

Prevalence and Determinants of Diabetes among Adult Patients Attending Hargeisa Group Hospital of Somalia: A Hospital-Based Cross-Sectional Study

Sadam Ismail Ahmed^{1*}, Abdirashid Mohamoud Abdi1, Hassan Elmi Moumin², Safayet Jamil^{3, 4, 5,} Masoud Mohammadnezhad^{3, 5}

¹ Faculty of Medicine and Health Science, University of Burao, Burao, Somaliland

² College of Health science, School of Medicine and Surgery, Amoud University, Borama, Somaliland

³ Department of Public Health, Daffodil International University, Dhaka 1216, Bangladesh

⁴ Department of Public and Community Health, Frontier University Garowe, Puntland, Somalia

⁵ Faculty of Health, Education and Life Sciences, Birmingham City University, Birmingham, UK

Abstract

Corresponding author* Sadam Ismail Ahmed

Faculty of Medicine and Health Science, University of Burao, Burao, Somaliland

Email: sadaamismaaciil106@gmail.com

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Copyright: © by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution 4.0 (CC BY 4.0) International license. The main aim of the study was to assess the prevalence of diabetes and associated factors among adult patients attending at Hargeisa group hospital, Hargeisa, Somaliland. This cross-sectional study was conducted at Hargeisa Group Hospital (HGH). The sample size was 167 adult patients who visited Hargeisa Group Hospital during the study period. we collected data by following convenience sampling using semi-structured questionnaire. Data was collected from May 1, 2024, up to May 25, 2024. To conduct data analysis, SPSS version 20 software was used. The overall prevalence of diabetes mellitus among adult patients was 29.9%. Not taking exercise regularly was the significant factor of having diabetes. Less lifestyle modification was also the significant factor of having diabetes. The prevalence of diabetes mellitus among the patients (70.0%) had type 2 diabetes. Besides, 54.0% of patients had a family history of diabetes. The prevalence of diabetes mellitus among the adult patients in this study was higher. Therefore, it is better to design strategies for diabetes clients to lower their blood sugar in addition to insulin and oral agent medication, and they should do lifestyle modifications and exercises.

Introduction

Diabetes mellitus (DM) is a chronic metabolic disease which has emerged as one of the major global causes of morbidity and mortality (Junaid et al., 2024). It is a condition of chronic hyperglycemia due to the inability of the pancreas to produce sufficient insulin, or the body's resistance to the insulin it produces. Insulin is a hormone that is produced by the pancreas and encourages the absorption of glucose from the blood. Failure to control blood sugar may result in chronic complications that hit primary organs such as the kidney, heart, nerves, and the eye (Mukhtar et al., 2020).

Types There are 2 main types of diabetes. Type 1 Diabetes (T1D) is an autoimmune disease in which the immune system destroys the insulin-producing cells in the pancreas (Junaid et al., 2024). The disease is most commonly diagnosed in children and young adults. On the other hand, type 2 diabetes (T2D) is strongly associated with environmental factors like unhealthy diet, physical inactivity and obesity, although there is a genetic susceptibility as well (IDF, 2017). T2D, which is more studied at a global level, is the most prevalent form of DM and represents about 90% of all diabetes cases worldwide.

Diabetes has reached epidemic proportions in recent years. The international diabetes federation (IDF) reported that there were an estimated 463 million people with diabetes globally in 2019, and predicted that it would increase to 578 million in 2030 and 700 million in 2045 (Saeedi et al., 2019). Not only a leading cause of death, diabetes is now one of the top causes of morbidity from its many complications: cardiovascular disease, kidney failure, and blindness (World Health Organization [WHO], 2020). Rising diabetes prevalence is especially worrying in low and middle-income countries (LMICs) where

heath care preventive measures are scarce (Zimmet et al., 2016). In these places, rapid urbanization, dietary patterns changes, and decreased physical activity are fuelling a dramatic increase in diabetes prevalence (Lovic et al., 2020). Africa, with the lowest prevalence of diabetes globally, is currently experiencing a rapid increase in DM. The number of adults with diabetes in Africa was set to reach 24 million in 2021, with a significant increase projected for the coming decades (IDF, 2017). In the face of this growing epidemic, little is known about the prevalence and risk determinants of diabetes in many African countries, including Somaliland, the setting of this study.

Introduction Somaliland, a territory in the Horn of Africa, has its own set of special challenges to healthcare infrastructure, health education, and disease surveillance. Given that diabetes is increasingly becoming a public health problem in the region, such a comprehensive study on the prevalence of diabetes and its risk factors is lacking hitherto. The increasing burden of NCDs such as diabetes in Somaliland underscores the necessity for improving understanding and management of these health problems.

The objective of this study is to estimate the prevalence of diabetes and determinants of diabetes among adult patients visiting Hargeisa Group Hospital in Hargeisa, Somaliland. The hospital is one of the largest hospitals in the region; thus, information on prevalence of diabetes among its clients can give good interreferences on the general public in Somaliland. Findings from this study can inform future health policies and contribute to the design of prevention and treatment interventions to reduce the burden of diabetes in the region. The second aim is to investigate different potential risk factors for diabetes in this population. Although the world load of diabetes is clearly documented, much is lacking in terms of evidence from other regions, more so in Africa. The purpose of this study therefore is to fill this gap by presenting the empirical evidence of the pattern and distribution of diabetes in Somaliland.

Materials and Methods:

Study Design and Settings

A hospital-based cross-sectional study was conducted at Hargeisa Group Hospital, located in Hargeisa City, Somaliland (Akhter et al., 2022). This facility serves as a major healthcare provider catering to a diverse patient population. The study was carried out over a period from May 1, 2024, to May 25, 2024.

Inclusion and Exclusion Criteria

Inclusion Criteria:

- Adult patients aged 18 years and above.
- Patients attending Hargeisa Group Hospital during the study period.
- Willingness to participate and provide informed consent.
- **Exclusion Criteria**:
- Patients below 18 years of age.
- Patients with cognitive impairments or communication difficulties affecting their ability to provide accurate information.
- Patients who declined to participate or refused to provide informed consent.

Sample Size Calculation and Sampling Technique

The sample size was calculated using this formula (Mohammed et al. 2023)– n=($z^2 pq$)/d² *design effect; Where, n= desired sample size; z = 1.96 (95% confidence interval), p = population proportion (considering 10%), q = 1-p, d = precision level (5%), effect of design=2.0, and adjusting 10.0% of non-response. Our calculated sample size was 160. Thus, we gathered a total of 167 participants in the study. Convenience sampling was employed to select participants among adult patients visiting Hargeisa Group Hospital during the study period.

Questionnaire and Variables

Data were collected using a self-administered, semi-structured questionnaire. The questionnaire was initially developed based on a thorough review of the literature and tailored to meet the research objectives (Cheng et al., 2019; Yang et al., 2010; Dunstan et al., 2002). A pre-test was conducted with 5% of the total sample to refine the questionnaire. It was translated into Somali and then back-translated into English to ensure consistency.

The dependent variable of this study was prevalence of diabetes mellitus. The independent variables were age, obesity, family history of diabetes (heredity), stress, dietary habits, income, having hypertension, history of infections, physical inactivity, maternal history of gestational diabetes, low birth weight or preterm birth, and knowledge about diabetes.

Data Analysis

The collected data were checked manually for completeness and coded. Data were then entered into SPSS version 20 for analysis. Descriptive statistics such as frequency, percentage, mean, and standard deviation were computed for the study variables. The findings were presented in the form of tables, graphs, and charts.

Ethical Consideration

Ethical clearance was obtained from the Ethical Committee of Edna Adan University, nursing department. Before collecting data, participants were told the purpose and significance of the study. Written consent was sought from all participants. Confidentiality was observed in the conduct of data collection and the data was used anonymously and only for research purposes. Participants maintained their anonymity during the study. Finally, everything was conducted under the World Medical Declaration of Helsinki (Kabir et al., 2022).

Results

Overall, 29.9% of study participants had diabetes, and 50 participants had diabetes (Figure 1). Various socio-demographic characteristics and their correlation with diabetes, and determinants of diabetes prevalence, and overall and optimal diabetes control were studied.

Socio demographic	Categories	Frequenc	Percentage	Р-
factor		у	(%)	value
Gender	Male	68	40.7	0.141
	Female	99	59.3	
	Total	167	100	
Resident	Rural	44	26.3	0.51
	Urban	123	73.7	
	Total	167	100	

Table1. Association between socio-demographic variables and having diabetes

Age	15 –25 years	10	6.0	0.02
	26 –30 years	52	31.1	
	35- 40 years	59	35.3	
	45- 50 years	29	17.4	
	50 and above	17	10.2	
	Total	167	100	
Education	Illiterate	37	22.6	0.34
	Primary	64	38.3	
	Secondary	40	24.0	
	University	26	15.6	
	Total	167	100	
Marital status	Single	54	32.3	0.46
	Married	85	50.9	-
	Divorce	12	7.2	
	Widows	16	9.6	
	Total	16	100.0	
Occupation	Employee	62	37.1	
	No worker	50	29.9	
	house wife	30	18.0]
	Others	25	15.0	
	Total	167	100.0	
Income	50- 100	38	22.8	0.13
	<100-200	37	22.2	
	200-300	42	25.1	
	300 and above	50	29.9]
	Total	167	100.0	

In Table 1, Regarding gender, 40.7% were male and 59.3% were female. In terms of settlement, 73.7% were urban dwellers, and 26.3% were rural dwellers. The P-value is higher than 0.51, indicating that residency did not have a significant influence on the prevalence of diabetes. Age of the subjects was also associated with prevalence of diabetes which was highest among the 26-30 years age group (31.1%). Overall, among those over 50 years of age, the prevalence of diabetes was 10.2%. Age was significantly associated with diabetes, and its P-value was 0.02. The participants were from different educational status, in such a way that 22.6% were illiterate, 38.3% had primary education, 24.0% secondary education and 15.6% university. The majority of the respondents were married (50.9%) followed by single (32.3%). As for occupation 37.1% worked as salaried employees, 29.9% were self-employed, and 18.0% were housewives. There was no significant difference in prevalence of diabetes by occupation. Distribution of income showed 29.9% having an income of \$300 or more, but income was not significantly associated with prevalence of diabetes (P-value > 0.13).

Prevalence diabetes	Response	Frequen	Percentages
		cy	(%)
Do you have diabetes?	Yes	50	29.9
	No	117	70.1
	Total	167	100.0
Do you have family history of diabetes?	Yes	27	54.0
	No	23	46.0
	Total	50	100.0
How long have you had	Long time	25	50.0
diabetes?	Short time	25	50.0
	Total	50	100.0
Do you check your blood sugar regularly?	Yes	36	72.0
	No	14	28.0
	Total	50	100.0
What type of diabetes do you have?	Type one	13	26.0
	Type two	35	70.0
	Gestational diabetes	2	4.0
	Total	50	100.0
What type of treatment are using for diabetes?	Prescription oral agent	28	56.0
	Prescription insulin	13	26.0
	Herbal medication	4	8.0
	Special diet	2	4.0
	None	3	6.0
	Total	50	100.0
Have you ever been	Yes	26	52.0
hospitalised for your	No	24	48.0
uiabetes?	Total	50	100.0

Table 2: Questions related to Prevalence of diabetes Mellitus



Figure 1: Prevalence of diabetes mellitus among adult patients

In table 2, The diabetic prevalence of diabetes was 29.9% among the 167 individuals. The proportion of those with a family history of diabetes among diabetics was 54%. Diabetes duration was divided equally between type I diabetics who had a long-standing disease and those recently diagnosed one. Seventy-two per cent of adults reported regular monitoring of their blood sugar and 70% had been diagnosed with Type 2 diabetes. The majority (56%) of participants were on oral medication for treatment, followed by 26% for injectable insulin and 8% for herbal medication. Fifty-two percent of diabetics had been hospitalized due to diabetes.

Variables	Categori	Frequen	Percentages	P-
	es	cy	(%)	value
Do you exercise regularly?	Yes	17	34%	<0.001
	No	33	66%	
	Total	50	100.0	
What kind of exercise do you	Walking	16	32%	0.120
do?	Running	1	2%	
	push up	1	2%	
	Yoga	0	0%	
	Non	32	64%	
	Total	50	100.0	
Do you make lifestyle modification?	Yes	13	26%	0.023
	No	37	74%	
	Total	50	100.0	
Do you check your blood	Yes	14	28%	0.401
sugar every 3 months?	No	36	72%	

Table 3. Associated factors of diabetes mellitus amount adult patients

	Total	50	100.0	
Do you have any habits?	Smoking	7	14%	0.54
	Khat	10	20%	
	Alcohol	0	0%	
	None	33	66%	
	Total	50	100.0	

In table 3, For diabetes-related factors: 34% of diabetics had regular exercise activity; walking was the most preferred exercise (32%). However, lifestyle change was practiced by 26% and checking of blood sugar was done by 28% every three months but this was not statistically significant (P-value: 0.401). Regarding harmful habits, 14% of the study participants smoked, 20% chewed Khat and 66% had no harmful habits, which were not significantly associated with diabetes.

Discussion:

The results of this study are very important to gain an understanding about the magnitude and associated factors of diabetes mellitus in adult patients in Hargeisa Group Hospital, Hargeisa, Somaliland. In the present hospital-based cross-sectional study, the prevalence of diabetes among adult patients was observed to be 29.9% and this percentage is alarmingly very high as compared to the global prevalence of 8.5% for persons aged 18 and above (IDF, 2017). These findings should be alarming, especially in a low-income country such as Somaliland, where diabetes and other non-communicable diseases (NCDs) have not yet received the level of attention they deserve compared with infectious diseases.

The prevalence of diabetes in this study at 29.9% is much higher compared to several African countries. For example, in Ethiopia, diabetes prevalence has been reported as 12.4% (Zawudie et al., 2022) and 15.4% in Kenya (Harding et al., 2024). Thus, the results from Somaliland would indicate that it is facing an emerging diabetes epidemic, which requires further focus and resources to be directed to this. There are a few reasons that may be responsible for the higher prevalence of diabetes we observed in this particular study. Simplify the top cause and it falls into age. The highest prevalence of diabetes in the current study was reported in people aged 35–40 years, and these findings agree with those in other parts of the world where older age is associated with greater risk of developing diabetes (Saeedi et al., 2019). Age is a known risk for the onset of Type 2 diabetes since the body's capacity to balance blood sugar decreases with age. In addition, in an aging population in a variety of parts of world, such as Somaliland, the DM burden is going to increase appreciably, unless preventive measures are put in place (Harris et al., 2010).

Lack of regular physical activity is one of the other major causes of high prevalence of diabetes in this study. About two-thirds were sedentary, which is similar to worldwide data demonstrating that physical inactivity is a major risk factor for Type 2 diabetes (Tobias et al., 2012). The cause of insulin resistance is unknown, disease, particularly obesity, and represents a major risk factor for the development of diabetes (Lovic et al., 2020). Physical activity improves the maintenance of glycaemia and levels by increasing insulin sensitivity, whereas physical inactivity is one of the risk factors of heart and circulatory diseases (Junaid et al., 2024). In Somaliland, where westernization related to sedentary lifestyle changes is growing in magnitude, sedentary behavior is likely to increase and thus diabetes risk. In addition, risk-reducing lifestyle changes known to prevent the onset of Type 2 diabetes, were followed by 26% of subjects in the present cohort. This reflects a low level of knowledge on the significance of lifestyle modification for the prevention of diabetes risk, possibly as a result of inadequate provision of health education and absence of public health campaigns on lifestyle aspects. Wider evidence supports the importance of diet and physical activity, in the prevention and control of diabetes. For instance, studies of Tobias et al. (2012) have demonstrated that highrisk individuals are able to prevent or delay Type 2 diabetes development by adopting healthy dietary and exercise habits, most notably for those with a family history of the disease.

The research also found a strong link between the developing of the diabetes and a family history of the disease. This is consistent with evidence worldwide for genetic predisposition as a strong risk associated with diabetes (Saeedi et al., 2019). Having family history of diabetes enhances the probability of arising the disease for the combined effects of genetic and environmental factors had evidence in 54% of the patients who suffered from diabetes in this study. The genetic basis for diabetes is not simple and can be attributed to the combined effect of a number of genes that disrupt insulin synthesis and the capacity of the body to respond to insulin efficiently (Adugnew et al., 2024).

One remarkable finding of this study is the rather high degree of self-care in this population of diabetic patients. A high percentage (72%) of diabetic patients reported checking their blood sugar. This reflects active involvement with diabetes care, which is essential for diabetes control and the prevention of complications. The monitoring of blood sugar levels and making appropriate changes in lifestyle and medications are required for patients to be fully informed of their status (Zimmet et al., 2016). Nevertheless, even though it was the good news for these groups, more than 50% of the patients in the study still used prescription oral agents and some of them also used insulin, indicating that better healthcare services and treatment options are necessary (Balakumar et al., 2016).

Although this study offers valuable information on diabetes prevalence and its associated factors in Somaliland, the following limitations to the study should be kept in mind. Convenience sampling might have introduced selection bias as the patients might differ from the overall population of Hargeisa and Somaliland, although from a population perspective, those seeking care represent the larger part of the population. Furthermore, as a cross-sectional study, we could not draw conclusions of causality between these factors and the development of diabetes. However, longitudinal analyses should be conducted to better understand the causality.

Conclusion:

The findings of this study underscore the urgent need for comprehensive public health interventions to address the growing diabetes epidemic in Somaliland. Efforts should focus on raising awareness about diabetes, promoting physical activity, and encouraging lifestyle modifications such as dietary changes. Furthermore, healthcare infrastructure should be strengthened to ensure that patients with diabetes have access to proper management and treatment. Public health policies should also address the social determinants of health, such as income and education, which are linked to diabetes risk.

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References

Akhter, A., Jamil, S., Hossain, M. J., Islam, M. M., Bari, Q. I., & Sultana, M. A. (2022). Hospital pharmacy practice and drug management system of Khulna division, Bangladesh: Results from a cross-sectional study. Bangladesh Pharmaceutical Journal, 25(1), 44-53.

Adugnew, M., Fetene, D., Assefa, T., Kedir, S. A., Asmamaw, K., Feleke, Z., ... & Mamo, H. (2024). Diabetes-related distress and its associated factors among people with type 2 diabetes in Southeast Ethiopia: A cross-sectional study. BMJ Open, 14(1), e077693.

Balakumar, P., Maung-U, K., & Jagadeesh, G. (2016). Prevalence and prevention of cardiovascular disease and diabetes mellitus. Pharmacological Research, 113, 600-609.

Cheng, Y. J., Kanaya, A. M., Araneta, M. R. G., Saydah, S. H., Kahn, H. S., Gregg, E. W., ... & Imperatore, G. (2019). Prevalence of diabetes by race and ethnicity in the United States, 2011-2016. JAMA, 322(24), 2389-2398.

Dunstan, D. W., Zimmet, P. Z., Welborn, T. A., De Courten, M. P., Cameron, A. J., Sicree, R. A., ... & AusDiab Steering Committee. (2002). The rising prevalence of diabetes and impaired glucose tolerance: The Australian Diabetes, Obesity and Lifestyle Study. Diabetes Care, 25(5), 829-834.

Holt, R. I., & Flyvbjerg, A. (Eds.). (2024). Textbook of diabetes. John Wiley & Sons.

IDF Diabetes Atlas. (2017). International Diabetes Federation.

Kabir, H., Hasan, M. K., Tutul, A. H., Islam, M. S., Jamil, S., Das, B. C., ... & Mitra, D. K. (2022). Prevalence and determinants of antibiotic self-administration among adult antibiotic users: A cross-sectional study. Patient Preference and Adherence, 2409-2421.

Kamara, A. (2024). A modern overview on diabetes mellitus: A chronic endocrine disorder. European Journal of Biology, 5(2), 1-14.

Lovic, D., Piperidou, A., Zografou, I., Grassos, H., Pittaras, A., & Manolis, A. (2020). The growing epidemic of diabetes mellitus. Current Vascular Pharmacology, 18(2), 104-109.

Mohammed, A. S., Asumah, M. N., Padhi, B. K., Sinha, A., Mohammed, I., Jamil, S., ... & Kabir, R. (2023). Predictors of SARS-CoV-2 vaccine uptake among health professionals: A cross-sectional study in Ghana. Vaccines, 11(1), 190.

Nasser, S. A., Ghazi, L., & Abuelezam, N. N. (2023). Inclusion of Middle Eastern and North African populations in diabetes clinical research. Journal of the National Medical Association, 115(4), 454-458.

Saeedi, P., Petersohn, I., Salpea, P., Malanda, B., Karuranga, S., Unwin, N., ... & IDF Diabetes Atlas Committee. (2019). Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas. Diabetes Research and Clinical Practice, 157, 107843.

Tobias, D. K., Hu, F. B., Chavarro, J., Rosner, B., Mozaffarian, D., & Zhang, C. (2012). Healthful dietary patterns and type 2 diabetes mellitus risk among women with a history of gestational diabetes mellitus. Archives of Internal Medicine, 172(20), 1566-1572.

Yang, W., Lu, J., Weng, J., Jia, W., Ji, L., Xiao, J., ... & He, J. (2010). Prevalence of diabetes among men and women in China. New England Journal of Medicine, 362(12), 1090-1101.

Zawudie, A. B., Daka, D. W., Teshome, D., & Ergiba, M. S. (2022). Economic burden of diabetes mellitus among patients on follow-up care in hospitals of Southwest Shewa Zone, Central Ethiopia. BMC Health Services Research, 22(1), 1398.

Zimmet, P., Alberti, K. G., Magliano, D. J., & Bennett, P. H. (2016). Diabetes mellitus statistics on prevalence and mortality: Facts and fallacies. Nature Reviews Endocrinology, 12(10), 616-622.