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Assessment of adherence to dietary recommendations and associated factors among type 2 diabetic patients in selected hospitals in Addis Ababa, Ethiopia

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Background: In Ethiopia, diabetes and its complications are significant causes of morbidity and mortality, with huge economic implications. Despite the high dietary non-adherence that has been reported in limited studies in Ethiopia. Moreover, there is a gap from the perspective of patients in the area of this topic.

Objectives: This study aimed to assess adherence to dietary recommendations and associated factors among type 2 diabetic patients in Addis Ababa Selected Hospitals, Addis Ababa, Ethiopia, 2024.

Methods and materials: An institution-based cross-sectional study was conducted in a 420 sampled population among four hospitals found in Addis Ababa, Ethiopia, from 24 June to 15 July 2024. Systematic random sampling was used to recruit individual study participants. The collected data were exported into SPSS version 25 software for analysis. A descriptive summary, including frequencies, percentages, and graphs, was used to present the study results. Binary logistic regression was used for statistical analysis. Finally, the results of bivariate and multivariable logistic regression analyses were presented using odds ratios with 95% confidence intervals. In the final model, a *p*-value of <0.05 was taken as statistically significant.

Results: A total of 406 participants were included, with a response rate of 96.7%. The study participants had an average age of 48 (\pm 11.4 years), and the overall adherence to dietary recommendations in this study was 62.8% among type 2 diabetic patients. Years of diagnosis of DM, having a family history of DM, having comorbidities, and having received diabetic nutrition education were significantly associated with adhering to diabetic dietary recommendations among type 2 diabetic patients.

Conclusion and recommendation: The study found that overall adherence to dietary recommendations among type 2 diabetic patients was relatively high at 62.8%, suggesting the need to develop and implement tailored dietary education and counseling programs for this patient population.

KEYWORDS

adherence, diabetes mellitus, dietary recommendations, Addis Ababa, Ethiopia

Introduction

Diabetes is a chronic metabolic disorder defined by elevated blood glucose (or blood sugar) levels that leads to catastrophic damage to the heart, blood vessels, eyes, kidneys, and nerves over time, according to the World Health Organization (1). Diabetes affects approximately 422 million people globally, the majority of whom live in low- and middle-income countries, and diabetes is directly responsible for 1.6 million fatalities per year. Over the last few decades, both the number of cases and the prevalence of diabetes have significantly increased (1). By 2025, a global agreement has been reached to halt the rise in diabetes and obesity (2, 3).

The significant increase in overweight, obesity, and physical inactivity rates may be partly responsible for this global epidemic (2). The most prevalent type of diabetes, type 2 diabetes (accounting for 90% of cases), affects adults and occurs when the body becomes resistant to insulin or does not produce enough of it (4).

Ethiopia is one of the top five countries in sub-Saharan Africa with the highest number of individuals affected by diabetes (5–7). Diabetes and its complications are the leading causes of illness and mortality in Ethiopia, with severe economic effects (6). The prevalence of diabetes is rapidly growing in Ethiopia. According to reports, the prevalence of diabetes in Ethiopia ranged from 2 to 6.5%, with the lowest 2% in rural areas (5). Oral hypoglycemia and insulin were the most common treatments (8). Retinopathy (2.7–25%), nerve damage (4.8–35.0%), depression (13–61.0%), kidney illness (18.2–23.8%), hypertension (23–54.82%), anemia (19%), and related costs were the most commonly reported diabetes-related problems in the country (5, 6, 8).

Dietary practice refers to patients' food preferences based on diabetes education, emphasizing the consumption of foods containing less fat, more fiber, and less sodium (9). Daily carbohydrate, protein, and fiber intake should be 45–50%, 10–20%, and 12% of total calories, with a minimum of 0.5 g of fat per meal (10). Nutrition is crucial for diabetes management and prevention.

The risk of T2DM is connected to both malnutrition and overnutrition (11). Balanced food intake with endogenous and/or exogenous insulin levels is the most important for diabetes treatment in improving glycemic control (12). However, for many DM patients, deciding what to eat and adhering to the meal plan are the most difficult aspects of the treatment strategy. There is no one-size-fits-all eating pattern for those with diabetes (13).

According to a study conducted at Gondar Comprehensive Specialized Hospital in Ethiopia, 48.3% of participants had poor adherence to dietary recommendations. and a study conducted in northern Ethiopia found that 74.3% of participants also had poor adherence to dietary recommendations. In Gondar Comprehensive Specialized Hospital and study conducted in general Ethiopian hospitals, respectively (14, 15). Another study conducted in Ethiopian teaching hospitals showed that the overall adherence to dietary recommendations was 44.3% among diabetic patients who participated in the study (16). Furthermore, study findings in Jimma,

Ethiopia, have shown that the level of diabetic self-care practice was insufficient among the study participants (17).

In developed countries, dietary compliance among people with type 2 diabetes has improved. In affluent countries, dietary adherence among type 2 diabetes patients has improved and is currently considered satisfactory. However, in underdeveloped nations, dietary adherence among type 2 diabetes patients is given minimal attention and is not regarded as a major national priority. Diabetes has improved and is now relatively satisfactory.

In developing countries, there is minimal focus on dietary adherence for patients with type 2 diabetes, and it is not given priority at the national level. Due to the importance of involving patients in chronic disease management, this study aims to show the level of adherence to dietary recommendations and identify associated factors among type 2 DM patients in selected hospitals in Addis Ababa, Ethiopia, in 2024.

Materials and methods

Study design and period

An institutional cross-sectional study was conducted from 24 June to 15 July 2024 among type 2 DM patients in selected hospitals in Addis Ababa, Ethiopia, in 2024.

Study participants and sample size determination

The population for this study consisted of all adult type 2 diabetic patients visiting non-communicable disease clinics in selected hospitals in Addis Ababa, Ethiopia. Patients who attended these hospitals during the study period were considered the study population. All type 2 diabetes patients who had at least one follow-up visit at the selected hospitals after diagnosis before the data collection period were included in the study, and newly diagnosed type 2 diabetes of less than 1 month, pregnant and lactating women, and those requiring constant medical support and monitoring were excluded from this study.

The sample size was obtained using a single population proportion formula:
$$n = \frac{Z_{\alpha/2}^2 P(1-P)}{D^2}$$

where n = sample size, $Z_{\alpha/2}$ = level of confidence 95%, or reliability coefficient = 1.96, P = proportion of the population = 53.7%, poor dietary practice among type 2 diabetes mellitus patients in Nigist Eleni Mohammed Memorial Teaching Hospital (18), and D = margin of error (0.05). Thus, the final sample size for this study was 420 type 2 diabetes patients.

Sampling procedures

The study was conducted in 4 randomly selected hospitals out of 13 government hospitals in Addis Ababa, Ethiopia. A systematic random sampling technique was used to select the study participants. The study participants were chosen from the selected hospitals in Addis Ababa, Ethiopia. The total number of type 2

Abbreviations: AOR, Adjusted odds ratio; CI, confidence interval; COR, crude odds ratio; DK, diabetic ketoacidosis; DM, diabetes mellitus; FMOH, Federal Ministry of Health; SSA, sub-Saharan Africa; T2DM, type 2 diabetes mellitus; WHO, World Health Organization.

DM patients who visited the selected hospitals during the data collection period was calculated based on the hospitals' previous monthly reports. The calculated sample size was then distributed proportionally across each hospital according to the number of type 2 DM patients at each location. The first respondent was selected randomly.

Data collection tools and procedure

Data were collected using a pretested structured questionnaire administered via face-to-face interview. The questionnaire was adapted from various previously published studies (14, 16, 18, 19). The questions were initially prepared in English, then translated into Amharic, and then back-translated to English by language experts to ensure consistency. Four data collectors (BSC nurses) who had prior experience in data collection collected the data, and one experienced public health professional was assigned as supervisor. One-day training was given to the data collectors and supervisors for the data collection process. The list of selected participants to be interviewed was located in the follow-up waiting rooms of the hospitals. The completeness, consistency, and accuracy of the collected data were examined every day.

Adherence to dietary recommendations, the dependent variable in this study, was defined as adherent when the participant's score on the item used to measure the dietary adherence assessment scale was equal to or above the mean score and non-adherent when the score was below the mean scale (16).

Data quality control

To ensure data quality, supervisors and data collectors were given one-day training on the purpose of the study, data collection tools, and procedures. The questionnaire was translated from English to Amharic, and to check for the original meaning, the Amharic version was re-translated to English. The questionnaire was pre 5% of the calculated sample size out of the study area before 2 weeks of the main data collection. The collected data were checked by reviewing all the questionnaires to ensure completeness and consistency of the information collected.

Data processing and analysis

The collected data were visually checked by the investigator, and then the data were coded and entered into Epi Data version 3.1 software before being exported into SPSS version 25 software for further analysis. Data cleaning was conducted before the analysis. Mean and standard deviation were calculated for continuous variables. A descriptive summary using frequencies, percentages, and graphs was used to present the study results. Then, logistic regression analysis was applied to assess the association between the dependent and explanatory variables. The degree of association was interpreted using odds ratios with 95% confidence intervals, and *p*-values less than 0.05 were considered statistically significant. Bivariate and multivariate analyses were used to identify characteristics that influence the recommended dietary adherence.

The variance inflation factor (VIF) was used to test the multicollinearity assumption, and the results ranged from 1 to 10, suggesting no collinearity. Cross-tabulation was used for each independent variable to better understand cell information and to correct for extreme cell values in the logistic regression analysis. The model's fitness was evaluated using the Hosmer–Lemeshow goodness-of-fit test, which yielded a *p*-value of 0.76, suggesting that the model was well-fitted.

Results

Socio-demographic characteristics of respondents

The study planned to include 420 participants, and 406 patients volunteered to participate, resulting in a response rate of 96.7%. Approximately half of the study participants were men (220, 54.2%), while the other half were women (186, 45.8%). The study participants had an average age of 48 (\pm 11.4 years), with the majority, 168 participants (41.4%), being above >60 years old. The educational status of participants revealed that 38.9% of the study participants had attended college or higher education (Table 1).

TABLE 1 Socio-demographic characteristics of study participants among type 2 diabetic patients in selected hospitals, in Addis Ababa, Ethiopia, 2024.

Variables	Categories	Frequency	Percent
Age in years	<20	38	9.3%
	20–40	77	19%
	41–60	123	30.3%
	>60	168	41.4%
Sex	Male	220	54.2%
	Female	186	45.8%
Marital status	Single	17	4.4%
	Married	329	81%
	Divorced	34	8.2%
	Widowed	26	6.4%
Religion	Orthodox	164	40.4%
	Protestant	142	35%
	Muslim	71	17.5%
	Others ¹	29	7.1%
Occupation	Government employee	112	27.6%
	Private employee	117	28.8%
	Merchant	108	26.6%
	Others	69	17%
Educational status	No formal learning	46	11.4%
	Primary school	85	20.9%
	Secondary school	117	28.8%
	College and above	158	38.9%
Household monthly income	<4,000	115	28.3%
	4,000–8,000	204	50.2%
	>8,000	87	21.5%

¹Others, Catholic Judith, Waqefata, Adventist.

TABLE 2 Health-related characteristics of the study participants among type 2 diabetic patients in selected hospitals, Addis Ababa, Ethiopia, 2024.

Variables	Categories	Frequency	Percent
Years of diagnosis for Diabetes	≤5	187	46.1%
	>5	219	53.9%
Comorbid conditions	Yes	182	44.8%
	No	224	55.2%
Family history of DM	Yes	96	23.6%
	No	310	76.4%
Encountered any of the complications of DM	Yes	128	31.5%
	No	278	68.5%
Complications of DM encountered	Diabetic foot ulcer	23	18%
	Renal diseases	16	12.5%
	Eye condition	33	25.8%
	Diabetic neuropathy	44	34.4%
	Amputation	12	9.3%
Treatment medication for DM	Oral hypoglycemic drugs	349	86%
	Both oral hypoglycemic drugs and insulin	57	14%
Diabetes nutritional education	Yes	316	77.8%
	No	90	22.2%
BMI kg/m ² .	<18.5 kg/m ² .	26	6.4%
	18.5–24.5 kg/m ² .	254	62.5%
	24.5–29.5 kg/m ² .	66	16.3%
	>30 kg/m ² .	60	14.8%

Health-related characteristics of respondents

Table 2 illustrates the distribution of health-related characteristics of the study participants. The participants who had the condition for greater than 5 years were 219 (53.9%), and 187 of the participants were less than or equal to 5 years ago after they were diagnosed with the disease. The majority of individuals, (349, 86%) were on oral hypoglycemic medication, with 57 (14%) using both oral medication and insulin. Among the study participants, 182 (44.8%) had comorbidities, and the majority, (310, 76.4%), had no family history of diabetes. Among the study participants, 254 (62.5%) patients had a BMI between 18.5 and 24.5 kg/m², 26 (6.3%) patients had a BMI less than 18.5 kg/m², and 66 (16.3%) of the study participants had a BMI between 24.5 and 29.5 kg/m² (Table 2).

Behavioral-related factors

The majority of study participants had never consumed drinks containing alcohol (198, 48.7%). Additionally, approximately 347 participants (85.5%) were not currently smoking cigarettes, and 162 participants (39.9%) engaged in physical exercise at least once per week, as much as they were able (Table 3).

TABLE 3 Behavioral-related characteristics of the study participants among type 2 diabetic patients in selected hospitals, Addis Ababa, Ethiopia, 2024.

Variables	Categories	Frequency	Percent
Frequency of drink containing alcohol	Never	198	48.7%
	<2 per day	68	16.8%
	2–4 per day	59	14.5%
	>4 per day	81	20%
Currently smoke cigarette	Yes	59	14.5%
	No	347	85.5%
Doing physical exercise	Yes	162	39.9%
	No	244	60.1%

Adherence to dietary recommendation among type 2 diabetic patients in selected hospitals, Addis Ababa, Ethiopia, 2024

The overall adherence to dietary recommendations according to our research findings is 255 (62.8%) (95% CI, 54.3, 67.4) among diabetic patients who participated in the study, and 129 participants (31.8%) were not adherent to the dietary recommendation.

Factors associated with adherence to the recommended dietary regime among type 2 diabetic patients in selected hospitals, Addis Ababa, Ethiopia, 2024

The following independent variables were candidates for the final model in the bivariate logistic regression analysis: family history of DM, presence of comorbidities, duration of diagnosis, physical activities, educational status, and diabetic nutritional education. In the multivariable logistic regression analysis, family history of DM, presence of comorbidities, duration of diagnosis, and receiving diabetic nutritional education were significantly associated with adherence to dietary recommendations among type 2 diabetic patients.

Our study shows that patients who had a family history of DM were 1.58 times more likely to adhere to dietary recommendations as compared to those patients who had no family history of DM [AOR 1.58 = 95%CI (1.06–2.10)]. The odds of adhering to dietary recommendations among type 2 diabetic patients were 1.08 times greater in patients who had comorbidities compared to those who had no history of comorbidity conditions [AOR = 1.08, 95%CI (1.02–1.14)].

Our study findings show that patients who were diagnosed with type 2 diabetic cases before 5 years were 1.46 times more likely to adhere to dietary recommendations as compared to those patients who were diagnosed with type 2 diabetic cases less than 5 years [AOR = 1.46, 95%CI (1.02–1.90)]. Additionally, patients who received diabetic nutrition education were 1.14 times more likely to adhere to the recommended dietary guidelines than those who did not receive nutritional education [AOR = 1.14, 95%CI (1.04–95)] (Table 4).

Discussion

The purpose of this hospital-based cross-sectional study was to measure the proportion of adherence to dietary recommendations and

TABLE 4 Bivariate and multiple logistic regression analyses of factors associated with adherence to the recommended dietary regime among type 2 diabetic patients in selected hospitals, Addis Ababa, Ethiopia, 2024.

Variables	Categories	Adherence		COR (95% CI)	AOR (95% CI)	p-value
		Yes	No			
Family history of DM	No	203	107	1	1	
	Yes	52	44	1.61(1.07–2.15)	1.58(1.06–2.10)	0.001*
Presences of comorbidities	No	143	81	1		
	Yes	112	70	1.10(1.02–1.18)	1.08(1.02–1.14)	0.004*
Duration of the diagnosis	<=5	126	61	1	1	
	>5	129	90	1.44(1.08–1.80)	1.46(1.02–1.90)	0.001*
Physical activities	Yes	118	44	1	1	
	No	137	107	2.09(1.23–2.95)	2.07(0.87–3.27)	1.24
Educational status	No formal education	24	22	1	1	
	Primary school	48	37	0.84(0.22–1.46)	0.84(0.22–1.46)	0.87
	Secondary school	77	40	0.67(0.46–1.06)	0.64(0.25–1.03)	0.79
	College and above	106	52	0.94(0.91–0.97)	0.92(0.78–1.06)	0.91
Diabetic nutritional education	No	59	31	1	1	
	Yes	196	120	1.17(1.03–1.97)	1.14(1.04–95)	0.003*

*Statistically significant.

associated factors among type 2 diabetic patients in selected hospitals, in Addis Ababa, Ethiopia, in 2024. The findings indicate that the overall adherence to the dietary recommendation in this study was 255 (62.8%) (95% CI, 54.3, 67.4) among type 2 diabetic patients who participated in the study, and 129 participants (31.8%) were not adherent to the dietary recommendation. Adherence to the appropriate diet for diabetes patients is particularly crucial to achieving optimal metabolic management, as non-adherence is related to increased glucose and cholesterol levels, which eventually lead to serious problems (20). Diabetes and its complications are widely recognized as a major global burden, presenting considerable challenges to patients, healthcare systems, and national economies (21).

According to our results, a total of 62.8% of participants adhered to dietary recommendations. This finding is comparable to studies conducted in Southern Ethiopia (64%) (22), Ghana (65.1%) (23), Kuwait (63.5%) (24), and Saudi Arabia (67.2%) (25). The populations in these regions may share similar dietary patterns, food preferences, and socioeconomic backgrounds that influence their ability to adhere to recommended dietary guidelines. However, this proportion is higher than that found in studies conducted in Dire Adwa (37.5%) (26), Debre Tabor (25.7%) (27), and Bahir Dar (53.2%) (28). This disparity could be attributed to differences in the study demographic, sample size, and adherence measuring technique, as well as the difficulty of defying social expectations or demands to eat with friends and family or the necessity of eating out.

This result is lower than the findings of studies conducted in Surat City (76.2%) (29) and Delhi, India (84.6%) (30). The disparity could be explained by the variation in the study settings, differences in socioeconomic status, and availability of different types of foods in the two countries.

These patients who were diagnosed with type 2 diabetic cases before 5 years were 1.46 times more likely to adhere to dietary recommendations as compared to those patients who were diagnosed with type 2 diabetic cases less than 5 years. This finding is in line with studies conducted in Debre Berhan (16), Addis Ababa (9), Gondar (31),

Bahir Dar (28), and Nigeria (32). A possible explanation is that patients with diabetes for a longer period of time have more frequent contact with health professionals and are more likely to receive repetitive instructions on adhering to dietary recommendations. This increased exposure may help them become more aware of the acute and chronic complications of uncontrolled blood glucose, ultimately leading to the adoption of healthier behaviors.

Our findings demonstrate that patients with a family history of diabetes were 1.58 times more likely to follow dietary recommendations than those who did not have a family history. This finding is similar to studies conducted in Gondar (31), Eastern Ethiopia (26), and Southwest Ethiopia (22). This might be because having a family member with diabetes could be a good source of information about the disease process and how to control blood glucose.

The odds of adhering to dietary recommendations among type 2 diabetic patients were 1.08 times greater in patients who had comorbidities compared to those who had no history of comorbidity conditions. This finding is in line with studies conducted in Debre Tabor (27) and Gondar (31). Patients with comorbidity may be on complex medication regimens and dietary advice. As a result, providing comprehensive information on the benefits of dietary adherence, particularly for diabetic patients with comorbidities, is a crucial strategy to improve overall health outcomes.

Patients who received diabetic nutrition education were 1.14 times more likely to adhere to the suggested diet for their conditions than patients who did not receive nutritional education.

This finding aligns with studies conducted in Addis Ababa (9) and Debre Berhan (16). This may be due to the fact that those who received nutrition education are more likely to follow the advice of clinicians and have a better understanding of the food-disease association, food guides, and dietary prescriptions than those who did not receive nutrition education. In addition, patients who have received nutrition education may perceive a greater level of seriousness of not adhering to the recommended dietary regimen.

Limitations of the study

This study has limitations that must be considered while interpreting the results. This study may not show temporal relationships of potential risk factors with dietary recommendation adherence due to the cross-sectional nature of the design used. Using self-reported dietary recommendation adherence as a measure of the level of practice may introduce social desirability bias. The dietary recommendation adherence scale has not been validated before, and it is likely that our estimates may underestimate or overestimate the outcome. Moreover, readers and researchers should be aware that the findings of the present study may not represent the population of the entire country as a source of food and other factors may vary across different geographical areas.

Conclusion

According to our findings, the overall adherence to dietary recommendations in this study was 62.8% among type 2 diabetic patients who participated in the study, which is relatively high. Years of diagnosis of DM, having a family history of DM, having comorbidities, and having received diabetic nutrition education were significantly associated with adhering to diabetic dietary recommendations among type 2 diabetic patients who had follow-ups at selected public hospitals in Addis Ababa, Ethiopia. Healthcare providers can develop effective strategies to improve dietary adherence, such as following dietary plans, providing dietary education, and tailoring dietary interventions to patients' preferences. Additionally, tailored dietary education and counseling programs should be developed and implemented specifically for type 2 diabetic patients with comorbidities, and diabetic nutrition education should be established as a standard component of comprehensive care plans for type 2 diabetes management.

Data availability statement

The datasets presented in this article are not readily available because some of the datasets contain sensitive information that cannot be shared publicly due to participant confidentiality and data protection regulations. Requests to access the datasets should be directed to the corresponding author.

References

1. WHO. WHO 10 facts about diabetes. Geneva: The World Health Organization (2014).
2. Whiting DR, Guariguata L, Weil C, Shaw J. IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030. *Diabetes Res Clin Pract.* (2011) 94:311–21. doi: 10.1016/j.diabres.2011.10.029
3. American Diabetes Association. Economic costs of diabetes in the US in 2007. *Diabetes Care.* (2008) 31:596–615. doi: 10.2337/dc08-9017
4. WHO. R. G. Global Report on Diabetes. Geneva: World Health Organization (2016).
5. Sahile AT, Bekele GE. Prevalence of Diabetes Mellitus and Associated Factors in Addis Ababa Public Health Facilities, 2016. (2020) 13:501–508. doi: 10.2147/DMSO.S237995
6. Bishu KG, Jenkins C, Yebo HG, Atspha M, Wubayehu T, Gebregziabher M. Diabetes in Ethiopia: A systematic review of prevalence, risk factors, complications, and cost, vol. 15 (2019).
7. Ambachew Y, Kahsay S, Tesfay R, Tesfahun L, Amare H, Gebreegziabher G. Prevalence of diabetes mellitus among patients visiting medical outpatient department of Ayder referral hospital, Mekelle, Ethiopia. A three years pooled data. *Int J Pharma Sci Res.* (2015) 6:435–9.
8. Alemu S, Dessie A, Seid E, Bard E, Lee PT, Trimble ER, et al. Insulin-requiring diabetes in rural Ethiopia: Should we reopen the case for malnutrition-related diabetes?. *Diabetologia.* (2009) 52:1842–5.
9. Worku A, Mekonnen Abebe S, MMJS W. Dietary practice and associated factors among type 2 diabetic patients: A cross sectional hospital based study. Ethiopia: Addis Ababa (2015).
10. Gray A, Threlkeld RJ. Nutritional recommendations for individuals with diabetes. (2000). South Dartmouth (MA): Endotext. MDText.com, Inc.
11. Bekele BB. The prevalence of macro and microvascular complications of DM among patients in Ethiopia 1990–2017: systematic review. *Diabetes Metab Syndr Clin Res Rev.* (2019) 13:672–7. doi: 10.1016/j.dsx.2018.11.046
12. Abejew AA, Belay AZ, Kerie MW. Diabetic complications among adult diabetic patients of a Tertiary Hospital in northeast Ethiopia. *Advances in Public Health.* (2015) 2015:290920.
13. Introduction. *Diabetes Care.* (2017) 40:S1–S2. doi: 10.2337/dc17-S001
14. Mekonnen CK, Ferede YM, Abate HK. Determinants of dietary adherence among type 2 diabetes patients aimed COVID-19 at the University of Gondar Comprehensive

Ethics statement

The study protocol was reviewed and approved by the Institutional Review Board (IRB) of Ambo University. Written informed consent was obtained from all study participants before their participation. Additionally, consent was secured from each selected hospital. Confidentiality was maintained by anonymizing the data collected from both the hospitals and the study participants. This study was conducted in accordance with the Declaration of Helsinki.

Author contributions

WA: Conceptualization, Formal analysis, Investigation, Methodology, Software, Visualization, Writing – original draft, Writing – review & editing. KT: Methodology, Visualization, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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- Specialized Hospital. *Diabetes, Metabolic Syndrome and Obesity*. (2021) 14:917–27. doi: 10.2147/DMSO.S297582
15. Ayele AA, Emiru YK, Tiruneh SA, Ayele BA, Gebremariam AD, Tegegn HG. Level of adherence to dietary recommendations and barriers among type 2 diabetic patients: a cross-sectional study in an Ethiopian hospital. *Clin Diabetes Endocrinol*. (2018) 4:21. doi: 10.1186/s40842-018-0070-7
16. Mohammed MA, Sharew NT. Adherence to dietary recommendation and associated factors among diabetic patients in Ethiopian teaching hospitals. *Pan Afr Med J*. (2019) 33:260. doi: 10.11604/pamj.2019.33.260.14463
17. Hailu E, Mariam WH, Belachew T, Birhanu Z. Self-care practice and glycaemic control amongst adults with diabetes at the Jimma University specialized hospital in south-West Ethiopia: A cross-sectional study. *Afr J Prim Health Care Fam Med*. (2012) 4:311. doi: 10.4102/phcfm.v4i1.311
18. Erkocho MS, Adugna DT, Arficho TT, Azene AG. Poor dietary practice and associated factors among type-2 diabetes mellitus patients on follow-up in Nigist Eleni Mohammed memorial teaching hospital, Ethiopia. *Pan African Medical J*. (2022) 41:41. doi: 10.11604/pamj.2022.41.164.28675
19. Gebeyehu AF, Berhane F, Yimer RM. Dietary knowledge and practice and its associated factors among type 2 diabetes patients on follow-up at public hospitals of Dire Dawa, eastern Ethiopia. *SAGE Open Med*. (2022) 10:20503121221107478. doi: 10.1177/20503121221107478
20. Pladevall M, Williams LK, Potts LA, Divine G, Xi H, Lafata E. Clinical outcomes and adherence to medications measured by claims data in patients with diabetes. *Diabetes Care*. (2004) 27:2800–5. doi: 10.2337/diacare.27.12.2800
21. Sajith M, Pankaj M, Pawar A, Modi A, Sumariya RJI. Medication adherence to antidiabetic therapy in patients with type 2 diabetes mellitus. *Int J Pharm Pharm Sci*. (2014) 6:564–70.
22. Zeleke Negera G, Charles Epiphany DJI. Prevalence and predictors of nonadherence to diet and physical activity recommendations among type 2 diabetes patients in Southwest Ethiopia: A cross-sectional study. *Int J Endocrinol*. (2020) 2020:1512376:1–8. doi: 10.1155/2020/1512376
23. Akumiah PO, Samuel O, Azumah Nayembil D, Ofosu Agyapong G, Fataw P. Barriers to adherence to diet and exercise recommendation amongst type 2 diabetes mellitus patients. *J Heal Med Nurs*. (2017) 39:48–53.
24. Serour M, Alqhenaei H, Al-Saqabi S, Mustafa A-R. Cultural factors and patients' adherence to lifestyle measures. *British J General Pract*. (2007) 57:291–5.
25. Khan AR, ZNA-A L, Al Aithan MA, Bu-Khamseen MA, Al Ibrahim I, Khan SA, et al. Factors contributing to non-compliance among diabetics attending primary health centers in the Al Hasa district of Saudi Arabia. *J Family Community Med*. (2012) 19:26–32. doi: 10.4103/2230-8229.94008
26. Mohammed AS, Adem F, Tadiwos Y, Woldekidan NA, Degu A. Metabolic syndrome, obesity. Level of adherence to the dietary recommendation and glycemic control among patients with type 2 diabetes mellitus in eastern Ethiopia: a cross-sectional study. *Diabetes, Metabolic Syndrome and Obesity*. (2020) 13:2605–12. doi: 10.2147/DMSO.S256738
27. Ambaw ML, Gete YK, Abebe SM, Teshome DF, Gonete KA. Recommended dietary practice and associated factors among patients with diabetes at Debre Tabor general hospital, Northwest Ethiopia: institutional-based cross-sectional study design. *BMJ Open*. (2021) 11:e038668. doi: 10.1136/bmjopen-2020-038668
28. Tirfie M, Tadesse S, Woldie H, Weldegiorgis T, Birhanu M, Shibabaw T. Dietary non-adherence and associated factors among individuals with diabetes who are on treatment follow up at Felege-Hiwot referral hospital, Northwest Ethiopia. *Heliyon*. (2020) 6:e04544. doi: 10.1016/j.heliyon.2020.e04544
29. Jadawala HD, Pawar AB, Patel P, Patel KG, Patel SB. Factors associated with non adherence to diet and physical activity among diabetes patients: a cross sectional study. *Diabetes Res Clin Prac*. (2017) 8:68–73.
30. Basu S, Garg S, Sharma N, Singh MM. Adherence to self-care practices, glycemic status and influencing factors in diabetes patients in a tertiary care hospital in Delhi. *World J Diabetes*. (2018) 9:72–9. doi: 10.4239/wjd.v9.i5.72
31. Mekonnen CK, Ferede YM, Abate HKJD, Metabolic syndrome, obesity. Determinants of dietary adherence among type 2 diabetes patients aimed COVID-19 at the University of Gondar Comprehensive Specialized Hospital. (2021) 14:917–927.
32. Pascal IG, Ofoedu JN, Uchenna NP, Nkwa AA. Blood glucose control and medication adherence among adult type 2 diabetic Nigerians attending a primary care clinic in under-resourced environment of eastern Nigeria. *N Am J Med Sci*. (2012) 4:310–5. doi: 10.4103/1947-2714.98590