



A STUDY TO ASSESS THE KNOWLEDGE AND ATTITUDE OF DIABETES MANAGEMENT AMONG ADULTS WITH TYPE II DIABETES MELLITUS OF SELECTED COMMUNITY AREA, HAROHALLI.

¹Mr. Sanat Majumdar, ² Ms.Anjana Thangjam, ³Ms. Soundarya, ⁴Ms. Saraswathi A H, ⁵Ms. Singh Jyoti, ⁶ Mr. Dhanavelu J

Assistant Professor, Department of medical Surgical Nursing, College of Nursing Science, Dayananda Sagar University, Harohalli, Karnataka, India.

Abstract: Background of the study: Type II diabetes mellitus is called as life style disease as it is more common in people who don't do enough exercise, have an unhealthy diet and obese so it is very important to have a knowledge about prevention and management of type II diabetes mellitus through life style modification like exercise, diet. It also helps in prevention of complications of diabetes mellitus.

Objectives:

1. To assess the knowledge and attitude of diabetes management.
2. To associate between the level of knowledge and attitude of diabetes management among adults with type II diabetes mellitus with their bio socio demographical variables.

Method: A study was conducted by using the descriptive design. The setting of the study was in a selected community area, Harohalli. Sample size of 30 adults with type II diabetes mellitus were selected by probability simple random sampling technique. A proforma for collection of baseline data and structured questionnaire was used to assess the level of knowledge and attitude of diabetes management among adults with type II diabetes mellitus.

Results: The findings of the study shows that majority of the samples that is 16(53.3%) had moderate level of knowledge, 14(46.7%) had inadequate level of knowledge of diabetes management. The majority of the samples that is 15(50%) had moderate attitude level 15(50%) had unfavorable attitude level. There was significant association between level of knowledge and attitude of diabetes management with bio socio demographic variables.

Index Terms - Type II diabetes mellitus, knowledge, attitude, management.

INTRODUCTION

Diabetes mellitus is a group of metabolic disease in which a person has high blood sugar either because the pancreas does not produce enough insulin or because pancreatic β cells do not respond to the insulin that is produced. This high blood sugar produces the classical symptoms of polyuria, polydipsia and polyphagia. Diabetes mellitus type II (NIDDM) is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency. This is in contrast to diabetes mellitus type 1, in which there is an absolute

insulin deficiency due to destruction of islets cells in the pancreas type II diabetes mellitus makes up about 90% of cases of diabetes with the other 10% due to diabetes mellitus type 1 and gestational diabetes.

Prevalence of type 2 diabetes is increasing globally, more so in developing countries like India due to rapid urbanization. It is estimated that prevalence of diabetes will rise to 5.5% in 2025 as compared to 4% in year 1995. The total direct cost for diabetes management has doubled from 1998 to 2005. Therefore, prevention is important both on monetary and human matters. There is an increasing amount of evidence that the patient education is the most effective way to lessen the complications of diabetes and its management. Education is likely to be effective if we know the characteristic of the patients in terms of knowledge, their attitude and practices about diabetes 1.

As per the report of International Diabetics Federation, India is looming epidemic of diabetes and known as the diabetes capital of the world. According to IDF India has the highest no. of 537 million people have diabetes in the world and 90 million people in the South East Asia region; by 2045 this will rise to 151.5 million people 21.

There is no cure for diabetes so far, but it can be treated and controlled. Pharmacological therapy and/or insulin may be required in order to maintain the blood glucose level as near as possible to normal and to delay or possibly to prevent the development of diabetes-related health problems. However, disease management can be helped also by healthy eating and physical exercise.

Diabetes is a chronic disease, requiring a multipronged approach for its management, wherein the patient has an important role to play. They are required to follow certain self-care practices to achieve an optimal glycemic control and prevent complications. These practices include regular physical activity, appropriate dietary practices, daily foot care practice, compliance with treatment regimen, and tackling complications such as hypoglycemic episodes. Thus, the objective of this study was to assess the knowledge and attitude of diabetes management among adults with type II diabetes mellitus of selected community area, Harohalli.

MATERIALS & METHODS

A. Study Design: The research design used in this study was descriptive design.

B. Variables:

Independent Variables-Type II diabetes mellitus.

Dependent Variables- Level of knowledge and attitude of diabetes management.

Bio socio demographical Variables-Age, gender, working status, taking of anti-diabetes medication, family history of diabetes, level of education, duration of diabetes, height, weight, body mass index

Settings of the study:

The study was conducted in a selected community area, Harohalli.

Sample size: In this study, the sample comprised of 30 adults with Type II diabetes mellitus of a selected community area, Harohalli.

Sample technique: Sampling technique is the process of selecting a portion of the population. Probability simple random sampling technique was used to select the sample.

Inclusion criteria:

1. Both male and female with type II diabetes mellitus who are present at the time of data collection.
2. Adults with type II diabetes mellitus of a selected community of Harohalli.

Exclusion criteria:

1. The adults with type II diabetes mellitus who are not present at the time of data collection.
2. The adults with type II diabetes mellitus who are not from the selected community area, Harohalli.
3. The adults who are not diagnosed with Type II diabetes management.

Instruments used in the study:

Tools consist of

1. Bio socio demographical variables
2. Structured Questionnaire
3. Five-point Likert to assess the level of attitude

Analysis:

- Descriptive and
- Inferential statistical analysis

Method of data collection:

- Oral consent was taken from the participants of a selected community Harohalli.
- Investigators introduce themselves to the samples about the objectives and purpose of the study.
- Selection of the sample using simple random sampling technique.
- Structured questionnaire was administered to assess the level of knowledge and Likert scale to assess the attitude of diabetes management among adults with type II diabetes mellitus.

Data analysis plan:

Steps taken to analyse data

- Organize the data in a master sheet.
- Calculate the frequencies and percentage to show the distribution of subjects according to baseline variables.
- To find out the association between level of knowledge, attitude and the selected bio socio demographical variables using chi-square.

RESULTS**SECTION1: BIO SOCIO DEMOGRAPHIC AND DISTRIBUTION OF SAMPLES****TABLE – 1.a**

Classification of Respondents by Bio socio demographic variables

N=30

Characteristics	Category	Respondents	
		Number	Percentage (%)
Age group (years)	46-55	15	50
	56-65	11	36.7
	66-75	4	13.3
Gender	Male	17	56.7
	Female	13	43.3
Level of Education	Illiterate	9	30
	Up to 10 th Std	3	10
	PUC	12	40
	Graduate	6	20
Working status	Retired	5	16.6
	Private	11	36.7
	Others	14	46.7
Duration of Diabetes	< 1 year	4	13.3
	1-3 years	8	26.7
	3-5 years	5	16.7
	>5 year	13	43.3
Taking antidiabetic medication	Yes	26	86.7
	No	4	13.3
Family history of Diabetes	Yes	16	53.3
	No	14	46.7
Relationship	Parents	9	30
	Grand parents	2	6.6
	Both	5	16.7

	None	14	46.7
Total		30	100

- In this study, with regard to age, majority of the sample 15(50%) belongs to age group of 46-55 years, 11(37.7%) belongs to the age group of 56-65 and 4(13.3%) belongs to the age group of 66-75.
- With regards to gender, majority of the samples 17(56.7%) were male and 13(43.3%) were female.
- With regard to the education level, majority 12(40%) are PUC passed, 9(30%) are illiterate, 6(20%) are graduated and 3(10%) are studied till 10th standard.
- With regard to working status of the samples, majority 14(46.7%) belongs to others, 11(36.7%) belongs to private and 5(16.6%) belongs to retired.
- With regard to duration of the Diabetes of the samples, majority 13(43.3%) are suffering from more than 5 years, 8(26.7%) are suffering from 1-3 years, 5(16.7%) are suffering from 3-5 years, 4(13.3%) are suffering from less than 1 year.
- With regard to samples of taking antidiabetic medication, majority 26(86.7%) are taking medication and 4(13.3%) are not taking medication.
- With regard to samples having family history of diabetes, majority 16(53.3%) has family history of diabetes and 14(46.7%) do not have any family history.
- With regard to samples having family history, None 14(46.7%), Parents 9(30%), Grandparents 2(6.6%) and Both 5(16.7%).

TABLE – 1.b

Classification of Respondents by Age group and Weight

N=30

Age group (years)	Weight (kg) of Respondents						't' Test
	Male		Female		Combined		
	N	Mean ± SD	n	Mean ± SD	n	Mean ± SD	
46-55	10	71.4 ± 8.7	5	59.2 ± 6.6	15	67.3 ± 9.8	2.65*
56-65	7	71.7 ± 12.6	4	68.8 ± 10.9	11	70.6 ± 11.6	0.44 ^{NS}
66-75	0	-	4	59.3 ± 8.8	4	59.3 ± 8.8	0.00 ^{NS}
Overall	17	71.5 ± 10.1	13	62.2 ± 9.2	30	67.5 ± 10.7	2.69*

*Significant at 5% level, NS: Non-significant,

The above table shows classification of respondents by Age group and Weight, it shows that there is a significant association in 46-55 years of age group.

TABLE –1.c

Classification of Respondents by Age group and Height

N=30

Age group (years)	Height (cm) of Respondents						't' Test
	Male		Female		Combined		
	N	Mean ± SD	n	Mean ± SD	n	Mean ± SD	
46-55	10	162.4 ± 11.2	5	147.3 ± 11.4	15	157.4 ± 13.1	2.43*
56-65	7	154.1 ± 18.0	4	160.0 ± 3.9	11	156.2 ± 14.4	0.83 ^{NS}
66-75	0	-	4	154.7 ± 8.0	4	154.7 ± 8.0	0.00 ^{NS}
Overall	15	158.9 ± 14.5	13	153.5 ± 9.7	30	156.6 ± 12.7	1.22^{NS}

*Significant at 5% level, NS: Non-significant,

The above table shows classification of respondents by Age group and Height, it shows that there is a significant association in 46-55 years of age group.

TABLE – 1.d

Classification of Respondents by Age group and Body mass index

N=30

Age group (years)	BMI of Respondents						't' Test
	Male		Female		Combined		
	n	Mean ± SD	N	Mean ± SD	n	Mean ± SD	
46-55	10	27.1 ± 2.6	5	27.5 ± 4.3	15	27.3 ± 3.1	0.20 ^{NS}
56-65	7	30.6 ± 6.0	4	27.0 ± 5.3	11	29.3 ± 5.8	1.03 ^{NS}
66-75	0	-	4	25.1 ± 5.8	4	25.1 ± 5.8	0.00 ^{NS}
Overall	15	28.6 ± 4.5	13	26.6 ± 4.8	30	27.7 ± 4.6	1.16^{NS}

NS: Non-significant,

The table shows that there is no significant difference of age group with body mass index.

TABLE – 1.e

Classification of Respondents by Body mass index

N=30

Body mass index (BMI)	Respondents						χ^2 Test
	Male		Female		Combined		
	N	%	N	%	N	%	
Normal (<18.5)	3	17.7	7	53.8	10	33.3	5.07
Over weight (25.0-29.9)	10	58.8	3	23.1	13	43.4	NS
Obese (>30.0)	4	23.5	3	23.1	7	23.3	
Overall	17	100.0	13	100.0	30	100.0	

NS: Non-significant, χ^2 (0.05,2df) =5.991

The table shows that there is no significant difference with body mass index.

Section – 2: Overall and Aspect wise Knowledge and Attitude on diabetes mellitus management among adults with type II diabetes mellitus

TABLE – 2.a

Classification of Respondent Knowledge on diabetes mellitus management among adults with type II diabetes mellitus

Knowledge Level	Category	Respondents	
		Number	Percent
Inadequate	≤ 50 % Score	14	46.7
Moderate	51-75 % Score	16	53.3
Adequate	> 75 % Score	0	0.0
Total		30	100.0

The above table shows the percentage of knowledge level of samples, adequate 0%, moderate 16(53.3%), inadequate 14(46.7%).

TABLE –2.b

Classification of Respondent Attitude on diabetes mellitus management among adults with type II diabetes mellitus

Attitude Level	Category	Respondents	
		Number	Percent
Unfavorable	≤ 50 % Score	0	0.0
Moderate	51-75 % Score	15	50.0
Favorable	> 75 % Score	15	50.0
Total		30	100.0

The above table shows the percentage of attitude of samples, unfavorable 0%, moderate 15(50%), favourable 15(50%).

TABLE –2.c

Relationship between Knowledge and Attitude scores on diabetes mellitus management among adults with type II diabetes mellitus

N=30

Aspects	Statement	Max. Score	Scores				Correlation coefficient (r)
			Mean	SD	Mean (%)	SD (%)	
Knowledge	25	25	12.97	3.53	51.9	14.1	+0.5160
Attitude	10	50	38.13	4.82	76.3	9.6	

The table shows the relationship between the knowledge and attitude scores on Diabetes Mellitus management. The mean and mean percentage of knowledge and attitude was 12.97(51.9%) and 38.13 (76.3)

respectively. The standard deviation and SD percentage was 3.53(14.1%) and 4.82(9.6%) respectively. The correlation coefficient was +0.5160.

Section – 3: Association between Bio socio demographic variables and Knowledge/Attitude level on diabetes mellitus management among adults with type II diabetes mellitus

TABLE – 3.a

Association between Bio socio demographic variables and Knowledge level on diabetes mellitus management among adults with type II diabetes mellitus

n=30

Bio socio demographic Variables	Category	Sample	Knowledge Level				χ^2 Value	P Value
			Inadequate		Moderate			
			N	%	N	%		
Age group (years)	46-55	15	3	20.0	12	80.0	8.58*	P<0.05 (5.991) df=3
	56-65	11	8	72.7	3	27.3		
	66-75	4	3	75.0	1	25.0		
Gender	Male	17	5	29.4	12	70.6	4.69*	P<0.05 (3.841) df=2
	Female	13	9	69.2	4	30.8		
Level of Education	Illiterate	9	5	55.6	4	44.4	1.32 NS	P>0.05 (7.815) df=4
	Up to 10 th Std	3	2	66.7	1	33.3		
	PUC	12	5	41.7	7	58.3		
	Graduate	6	2	33.3	4	66.7		
Working status	Retired	5	5	100.0	0	0.0	9.36*	P<0.05 (5.991) df=3
	Private	11	2	18.2	9	81.8		
	Others	14	7	50.0	7	50.0		
Duration of Diabetes	< 3 year	12	5	41.7	7	58.3	0.20 NS	P>0.05 (3.841) df=2
	>3 year	18	9	50.0	9	50.0		
Taking anti-diabetic medication	Yes	26	11	42.3	15	57.7	1.49 NS	P>0.05 (3.841) df=2
	No	4	3	75.0	1	25.0		
Family history of Diabetes	Yes	16	4	25.0	12	75.0	6.47*	P<0.05 (3.841) df=2
	No	14	10	71.4	4	28.6		
Body mass index	Normal	10	4	40.0	6	60.0	0.49 NS	P>0.05 (5.991) df=3
	Over weight	13	7	53.8	6	46.2		
	Obese	7	3	42.9	4	57.1		
Combined		30	14	4.7	16	53.3		

* Significant at 5% Level, NS: Non-significant, **Note:** Figures in the parenthesis indicate Table value. The above table shows significant association with the bio socio demographic variables such as age group, gender, working status and family history of diabetes mellitus. It is found that there is no significant difference with the bio socio demographic variables such as level of education, duration of diabetes, taking anti-diabetic medication and body mass index.

TABLE – 3.b

Association between Bio socio demographic variables and Attitude level on diabetes mellitus management among adults with type II diabetes mellitus

n=30

Bio socio demographic Variables	Category	Sample	Attitude Level				χ^2 Value	P Value
			Moderate		Favorable			
			N	%	N	%		
Age group (years)	46-55	15	4	26.7	11	73.3	8.08*	P<0.05 (5.991) df= 3
	56-65	11	7	63.6	4	36.4		
	66-75	4	4	100.	0	0.0		
Gender	Male	17	8	47.1	9	52.9	0.14 NS	P>0.05 (3.841) df=2
	Female	13	7	53.8	6	46.2		
Level of Education	Illiterate	9	7	77.8	2	22.2	5.11 NS	P>0.05 (7.815) df=4
	Up to 10 th Std	3	2	66.7	1	33.3		
	PUC	12	4	33.3	8	66.7		
	Graduate	6	2	33.3	4	66.7		
Working status	Retired	5	5	100	0	0.0	9.74*	P<0.05 (5.991) df=3
	Private	11	2	18.2	9	81.8		
	Others	14	8	57.1	6	42.9		
Duration of Diabetes	< 3 year	12	3	25.0	9	75.0	5.00*	P<0.05 (3.841) df=2
	>3 year	18	12	66.7	6	33.3		
Taking antibiotic medication	Yes	26	13	50.0	13	50.0	0.00 NS	P>0.05 (3.841) df=2
	No	4	2	0.0	2	0.0		
Family history of Diabetes	Yes	16	3	18.8	13	81.3	13.39 *	P<0.05 (3.841) df=2
	No	14	12	85.7	2	14.3		
Body mass index	Normal	10	5	50.0	5	50.0	0.22 NS	P>0.05 (5.991) df=3
	Over weight	13	7	53.8	6	46.2		
	Obese	7	3	42.9	4	57.1		
Combined		30	15	50.0	15	50.0		

* Significant at 5% Level, NS: Non-significant, **Note:** Figures in the parenthesis indicate Table value

The above table shows significant association with the bio socio demographic variables such as age group, working status, duration of diabetics and family history of diabetes mellitus. It is found that there is no significant difference with the bio socio demographic variables such as gender, level of education, taking antidiabetic medication and body mass index.

DISCUSSION

Objective 1: To assess the knowledge and attitude of diabetes management.

The structured knowledge Questionnaire was prepared by researcher for collecting data from the adults with type II diabetes mellitus. The present study found out the knowledge level of 30 adults with type II diabetes mellitus, in that 53.3%(16) adults were having moderate level of knowledge and Attitude of diabetes management and 50% (50) adults were having moderate attitude on diabetes management, 46.7%(14) adults were having inadequate level of knowledge on diabetes management and 50%(50) of adults were having favorable attitude on diabetes management.

Similarly, a study was conducted by Meeri Urite Tekanene et.al (2021) in South Tarwar, Kiribati to assess the

level of knowledge, Attitude and practice (KAP) among healthy adults regarding diabetes. The results revealed that, 405 persons participated in this study. Majority of the participants were in the age range of 18-24 years (30.4%), were females (66.2%) and had ever married (68.6%). The study showed that the mean knowledge score was 20.47 (± 3.49) which shows that participants had moderate level of knowledge towards Type II diabetes mellitus. The mean score for attitude score was 61.06 (± 5.48) which shows that participants had high level of attitude towards Type II diabetes mellitus. The mean practice score was 4.57 (± 2.01) which shows that participants had a low level of practice towards type II diabetes mellitus¹¹.

Objective 2: To associate between the level of knowledge and attitude of diabetes management among adults with type II diabetes mellitus with their bio socio demographical variables.

Chi square was computed, to find out the association between level of knowledge on diabetes mellitus management among adults with type II diabetes mellitus with selected bio socio demographic variables, which shows there is a significant association between the selected bio socio demographic variable such as age group, with computed $X^2 = 8.58$ at $df=3$, gender with computed $X^2 = 4.69$ at $df=2$, working status with computed $X^2 = 9.36$ at $df=3$, family history of Diabetes with computed $X^2 = 6.47$ at $df=2$ with knowledge score at $P < 0.05$ level of significance.

Chi square was computed, to find out the association between attitude of diabetes mellitus management among adults with type II diabetes mellitus with selected bio socio demographic variables, which shows there is a significant association between the selected bio socio demographic variable such as age group, with computed $X^2 = 8.08$ at $df=3$, duration of diabetes with computed $X^2 = 5.00$ at $df=2$, working status with computed $X^2 = 9.74$ at $df=3$, family history of Diabetes with computed $X^2 = 13.39$ at $df=2$ with attitude score at $P < 0.05$ level of significance.

Nursing Implication:

Nursing practice:

Several implications can be drawn from the present study of nursing practice. Health education is one of the cost-effective interventions, so nurse should take initiative for arranging health talks, seminar, educative counselling, awareness program to all the schools, colleges, communities and outpatient department of hospitals so that they can manage the type II diabetes mellitus and helps to understand the importance of self-care.

Nursing Education:

- Nursing curriculum should prepare the prospective nursing colleges to organize seminar and assist the public in giving information about management diabetes mellitus.
- The holistic health care approach should be emphasized during the training period and awareness should be given about the importance of educating the public regarding diabetes mellitus management and self-care.
- The nursing personal should be given In-service education to update their knowledge and about the importance of management of type II diabetes mellitus.

Nursing administration:

- The nurse administrator should organize in-service education program for staffs.
- The nurse to update their knowledge on management and prevention of type II diabetes mellitus.

Nursing Research:

- The findings of the study add to the research database.
- The study serves as a guide to conduct similar studies in various settings.
- This study serves as a valuable reference material for future investigation.
- The result of the study motivates those who are interested in conducting similar kind of studies of other group.

ACKNOWLEDGMENT

The authors would like to thank the guide Ms. Anjana Thangjam, Assistant Professor, Department of Medical Surgical Nursing, College of Nursing Sciences, Dayananda Sagar University and Dr. D Santham Sweet Rose, Principal, College of Nursing Sciences, Dayananda Sagar University for their sound knowledge, support, constructive and focused direction, dedication and motivation which enabled the fruitful completion of the study and also all the study participants of the studies.

REFERENCES

- [1] Shah V, Kamdar P, Shah N et.al. Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat. *International Journal of Diabetes in Developing Countries*. 2009 Jul-Aug; 29(3): 118-122. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2822215/>
- [2] Kant Ravi, Thapliyal Vinita et.al. Knowledge attitude and practice of type 2 diabetic patients in a tertiary care teaching hospital in India. Available at: <https://www.oatext.com/Knowledge-attitude-and-practice-of-type-2-diabeticpatients-in-a-tertiary-care-teaching-hospital-in-India.php>
- [3] Devi Laishram Davashini, Devi Lakshmi.et.al. A study to assess the knowledge regarding home care management on diabetes mellitus among adults in a selected community area at Bangalore. 2020. Available at: <https://www.slideshare.net/JulieDavis287594/a-study-to-assess-the-knowledgeregarding-home-care-management-on-diabetes-mellitus-among-adults-in-aselected-community-area-at-bangalore>
- [4] Shrivastva A, Phadnis S, Rao N K, Gore M et.al. A study on knowledge and self-care practices about Diabetes Mellitus among patients with type 2 Diabetes Mellitus attending selected tertiary healthcare facilities in coastal Karnataka. Available at: <https://doi.org/10.1016/j.cegh.2020.01.003>
- [5] Sharma Priya, Sujeeta M et.al. Knowledge on Management of Diabetes Mellitus among Patients with type II Diabetes Mellitus in a Selected Community Health Centre of Dadra and Nagar Haveli Area. *Asian Journal of Nursing Education and Research*. Available at: <https://ajner.com/HTMLPaper.aspx?Journal=Asian+Journal+of+Nursing+Education+and+Research%3bPID%3d2019-9-1-21> Ali, A. 2001. Macroeconomic variables as common pervasive risk factors and the empirical content of the Arbitrage Pricing Theory. *Journal of Empirical finance*, 5(3): 221–240.
- [6] Zakia Sultana, Md. Ershad Ali, Most. Afia Akhtar, Md. Sala Uddin, Md. Mominul Haque et. al. A cross sectional study. Evaluation for the management of Diabetes in Bangladesh. January 2013. 04(03):355-361. Available at: https://www.researchgate.net/publication/269797853_A_Study_of_Evaluation_for_the_Management_of_Diabetes_in_Bangladesh
- [7] Pattan AD, Dr. NareshGodara, Praful Damor, Chauhan MJ et.al. Knowledge of patient regarding management of diabetes mellitus. Vadodara, India. 2022. Vol. 6, no. 3, 3874-3879.
- [8] Halimatou Alaofe, Waliou Amoursa et.al. Knowledge, attitude, practice and associated factors among patients with type 2 diabetes in Cotonou, southern Benin. *BMC public health* 21;1-11:2021[Google scholar]
- [9] Rawaida Mat Salleh, Nor Azlina A Rahman et.al . knowledge, attitude and practice regarding type 2DM among outpatients in a health center in East Coast of Peninsular Malaysia. *Istanbul medical journal* 20(3);2019.
- [10] Ravi Kant, Vinita Thapliyal et.al .Knowledge, attitude and practice of type 2 diabetic patients in a tertiary care teaching hospital in India. *Integr Food Nutr Metab* 2(1);131- 135:2015 [google scholar].
- [11] Meeri Urite Tekanene et.al . A cross sectional study. knowledge, attitude and practice related to type 2 diabetes mellitus among healthy adults in Kiribati, South Tarawa. *Global journal of health science* 13(5); 10:2021. Available at: <https://doi.org/gjhs.v13n5p10> (accessed 24 march 2021).
- [12] Fatma Al Maskari, Mohammed El Sadig et.al . A cross sectional descriptive study. knowledge, attitude and practices of diabetic patients in the united Arab Emirates. *PloS one* 2013;8(1): e52857 (PubMed).
- [13] Sumanpreet Kaur, Harmanpreet Kaur. knowledge regarding diabetes mellitus among the residents of selected rural community, Gurdaspur, Punjab. *International journal of nursing education and research* 2017; 5(1):19-26.
- [14] Surendra Babu Darivemula, G Vishwajeeth et.al . knowledge and awareness regarding type 2 diabetes mellitus and its complications among urban and rural patients in Hyderabad. A comparative study. *BLDE*

university journal of health sciences 2022;7(2):276. (Google scholar).

- [15] Farzana Saleh, Shirin J Mumu, Ferdous Ara et.al . Knowledge and self-care practices regarding diabetes among type 2 diabetics in Bangladesh. BMC public health 2012;1-8:1112.
- [16] Al-Aboudi, I. S., Hassali, M. A., & Shafie, A. A. (2016). Knowledge, attitudes, and quality of life of type 2 diabetes patients in Riyadh, Saudi Arabia. *Journal of pharmacy & bio allied sciences*, 8(3), 195. Available at: <https://doi.org/10.4103/0975-7406.171683>
- [17] Al-Maskari, F., El-Sadig, M., Al-Kaabi, J. M., Afandi, B., Nagelkerke, N., & Yeatts, K. B. (2013). Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. *PloS one*, 8(1), e52857. Available at: <https://doi.org/10.1371/journal.pone.0052857>
- [18] Bukhsh A, Khan TM, Lee SWH, Lee LH, Chan KG, Goh BH. Efficacy of pharmacist based diabetes educational interventions on clinical outcomes of adults with type 2 diabetes mellitus. A network meta-analysis. *Front Pharmacol*. 2018; 9:339. doi: 10.3389/fphar.2018.00339. [PubMed: 29692730]. [PubMed Central: PMC5902757].
- [19] Niroomand M, Ghasemi SN, Karimi-Sari H, Kazempour-Ardebili S, Amiri P, Khosravi MH. Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes. A cross-sectional study. *Diabetes Metab Syndr*. 2016;10(1 Suppl 1): S114-9. doi: 10.1016/j.dsx.2015.10.006. [PubMed: 26610404].
- [20] Asmamaw, A., Asres, G., Negese, D., Fekadu, A., & Assefa, G. (2015). Knowledge and attitude about diabetes mellitus and its associated factors among people in Debre Tabor town, Northwest Ethiopia: cross sectional study. *Science*, 3(2), 199-209. <https://doi.org/10.11648/j.sjph.20150302.17>
- [21] India [Internet]. International Diabetes Federation. Available from: <https://idf.org/our-network/regions-and-members/south-east-asia/members/india/>
- [22] Diabetes - India [Internet]. www.who.int. Available from: <https://www.who.int/india/health-topics/mobile-technology-for-preventing-ncds>
- [23] Diabetes now affects one in 10 adults worldwide [Internet]. International Diabetes Federation. Available from: <https://idf.org/news/diabetes-now-affects-one-in-10-adults-worldwide/>
- [24] C. Muninarayana, G. Bala Chandra, S. g. Hire math, Krishna Iyengar. Prevalence and awareness of diabetes Mellitus in rural Tamaka, Kolar. A cross sectional study. https://rssdi.in/new/diabetesbulletin/2010/JAN/IntJDiabDevCtries30118-9631114_024031.pdf