amharic and back-translated into English to guarantee phrasing accuracy. It is divided into three sections. These include the Mini Mental State Examination (MMSE) to test cognitive impairment, the Cornell Scale for Depression (CSD) and associated variables, and the Neuropathy Disability Score to assess peripheral neuropathy. The MMSE consists of 11 questions that assess five domains of cognitive function: orientation, registration, attention and computation, recollection, and language. The maximum possible score is 30 and a score of 23 or less suggests cognitive impairment. Because the valid MMSE takes only 5-10 minutes to administer, it is feasible to utilize repeatedly and routinely [19]. The CSD is the best scale available to assess depression in the presence of cognitive impairment [20,21]. It has a scale of 0-2 (0=absent, 1=mild or intermittent, 2=severe). Then the item scores were added. Scores above 10 indicated probable major depression. Scores above 18 indicate a definite major depression. Scores below 6 as a rule are associated with absence of significant depressive symptoms. To finish the CSD question approximately 20 minutes had taken. Finally, to assess the associated factors, different studies were reviewed (sociodemographic factors, history of substance use and clinical characteristics).

Data quality assurance

Data collectors were trained, and the total data collection efforts were overseen by the primary investigator. A week before the actual data collection, a pretest was done on a 5% sample population in Bure. The surveys were tested for reliability using Cronbach's alpha, which was 0.78. This aids in determining the clarity of the data collecting tools and determining the average duration of the questioner for each respondent, as well as modifying the tool as needed. After data were collected, each questioner was reviewed for errors and completeness, and obtained data were managed and stored correctly until analysis was completed.

Operational definitions

Cognitive impairment was considered a score of 24 or above on the MMSE questions [19]. Adherence was categorized as high, middle, or low when a score of 0 was present, a score of 1 or 2, and

a score of 3 or 4 indicated from the mmas-4 Questions, respectively. Depression was considered when a total of CSD questions yielded a score of 6 or above [20,21].

Peripheral neuropathy was assessed through Neuropathy Disability Score [22] score 3 or above from total questions recognized as having peripheral neuropathy at the time of data collection by physician. Foot ulcer; if a previous foot ulcer diagnosis was recorded on the patient card or during the physical examination at the time of data collection by the physician.

Data processing and analysis

Statistical analysis was carried out utilizing the SPSS 20.0 software package after the data were entered through epi data 4.1 version software. An evaluation of the sociodemographic and other predicting parameters was conducted. Depression and cognitive impairment prevalence was calculated. Categorical variables were compared using chi-square statistics. Utilizing univariate analysis, factors linked to cognitive impairment and depression were first investigated. After adjusting for all the variables, multivariate analysis was performed on the factors with a p value of 0.2 or below in the univariate analysis. To assess the relationship between depression and cognitive impairment and various covariates, Crude Odds Ratios (CORs), Adjusted Odds Ratios (AORs), and 95% CIs were determined. All statistical analyses with a P value of 0.05 below were deemed statistically significant.

Result

Descriptive results

Sociodemographic characteristics of elderly people with type 2 DM

A response rate of 97.1% was achieved out of 423 participants, with 400 actually participating in the study. Out of 400 responders, 246 (61.3%) were men, with nearly half being between the ages of 65 and 69. The participants' median age ranged from 55.05 to 56.9, with a mean age of 68. The respondents' levels of education were sequentially Uneducated (18.5%), Primary School (41.0%), and College and above (32.8%). Only 20 (5% of respondents) smoked, nearly half (46%) were former government employees, and 76 (19%) currently consumed alcohol (Table 1).

Clinical characteristics of elderly people with type 2 DM

The average time on DM treatment lasted 7.02 years, with a 95% confidence interval of 6.72 to 7.35. Only 191 people (47.75%) had blood lipid levels below 200 mg/dL, 248 people (61.8%) had hypertension, and 88 people (21.9%) had chronic diabetes associated complications. Approximately 138 people (34.4%) were overweight, and 306 people (76.5%) had 1-9 times the frequency of hypoglycemia (Table 2).

Medication adherence of elderly people with type 2 DM

After calculating each participant's response to each question, the MMAS-4 tool indicated that 217 participants (54.3%) had strong adherence to medicine (Table 3).

Depression in elderly people with type 2 DM

The PHQ-9 tool assesses depression among patients who have DM with cognitive impairment. Those questions can identify any feeling of depression for approximately 2 weeks. We found that only 2.5% of the participants had no depression (Table 4).

In addition, the severity of the depression was divided into two categories, those with no moderate and severe depression as computed by computing both mild and no depression, for whom medication and close supervision are not necessary, and those with moderate and severe depression, as computed by computing both moderate and severe depressed, for whom medication and close supervision are necessary. The graphic below shows that 59% of the participants had moderate and severe depression (Figure 2).

Level of cognitive impairment

Regarding cognitive impairment in elderly people with type 2 DM after applying the MME tool, 77 participants (19.3%) had cognitive impairment (Figure 3).

Factors associated with cognitive impairment and depression among elderly people with type 2 DM

The following variables were identified in the bivariate logistic regression analysis with cognitive impairment as having a p value less than 0.2. These include age, drinking alcohol, and chewing tobacco, getting help from relatives, having chronic conditions, having high blood pressure, and adhering to medication. Multivariate logistic regression analysis was carried out using these variables.

Participants above the age of 70 have a 6.86-times increased likelihood of developing cognitive impairment than those under the age of 70. Alcohol usage increases the likelihood of developing cognitive impairment by 2.51 times compared to alcohol abstinence. The likelihood that someone will acquire cognitive impairment is 71% higher for those who are not receiving familial assistance than for those who are. The likelihood that someone with a chronic complication will experience cognitive impairment is 11.25 times higher than the likelihood that someone without a chronic complication will. The likelihood that someone with poor medication adherence would experience cognitive impairment is 3.55 times higher than the likelihood that someone with strong medication adherence would experience such a condition (Table 5).

The following factors were found to have a p value less than 0.2 in the bivariate logistic regression analysis with depression. These are occupation, partner alcohol use, alcohol usage, chronic complications, lipid profile, educational status, and adherence after that, a multivariate logistic regression analysis was performed using these variables.

The likelihood of having moderate or severe depression is three times higher in people whose partners drink than in those whose partners don not consume alcohol. The likelihood of having moderate or severe depression is 3.26 times higher in those with a severe lipid profile than in people with a normal lipid profile. Higher education status is associated with a 2.46 times greater chance of having moderate or severe depression compared to illiteracy. The likelihood of those with poor adherence was 84% higher than the likelihood of those with strong adherence having moderate or severe depression (Table 6).

Discussion

Cognitive impairment is the neurophysiologic disturbance caused by neuronal damage and functional defects among neurotransmitters. There is a proven link between type 2 diabetes and cognitive impairment. Type 2 diabetes is a powerful predictor of cognitive impairment and is more pronounced in elderly persons. Type 2 diabetes, as well as hereditary risk, is associated with a higher loss in cognitive capacity.

Table 1: Sociodemographic characteristics of elderly people with type 2 DM in the East and West Gojjam zones, (N=400), 2022.

Variable	Categories	Frequency (N)	Percentage (%)
Sex	Female	154	38.4
	Male	246	61.3
Age	65 to 69	309	77.3
	70 to 74	58	14.5
	75 to 79	33	8.3
Residence	Rural	160	40
	Urban	240	60
Religion	Orthodox	324	81
	Muslim	46	11.5
	Others	30	7.5
Living with someone or alone	Someone	148	37
	Alone	252	63
Educational status	Uneducated	74	18.5
	Primary	164	41
	Up to college	131	32.8
	College and above	31	7.8
Occupation	Farmer	47	11.8
	Retire from governmental employed	184	46
	Merchant	149	37.3
	other	20	5
Having alcohol consuming partner	No	47	11.75
	Yes	353	88.25
Current Alcohol use	Yes	76	19
	No	324	80.8
Current Chat chewing	Yes	25	6.25
	No	375	93.75
Smoking	Yes	20	5
	No	380	95
Do you have Family support	Yes	22	5.5
	No	378	94.5

Table 2: Clinical characteristics of elderly people with type 2 DM in the East and West Gojjam zones, (N=400), 2022.

Variables	category	Frequency(N)	Percent (%)
Duration of DM Treatment	1-5 years	182	45.5
	6-10 years	193	48.3
	Above 10 years	25	6.3
body mass index	Below 18.5, Underweight	52	13
	18.5-24.9, Healthy Weight	210	52.4
	25.0 and above, Overweight	138	34.4
Recorded frequency of Hypoglycemia episodes throughout DM diagnosis	No	26	6.5
	1-9 times	306	76.5
	10 and above times	68	17
Treatment regime	Oral hypoglycemia	264	65.8
	both insulin use and Oral hypoglycemia	136	33.9
lipid profile	Less than 200 mg/dL	191	47.75
	200 to 239 mg/dL	148	37
	240 mg/dL or greater	61	15.25
Do you have fear of Diabetic complication	Yes	378	94.3
	No	23	5.7
Do you have physical impairment	Yes	49	12.25
	No	351	87.75
Hypertension	Yes	152	61.8
	No	248	38.2
Diagnosed chronic diabetes related complication	Yes	84	21
	No	315	79
Diabetic retinopathy	Yes	378	94.3
	No	23	5.7
Diabetic foot ulcer/amputation			
	Yes	24	6
	No	377	94
Diabetic neuropathy	Yes	58	14.5
	No	343	85.5
Cardiovascular disease (other than hypertension)	Yes	382	95.5
	No	18	4.5
Chronic renal disease			
	Yes	63	15.75
	No	337	84.25

The overall cognitive impairment in this study was 19.3%, with a 95% confidence interval of 15% to 23%, which is comparable with a study in Taiwan of 22.3%, although it was primarily focused on dementia [23]. However, it is lower than the findings of the study conducted in Tikur Anbesa referral Hospital, Ethiopia [24] which was 45% and Nigeria [25] which was 40%. Cognitive impairment in

Table 3: Medication adherence of elderly people with type 2 DM in the East and West Gojjam zones, (N=400), 2022.

Variable	Category	Frequency(N)	Percent (%)
Do you ever forget to take your medicine?	Yes	219	54.75
	No	181	45.25
Are you careless at times about taking your medicine?	Yes	13	3.25
	No	387	96.75
Sometimes if you feel worse when you take the medicine, do you stop taking it?	Yes	95	23.75
	No	305	76.25
When you feel better do you sometimes stop taking your medicine?	Yes	19	4.75
	No	381	95.25
Over all adherence category	good adherence	217	54.3
	intermediate adherence	135	33.8
	low adherence	48	12

Table 4: Assessment of depression in elderly people with type 2 DM in the East and West Gojjam zones, (N=400), 2022.

Questions	Not at all (N(%)	Several days (N(%)	More than half days (N(%)	Nearly every day (N(%)
Thoughts that you would be better off dead or of hurting yourself in some way	101(25.3)	166(41.5)	114(28.5)	19(4.8)
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	104 (26.0)	171(42.8)	106 (26.5)	19(4.8)
Trouble concentrating on things, such as reading the newspaper or watching Television	104 (26.0)	166 (41.5)	106 (26.5)	24(6.0)
Feeling bad about yourself- or that you are a failure or have let yourself or your family down	116(29.0)	188(47.0)	84 (21.0)	12 (3.0)
Poor appetite or overeating	97(24.3)	169(42.3)	110(27.5)	24(6.0)
Feeling tired or having little energy	80(20.0)	180(45.0)	125(31.3	15(3.8)
Trouble falling or staying asleep, or sleeping too much	92(23.0)	179(44.8)	109 (27.3)	20(5.0)
Feeling down, depressed, or hopeless	93 (23.3)	170 (42.5)	117(29.3)	20(5.0)
Little interest or pleasure in doing things	73 (18.3)	159 (39.8)	146 (36.5)	22 (5.5)
Over all depression	Category		Frequency	Percent
	None		10	2.5
	Mild		154	38.5
	Moderate		194	48.5
	Severe		42	10.5

Table 5: Factors associated with cognitive impairment among elderly people with type 2 diabetes mellitus in the East and West Gojjam zones, (N=400), 2022.

Variables		Cognitive impairment		P-value	COR (95% C.I)	p-value	AOR (95% C.I)
		Yes	No				
Age category	65- 69	32	277	1			
	> 70	45	46	0	8.46(4.88-14.68)	0	6.86(3.26-14.40)
Alcohol use	Yes	42	34	0	10.2(5.75-18.07)	0.027	2.51 (1.11-5.67)
	No	35	289	1			
Chat chewing	Yes	19	6	0	17.3(6.63-45.18)	0.108	2.78 (0.8- 9.72)
	No	58	317	1			
Receiving family support	Yes	7	15	0.13	2.05 (0.8-5.22)	0.047	0.29 (0.08, 0.98)
	No	70	308	1			
chronic complication	Yes	46	38	0	11.12(6.31-19.62)	0	11.25 (5.33-23.73)
	No	31	285	1			
Hypertension	Yes	46	106	0	3.03 (1.82-5.06)	0.077	1.78 (0.93-3.37)
	No	31	217	1			
Adherence	Yes	17	200	1			
	No	60	123	0	5.73(3.20-10.28	0.001	3.55(1.65-7.65)

this study was greater than that in a study among elderly Chongqing people (12.6%) [26], and in a study in Jamaica, 11% of older adults had severe cognitive impairment [27], probably due to sociodemographic differences.

In this study those aged 70 years and older had a 6.86-fold increased likelihood of developing cognitive impairment comparted with those under the age of 70. This is corroborated by additional research [6,15,28,29]. When people get older, they are more likely to experience vascular and metabolic changes, which are also heavily influenced by diabetes. Aging is characterized by multifaceted homeostatic dysfunction and impaired cellular stress.

Similarly, evidence, such as this one, has shown that drinking alcohol increases the risk of acquiring cognitive impairment. Alcohol can impair coordination, executive learning abilities, reflexes, abstract thinking, the capacity to plan and implement a strategy, and the ability to discriminate and react appropriately [30,31]. However, the level and type of drink matter [30-32]. Chronic alcohol consumption affects glucose tolerance, reduces insulin sensitivity, and raises

Table 6: Factors associated with cognitive impairment among elderly people with type 2 diabetes mellitus in the East and West Gojjam zones, (N=400), 2022.

Variables		Depression		P-value	COR (95% C.I)	p-value	AOR (95% C.I)
		Yes	No				
Occupation	Farmer	29	18	1			
	Former Governmental employed	112	72	0.91	0.96(0.5-1.86	0.881	0.94(0.44-1.99)
	Merchant	86	63	0.62	0.847(0.43-1.65	0.352	0.69(0.32-1.50)
	other	9	11	0.21	0.50(0.17-1.46)	0.409	0.61(0.18 -1.97)
Partner use alcohol	No	217	136	0.007	2.35(1.26-4.37)	0.003	3.00 (1.45- 6.20)
	Yes	19	28	1			
Use alcohol	No	176	148	0	0.31(0.17-0.57)	0.39	1.39(0.64-3.02)
	Yes	60	16	1			
chronic complication	Yes	178	138	0.03	0.57(0.34-0.96)	0.869	1.05(0.54-2.05)
	No	58	26	1			
Lipid profile	normal	105	86	1			
	elevated	82	66	0.93	1.01(0.66-1.56)	0.355	1.25(0.77-2.04)
	sever	49	12	0.001	3.34(1.67-6.68)	0.009	3.26(1.33-7.98)
Educational status		37	37	1			
		71	93	0.337	1.31(0.75-2.27)	0.491	1.24(0.66-2.33)
		56	106	0.025	1.89(1.08-3.31)	0.006	2.46(1.28-4.70)
Adherence	good adherence	89	128	0	5.87(3.73-9.24)	0	0.16(0.09-0.27)
	poor adherence	147	36	1			

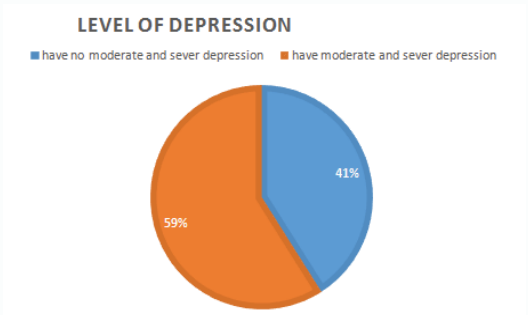

Figure 2: Level of depression among elderly people with type 2 diabetic mellitus attending in governmental hospital at East and West Gojjam, Ethiopia 2022.

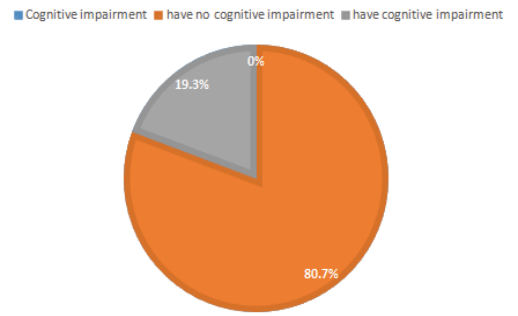

Figure 3: Level of Cognitive impairment among elderly people with type 2 diabetic mellitus attending in governmental hospital at East and West Gojjam, Ethiopia 2022.

insulin resistance, all of which indicate an increased risk of T2DM complications and, as a result, a decline in cognitive performance.

Receiving familial assistance can minimize the acquiring cognitive impairment by 71%. Most likely, those who receive support from family are more likely to adhere to medication and even decrease their sense of loneliness, thus, decreasing the probability of cognitive impairment [33,34]. In this study, those who had poor adherence to medication were more affected by cognitive impairment as well. This can aggravate the pathological changes due to metabolic disturbance of DM, if the medication is not well used. The likelihood of chronic complications experiencing cognitive impairment is 11 times higher than the likelihood that someone without a chronic complication will have. This is similarly supported by other studies in Taiwan [23], specifically those who had renal and metabolic system diseases were 2.81 times as affected. Similarly, in a study in Nigeria [25], an Olmsted County (Minnesota) population [29] and a literature review [35], the presence of complications of DM was associated with cognitive impairment. In this study, having high blood pressure was also associated with cognitive impairment. A study in Korea supports this, and systolic blood pressure was a determining factor [36]. This is because hypertension may worsen the evolution of cognitive decline by increasing oxidative microvascular damage, brain inflammation, and blood-brain barrier disruption, as well as impairing glial-lymphatic clearance of amyloid [37].

In this study those who had level of depression moderate and above was 59% CI (54%-64%). Relatively in line with a study conducted at Debre Markos, Amhara region, which was 64.9% [38]. This is higher than the systematic literature review and meta-analysis in Ethiopia pooled prevalence of 34.61% [28], 40.4% was observed in a study conducted at Felege Hiwot Referral Hospital, Bahir Dar, Northwest Ethiopia [39], at Ambo General Hospital, Oromia Regional State was found to be 47% [40], university of Gondar hospital diabetic clinic, Northwest Ethiopia Amhara region studies which was 15.4% [41], at Addis Ababa 19.2% [42], Mekelle was 17% [43], in Chaniathe overall prevalence was 24.3% [15]. The discrepancy in the study of Chania is due to the study population being among the general population rather than DM patients. However, a study in Ethiopia, pooled the effects of different studies after reviewing the literature, and other studies primarily focused on all adult age groups rather than elderly individuals.

The likelihood of having moderate or severe depression is three times higher in people whose partners drink than in those whose partners do not consume alcohol. Most likely, it can be associated with those who live with such partners being influenced and starting to engage in this harmful behavior. Regular heavy drinking has been connected to depressive symptoms; this can be shared with family and even upsets the family. When his or her partner drinks frequently or heavily, he or she may neglect the needs of his or her loved ones and

fail to complete responsibilities as a partner, friend, or family member [44]. A study conducted in Korea on cognitive function depression, found that factors in elderly people living alone were affected by depression [45]. Family support is connected with better diabetes outcomes, but a lack of family support is associated with problems. However, another study showed that living with people in the same household does not ensure diabetes management support [46]. In this study, the likelihood of having moderate or severe depression was 3.26 times higher in those with a severe lipid profile than in people with a normal lipid profile. This is supported by another study which conducted on community-dwelling older adults with T2DM and found that cholesterol levels were significantly associated with depression [47]. These may be attributed to increased noradrenergic activity, which may be responsible for lipid increases in depressed people [48]. Higher education status is associated with a 2.46 times greater chance of having moderate or severe depression compared to illiteracy. Most likely, in this study, this is due to the large frequency of elders living in urban residences. There was an uninformed distribution of age groups in the residence variable, which is mostly educated in urban areas. The likelihood of those with poor adherence is 84% higher than the likelihood of those with strong adherence having moderate or severe depression. This is supported by a study conducted at Mekelle on depression among diabetic patients, which showed that poor medication adherence was significantly associated with depression among DM patients [43]. It is due to when there is depression there will be forgetting to take medication properly. Thus, having a poor medication adherence further aggravates the health status of DM patients, especially elderly individuals. They can easily develop diabetic complications and are at risk for other medical comorbidities that challenge the treatment. In this study, the likelihood of those with poor adherence was 84% higher than the likelihood of those with strong adherence having depression. Although it was not significant in this study, depression was statistically significantly correlated with the presence of peripheral artery disease, ischemic heart disease and chronic kidney disease, and diabetic complications such as retinopathy were also related to cognitive impairment. There is a need for treatment for any diabetic complication and comorbidity that can minimize the development of depression as well as minimize its severity. Many studies have shown that age, sex, area of residence, educational level, income, occupation, comorbid diseases, substance use, adherence, support, diabetic complications, diabetes treatment frequent hypoglycemia and cognitive impairment affect depression, and cognitive impairment [14-16,28,29,39,40].

Conclusion

The level of cognitive impairment was tolerable, but depression was found to be high, which required immediate medical and psychotherapy attention. Elderly people with DM who were above the age of 70, consumed alcohol, did not receive familial assistance, and had chronic complications and poor medication adherence were significantly associated with cognitive impairment. Elders who had partners who consumed alcohol, had a severe lipid profile, had a higher education status and had poor adherence were significantly associated with moderate or severe depression.

Recommendation

The national health bureau, zonal health office, woreda health office, and health institutions should take specific measures to avoid depression and address the conditions that lead to it. Future research focusing on the causes of poor adherence, substance use, and the degree of support for those who have depression and cognitive impairment among elderly adults with diabetes is highly encouraged.

Declarations

Ethics approval

The College of Medicine and Health Sciences at Debre Markos University provided the necessary ethical clearance and approval for this research. Before the questionnaire was provided, the participants were given a detailed explanation of the study's aims and objectives, and their informed consent was obtained, and the confidentiality of the data obtained was ensured.

Availability of data and materials

The data analyzed is available from the corresponding author (Haymanot Zeleke) on reasonable request.

Authors' Contribution

Both authors contributed equally to this study. The final draft of the work was read and approved.

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