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Lifestyle Modification Practice and Associated Factors among Type 2 Diabetic Patients in Oromia: A Multicenter Study

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Abstract

Background: Diabetes mellitus is a metabolic disorder characterized by high blood glucose levels due to insulin irregularities. It is frequently accompanied by difficulties in the metabolism of carbohydrates, fats, and proteins. Despite the significant loss of life and resources associated with DM, management remains insufficient. This management typically involves pharmacologic interventions and lifestyle modifications (LSM). However, a majority of patients and caregivers tend to disregard LSM in the management of type 2 diabetic patients.

Objective: To assess lifestyle modification practice and associated factors among type 2 diabetic patients in selected North Shewa Public Hospitals, Oromia, Ethiopia.

Methods: A hospital-based cross-sectional study design was conducted in North Shewa Zone public hospitals among 407 randomly selected type 2 diabetic patients from September 1 to November 30, 2022. Data were collected using a structured and pre-tested interviewer-administered questionnaire entered into Epidata version 3.1 and then exported to SPSS version 24 for statistical analysis. Descriptive, bivariate, and multivariate binary logistic regression analyses were done using SPSS.

Results: The overall magnitude of good lifestyle modification practice among type 2 diabetic patients was 41.5 % [95% CI: (36.7, 46.3)]. In the multivariable logistic regression analysis attending secondary, college and above education (AOR = 3.73, 95% CI: 1.56–8.92) and (3.995% CI: 1.71–8.90), respectively, urban dwellers (AOR = 3.19, 95% CI: 1.65–6.17), respondents who had no diabetic related comorbidities (AOR = 3.17, 95% CI: 1.85–5.44), and patients who got LSM education (AOR = 2.37, 95% CI: 1.44–3.92) were significantly associated with good lifestyle modification practice.

Conclusion: The prevalence of poor lifestyle modification practice was observed in more than fifty per cent of the patients. LSM practice was good among high educational levels, urban dwellers, those not having diabetic comorbidities, and those with diabetic LSM education.

Keywords: Type 2 diabetes, Lifestyle Modification, Practices, Diabetic patients, Co-morbidities, Oromia

Introduction

Diabetes mellitus (DM) is a metabolic disorder that is characterized by elevated blood glucose levels (hyperglycaemia) due to irregularities in the body's production of insulin, which is frequently accompanied by problems in the metabolism of carbohydrates, fats, and proteins [1]. Diabetes mellitus is one of the widespread and universal health problems that affect many people worldwide [2,3]. Obesity, junk food consumption, and a sedentary lifestyle are the key etiological variables that lead to the development of diabetes. Controlling increased blood sugar levels (BSL) is crucial in preventing both microvascular and macrovascular issues [4]. About 90–95% of all cases of diabetes worldwide are Type 2 Diabetes mellitus (T2DM) in industrialized countries, and the ratio is significantly greater in underdeveloped nations [5].

According to the International Diabetes Federation 2021 study, 537 million persons globally between the ages of 20 and 79 (10.5% of all adults in this age group) are predicted to have diabetes. It is anticipated that 643 million individuals between the ages of 20 and 79 will have diabetes by 2030, and 783 million by 2045. As a result, although the global population is predicted to expand by 20% during this time, the number of people with diabetes is predicted to rise by 46% [6].

In Africa, 24 million adults have diabetes, and by 2045, 55 million individuals are anticipated to have the disease which shows a 129% increment. In Ethiopia, 1.9 million individuals suffer from diabetes [6]. Ethiopia is one of the sub-Saharan African nations with the fastest-growing rates of diabetes mellitus, which range from 1.9% in southern Ethiopia to 6.8% in the northeast [7]. Diabetes management is difficult since it necessitates many therapy modalities, such as Self-Monitoring of Blood Glucose, dietary and lifestyle changes, and schedule-based drug delivery. Regimen adherence problems are common in individuals with diabetes, thus making glycaemic control difficult to attain. The patient, family, doctor, and other medical team members should develop an individual therapeutic alliance as part of the management strategy [9].

The key lifestyle modifications (LSM) for type 2 diabetes are dietary changes, physical activity, weight management, smoking cessation, and adherence to medication [4]. Factors associated with LSM Practices are: socio-demographic factors such as age, gender, education level, and income [9-11]. Health-related factors such as duration of diabetes, comorbidities, previous health behaviors, environmental [12,13]. Improvement in physical activities (walking) and exercises (running, cycling, etc.) and modifying the diet are vital factors in the management of T2DM [14]. Appropriate utilization of the recommended guidelines for the above-mentioned lifestyle features is also important for preventing the incidence as well as managing the occurrence of the disease [15]. Furthermore, lifestyle changes are important factors in achieving good control of T2DM and avoiding its long-term complications [16].

According to a study conducted in an Ethiopian teaching hospital, the adherence to dietary recommendations was 44.3% among diabetic patients who participated in the study [17]. Another study on physical activity found that 38% of T2DM patients in the Illubabor zone of South West Ethiopia do not adhere to physical activity recommendation [18]. Another comparable cross-sectional study on the degree of physical activity among type 2 diabetic patients at Dessie Referral Hospital, Northeast Ethiopia, revealed that 33.1% of the study's participants were physically inactive or did not engage in health-improving physical activity [19].

Diabetes patients are sent to follow-up clinics in public hospitals in North Shewa based on their illness condition. The majority of patients visit the hospitals once a month or once in two months to get their medications refilled. They only check their blood glucose levels when they have a follow-up visit and contact the doctor for a refill in less than five minutes. Most of the time, they merely wanted to know when taking their prescription and also didn't check whether they were aware of any lifestyle changes. There are times when both health care providers and patients, especially newly diagnosed T2DM patients; do not express any concerns regarding non-pharmacologic diabetic management. These detections piqued our interest to conduct this study in the practice of lifestyle adjustments among diabetes patients in selected public hospitals in the North Shewa Zone.

Methods and Materials

Study design, period, and setting

An institutional-based cross-sectional study was conducted from September to November 2022 G.C. In the North Shewa zone, Oromia regional state, central Ethiopia, among T2DM patients who were in diabetes follow-up clinics at public hospitals (Salale University Comprehensive Specialized Hospital, Kuyu General Hospital, Muka Turi Primary Hospital) in the North Shewa zone, Oromia regional state. The capital city of the zone, Fitche, is located approximately 114 km away from Addis, the capital city of Ethiopia. The zone has a total of 14 districts and 291 kebeles. There were 1,639,587 people (362,841 women) and 78700 households in the zone in 2020. There were 6 hospitals, 63 health centres, and 267 health posts in the zone where the current study was conducted. The number of hypertensive patients in the zone in 2022 was 751.

Population

All T2DM patients who were in the diabetes follow-up clinic at North Shewa Public Hospital were included in the population. The study population consisted of randomly selected T2DM patients who fulfilled the inclusion criteria.

Inclusion and exclusion criteria

Inclusion criteria: All T2DM patients visited North Shewa Public Hospitals for chronic follow-up during the data collection period.

Exclusion criteria: All T2DM patients who were seriously ill and unable to provide information.

Sample size determination

The sample size was determined using the single population proportion formula for the Epi Info STAT CALC cohort, version 7.2.4, based on the assumptions of a 95% confidence level (CL), the proportion of good lifestyle modification practice, 49.1%, and 5% marginal error from the study conducted among type 2 diabetic patients attending Adamaa Hospital Medical

College, Oromia Region, Ethiopia [20], and also by considering 10% non-response, the sample size was taken to be 422.

Sampling procedure

Three hospitals were selected from the five public hospitals in the North Shoa Zone using a simple random sampling technique known as the lottery method. The selected hospitals were Salale University Comprehensive Specialized Hospital, Kuyu General Hospital, and Muka Turi Primary Hospital. The sample size was then allocated proportionally among the three hospitals based on the number of patients they served. The study participants were selected using a simple random sampling technique, again using the lottery method. To prevent the recycling of data resulting from double interviewing, special markers were used during the registration of the interviewed patients. This process was further reinforced by verbally confirming whether the patients had been interviewed on the previous consecutive days of data collection.

Data collection procedures (tools, techniques and personnel)

The structured, interview-administered questionnaire was adapted and modified from similar literature [7,16,21,22]. The questionnaire included socio-demographic characteristics, the patient's health profile, individual-related factors, and the diabetes score questionnaire for lifestyle changes. The assessment of lifestyle modification practice was done using a diabetes score questionnaire consisting of 10 behaviorally-oriented items [22]. Each item was rated as either 0, 5, or 10 points based on a rubric of lifestyle targets. The ratings of the items were summed up to obtain a total score ranging from zero to 100 points. A total score of ≥ 60 out of 100 points was considered indicative of good practice, while scores <60 points were considered poor practice [22]. Initially, the questionnaire was prepared in English and then translated into Afaan, Oromo, and Amharic. It was later translated back into English to ensure consistency. Data collection and supervision were carried out by three diploma nurses and one BSc nurse, respectively. The data collectors and supervisors received a one-day orientation on how to use the tool and collect the data.

Study variables

Dependent variable: Lifestyle modification practice

Independent variables: Socio-demographic characteristics: Age, sex, income, marital status, educational status, religion, occupation, ethnicity, and residence.

Health profile of the patient: Time since diagnosis, presence of co-morbidity, family history of DM.

Individual-related factors: Chewing chat, drinking alcohol, smoking cigarettes, and diabetic health education.

Health education for lifestyle modification practice

Operational definition:

Lifestyle modification is about non-pharmacological management including dietary modification, physical activities, and exercise to control blood glucose levels and complications [23].

Practice: From 10 questions if the patient answers ≥ 60% as having good practice and if a patient answers <60% as having not good practice [22].

Co-morbidity: Respondents with one or more other medical conditions in addition to diabetes [24].

Data quality assurance

In one day, we trained the data collectors and the supervisor on the general purpose of the study and the data collection procedures. Language experts translated the questionnaire into Afan Oromo, and then we conducted a back-translation into English for consistency. To ensure clarity, understandability, and completeness, we conducted a pretest on 5% (21 samples) of the participants at Chanco Primary Hospital. Throughout each day of data collection, we checked the data for completion, accuracy, and clarity. After the data collection phase, the principal investigator reviewed the data for any missing values during the data entry process.

Data processing and analysis

Each questionnaire was reviewed for completeness and coded after data collection and data entry into Epi-Data version 3.1. The data was then exported to SPSS version 24 for editing, cleaning for inconsistencies, checking for missing values, and finally analyzing the data. Descriptive statistics, such as frequency, percentage, mean, and standard deviation, were calculated. Binary logistic regression was performed to assess the crude relationship between the independent variables and the dependent variable. All variables with a p-value <0.25 were considered candidates for multivariate logistic regression to control for possible confounding effects.

To determine the independent influence of each variable on the outcome variable, multivariate logistic regression was used. The multicollinearity was checked with variance inflation factors (VIFs) and tolerance tests, which had VIFs less than 5 and tolerance tests less than 1; these values were used as cut-off points for diagnosing multicollinearity. Model fitness was checked using the Hosmer and Lemeshow goodness-of-fit model, and the results were fitted (p-value = 0.84). The final results of the associations are presented as AORs with 95% CIs, and a p-value <0.05 was considered to indicate statistical significance.

Ethical considerations

The study protocol was approved, and an ethical approval

letter was provided by the Ethical Review Board of Salale University (reference number IRB/847/14). The study was performed by the World Medical Association Declaration of Helsinki on medical research. Written informed consent was obtained from every study subject before the data collection. All the information collected from the study participants was handled confidentially by omitting their identification.

Results

Socio-demographic characteristics of the respondents

In a study with 422 participants, 407 (96.4%) responded. The average age of respondents was 50.7 years (± 11.698), ranging from 22 to 85 years. The majority of participants (59.5%) were between 40 and 60 years old. Males accounted for over half of the participants (56.5%), and most respondents were married (83.4%). The study had a predominant representation of Orthodox religion followers (83%) and participants of Oromo ethnicity (75.2%). In terms of educational status, 29.2% attended higher education, 43.2% were unable to read and write, and 62% lived in urban areas (**Table 1**).

Health profile of type 2 diabetic patients

Among the type 2 diabetic patients, 47.9% (195) had another chronic illness alongside diabetes and hypertension. The most common additional chronic illness was hypertension, affecting

Table 1. Socio-demographic characteristics of type 2 diabetic patients in North Shewa Zone Public Hospitals, Oromia region, Ethiopia, 2022(n=407).

Variables	Category	Frequency	Percentage
Age	20-39 years	67	16.5
	40-60 years	242	59.5
	>60 years	98	24.0
Sex	Male	230	56.5
	Female	177	43.5
Marital status	Single	12	2.9
	Married	341	83.4
	Widowed	28	6.9
	Divorced	26	6.4
Religion	Orthodox	338	83.0
	Protestant	52	12.8
	Muslim	17	4.2
Educational level	Unable to read and write	176	43.2
	Primary school	45	11.1
	Secondary school	67	16.5
	College/above	119	29.2
Residence	Urban	252	61.9
	Rural	155	38.1
Occupation	Farmer	92	22.6
	Merchant	108	26.5
	Government employee	98	24.1
	Daily labor	41	10.1
	Housewife	68	16.7
Ethnicity	Oromo	306	75.2
	Amhara	90	22.1
	Wolaita	7	1.7
	Tigray	4	1.0

Family size	<5	277	68.1%
	≥ 5	130	31.9%
Monthly income	≤ 1000ETB	90	22.1
	1001-2000ETB	82	20.1
	2001-3500ETB	104	25.6
	>3500 ETB	131	32.2

27.5% (112) of the patients. Nerve damage and heart disease were also present in 11.3% (22) and 19.5% (38) of the patients, respectively. Additionally, 39.6% (161) of the participants had a family history of diabetes, and 44.5% (181) had been living with the illness for 1 to 5 years. The next highest duration category was 6 to 10 years, accounting for 36.4% (148) of the patients (**Table 2**).

Individual-related factors (Substance use-related characteristics of type 2 diabetic patients)

Out of the total participants, 8.1% (33) reported consuming alcohol regularly, ranging from daily to 1-3 days per month. Additionally, 2.7% (11) of the respondents were smokers, and 1.2% (5) reported chewing chat (**Table 3**).

Table 2. Health profile related characteristics of type 2 diabetic patients in North Shewa Zone, Oromia Region, Ethiopia, 2022(n=407).

Variables	Category	Frequency	Percentage
History of co-morbidities	Yes	195	57.4
	No	212	52.1
Types of comorbidities	Hypertension	112	27.5
	Heart disease	38	19.5
	Dyslipidemia	12	6.2
	Eye damage	11	5.6
	Nerve damage	22	11.3
Family history of diabetics	Yes	161	39.6
	No	246	60.4
Duration of diabetes	1–5 years	181	44.5
	6–10 years	148	36.4
	11–15 years	46	11.3
	16 and above years	32	7.9

Table 3. Substance use-related characteristics of type 2 diabetic patients in North Shewa Zone, Oromia Region, Ethiopia, 2022(n=407).

Variables	Category	Frequency	Percentage
Currently smoking tobacco	Yes	11	2.7
	No	396	97.3
Consumed any alcohol	Yes	33	8.1
	No	374	91.9
How frequently have you drunk alcohol?	Daily	20	60.6
	1–3 days per month	9	27.3
	Less than once a month	4	12.1
Chewing chat	Yes	5	1.2
	No	402	98.8

Health education for lifestyle modification practice

Out of the total participants, 47.2% (192) received health education on lifestyle modification practices for type 2 diabetic patients. Among those, 34.9% (142) received education from health professionals. The remaining participants obtained information from various sources, including television/radio (7.4% - 30), books (3.2% - 13), and websites (1.7% - 7) (**Table 4**).

The magnitude of lifestyle modification practice and LSM scores of type 2 diabetic patients

The study found that 41.5% [95% CI: (36.7, 46.3)] of type 2 diabetic patients had a good lifestyle modification practice, while the remaining 58.5% [95% CI: (53.5, 63.3)] did not practice it. The mean lifestyle modification practice score was 52.99 (SD ± 15.87). Out of the participants, 32.4% (132) reported engaging in physical exercise, but only 11.8% (48) of them performed vigorous exercise for 3 or more days per week, lasting at least 30 minutes (**Figures 1 and 2**).

Factors associated with lifestyle modification of type 2 diabetic patients

Factors associated with lifestyle modification practice among type 2 diabetic patients were examined through bivariate and multivariable logistic regression analysis. In the bivariate analysis, factors such as educational status, receiving health education on lifestyle modification, residence, duration of diabetes, family size, age, income level, and presence of comorbidities showed a p-value of <0.25 and were considered for multivariable analysis.

Table 4. Source of health education for lifestyle modification practice for type 2 diabetic patients in North Shewa Zone, Oromia Region, Ethiopia, 2022(n=407).

Variables	Category	Frequency	Percentage
Getting health education for lifestyle modification practice	Yes	192	47.2
	No	215	52.8
From where do you get health education?	Health professionals	142	34.9
	Books	13	3.2
	Television/radio	30	7.4
	Websites	7	1.7

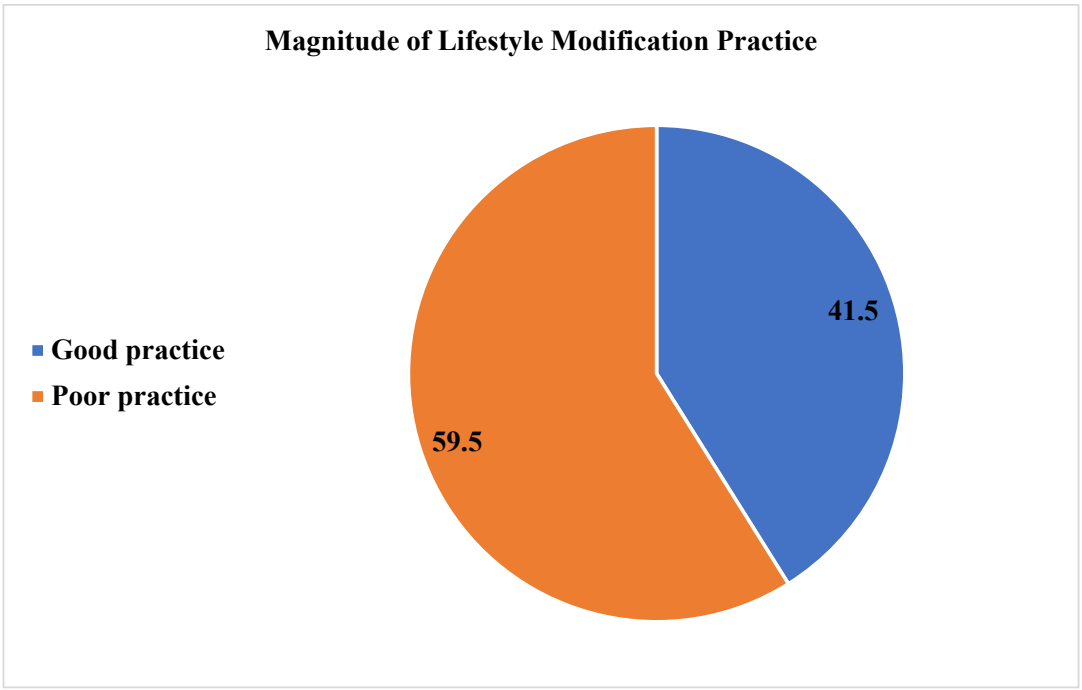

Figure 1. Magnitude of lifestyle modification practice among type 2 diabetic patients in North Shewa Zone, Oromia region, Ethiopia, 2022(n=407).

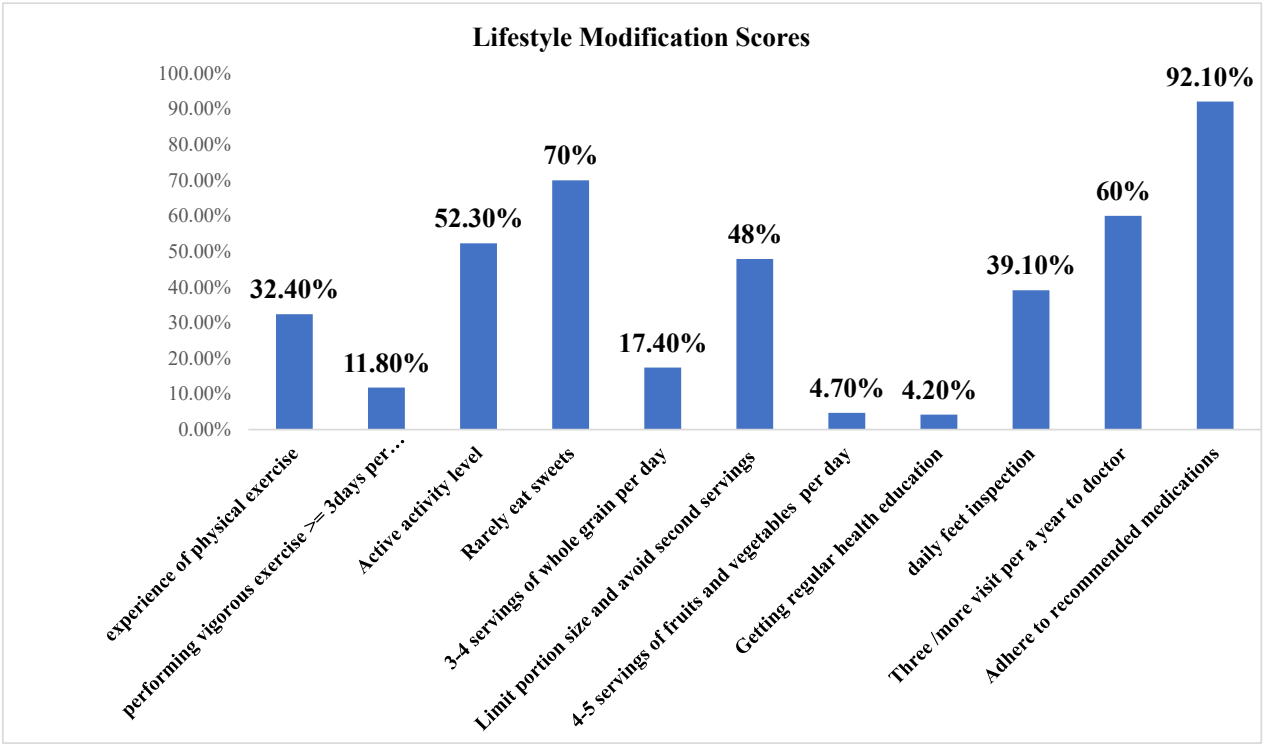

Figure 2. Diabetic lifestyle modification scores among type 2 diabetic patients in North Shewa Zone, Oromia region, Ethiopia, 2022(n=407).

The multivariable logistic regression analysis revealed that patients who attended secondary education or higher were 3.7 times more likely to have good lifestyle modification practice compared to those unable to read and write (AOR=3.73, 95% CI: 1.56-8.92) and 3.9 times more likely compared to those with no formal education (AOR=3.9, 95% CI: 1.71-8.90). Urban dwellers had 3.19 times higher odds of having good lifestyle modification practices compared to rural residents (AOR=3.19, 95% CI: 1.65-6.17). Patients without diabetic-related comorbidities were 3 times more likely to have good practice compared to those with comorbidities (AOR=3.17, 95% CI: 1.85-5.44). Furthermore, patients who received health education on lifestyle modification for type 2 diabetes were 2.3 times more likely to have good practice compared to those who did not receive education (AOR=2.37, 95% CI: 1.44-3.92).

In this study no statistically significant associations were found between good lifestyle modification practice and factors such as sex, religion, marital status, ethnicity, occupation, smoking habit, drinking habit, chat chewing habit, and family history of diabetes in this study (**Table 5**).

Table 5. Factors associated with lifestyle modification of type 2 diabetic patients in North Shewa Zone, Oromia Region, Ethiopia, 2022(n=407).

Variables	Practice lifestyle modification		COR (95% CI)	AOR (95% CI)	P value
	Good practice	Poor practice			
Age					
20-39 years	37	30	3.24 (1.68,6.24)	1.11 (0.45,2.71)	0.814
40-60 years	105	137	2.01 (1.20,3.36)	1.23 (0.62,2.42)	0.542
>60 years	27	71	1	1	1
Family size					
<5	128	149	1.86 (1.20,2.89)	1.41 (0.81,2.44)	0.223
≥ 5	41	89	1	1	1

Residence					
Urban	142	110	6.12 (3.77,9.93)	3.19 (1.65,6.17)	**0.001***
Rural	27	128	1	1	1
Educational status					
Unable to read and write	17	66	1	1	
Primary school	12	33	1.41 (0.60,3.30)	0.99 (0.37,2.67)	0.995
Secondary school	43	24	6.95 (3.35,11.44)	3.73 (1.56,8.92)	**0.003***
College/above	81	38	8.27 (4.28,15.97)	3.90 (1.71,8.90)	**0.001***
diabetic related comorbidities					
No	111	101	2.60 (1.72,3.91)	3.17 (1.85,5.44)	**0.000***
Yes	58	137	1	1	
Income level					
≤ 1000ETB	15	75	0.15 (0.8,0.29)	0.67 (0.28,1.60)	0.378
1001-2000ETB	15	67	0.17 (0.89,0.33)	0.49 (0.22,1.09)	0.084
2001-3500ETB	65	39	1.28 (0.75,2.17)	1.30 (0.70,2.41)	0.399
>3500 ETB	74	57	1	1	
Duration of diabetes					
1–5 years	87	94	2.77 (1.18,6.50)	1.52 (0.52,4.42)	0.438
6–10 years	58	90	1.93 (0.81,4.59)	1.29 (0.44,3.75)	0.634
11–15 years	16	30	1.60 (0.58,4.36)	1.71 (0.51,5.71)	0.377
16 and above years	8	24	1	1	
Education about lifestyle modifications					
Yes	104	88	2.72 (1.81.4.09)	2.37 (1.44,3.92)	**0.001***
No	65	150	1	1	
*Significant at 5% COR: Crude Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence Interval					

Discussion

Diabetic control requires applications of both pharmacological and non-pharmacological management. The present study assessed the practice of lifestyle modification practices and their determinants in type 2 diabetic patients. The level of good lifestyle modification practice in this study was 41.5%. Attending secondary education and those who were at college and above, getting lifestyle modification practice education, being urban dwellers, and being diabetic patients without the presence of comorbidities were the variables identified as having significant associations with good lifestyle modification practice.

The study revealed that only 41.5% with [95% CI: (36.7, 46.3)] of diabetic patients in selected North Shewa public hospitals practiced recommended lifestyle modifications. This is in line with a study conducted on the knowledge, attitude, and practice of diabetic patients toward lifestyle modification at the University of Gondar Comprehensive Specialized Hospital Northwest Ethiopia and a study done in Somalia indicated that good lifestyle modification practice was 41.0% (25) and 38.8% (26), respectively. However, these findings are higher than those of previous studies conducted in Hodeida City, Yemen 21.0% [16]. This discrepancy might be explained by the variation in the settings of the study, the difference in socioeconomic status, nutrition education as well as the difference in the tools used.

The multivariate regression analysis revealed that there were several factors associated with good lifestyle modification practices. In this study, educational status was positively related to good lifestyle modification practice in type 2 diabetic patients. Compared with patients who were unable to read and write, type 2 diabetic patients with secondary education and above had odds 3.7 times and 3.9 times greater, respectively, of having good lifestyle modification practice in type 2 diabetic patients. This finding is in line with previous

studies conducted in southern Ethiopia, University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, Bahir Dar [10,13,27] respectively, and another report from Southern Benin [9]. A Study conducted on physical activity among type 2 diabetic patients in Jimma [28] and Thailand [29] also shows an association of educational status with their practice. It may be possible to explain the association between respondents' higher educational levels and appropriate dietary and physical activity (lifestyle modification) practices by noting that patients with higher levels of education have easier access to information from books, leaflets, newspapers, and social media than patients with lower levels of education. Education allows patients to have better health literacy, which may in turn improve lifestyle modification practice.

Getting diabetic lifestyle modification education was one of the main factors that were identified to have a positive association with good lifestyle modification practices of the patients. Patients who did not get diabetic lifestyle modification education were more likely to have poor practice as compared with those who got diabetic lifestyle modification education. This is in agreement with a report from Dessie's referral hospital [30], Northeast Ethiopia [11], and Gurage zone southwest, Ethiopia [12]. A study conducted in Bahir Dar [13] and Debre Tabor [31] also identified patients who got nutrition education on diabetes diet were more likely to have good dietary practices than their counterparts. This may be because people with diabetes who get lifestyle modification education are more likely to adhere to clinical recommendations and have greater awareness and comprehension of the links between nutrition, physical activity, and illness than people who don't.

The residence was another factor that was identified to have an association with the lifestyle modification practices of patients with diabetes. This study revealed that urban patients with diabetes were three times more likely to have good lifestyle modification practices as compared with rural residents. This is in line with the study conducted in Tigray regional state [32]. Another study that was conducted in Debre Tabor General Hospital revealed that rural patients with diabetes were more likely to have poor dietary practices as compared with urban residents [31]. This might be due to differences in the educational level of the participants where rural residents are more likely to be illiterate and less understand their diabetic nutrition and physical activity education than urban respondents. The way of life (culture) of rural residents might also be the possible reason for the difference, which can be explained by the fact that rural family members usually ate similar plates altogether without special attention for patients with diabetes, which makes them less compliance about their diet and give minimal attention for their physical activity recommendations.

The presence of comorbidities was also identified as a factor for poor lifestyle modification practice. This study revealed that patients without comorbidities were three times more likely to have a good lifestyle modification practice as compared to patients with the presence of comorbidities. This result is in agreement with a study done in a tertiary hospital in Somalia [26]. This is because coexisting comorbidities in people with diabetes are associated with decreased adherence to lifestyle modification practice in all settings of diabetes patients. Most people with T2DM have at least one other comorbid condition that can influence the self-management of diabetes and its progression [33]. The possible reason is that comorbidities considerably impair the health-related quality of life among type 2 diabetic patients. Coexisting comorbidities in people with diabetes are also associated with decreased adherence to treatment, poor metabolic control, and decreased lifestyle modification practice [34].

Conclusion

The prevalence of poor lifestyle modification practice was observed in more than fifty per cent of the patients; hence, the condition is considered as one of the major public health problems. Higher level of education, getting diabetic lifestyle modification education, being an urban dweller, and the presence of diabetic comorbidities were factors associated with lifestyle modification practices of type 2 diabetic patients.

Limitations of the study

The study used a cross-sectional design and captured data at a single time point, limiting the ability to establish causality or determine the temporal sequence of events. There may also be recall bias due to the practice expressed.

Recommendations

Education about the disease condition and lifestyle modification (importance of physical exercise, weight loss, foot care, cessation of smoking, healthy dietary habits) to the general society ought to be implemented by the responsible body. Therefore, health professionals should have a common understanding and follow patients' adherence to the diabetic lifestyle modification recommendation and should also deliver patient-oriented diabetic lifestyle education in every follow-up visit. It is necessary to prepare diabetic lifestyle modification guidelines at a national level. Integrated governmental and nongovernmental activities should be in place to improve the literacy rate of citizens towards such disease conditions. Future researchers should look into a comprehensive community-based study to plan an awareness creation program and a longitudinal study for a better outcome in all dimensions of LSM practices.

Conflicts of Interest

The authors declare that they have no competing interests.

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Data Availability Statement

The original contributions presented in the study are included in the article and further inquiries can be directed to the corresponding author.

Author Contributions Statement

D.H. and A.G. were involved in the writing of the proposal, designed the study, participated in the coordination of the study, analyzed the data, and drafted and finalized the manuscript. D.G, T.A.G, S.M.I, M.S.L, T.B, B.M.K., and B.T.O, conceived the study and participated in all stages of the study and revision of the manuscript. All the authors read and approved the final version of the manuscript.

List of Abbreviations

AOR: Adjusted Odds Ratio; BSL: Blood Sugar Level; CI: Confidence Interval; LSM: Lifestyle Modification; SMBG: Self-Monitoring of Blood Glucose; SPSS: Statistical Package for Social Science; T2DM: Type 2 Diabetes Mellitus

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