HSOA Journal of Diabetes & Metabolic Disorders

Research article

Diabetes Knowledge and Associated Factors among Adult Diabetic Patients in Southwest Ethiopia

Tadesse Sheleme[1]*, Firomsa Bekele[1], and Wayessa Olika[1]

Department of Pharmacy, College of Health Science, Mettu University, Mettu, Ethiopia

Abstract

Background

Diabetes knowledge among diabetes patients population is a key factor to improve their quality of life and limit diabetic complications. A study that measures the baseline knowledge of target population is important in designing health education programs.

Methods

The study was conducted at the ambulatory clinic of Mettu Karl Referral Hospital during the period from 15 April to 17 May 2019. A prospective cross-sectional study design was used to assess patients' level of knowledge using the 24-item Diabetes Knowledge Questionnaire. Data were analyzed using SPSS version 24. Factors associated with diabetes knowledge were determined using the independent sample t-test and one-way analysis of variance. All significance tests were two-tailed, $P < 0.05$ was considered statistically significant.

Results

A total of 330 diabetic patients were included in the study, among whom male were 60.0%. The mean age of respondents was 49.85 ± 14.19 years. The mean of diabetes knowledge score of the study participants was 11.5 ± 4.6. More than 90% of study participants responded correctly two diabetes knowledge questions, which were untreated diabetes increases the amount of sugar in the blood and cuts and abrasions on diabetes heal more slowly. Diabetes often causes poor circulation was one of diabetes knowledge questions which answered correctly by 6.7% of study participants only. A significant association was found between diabetes knowledge score and gender, level of education, occupation, place residence, attending diabetes educational sessions and family history of diabetes.

Conclusion

The present study observed that diabetes knowledge among study participants was inadequate. The study also identified that patients with male gender, higher educational level, being employed, urban residents, attending diabetes educational sessions and having positive family history of diabetes were associated with better diabetes knowledge. Continuing education on diabetes for people living with the disease is crucial and this should be accompanied by a regular assessment of their diabetic knowledge.

Keywords: Diabetes; Diabetes knowledge; Southwest ethiopia

Introduction

Background

Diabetes Mellitus (DM) is a metabolic disorder characterized by hyperglycemia which leads to a number of complications, and imposes a significant burden on the health care system [1]. Diabetes is the most proliferated disease recognized across the world in the healthcare domain [2]. There has been persistent rise in prevalence of diabetes throughout the world [1]. According to the International Diabetes Federation, an estimated global burden of diabetes is 463 million in 2019 with the expected number of 578 million by the year 2030 [3]. Currently, Ethiopia has 2.6 million people living with diabetes [4].

Despite advancement in management options, diabetes prevalence continues to increase [5]. The global increment of diabetes is influenced by increasing ageing population, sedentary lifestyles, unhealthy diets, obesity, and urbanization [1,6]. The impact of diabetes includes social and economic outcomes, including costing millions of health care budgets of nations across the world [7]. Diabetes contributed to approximately 5 million deaths worldwide among adult population in 2017, with about 36.5% of these deaths occurring in people aged less than 60 years [8].

The management of DM is largely depends on patients' ability to self-care in their daily lives [9]. Diabetic patients with poor understanding of the disease have shown increased rate of hospitalization, and those with excellent knowledge and understanding of diabetes are able to adhere to the principles of self-care and have documented better glycemic control [5,6]. Therefore, patient education is the cornerstone of care for patients with DM [10].

Differences in knowledge level have been described depending on level of education, gender and social classes [11]. A study conducted by Eva K. Fenwick et al. [12], reported that socio-demographic, clinical and service use factors were independently associated with diabetes knowledge. A study done in Nepal showed that diabetes knowledge was associated with age, marital status, education level, occupation, and patients with family history of diabetes [6]. A study conducted by Kalayou K Berhe et al. [13], in Ethiopia revealed that diabetes knowledge was significant association diabetes family

history. Another study conducted in Ethiopia showed that being illiterate, underweight and duration of diabetes less than 5 years were significantly associated with low level of diabetes knowledge [7].

Obtaining knowledge level among diabetes patient population about diabetes is important to plan public-health polices with specific reference for implementation of national diabetes control programs [14]. Additionally, a study that measures the baseline knowledge of target population is important in designing health education programs [6]. Moreover, such study is essential for the appropriate and efficient use of limited resources to address any health condition. There was no study conducted regarding diabetes knowledge among diabetes patients at Mettu Karl Referral Hospital. Thus, this study aimed to assess the level of knowledge and associated factors about diabetes mellitus among diabetic patients at Mettu Karl Referral Hospital in Southwest Ethiopia.

Methods

Study Setting and Period

The study was conducted from 15 April to 17 May 2019 at Mettu Karl Referral Hospital, Southwest Ethiopia. The hospital is located in Mettu town at 600 km to Southwest of Addis Ababa, the capital city of Ethiopia. It serves about 2.5 million people from Ilu Ababor Zone, Glabella Regional State and Southern People Region. The hospital health service covers outpatient department, inpatient department, critical care and emergency intervention unit.

Study Design and Population

Health facility based a prospective cross-sectional study design was used. The source population was all diabetic patients on follow up at Mettu Karl Referral Hospital. The study population was all adult diabetic patients who visited the hospital during the data collection period and fulfilled the inclusion criteria. Type 1 and type 2 diabetes patients whose ages were ≥18 years were included in the study. Diabetic patients who were not willing to participate in the study and patients who were critically ill or unable to participant due to mental problems were excluded from the study.

Sample size and sampling technique

This study was conducted alongside our recently published studies [15,16]. Originally, the study had glycemic control, diabetes complications and diabetes knowledge as primary outcomes. The sample size was calculated considering all outcomes and glycemic control yielded the maximum sample size. The single population proportion formula was used to estimate sample size using 59.4% proportion poor glycemic control [17], 95% Confidence Interval (CI), 5% margin of error, and 10% nonresponse rate. The total number of diabetic patients attending follow-up at Mettu Karl Referral Hospital was 1560. Therefore, the correction formula was considered and the required sample size obtained was 330. A consecutive sampling technique was used to collect data from patients who fulfilled the inclusion criteria.

Study variables

The dependent variable was diabetes knowledge. The independent variables included socio-demographic variables (age, gender, marital status, religion, educational status, occupation, and place of residence), family history diabetes, duration of diabetes, and attending diabetes-related educational sessions.

Data collection

The data collection was performed using a structured questionnaire. The questionnaire contains diabetes knowledge questions, socio-demographic and clinical characteristics. Face to face interview was performed to collect information from all the participants. The questionnaire was translated into Afan Oromo and Amharic languages to interview the patients. The data collection was done by healthcare professionals.

Diabetes knowledge determinations

Patient's diabetes knowledge was measured using the 24-item version of Diabetes Knowledge Questionnaire (DKQ-24). It has 24 diabetes related questions with yes, no or don't know alternative answers. Each knowledge question was scored 1 point for the correct answer and zero point for an incorrect or unknown response. For each participant, a sum of score was calculated to define a knowledge variable. The possible value that the patient could score was 0 to 24. Then the mean knowledge score for the participants was calculated. The DKQ-24 is a reliable and valid measure of diabetes-related knowledge [18,19].

Data quality assurance

The data collectors were trained by principal investigator. The pretest was done on 17 diabetic patients attending follow at Jimma University Medical Center to check applicability, consistency, and understandability of the questionnaire. Unclear and misunderstood questions were modified before data collection. All completed data collection forms were checked for their completeness, consistency, clarity, and accuracy by the principal investigator on daily basis.

Statistical analysis

The data were entered into Epidata Manager Version 4.4.2 and then exported to Statistical Package for Social Science (SPSS) version 24.0 for analysis. Frequency, percentage, mean and Standard Deviation (SD) were used for descriptive statistics. The association between patients' characteristics and diabetes knowledge was evaluated by the independent sample t-test and one-way analysis of variance (ANOVA) using means among groups of different variables. All significance tests were two-tailed, $P < 0.05$ was considered statistically significant.

Results

Socio-demographic and clinical characteristics of the study participants

The study included a total of 330 participants of whom males were 60.0%. The mean age of respondents was 49.85±14.19 and 47.3% were 41 to 60 years old. The majority of the study participants were married which counted for 84.5%. In terms of region, orthodox followers counted highest number (43.9%). The educational status showed that about 34.5% of participants had attained primary school education. About 34.2% of participants were farmers in terms of occupational status. More than half (53.6%) of study participants were urban residents. Family history of diabetes was identified in 28.8% of study participants. About 40.0% of participants had duration of diabetes 5-10 years. Participants who did not attended diabetes educational sessions at the hospital were 60.0% (Table 1).

Variables	Categories	n (%)
Gender	Male	198 (60.0)
	Female	132 (40.0)
Age (years)	18-30	34 (10.3)
	31-45	96 (29.1)
	46-60	122 (37.0)
	>60	78 (23.6)
Marital status	Married	279 (84.5)
	Single	21 (6.4)
	Divorced	11 (3.3)
	Widowed	19 (5.8)
Religion	Orthodox	145 (43.9)
	Muslim	106 (32.2)
	Protestant	79 (23.9)
Educational status	No formal education	71 (21.5)
	Primary	114 (34.6)
	Secondary	65 (19.7)
	Tertiary	80 (24.2)
Occupation	Farmers	113 (34.2)
	Merchants	97 (29.4)
	Employees	45 (13.6)
	House wives	41 (12.4)
	Retired	25 (7.6)
	Daily laborers	4 (1.2)
	Students	3 (0.9)
	Drivers	2 (0.6)
Residence	Urban	177 (53.6)
	Rural	153 (46.4)
Family history of diabetes	Yes	95 (28.8)
	No	235 (71.2)
Duration of DM (years)	<5	110 (33.3)
	5-10	132 (40.0)
	>10	88 (26.7)
Attended diabetes educational sessions	Yes	130 (39.4)
	No	200 (60.0)

Table 1: Socio-demographic and clinical characteristics of diabetic patients attending Mettu Karl Referral Hospital, 2019.

DM: Diabetes Mellitus

Diabetes knowledge of the study participants

The mean±SD DKQ score of the participants was 11.5±4.6. Maximum number of participants (92.4%) believed that in untreated diabetes, the amount of sugar in the blood usually increases. Similarly, majority of the participants (90.6%) had correctly answered about cuts and abrasions on diabetes. About 82.4% participants knew that a fasting blood sugar level of 210 is too high. More than four-fifth of the participants were well acquainted that children have a higher chance of being diabetic if parents had diabetes, diabetes is incurable, diabetics should take extra care when cutting their toenails, the way of preparing their food is as important as the foods they eat and diabetes can cause loss of feelings in hands, fingers and feet. Almost two-third of study participants knew the types of diabetes and recognized the

signs of hypoglycemia. However, only 45.8% of participants knew the signs of hyperglycemia. More the half of the participants knew that the usual cause of diabetes is lack of effective insulin in the body, diabetes can damage the kidneys and tight elastic hose or socks are bad for diabetics. Furthermore, less than one-third of the patients had knowledge about the effect eating too much sugar and other sweet foods on diabetes, the role of kidney failure on diabetes, the way of testing diabetes, the roles of exercise, diet and medications, insulin production and reaction, impact of diabetes on circulation and diabetic wound care (Table 2).

Number	Questions	n (%)*
1	Eating too much sugar and other sweet foods is a cause of diabetes.	101 (30.6)
2	The usual cause of diabetes is lack of effective insulin in the body.	170 (51.5)
3	Diabetes is caused by failure of the kidneys to keep sugar out of the urine.	70 (21.2)
4	Kidneys produce insulin.	57 (17.3)
5	In untreated diabetes, the amount of sugar in the blood usually increases.	305 (92.4)
6	If I am diabetic, my children have a higher chance of being diabetic.	236 (71.5)
7	Diabetes can be cured.	240 (72.7)
8	A fasting blood sugar level of 210 is too high.	272 (82.4)
9	The best way to check my diabetes is by testing my urine.	88 (26.7)
10	Regular exercise will increase the need for insulin or other diabetic medication.	39 (11.8)
11	There are two main types of diabetes: Type 1 (insulin dependent) and Type 2 (noninsulin dependent).	214 (64.8)
12	An insulin reaction is caused by too much food.	31 (9.4)
13	Medication is more important than diet and exercise to control my diabetes.	60 (18.2)
14	Diabetes often causes poor circulation.	22 (6.7)
15	Cuts and abrasions on diabetes heal more slowly.	299 (90.6)
16	Diabetics should take extra care when cutting their toenails.	246 (74.5)
17	A person with diabetes should cleanse a cut with iodine and alcohol.	34 (10.3)
18	The way I prepare my food is as important as the foods I eat.	233 (70.6)
19	Diabetes can damage my kidneys.	189 (57.3)
20	Diabetes can cause loss of feeling in my hands, fingers and feet.	238 (72.1)
21	Shaking and sweating are signs of high blood sugar.	151 (45.8)
22	Frequent urination and thirst are signs of low blood sugar.	219 (66.4)
23	Tight elastic hose or socks are not bad for diabetics.	194 (58.8)
24	A diabetic diet consists mostly of special foods.	74 (22.4)

Table 2: DKQ-24 Results of diabetic patients attending Mettu Karl Referral Hospital, 2019.

*-correctly answered.

Factors associated with diabetes knowledge

The association between DKQ scores and different characteristics of the study participants was determined. A significant association was identified between DKQ score and gender, educational status, occupation, residence, attending diabetes educational sessions and

family history of diabetes. However, no significant difference was observed in DKQ score and age, marital status, religion and duration of diabetes (Table 3).

Variables	Categories	DKQ-24 Score (Mean±SD)	P-value
Gender	Male	11.86±4.63	
	Female	10.83±4.62	0.049
Age (years)	18-30	11.88±3.60	
	31-45	11.51±4.80	0.935
	46-60	11.25±4.91	0.756
	>60	11.50±4.49	0.936
Marital status	Married	11.57±4.74	
	Single	11.48±4.24	0.550
	Divorced	10.64±4.61	
	Widowed	10.11±3.65	
Religion	Orthodox	11.74±4.92	
	Muslim	11.76±4.74	0.231
	Protestant	10.81±4.14	
Educational status	Illiterate	8.58±3.06	
	Primary	10.22±3.92	<0.001
	Secondary	12.17±4.20	
	Tertiary	15.16±4.62	
Occupation	Farmers	10.06±4.14	
	Merchants	10.86±3.72	
	Employees	16.36±4.10	
	House wives	9.12±4.04	<0.001
	Retired	14.40±4.44	
	Daily laborers	10.75±4.11	
	Students	14.00±6.56	
	Drivers	15.50±2.12	
Residence	Urban	12.69±4.76	<0.001
	Rural	10.01±4.08	
family history of diabetes	Yes	11.81±4.81	0.025
	No	10.55±4.10	
Duration of diabetes	<5	11.75±4.70	0.636
	5-10	11.42±4.65	
	>10	11.11±4.59	
Attended diabetes educational sessions	Yes	12.25±4.53	0.011
	No	10.93±4.66	

Table 3: Association between socio-demographic and clinical characteristic of study participants and DKQ score among study participants at Mettu Karl Referral Hospital, 2019.

DKQ-24: Diabetes Knowledge Questionnaire 24-item version, SD- Standard Deviation.

Discussion

The risks of developing diabetes complications can be influenced by the patient's knowledge about the disease [20]. Adequate diabetes knowledge is considered as a key component of diabetes management [11]. Poor diabetes knowledge has a negative impact on self-care behavior. Those with greater knowledge of diabetes are expected to maintain better glycemic control [21]. Therefore, patient's knowledge of diabetes is important to minimize the occurrence of diabetes complications, and it has significant impact on the quality of life of the diabetic patient [22].

The present study observed that diabetes knowledge among study participants was inadequate. Similarly, a study conducted in central Nepal reported poor diabetes knowledge among diabetic patients [6]. A study conducted by Arora S et al. [23], showed poor diabetes knowledge among diabetic patients. There are also other studies that reported similar findings of the present study [11,21]. A previous study conducted in Ethiopia also reported similar result [13]. In inconsistent to the present study, a study conducted in Saudi Arabia showed that diabetes patients had adequate knowledge about the disease [2]. The discrepancy might be due to difference methods of assessing diabetes knowledge. The difference in level of education might be also a reason for the discrepancy.

This study observed that male participants had higher diabetes knowledge score than females. In consistent with this finding, a study conducted in King Hussein Medical Center of Jordan reported that men achieved significantly higher in knowledge score than women [11]. Similarly, a study done by Bukhsh et al. [5], in Pakistan showed that male gender had higher diabetes knowledge score. This might be because of women were less aware than men mostly due to low literacy rates. A study showed that there was a low literacy rate among women throughout the world [24]. In contradictory to this finding, other studies identified that female patients had better diabetes knowledge [25,26]. The discrepancy might be due to the differences of the patients' populations.

The present study revealed that diabetes knowledge significantly associated with educational status. It was observed that participants who never attended school scored lowest and those with tertiary education got highest score of diabetes knowledge. This result was correlate with a study done in central Nepal which observed better diabetes knowledge with higher level of education [6]. Similarly, a study conducted in Australia showed that higher education level was associated with better diabetes knowledge [12]. A previous study done in Ethiopia also reported that being illiterate was significantly associated with low level of diabetic knowledge [7]. A better educated people may be more curious while being counseled on diabetes [27]. Besides, it is possible that educated patients could gather more information about the disease from different sources like internet, magazine, etc.

Occupation was significantly associated with diabetes knowledge in present study, with employees scored higher than others. This was in line with a study done by Shrestha et al. [6], which reported that government and private employee had better diabetes knowledge score than others. The possible reason is that employees are better educated and have higher chance of accessing educational resources to get information about their disease. House wives obtained the lowest diabetes knowledge scores in this study. This was supported by a study conducted in Bangladesh which reported that the mean knowledge of diabetes scores were the lowest among housewives [28].

The present study showed that the family history of diabetes was positively associated with better knowledge of patient. This finding was in accordance with the results of other studies [9,29,30]. A previous studies conducted in Ethiopia also demonstrated that participants with a family history of diabetes had better diabetes knowledge [7,31]. A study done in Pakistan observed that 65% of adults with a family history of diabetes were aware of diabetes. However, only 32% of people with a negative family history were aware of the disease [32]. A study showed that family member with chronic disease may be a source of information about the disease [33].

The urban resident diabetic patients were found to be more knowledgeable about diabetes when compared with the rural residents in this study. It was in line with study done by Sabri et al. [34], which reported that the rural diabetic patients were far less knowledgeable about diabetes. A study in India also showed that rural residents had poorer knowledge about diabetes compared to urban residents [35]. This might be because of the urban area is a place where education may be more readily accessible to people which affect patients ability to get diabetes related information.

This study identified that participants who attended diabetes educational sessions at the hospital had better diabetes knowledge. This finding was supported by a study conducted by Ulvi et al. [32], in Pakistan. The finding was also consistent with a previous study done in Ethiopia [31]. A study revealed that educational sessions on diabetes have been shown to improve patients' diabetes knowledge [30]. It is also identified that people who obtained information about diabetes from different sources were more likely to have a good level of knowledge about diabetes [30].

In this study there was no association between diabetes knowledge and age, marital status and duration of diabetes. In consistent with this finding, a study conducted in Lebanon reported that there was no significant association between age and diabetes knowledge [36]. However, a study done in Peru and Kuwaiti indicated that age was associated with diabetes knowledge [29,30]. A study conducted by Al-Adsani et al. [19], found difference in diabetes knowledge by duration of diabetes. They reported that diabetes knowledge score was lower among those had shorter duration of diabetes. One of the limitations of this study was the possibility of self-reporting bias. Since this study was conducted on ambulatory diabetes patient population, the results may not be truly generalized to all diabetic patients in the country. There was also a possibility of selection bias.

Conclusion

The present study observed that diabetes knowledge was inadequate among diabetic patients at Mettu Karl Referral Hospital. The study identified that patients with male gender, higher educational level, being employed, urban residents, attending diabetes educational sessions and having positive family history of diabetes were associated with better diabetes knowledge. Knowledge related to diabetes can help patients to overcome diabetes related the problem through performing a good self-care practices and other important safety measures. Continuing education on diabetes for people living with the disease is crucial and this should be accompanied by a regular evaluation of their diabetic knowledge.

Acknowledgement

Ethics approval

The study was approved by the institutional review board of Jimma University. Written informed consent was obtained from all study participates.

Competing interests

The author declares that there are no competing interests.

Funding

Author's contribution

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data. TSH took part in writing up the manuscript. All authors involved in revising the manuscript critically for important intellectual content. All authors agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work.

References

1. Shams N, Amjad S, Seetlani NK, Ahmed W (2016) Diabetes knowledge in elderly type 2 diabetes mellitus patients and association with glycemic control. J Liquat Uni Med Health Sci 15: 71-77.

2. Abouammoh NA, Alshamrani MA (2020) Knowledge about diabetes and glycemic control among diabetic patients in Saudi Arabia. J Diabetes Res 2020: 1239735.

3. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, et al. (2019) Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9th edition. Diabetes Res Clin Pract 157: 107843.

4. Gebreyohannes EA, Netere AK, Belachew SA (2019) Glycemic control among diabetic patients in Ethiopia: A systematic review and meta-analysis. PloS one 14: 0221790.

5. Bukhsh A, Khan TM, Nawaz MS, Ahmed HS, Chan KG, et al. (2019) Association of diabetes knowledge with glycemic control and self-care practices among Pakistani people with type 2 diabetes mellitus. Diabetes Metab Syndr Obes 12: 1409-1417.

6. Shrestha N, Yadav S, Joshi A, Patel B, Shrestha J, et al. (2015) Diabetes knowledge and associated factors among diabetes patients in Central Nepal. International Journal of Collaborative Research on Internal Medicine & Public Health 7: 82-91.

7. Kassahun T, Gesesew H, Mwanri L, Eshetie T (2016) Diabetes related knowledge, self-care behaviours and adherence to medications among diabetic patients in Southwest Ethiopia: A cross-sectional survey. BMC endocrine disorders 16: 28.

8. Cho NH, Shaw JE, Karuranga S, Huang Y, da Rocha Fernandes JD, et al. (2018) IDF Diabetes Atlas: Global estimates of diabetes prevalence for 2017 and projections for 2045. Diabetes Res Clin Pract 138: 271-281.

9. Al-Maskari F, El-Sadig M, Al-Kaabi JM, Afandi B, Nagelkerke N, et al. (2013) Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. PloS one 8: 52857.

10. Murata G, Shah J, Adam K, Wendel CS, Bokhari S, et al. (2003) Factors affecting diabetes knowledge in Type 2 diabetic veterans. Diabetologia 46: 1170-1178.

11. Al-Sarihin K, Bani-Khaled M, Haddad F, Althwabia I (2012) Diabetes knowledge among patients with diabetes mellitus at King Hussein Hospital. JRMS 19: 72-77.

12. Fenwick EK, Xie J, Rees G, Finger RP, Lamoureux EL (2013) Factors associated with knowledge of diabetes in patients with type 2 diabetes using the diabetes knowledge test validated with rasch analysis. PloS one 8: 80593.

13. Berhe KK, Gebru HB, Kahsay HB, Kahsay AA (2014) Assessment of diabetes knowledge and its associated factors among type 2 diabetic patients in Mekelle and Ayder referral hospitals, Ethiopia. J Diabetes Metab 5: 1000378.

14. Garfield S, Malozowski S, Chin M, Venkat Narayan K, Glasgow R, et al. (2003) Considerations for diabetes translation research in real-world settings. Diabetes Care 26: 2670-2674.

15. Sheleme T, Mamo G, Melaku T, Sahilu T (2020) Glycemic control and its predictors among adult diabetic patients attending Mettu Karl Referral Hospital, Southwest Ethiopia: A prospective observational study. Diabetes Ther 11: 1775-1794.

16. Sheleme T, Mamo G, Melaku T, Sahilu T (2020) Prevalence, patterns and predictors of chronic complications of diabetes Mellitus at a Large Referral Hospital in Ethiopia: A prospective observational study. Diabetes Metab Syndr Obes 13: 4909-4918.

17. Sheleme T, Mamo G, Melaku T, Sahilu T (2020) Prevalence, patterns and predictors of chronic complications of diabetes mellitus at a large referral hospital in ethiopia: A prospective observational study. Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy 13: 4909-4918.

18. Cheneke W, Suleman S, Yemane T, Abebe G (2016) Assessment of glycemic control using glycated hemoglobin among diabetic patients in Jimma University specialized hospital, Ethiopia. BMC research notes 9: 96.

19. Menino E, Maria dos A, Maria clarisse C (2017) Validation of diabetes knowledge questionnaire (DKQ) in the portuguese population. Diabetes Obes Int J 2: 1-8.

20. Garcia AA, Villagomez ET, Brown SA, Kouzekanani K, Hanis CL (2001) The starr county diabetes education Study: Development of the Spanish-language diabetes knowledge questionnaire. Diabetes Care 24: 16-21.

21. Mufunda E, Wikby K, Bjorn A, Hjelm K (2012) Level and determinants of diabetes knowledge in patients with diabetes in Zimbabwe: A cross-sectional study. The Pan African Medical Journal 13:78.

22. Parimalakrishnan S, Dussa K, Sahay R (2015) Assessment of diabetes knowledge using diabetes knowledge questionnaire among people with type 2 diabetes mellitus. Asian J Pharm Clin Res 8: 254-56.

23. Moodley L, Rambiritch V (2007) An assessment of the level of knowledge about diabetes mellitus among diabetic patients in a primary healthcare setting. South African Family Practice 49: 16-16d.

24. Arora S, Marzec K, Gates C, Menchine M (2011) Diabetes knowledge in predominantly Latino patients and family caregivers in an urban emergency department. Ethnicity & disease 21: 1-6.

25. Rafigue G, Azam SI, White F (2006) Diabetes knowledge believes and practices among people with diabetes attending a university hospital in Karachi. Eastern Mediterranean Health Journal 12: 590-598.

26. Gonzalez HM, Vega WA, Rodriguz MA, Tarraf W, Sribney WM (2009) Diabetes awareness and knowledge among latinos: Does usual sources of health care matter? Society of General Internal Medicine 24: 528-533.

27. Moodley LM, Rambiritch V (2007) An assessment of the level of knowledge about diabetes mellitus among diabetic patients an aprimary health cares setting. South African Family Practice 49: 16-16.

28. Jasper US, Ogundunmade BG, Opara MC, Akinolie O, Pyiki EB, et al. (2014) Determinants of diabetes knowledge in a cohort of nigerian diabetics. Journal of Diabetes and Metabolic Disorders 13: 39.

29. Mumu SJ, Saleh F, Ara F, Haque MR, Ali L (2014) Awareness regarding risk factors of type 2 diabetes among individuals attending a tertiary-care hospital in Bangladesh: A cross-sectional study. BMC research notes. 7: 599.

30. Al-Adsani A, Moussa M, Al-Jasem L, Abdella N, Al-Hamad N (2009) The level and determinants of diabetes knowledge in Kuwaiti adults with type 2 diabetes. Diabetes & metabolism 35: 121-128.

31. Cantaro K, Jara JA, Taboada M, Mayta-Tristan P (2016) Association between information sources and level of knowledge about diabetes in patients with type 2 diabetes. Endocrinologia Nutricion (English Edition) 63: 202-211.

32. Shiferaw WS, Gatew A, Afessa G, Asebu T, Petrucka PM, et al. (2020) Assessment of knowledge and perceptions towards diabetes mellitus and its associated factors among people in debre berhan town, northeast Ethiopia. PloS one 15: e0240850.

33. Ulvi OS, Chaudhary RY, Ali T, Alvi RA, Khan MFA, et al. (2009) Investigating the awareness level about diabetes mellitus and associated factors in Tarlai (rural Islamabad). JPMA The Journal of the Pakistan Medical Association 59: 798-801.

34. Harrison TA, Hindorff L, Kim H, Wines RCM, Bowen DJ, et al. (2003) Family history of diabetes as a potential public health tool. Am J Prev Med 24: 152-159.

35. Sabri AA, Qayyum MA, Saigol NU, Zafar K, Aslam F (2007) Comparing knowledge of diabetes mellitus among rural and urban diabetics. McGill Journal of Medicine: MJM 10: 87-89.

36. Deepa M, Bhansali A, Anjana R, Pradeepa R, Joshi S, et al. (2014) Knowledge and awareness of diabetes in urban and rural India: The Indian Council of Medical Research India diabetes study (phase I): Indian Council of Medical Research India diabetes 4. Indian journal of endocrinology and metabolism 18: 379-385.

Advances In Industrial Biotechnology | ISSN: 2639-5665

Advances In Microbiology Research | ISSN: 2689-694X

Archives Of Surgery And Surgical Education | ISSN: 2689-3126

Archives Of Urology

Archives Of Zoological Studies | ISSN: 2640-7779

Current Trends Medical And Biological Engineering

International Journal Of Case Reports And Therapeutic Studies | ISSN: 2689-310X

Journal Of Addiction & Addictive Disorders | ISSN: 2578-7276

Journal Of Agronomy & Agricultural Science | ISSN: 2689-8292

Journal Of AIDS Clinical Research & STDs | ISSN: 2572-7370

Journal Of Alcoholism Drug Abuse & Substance Dependence | ISSN: 2572-9594

Journal Of Allergy Disorders & Therapy | ISSN: 2470-749X

Journal Of Alternative Complementary & Integrative Medicine | ISSN: 2470-7562

Journal Of Alzheimers & Neurodegenerative Diseases | ISSN: 2572-9608

Journal Of Anesthesia & Clinical Care | ISSN: 2378-8879

Journal Of Angiology & Vascular Surgery | ISSN: 2572-7397

Journal Of Animal Research & Veterinary Science | ISSN: 2639-3751

Journal Of Aquaculture & Fisheries | ISSN: 2576-5523

Journal Of Atmospheric & Earth Sciences | ISSN: 2689-8780

Journal Of Biotech Research & Biochemistry

Journal Of Brain & Neuroscience Research

Journal Of Cancer Biology & Treatment | ISSN: 2470-7546

Journal Of Cardiology Study & Research | ISSN: 2640-768X

Journal Of Cell Biology & Cell Metabolism | ISSN: 2381-1943

Journal Of Clinical Dermatology & Therapy | ISSN: 2378-8771

Journal Of Clinical Immunology & Immunotherapy | ISSN: 2378-8844

Journal Of Clinical Studies & Medical Case Reports | ISSN: 2378-8801

Journal Of Community Medicine & Public Health Care | ISSN: 2381-1978

Journal Of Cytology & Tissue Biology | ISSN: 2378-9107

Journal Of Dairy Research & Technology | ISSN: 2688-9315

Journal Of Dentistry Oral Health & Cosmesis | ISSN: 2473-6783

Journal Of Diabetes & Metabolic Disorders | ISSN: 2381-201X

Journal Of Emergency Medicine Trauma & Surgical Care | ISSN: 2378-8798

Journal Of Environmental Science Current Research | ISSN: 2643-5020

Journal Of Food Science & Nutrition | ISSN: 2470-1076

Journal Of Forensic Legal & Investigative Sciences | ISSN: 2473-733X

Journal Of Gastroenterology & Hepatology Research | ISSN: 2574-2566

Journal Of Genetics & Genomic Sciences | ISSN: 2574-2485

Journal Of Gerontology & Geriatric Medicine | ISSN: 2381-8662

Journal Of Hematology Blood Transfusion & Disorders | ISSN: 2572-2999

Journal Of Hospice & Palliative Medical Care

Journal Of Human Endocrinology | ISSN: 2572-9640

Journal Of Infectious & Non Infectious Diseases | ISSN: 2381-8654

Journal Of Internal Medicine & Primary Healthcare | ISSN: 2574-2493

Journal Of Light & Laser Current Trends

Journal Of Medicine Study & Research | ISSN: 2639-5657

Journal Of Modern Chemical Sciences

Journal Of Nanotechnology Nanomedicine & Nanobiotechnology | ISSN: 2381-2044

Journal Of Neonatology & Clinical Pediatrics | ISSN: 2378-878X

Journal Of Nephrology & Renal Therapy | ISSN: 2473-7313

Journal Of Non Invasive Vascular Investigation | ISSN: 2572-7400

Journal Of Nuclear Medicine Radiology & Radiation Therapy | ISSN: 2572-7419

Journal Of Obesity & Weight Loss | ISSN: 2473-7372

Journal Of Ophthalmology & Clinical Research | ISSN: 2378-8887

Journal Of Orthopedic Research & Physiotherapy | ISSN: 2381-2052

Journal Of Otolaryngology Head & Neck Surgery | ISSN: 2573-010X

Journal Of Pathology Clinical & Medical Research

Journal Of Pharmacology Pharmaceutics & Pharmacovigilance | ISSN: 2639-5649

Journal Of Physical Medicine Rehabilitation & Disabilities | ISSN: 2381-8670

Journal Of Plant Science Current Research | ISSN: 2639-3743

Journal Of Practical & Professional Nursing | ISSN: 2639-5681

Journal Of Protein Research & Bioinformatics

Journal Of Psychiatry Depression & Anxiety | ISSN: 2573-0150

Journal Of Pulmonary Medicine & Respiratory Research | ISSN: 2573-0177

Journal Of Reproductive Medicine Gynaecology & Obstetrics | ISSN: 2574-2574

Journal Of Stem Cells Research Development & Therapy | ISSN: 2381-2060

Journal Of Surgery Current Trends & Innovations | ISSN: 2578-7284

Journal Of Toxicology Current Research | ISSN: 2639-3735

Journal Of Translational Science And Research

Journal Of Vaccines Research & Vaccination | ISSN: 2573-0193

Journal Of Virology & Antivirals

Sports Medicine And Injury Care Journal | ISSN: 2689-8829

Trends In Anatomy & Physiology | ISSN: 2640-7752

Submit Your Manuscript: https://www.heraldopenaccess.us/submit-manuscript