

Original Article

Knowledge on Selected Aspects of Type 2 Diabetes Mellitus Among the Adult Patients Attending Outpatient Department of Adhunik Zilla Hospital, Joypurhat, Bangladesh.

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Corresponding Author*Abstract**

Background: Type-2 Diabetes Mellitus is a chronic metabolic disorder of which prevalence has been increasing silently and poses a major public health problem all over the world.

Objective: To explore the level of knowledge about selected aspects of Type-2 Diabetes Mellitus among the adult patients attending outpatient departments of Adhunik Zilla Hospital, Joypurhat, Bangladesh.

Materials and Methods: A descriptive cross sectional study was conducted among adult patients aged 30-65 years irrespective of gender attending outpatient departments of Adhunik Zilla Hospital, Joypurhat. A pre-tested interviewer administered structured questionnaire was used for collecting data and the purposive sampling technique was used. The sample size was 434.

Results: Out of 434 respondents (241, 55%) were female and (193, 45%) were male, majority (155, 36%) of them were in the age group of 30-39 years, their educational qualification were up to class V (195, 45%), occupation wise majority of them were in Day worker category (farmer, beggar, rickshaw puller, hawker) (334, 76%) and (232, 54%) of the respondents' monthly family income was <10000 taka. As per our scoring scheme, the respondent's knowledge level in different aspects of type-2 Diabetes Mellitus - the knowledge level on general area of Type 2 DM was average (15/24 mean 2.36 and SD 1.29), the risk factors knowledge level was average (16/24 mean 2.56 and SD 1.24), sign symptoms' knowledge level was good (26/36 mean 2.88 and SD 1.21) and the knowledge level about complications was also average (22/36 mean 2.44 and SD 1.31) The overall knowledge level score of the respondents about Type-2 Diabetes Mellitus was good, but the score was at the lower level of good knowledge as per our scoring scheme. (81/120, mean 2.28 and SD .915)

Conclusion: Knowledge and health literacy is vital in the epidemiological change of any disease. The small scale hospital based study revealed the knowledge level is average to good in different facets of Type 2 Diabetes Mellitus among adult patients.

Keywords: Type-2 Diabetes Mellitus, Knowledge, Adult patient. Out door

Introduction

Diabetes mellitus or Type-2 Diabetes Mellitus (T2DM) is one of the most common non-communicable diseases internationally and at present, the disease is a major public health issue in developing countries because of its chronic nature, rapidly increasing prevalence, related complications, and the necessity of

long-term care. It is a chronic and most prevailing non-communicable diseases globally affecting 463 million individuals worldwide in 2019.¹ In 2021, according to the International Diabetes Federation (IDF), one adult in ten worldwide will be people with diabetes, representing a total of 537 million people.² Unrecognized people with diabetes account for an estimated 50% of all people with diabetes.^{3,4} At this

time, this disease is a major public health concern in developing countries because of its chronic nature, rapidly increasing prevalence with related complications.^{5,6} Currently low-income and middle-income countries have seen a faster increase in diabetes occurrence than high-income countries, with more than two-thirds of the population suffering from the disease.^{5,8} It is apparent, the economic growth, sedentary and multifaceted life style, changed food habits and urbanization have forced an increasing burden of T2DM on mankind.⁹

The frequency of diabetes, especially Type 2, is more common in male than female. However females normally have more serious complications and a greater risk of death than male.¹⁰ The town inhabitants in developing countries are predictable to double between 2000 and 2030. The most important demographic change to diabetes prevalence across the world appears to be the increase in the proportion of people >65 years of age.¹⁰ The blow of T2DM in Africa, and most other developing countries, has reached alarming proportions. A shocking 79.4% of adults with DM live in low- and middle-income countries. The African region is also estimated to have the highest percentage (73.1%) of DM-related deaths under 60 years.¹⁰ Literature showed that about 90 to 95% of all diagnosed diabetes cases of this region is Type 2 diabetes.^{10,11} Bangladesh is not different from other countries of the world, and changing the trend of communicable to non communicable diseases due to better socioeconomic status and unexpected but rapid urbanization. In Bangladesh, the predictable prevalence of diabetes among adults was 9.7% in 2011¹² and the number is projected to be 13.7 million by 2045.^{13,14} Knowledge is powerful tools in the fight against DM. Educative information can help people better understand DM risk factors and motivate them to seek proper treatment and take care of their condition.¹⁵ A study reported in Iran, only 2% of the respondents had good knowledge of T2DM and showed a low alertness of lifestyle modifications regarding weight management.¹⁵ Lifestyle modification is the foundation of T2DM control, but

often little is known about its application and practice among patients.^{16,17} An Ethiopian study reported that 77% of participants displayed adequate knowledge.¹⁸ A similar study in South Africa reported 92.1% of the respondents had poor knowledge regarding the benefits of exercise and weight loss, and 73.3% had poor knowledge regarding a healthy diet.¹⁹ These studies found that attitudes towards lifestyle modifications tended to be positive, especially when knowledge was sufficient.^{16,19,20} Even people being responsive of or adopting lifestyle modifications, hold on to the recommendations remains a challenge.²¹ The objective of our study was to explore the level of knowledge about selected aspects of type-2 DM among the adult patients attending outpatient department of District Hospital, Joypurhat, Bangladesh.

Materials and Methods

A cross sectional descriptive study was conducted among adult patients aged 30-65 years of age irrespective of gender attended outpatient department of Adhunik Zilla Hospital, Joypurhat, Bangladesh on September 2023.

Sampling: A Purposive sampling technique (non-probability) was employed and the sample size was n - 434

- **The inclusion criteria** in the sample were the patients aged 30 to 65 years of age irrespective of gender from outpatient departments of the selected hospital on the day of data collection.
- **Exclusion Criteria** were unwilling patients, severely ill patients, patients with Type-1 Diabetes Mellitus,

Data collection instrument

A pretested structured questionnaire was used for data collection. The questionnaire had two sections; as

Section-A- socio demographic profile of the respondents

Section B: knowledge based statements on selected aspects of Type-2 Diabetes Mellitus. In Section B there are THIRTY (30) knowledge based statements and each statement had five point likert scales 0-4

with maximum score of 4 in each statement. Strongly Agree (SA-4), Agree (A-3), Undecided (U-2), Disagree (DA-1) And Strongly Disagree (SDA-0).

Knowledge based thirty statements were divided into FOUR (4) subgroups

Sub Group 1- General knowledge of Type 2 DM

Sub Group 2-Risk factors of Type 2 DM.

Each group has **SIX** (6) statements and the total score is $6 \times 4 = 24$ in each group. Scoring guideline -

- 1-8 poor knowledge
- 9-16 average knowledge
- 17-24 good knowledge

Sub Group 3 - Sign symptoms of Type 2 DM,

Sub Group 4 -Complications of Type 2 DM

Each group has **NINE** (9) statements, so the total score is $4 \times 9 = 36$ in each group and scoring guideline -

- 1-12 poor knowledge
- 13-24 average knowledge
- 25-36 good knowledge

Total knowledge score of 30 statements about Type 2 DM is $30 \times 4 = 120$ and the overall knowledge level is categorized as below

- 1-40 poor knowledge
- 41-80 average knowledge
- 81-120 good knowledge

Data Collection: Data was collected through face to face interview by the third year medical students (TMC 13) of TMSS Medical College, Bogura as a part of their Residential Field Site Training Programme. Before data collection all respondents were briefed about the purpose ethical issues of the study by the students.

Data analysis: The collected data were checked and edited for any inconsistency and error, cleaned and coded properly and analyzed by Statistical Package for Social Sciences (SPSS) version 26. Missing data were coded as 999. Descriptive statistics were carried out for analysis of data and results were expressed in frequency and percentage.

Results

Table I: Socio demographic profile of the respondents (n=434)

Variable	Frequency	Percentage
1. Age in years		
30-39	155	36
40-49	118	27
50-59	101	23
60 and above	60	14
Total=434		
2. Gender		
Male	193	45
Female	241	55
Total=434		
3. Educational qualification		
Up to Class V	195	45
SSC	87	20
HSC	52	12
Graduate	11	3
Masters	17	4
Others	72	17
Total=434		
4. Occupation		
Govt. Service	23	5
Non-govt. Service	37	9
Business	40	10
Day worker (Farmer, beggar, rickshaw puller, hawker)	334	76
Total=434		
5. Monthly Family Income		
≤ 10000 taka	232	54
10001-20000	147	34
20001-30000	34	8
30001-40000	14	3
40001-50000	4	0.9
$> 50001+$	2	0.4
Total=434		

Out of 434 respondents, 155(36%) were within the age group of 30-39 years, 118(27%) in 40-49 years, 101(23%) in 50-59 years and 60(14%) were in above 60 years; 193(45%) were male and 241(55%) were female., 195(45%) had education up to class V, SSC 87(20%), HSC 52(12%), graduate 11(3%), masters 17(4%) and 72(17%) were in other category. Regarding occupation, 334(76%) were day worker

(Farmer, beggar, rickshaw puller, hawker), non-government service holder 37(9%), businessmen 40(10%) and 23(5%) had government job. Their monthly family income was $\leq 10,000$ taka 232 (54%), followed by 10,001-20,000 147(34%), 20,001-30,000 taka 34 (8%), 30,001-40,000 taka 14 (3%), 40,001-50,000 taka (0.9%) and only 2(0.4%) had monthly income $> 50,001$ taka

Table II: Respondents' level of knowledge in general area of Type-2 DM (n=434)

Statements	Agree Frequency (%)	Disagree Frequency (%)	Undecided Frequency (%)	Mean	Standard Deviation (SD)
Insufficient insulin production	165 (38)	163(38)	106(24)	1.98	1.45
Body not responding for insulin	140 (32)	173(40)	121(28)	1.83	1.37
Condition of high level sugar in the blood	293 (68)	80 (19)	60(14)	2.81	1.33
Not a curable disease	325 (75)	69 (16)	40 (9)	3.00	1.22
DM can cause serious health problems if it's address properly	312 (72)	56 (13)	65 (15)	2.96	1.13
Affect any parts of the body	276 (64)	66 (15)	91 (21)	2.82	1.24
Total score 4x 6=24 Interpretation guidelines 1-8 poor knowledge. 9-16 average knowledge 17-24 good knowledge				Obtained Score 15 Mean 2.56	SD 1.29

Based on our scoring scheme the respondents' level of knowledge in general area of Type-2 DM is average (15/24, mean 2.56 and SD 1.29)

Table III: Respondents' level of knowledge about risk factors of Type-2 DM (n=434)

Statements	Agree Frequency (%)	Disagree Frequency (%)	Undecided Frequency (%)	Mean	Standard Deviation (SD)
i. Older age	310(71)	78(18)	45 (10)	2.84	1.27
ii. Genetic or family history of Diabetes Mellitus	285 (66)	87(20)	62 (14)	2.74	1.35
iii. Being obese	312 (72)	66 (15)	55(13)	2.89	1.24
iv. Poor dietary habits	248 (57)	77(18)	107(25)	2.55	1.19
v. Not getting enough exercise	324(75)	47(11)	63 (15)	3.02	1.08
vi. Pregnancy in female (gestational Diabetes)	203 (47)	113 (26)	118 (27)	2.32	1.35
Total score 4x 6=24 Interpretation guidelines 1-8 poor knowledge. 9-16 average knowledge 17-24 good knowledge				Obtained Score 16 Mean 2.56	SD 1.24

Based on our scoring scheme the respondents' level of knowledge about risk factors of Type-2 DM is average, (16/24, mean 2.56 and SD 1.29) and level is at the upper margin of average score.

Table IV: Respondents' level of knowledge about signs and symptoms of Type-2 DM (n=434)

Statements	Agree Frequency (%)	Disagree Frequency (%)	Undecided Frequency (%)	Mean	Standard Deviation (SD)
i Frequent urination	377 (87)	38(9)	19 (4)	3.36	1.03
ii Excessive thirst and hunger	344 (79)	46(11)	44(10)	3.18	1.14
iii Excessive hunger	325 (75)	61(14)	48(11)	3.05	1.21
iv Weight loss	299 (69)	63(15)	72(17)	2.89	1.23
v Fatigue	303 (70)	61(14)	70(16)	2.89	1.21
vi Blurring of vision	265 (61)	81(19)	88(20)	2.71	1.29
vii Recurrent infection	232 (54)	95(22)	107(24)	2.50	1.32
viii Slow healing of cuts and wounds	315 (73)	61(14)	58(13)	3.02	1.25
ix High blood sugar level	323 (74)	59 (14)	52(12)	3.05	1.24
Total score 4 x 9 = 36 Interpretation guidelines 1-12 poor knowledge, 13-24 average knowledge, 25-36 good knowledge				Obtained Score 26 mean 2.88	SD 1.21

A per our scoring scheme the respondents' level of knowledge about risk factors of Type-2 DM is good (26/36, mean 2.88 and SD 1.21) and the score is at the lower margin of good knowledge.

Table-V: Respondents' level of knowledge about complications of Type-2 DM (n =434)

Statements	Agree Frequency (%)	Disagree Frequency (%)	Undecided Frequency (%)	Mean	Standard Deviation (SD)
i Eye problem or even blindness	288(66 %)	71(16)	75(17.3)	2.82	1.26
ii Gum disease and other mouth problems	220(51 %)	108(25)	105(24)	2.38	1.29
iii Kidney problems	282(65 %)	83(19)	67(15)	2.71	1.28
iv Nerve problems (neuropathy)	199(46 %)	117(27)	118(27)	2.29	1.33
v Heart problems	272(63 %)	87(20)	72(17)	2.66	1.30
vi Brain disease like stroke	231(53 %)	98(23)	102(24)	2.50	1.31
vii Skin problems	230(53 %)	110(25.4)	94(22)	2.43	1.33
viii Pregnancy complications	228(53 %)	102(23.5)	103(24)	2.42	1.32
ix Diabetes can result in amputation of limb	189(43.5)	127(29.3)	116(27)	2.27	1.40
Total score 4x9=36 0-12 poor knowledge 13-24 average knowledge 25-36 good knowledge				Obtained Score 22 Mean 2.44	SD 1.31

As per our scoring scheme the respondents' level of knowledge about complications of Type-2 DM is average (22/36 mean 2.44 and SD 1.31)

Table-6 : Respondents' overall knowledge level in certain aspects of Type 2 DM (n =434)

Overall Level of knowledge in different aspects of Type-2 DM	Obtained Score	Mean	Standard Deviation
A. knowledge in general area	15.4	2.56	1.29
B. knowledge of risk factors	16.36	2.56	1.24
C. knowledge of sign symptoms	26.65	2.00	1.21
D. knowledge of complications	22.48	2.00	1.31
Total obtained score	81	2.28	0.935
Total knowledge level score in four aspects of Type-2 DM - 24+24+36+36=120			
Interpretation guidelines 1-40 poor knowledge 41-80 average knowledge 81-120 good knowledge			

The respondents' level of knowledge in different aspects of Type-2 DM is good 81/120 (mean 2.28 SD 0.935), but it is at the lower level of good knowledge.

Discussion

Diabetes or Type-2 Diabetes Mellitus is an ice berg disease and a major public health concern in the current context. Being a non-communicable disease with epidemic nature, Type-2 DM becomes a major public health concern. The explosive occurrence of diabetes in recent years has been mainly in the form of Type 2 Diabetes Mellitus^{10,11}. There is strong epidemiological evidence that this epidemic of Type 2 Diabetes Mellitus is related to the changing lifestyle; refined foods have replaced natural whole grain, high fiber diets; and there is a lack of physical exercise partly due to sedentary lifestyles, stress and societal change^{2,3,5, 6}

A cross sectional descriptive study was conducted among (n=434) adult patients 30 to 65 years of age, attending different outpatient departments of Adhunik Zilla Hospital, Joypurhat. The knowledge based data were collected through a structured questionnaire by face to face interview by the third year medical students (TMC 13) as a part of their Residential Field Site Training.

Our study identified that the respondents' knowledge level in different facets is good to average (Table:2-5).

Respondents' knowledge in general area, risk factor and complications of Type-2 DM was average (Table:2,3,5) and knowledge regarding sign/symptom was good (Table:4). Similar results were found in many previous studies and our study findings are in line with other studies conducted in Bangladesh^{8,9}

A study reported that respondents properly identified diabetes-related symptoms such as frequent urination, increased thirst, hunger, fatigue, and delayed wound healing, which is comparable to our study²². Another research reported, 81% of the respondents rightly identified diabetes symptoms.²³ On the other hand, our study found that a greater proportion of our respondents were able to identify diabetic symptoms correctly than the study conducted among the Nepali people with diabetes which reported 37.9% of the participants managed to identify correctly the diabetes symptoms.²⁴

Overall knowledge about Type-2 DM was good among our respondents with plenty of scopes for improvement in different aspects of the disease. Our overall knowledge level score about Type-2 DM is also consistent with a KAP (Knowledge, Attitude, and Practice) study in the general population in rural Bangladesh.^{11,14} Even though our study shows a decent knowledge level in different aspects of Type 2 DM, still it is important to make patients aware about lifestyle modifications and other diabetes-related health concerns.

Conclusion

The objective of our study was to explore the knowledge about selected aspects of Type-2 Diabetes Mellitus among the adult patients attending the outpatient department of District Hospital, Joypurhat, Bangladesh. The respondents' knowledge in general and risk factors of Type-2 DM was average, sign/symptoms was good, complications were average respectively and the overall knowledge score level of the respondents was good. The occurrence of diabetes has been steadily increasing over time. For enhancing diabetes detection and prevention among adults in Bangladesh, community level interventions focusing on diabetes education, including a healthy diet and lifestyle, are required.

Limitations and Future directions

The small study population was selected from only one hospital, so the results cannot be generalized all over the country. In-depth large scale community based study should be done to know the hidden cases of DM in the community.

Ethical considerations

The project was approved by the concerned ethical committee of TMSS Medical College. For data collection, permission was taken from the Superintendent of the Hospital by a formal letter from the principal of TMSS Medical College, Bogura. Participant was briefed about the purpose of the study and the anonymity and confidentiality were ensured.

Funding: The study was conducted without any funding, commercial or financial relationships.

Conflict of Interest- The authors confirm that there is no conflict of interest among the authors.

References

1. Ogurtsova K/, da Rocha Fernandes J D, Huang Y, Linnenkamp U., Guariguata L, Cho N.H, Cavan D., Shaw J.E and Makaroff L.E (2017), IDF diabetes atlas: global estimates for the prevalence of diabetes for 2015 and 2040. *Diabetes Research and Clinical Practice*; 128:40–50. 10.1016/j.diabres.2017.03.024
2. Sun H, Saeedi P, Karuranga S, Pinkepank M , Ogurtsova K , Duncan B B , Stein C, Basit A , Chan J C N , Mbanya J C, Pavkov M E , Ramachandaran A, Wild S H , James S , Herman W H , Zhang P , Bomme C , Kuo S , Boyko E J and Magliano D J (2021) IDF Diabetes Atlas: Global, Regional and Country-Level Diabetes Prevalence Estimates for 2021 and Projections for 2045. *Diabetes Research and Clinical Practice*. Volume 183m January 2022
3. International Diabetes Federation (2019) Diabetes Atlas, Ninth edition 2019 retrieved from https://www.diabetesatlas.org/upload/resources/material/20200302_133351_IDFATLAS9e-final-web.pdf accessed on 20/05/2023
4. Ibrahim MM, Damasceno A, Hypertension in Developing Countries. *The Lancet*, 2012; 380: 611-619. [https://doi.org/10.1016/S0140-6736\(12\)60861-7](https://doi.org/10.1016/S0140-6736(12)60861-7) accessed on 21/05/2023
5. Dagenais G R, Gerstein H C , Zhang X, McQueen M, Lear S, Lopez-Jaramillo P, Mohan V Mony P, Gupta R. Kutty V R , Kumar R , Rahman O, Yusoff K , Zatonska K. Oguz A, Rosengren A, Kelishadi R , Yusufali A, Diaz R, Avezum A, Lanas F, Kruger A , Peer N, Chifamba J , Iqbal R , Ismail N, Xiulin B, Jiankang L Wenqing D, Gejie Y, Rangarajan Y, Sumathy, Teo K and Yusuf S · Variations in diabetes prevalence in low-, middle-, and high-income countries: results from the prospective urban and rural epidemiological study. *Diabetes Care* 2016; 39:780–7. 10.2337/dc15-2338
6. Mkuu R, Barry A, Yonga G ,Nafukho F, Wernz C, Gilreath T, Chowdhury MAB , Harvey I S Prevalence and factors associated with overweight and obesity in Kenya. *Preventive Medicine Report*. 2021; 22: 101340. 10.1016/j.pmedr.2021.101340
7. Mkuu RS · Gilreath T D Barry AE , Nafukho FM· Rahman J , Chowdhury M A B and Harvey I S . Identifying individuals with multiple non-communicable disease risk factors in Kenya: a latent class analysis. *Public Health*2021; 198:180–6. 10.1016/j.puhe.2021.07.031
8. Chowdhury M A B, Islam M , Rahman J, Mohammed, Uddin MT, Haque MR and Uddin M J, Urban rural differences in prevalence and risk factors of self-reported hypertension among Kenyan women: a population-based study. *Journal of Human Hypertension* 2021; 35:912-20. 10.1038/s41371-020-00435-x
9. W Sarah Roglic G, Green A, Sicree R, King Hilary, Global prevalence of diabetes: estimates for the year 2000 and projections for 2030 , *Diabetes Care* 2004; 27(5):1047-53. (doi: 10.2337/1047) .5.1047)
10. Simmons H, (2022) Diabetes in Men versus Women, News Medical retrieved from <https://www.news-medical.net/health/Diabetes-in-Men-versus-Women.aspx> on 10th June, 2024
11. Wi, J, C van R, Botes J , Type 2 diabetes mellitus patients' knowledge, attitude and practice of lifestyle modifications, Health SA, *Journal of Interdisciplinary Health Sciences*, 2022; 27: 1921. Published online 2022 Oct 21. doi: 10.4102/hsag.v27i0.1921
12. Hussain A, Vaaler S, Sayeed M, Mahtab H, Ali SK, Khan A A, Type 2 diabetes and impaired fasting blood glucose in rural Bangladesh: a population-based study. *European Journal of Public Health*.2006.;17(3):291–6.

13. Niti S, Amrit V, Gupta B, Jasdeep S, Prevalence and risk factors of diabetes mellitus among adults residing in field practice area of a teaching Hospital in Punjab. *Health line Journal*. 2015; 6(1):57–62
14. Akter S, Rahman MM, Abe SK, Sultana P Prevalence of diabetes and pre diabetes and their risk factors among Bangladeshi adults: a nationwide survey. *Bulletin World Health Organisation*. 2014; 92:204–13A.
15. Chowdhury MAB, Islam M, Rahman J, Taj Uddin M, Haque MR, Uddin, (Changes in prevalence and risk factors of hypertension among adults in Bangladesh: an analysis of two waves of nationally representative surveys. *PLoSOne* , 2021;16: e0259507. 10.1371/journal. pone. 0259507
16. Puepet, F.H., Mijinyawa, B.B., Akogu, I. Azara, I. Knowledge, attitude and practice of patients with diabetes mellitus before and after educational intervention in Jos, Nigeria, *Journal of Medicine in the Tropics*, (2007); 9(1): 3–10. 10.4314/jmt.v9i1.35200
17. Mohammadi, S., Karim, N.A., Talib, R.A. Amani, R. Knowledge, attitude and practices on diabetes among type 2 people with diabetes patients in Iran: A cross-sectional study, *Science Journal of Public Health*. 2015; 3(4): 520–524. 10.11648/j.sjph.20150304.20
18. Islam FMA, Chakrabarti R, Dirani M, Islam MT, Ormsby G, Wahab M, Critchley C, Finger RP. Knowledge, attitudes and practice of diabetes in rural Bangladesh: the Bangladesh population based diabetes and eye study (BPDES). *PLoS One*. 2014; 9(10): e110368
19. Peter P I, Steinberg, WJ, Rooyen Cv, Botes J, Type 2 diabetes mellitus patients' knowledge, attitude and practice of lifestyle modifications m, Health SA. *Journal of Interdisciplinary Health services* 2022; 27: 1921. Published online 2022 Oct 21. doi: 10.4102/hsag.v27i0.1921
20. Okonta, H.I., Ikombele, J.B., Ogunbanjo, G.A., Knowledge, attitude and practice regarding lifestyle modification in type 2 people with diabetes patients', *African Journal of Primary Health Care and Family Medicine*. 2014; 6(1): E1–E6. 10.4102/phcfm.v6i1.655
21. Adem, A.M., Gebremariam, E.T., Gelaw, B.K., Ahmed, M., Fromsa Seifu, M. & Thirumurugan, G., Assessment of knowledge, attitude and practices regarding life style modification among type 2 people with diabetes mellitus patients attending Adama Hospital Medical College, Oromia Region, Ethiopia', *Global Journal of Medical Research*. 2014 ; 14(7) : 37–48
22. Mumu, S.J., Saleh, F., Ara, F., Afnan, F., Ali, Non-adherence to life-style modification and its factors among type 2 people with diabetes patients, *Indian Journal of Public Health* 2014: 58(1): 40–44. 10.4103/0019-557X.128165
23. Ibrahim Abougalambou SS, AbaAlkhail H, Abougalambou AS. The knowledge, attitude and practice among people with diabetes patient in central region of Saudi Arabia. *Diabetes Metab Syndr*. 2019; 13(5): 2975–2981.
24. Upadhyay D, Palaian S, Shankar P, Mishra P, Knowledge, attitude and practice about diabetes among diabetes patients in Western Nepal. *Journal Pakistan Medical Association*. 2008 ; 33 :1
25. Mansy W, Syed Wajid S , Alwhaibi A, Alghadeer SM, Alhossan A, Salmeen Babelghaith S, Alrabiah Z, Al Arifi MN, Assessing Outpatients' Knowledge, Attitude, and Practice Toward Managing Diabetes in Saudi Arabia, *The Journal of Health Care*, 2022 ; 59 : 1–9 DOI: 10.1177/0046958022108278

TMSS Medical College Journal 2024; 22(7-15)