ORIGINAL ARTICLE

Knowledge, Attitude, Practices and Self-Efficacy in Newly Diagnosed Type 2 Diabetes Patients Towards Dietary and Lifestyle Factors

Divya Tripathi[1], Swapna Chaturvedi[2] and Neena Bhatia[3*]

[1]Ph.D., Department of Medicine, All India Institute of Medical Sciences, New Delhi, India. E-mail: divyatripathi2911@gmail.com
[2]Ph.D., Department of Dietetics, All India Institute of Medical Sciences, New Delhi, India. E-mail: swapnaaiims@gmail.com
[3]Ph.D., Department of Food and Nutrition, Lady Irwin College, University of Delhi and Senior Specialist, NITI Aayog, Government of India.

ABSTRACT

Background: Type 2 Diabetes is one of the leading causes of morbidity and mortality in India and globally. Increasing awareness towards diabetes management at early stage is extremely important to develop better practices in the area of diabetes management. The present study was conducted to determine the knowledge, attitude, practices and self-efficacy of type 2 diabetes patients towards dietary and lifestyle factors, attending private Diabetes clinics in Delhi, NCR. **Material Methods:** The study was conducted on 100 newly diagnosed diabetic subjects, using pre-tested questionnaires. The questionnaire was designed to assess the socio-demographic, knowledge (DKQ), attitude (DAS), practices and self-efficacy (DSES) of patients with type 2 diabetes. Data was analyzed using t-test, one way ANOVA and multiple regression to understand the determinants of knowledge, attitude, practices and self-efficacy in patients with type 2 diabetes. **Results:** 100 T2 DM patients comprising 73 males and 27 females. Patients obtained score 13.16±4.18 out of 24 in knowledge assessment, 3.56±0.2 out of maximum 5 in attitude scale. Patients had suboptimal practices when compared to guidelines and obtained score of 6.02±1.57 out of maximum 10 in Diabetes self-efficacy scale. Use of internet is found to be positively associated with attitude with coefficient of 0.1 (CI 0.03-0.22). Educational qualification of study participants was associated with greater self-efficacy with coefficient of 0.38 (CI 0.008-0.76). **Conclusion:** Thorough and continuous patient education is required to bring changes in the knowledge and practices of patients and increase their self-efficacy towards type 2 diabetes management.

Keywords: Digital technology, Digital nutrition platforms, Artificial Intelligence, Cloud based digital health solution, Hand-held device users, Personalized nutrition

Address for correspondence: Neena Bhatia, Associate Professor, Lady Irwin College, University of Delhi and Senior Specialist, NITI Aayog, New Delhi, India. E-mail: neena.bhatia@lic.du.ac.in

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1. INTRODUCTION

Diabetes is one of the largest health emergencies of the 21st century with a worldwide prevalence of 422 million[1]. It is predicted by International Diabetes Federation (IDF) that this number will reach 642 million by 2040, i.e. one in every ten adults[2] (International Diabetes Federation, 2017). The largest increase is taking place in regions where economies are moving from low- to middle-income levels. About 75% of people with diabetes live in low- and middle-income countries (LMIC)[3]. In India, an estimated 8.7% of the population between 20-70 years of age are diabetic[4]. Recently released National Family Health Survey-4 (NFHS 4) reports have highlighted that 6% women and 8% men between the age of 18-49 years have blood glucose level more than 140 mg/dl[5].

Knowledge plays a vital role in any future disease development and its early detection and prevention. Good knowledge, attitude and practice and self-efficacy (KAP, SE) are important

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for type 2 diabetes patients. Elements of KAP, SE are interconnected and dependent on each other. If the one element is good, the other two factors would be affected positively. KAP regarding diabetes vary greatly depending on multiple factors which may be socio-economic conditions, cultural beliefs and habits of patients[6, 7]. Knowledge of diabetes can prevent the forthcoming diabetes related co-morbidities, which have significant impact on the quality of life of the diabetic patients. Knowledge can assist people to assess their risk of diabetes, motivate them to adopt proper treatment and care, and encourage them to take charge of their disease for their lifetime[8, 9]. The present study was conducted to determine the knowledge, attitude, practices and self-efficacy of type 2 diabetes patients attending private Diabetes clinics in Delhi, NCR. Sample size was calculated by using the formula which based on the following assumptions a. Anticipated percentage of individuals following desirable practices = 50% (p) b. Absolute precision = ±10 (d) c. Confidence level = 95%. Thus, the formula used to calculate the sample size was $n = 4*p*(100-p)/d^2$. This gives the sample size of 100 newly diagnosed type 2 diabetes patients.

2. MATERIALS AND METHODS

The study was an exploratory study which was conducted to assess the knowledge, attitude, practice, self-efficacy of type 2 diabetes patients. The study was conducted at two private Diabetes care centers of Delhi. Adult men and women diagnosed with Type 2 Diabetes who voluntarily agreed to participate in the study and fulfill the inclusion criteria were included in the study. The survey was conducted on 100 newly diagnosed Type 2 Diabetes patients (≤1 year of diagnosis). Patients with any chronic medical complication like coronary artery dysfunction or severe end- organ dysfunction like liver or kidney dysfunction were excluded. The study was conducted between September 2017 to March 2018. Prior approval for the study was taken from Institution Ethics committee of Lady Irwin College, University of Delhi. Patient's consent to proceed to the survey questionnaire was taken in the written informed consent form.

Tools and Techniques

The questionnaire comprises of following parts: demographic information, height and weight, HbA1c level. The Diabetes Knowledge Questionnaire-24 (DKQ-24) was used to assess the knowledge of patients[10] which consists of 24 True, False, don't know type questions. Every correct answer was scored as 1 and wrong answers and don't know were marked 0. The Diabetes Attitude Scale (DAS-3) questionnaire[11] developed by the University of Michigan Diabetes Research and Training Center was used in the present study. The scale consists of 33 items with 5 domains. Patients practices in diabetes was assessed using researcher developed questionnaire modified from Stetson *et al.* (2011). The questionnaire contains questions covering following domains: (1) nutritional management, (2) blood glucose (BG) monitoring, and (3) physical activity. The Diabetes Self-Efficacy Scale (DSES) developed by the Stanford Patient Education Research Center[12] was used for assessing self-efficacy of patients. Bloom's cut-off point was used to categorize the scores as good if the score was between 80 and 100%, moderate if the score was between 60 and 79%, and poor if the score was less than 60%.

3. RESULTS

A total of 100 diabetic patients consented and participated in the study of whom 73 were male and 27 were female. Mean age of the participants was 43.02±9.06 years. Socio-economic status was assessed by categorizing the patients into lower, lower middle, upper middle and upper class according to modified Kuppuswamy classification (2015). Most of the respondents (n = 73) belonged to upper middle class. Mean duration of disease was 5.20±3.94 months. The study revealed that 38% of the patients have been diagnosed between the age of 41-50 years. In a recent report of International Diabetes Federation (2017) it was reported that higher number of diabetics were seen between the age of 40-49 years[13]. It was observed that majority of participants in the study were Obese (84%). Obesity and overweight in diabetes can lead to poor glycemic control in diabetes[14]. Detailed description of baseline characteristics is given in Table 1.

Knowledge of Type 2 Diabetes Patients

On calculation of knowledge score, it was observed that 46% participants have poor (score ≤12) knowledge about diabetes, 44% participants have moderate level (score 13-18) of knowledge and only 10% have high (score >18) knowledge about Diabetes.

The mean level of knowledge according to DKQ-24 was 13.16±4.18, with a median of 13. Scores are mentioned in Table 2.

Overall, 54% of participants were having moderate to high knowledge. More than two-third (87%) of the participants were well acquainted that diabetes is hereditary. Patients were less aware about the causes of diabetes, i.e., majority of patients had misconception that Diabetes is caused when kidneys fail to keep sugar out of the urine. Also, majority of patients had misunderstood that kidney produces insulin. In the present survey, it was observed that 47% of participants misunderstood that diabetes is caused by eating too much sugar or sweet things. Furthermore, 70% of participants knew

Table 1: Baseline Characteristics of Study Participants

		Total	Female	Male
Gender		100	27	73
Age (years) Mean± SD		43.02±9.06	43±9	42.9±9
Age (years) range	20-30	6	1 (4%)	5 (7%)
	31-40	33	8 (30%)	25 (34%)
	41-50	38	5 (18%)	33 (45%)
	51-60	20	10 (37%)	10 (14%)
	61-70	3	3 (11%)	0
Education level	Up to Intermediate	34	11 (41%)	23 (32%)
	Graduate or Post-graduate	57	15 (55%)	42 (57%)
	Profession or Honors	9	1 (4%)	8 (11%)
Occupation	Professional	24	5 (18%)	19 (26%)
	Semi-Professional	12	2 (8%)	10 (14%)
	Clerical/Shop owner/Farmer	46	4 (15%)	42 (56%)
	Skilled Worker	1	0	1 (2%)
	Unskilled Worker	0	0	0
	Homemaker	16	16 (59%)	0
	Student	1	0	1 (2%)
Socioeconomic status[1]	Upper class	24	5 (19%)	19 (26%)
Upper middle class		73	22 (81%)	51 (70%)
Lower middle class		3	0	3 (4%)
Weight (kg)			74.3±12.4	77.6±12.7
Height (cm)			158.3±7.8	166.5±7.7
BMI (Kg/m^2)			27.88±3.8	27.97±3.9

Note: [1] Kuppuswamy scale 2016.

Table 2: Knowledge Scores of Study Participants

Diabetes Score (Total Score = 24)	Frequency	Percentage (%)
Average score = 13.16±4.18		
Median = 13		
DKQ Score ≤ 12 (Poor)	46	46
DKQ Score 13-18 (Moderate)	44	44
DKQ Score >18 (Good)	10	10

that usual cause of diabetes is lack of effective insulin in the body; 77% of participants misbelieved diabetes to be caused by failure of the kidneys to keep sugar out of the urine. 58% of participants misbelieved insulin to be produced by Kidneys, 87% of participants were aware of the fact that diabetes may also be developed due to hereditary reasons. Majority of participants (65%) were aware of the fact that there are two types of diabetes. In the present study, majority of participants (91%) were aware that controlling blood glucose is essential and in untreated diabetes the amount of sugar in the blood usually increases.

In the present study, 67% of the participants knew that it is importance to exercise in addition to medication. Almost

Table 3: Diabetes Attitude Score of Participants

Scale Name	Mean Score
1. Need for special training	3.97±0.29
2. Seriousness of type 2 diabetes	3.36±0.35
3. Value of tight control	3.39±0.66
4.Psychosocial impact of diabetes	3.80±.37
5. Patient autonomy	3.45±0.60
Mean attitude score	3.56±0.2,
Poor attitude<3	0 (0%)
Moderate attitude score =3-3.99	97 (97%)
Good attitude score ≥ 4	3 (3%)

Note: n = 100.

half the patients (n = 49) were of the view that Medication is more important than diet and exercise in Diabetes management. The present study has observed that only 22% of the participants were aware about how to manage cuts and abrasions in Diabetes. Only 20% subjects were aware that tight elastic socks are not good for diabetics. In the present study, only a few Patients (12%) knew how to cleanse their feet. Majority of Patients (66%) thought that diabetic diet consists of special foods. However, most of them (77%) accepted that cooking method plays an important role in dietary management in diabetes. Majority of subjects, in the present study, were aware about diabetic neuropathy as 68% of them knew that diabetes can cause loss of feeling in their hands, fingers and feet. Moreover, Majority of patients (83%) were aware that diabetes can damage their kidney. Further, in the present study, 60% of participants had knowledge that diabetes often causes poor circulation and 84% of them were aware with the fact that in diabetes cuts and abrasions heals slowly.

Only about one third of the subjects were aware of the symptoms of Hyperglycemia (31% of participants) and less than half (43%) of the study subjects were aware about symptoms of Hypoglycemia. Most of the subjects (86%) were well aware that fasting blood glucose of 210 is too high. Only 32% of participants knew about insulin reaction. In the study, it was observed that 54% of participants were not sure about the best way to check their blood glucose. In the present study, it has been observed that education level of patients has impact on knowledge score but the difference was not significant statistically on conducting one-way ANOVA. There was difference of knowledge score between professionals and shop owners but that was not statistically significant. Further, homemakers and students gained better knowledge score than business owners.

In the present study, no significant association of level of knowledge to gender, education and occupation was found. Some effect of use of internet on the level of knowledge of subjects has been observed in the present study as internet users have got higher scores in knowledge level but the difference was not statistically significant on applying independent sample t-test.

Attitude of Type 2 Diabetes Patients

In the present study, DAS-3 questionnaire was used to assess the attitudes towards type 2 diabetes on a scale of 1 to 5. All the mean scores on DAS-3 subscales were above 3.3. The patients believed that there is a need for special training for healthcare professionals (mean score, 3.97). Score of patients in Diabetes Attitude scale and sub-scales is as given in Table 3.

In the present study, attitude of patients was positive towards most of the items but it was observed that there is a need for better patient-healthcare provider communication and goal setting is required to achieve the desired control in blood glucose. Overall, 97% participant scored moderate score in attitude scale. Majority of participants expressed a need for special training for health care providers, 99% of patients reported that Healthcare professionals who treat people with diabetes should be trained to communicate well with their patients. 82% of subjects were of the view that Health care professionals should learn how to set goals with patients, not just tell them what to do. In the present study, 88% of patients reported that it is important for the nurses and dietitians who counsel people with diabetes to learn counseling skills. Further, 37% of participants believed that patients, who do not need to take insulin to treat their diabetes, have a pretty mild diabetes. Taking diabetes seriously is essential to follow the diabetes management regime and increasing patient seriousness towards diabetes care is needed. 75% of patients believed that regular blood glucose testing is important for Type 2 Diabetes patients. Patients believed that having a tight control of blood glucose is a lot of work. In the study 39% patients reported that low blood glucose reaction makes tight control very risky for patients and 75% believes that having tight control of blood glucose is too much work.

In case of patient autonomy in diabetes management 76% patients responded that people with diabetes have right not to take good care of their diabetes. This study finding showed that participants have good attitude towards diabetes management. Multiple regression analysis was done the description of which is provided in Table 4.

Table 4: Factors Associated with Attitude Among Type 2 Diabetes Patients in Multiple Regression

Determinant of Attitude	Coefficient	Standard Error	P-value	Confidence Interval
Age	-0.01	0.03	0.7	-0.07 - 0.05
Sex	0.07	0.05	0.1	-0.02 - 0.1
Edu Qualification	0.02	0.02	0.2	-0.019 - 0.06
Occupation	0.003	0.01	0.8	-0.03 - 0.039
Socioeconomic class	0.1	0.05	0.1	-0.02 - 0.19
Use of internet	0.1	0.04	0.008	0.03 - 0.22

In the present study, it was observed that education level and occupation of the patients have no impact on their attitude towards diabetes ($p > 0.05$).

In the present study it was observed that using internet for getting information about Diabetes have positive impact on the attitude of patients as the difference in attitude score of internet users and non-internet users were found to be statistically significant with coefficient of 0.1.

Practices of Type 2 Diabetes Patients

In the present study, it has been found that 30% of patients do not pay any attention towards diet control but 70% of patients are either following a diet plan or at least are conscious of dietary control and modifications. In the present study, it has been found that more than 70% of patients never adhere to written diet plan. However, according to the present study, around 60% of patients reported that they try to utilize the information about carbohydrate, fat and sugar content for food selection. More than 56% of patients reported that they skip meal to decrease the consumption of fat or sugar. The present study exposes need to explain patients about dietary modifications which are required to control their blood glucose levels. Around 65% of patients, at some time or the other, resist the temptation to eat any food which is high in fat or sugar. In the present study, 65% of patients eat their meals and snack at same time on most of the days of the week. Around 65% of patients do not make any changes in their diet in accordance with their physical activity. It was observed that patients were unaware about the symptoms of hypoglycemia and hyperglycemia and importance of its management.

In the study it was found that about 20% patients do not go for any physical activity and 77% do less than 60 mins of Physical activity and only 3% patients do more than 60 mins of Physical activity. According to Consensus Physical Activity guidelines for Asian India Diabetes patients it is recommended for Diabetes patients to do 60 minutes of Physical activity everyday including 15 minutes of resistance exercise[15]. When asked about possible facilitators for physical activity most of the patients reported that if someone reminds them or motivate them to do any activity. Twenty three percent think that they can go for any exercise if someone accompanies them and 31 participants reported that they can do some physical activity if they know the benefits of exercise. According to a report of WHO (2016), 20 minutes of daily moderate physical activity can reduce risk of co-morbidities related to diabetes by twenty seven percent[3]. However, about one fifth of the participants in the present study reported low or no physical activity.

In this study only 22% patients check their blood glucose once or twice in a week, hence there is a need to make patient aware about the importance of self-monitoring of blood glucose in management of type 2 diabetes and steps should be taken to bring blood glucose monitoring in their regular habit. Responding for the reason for blood glucose monitoring 48% patients reported that they check their blood glucose because their doctor asked them to do so. Forty two percent check their blood glucose to identify if their blood glucose is high or low. On analysis of the practices of subjects related to adherence to meal plan, physical activity and self-monitoring of blood glucose, it was found that gender of the subjects does not have any impact on diabetes related practices.

Self-Efficacy of Type 2 Diabetes Patients

In the present study mean self-efficacy score obtained by subjects was 6.02 ± 1.57 out of 10. The median score obtained by subjects was 5.75. In the present study 41% of participants score less than 5.75 and 59% participants scored equal to or more than 5.75.

In the study, it has been found that patients are less confident about management of Hypoglycemia. 59% of patients were less confident that they can do something to prevent their blood glucose levels from dropping while they exercise. It was also observed that 52% participants were not confident

about action to be taken when their blood glucose rises or falls. Patient must be educated about the symptoms of hypoglycemia and hyperglycemia and must be informed about the steps to be taken when blood glucose level fluctuates considerably.

Considerable number of patients (43%) were not confident that they can do exercise of 15-30 min 4-5 times in a week. 41% of patients felt that they cannot control their diabetes. Hence, there is need for making them aware about the importance of physical activity and motivating them for increasing their physical activity. In case of dietary management 40% participants were not confident that they can follow their diet when they have to prepare or share food with other people. It has also been observed that 39% of patients were not confident about the food they should eat when they feel hungry. In the present study, it has been observed that having meals at regular interval was not a major problem for patients but choosing right food and eating food with others is a larger problem. Comprehensive diabetes education is required to educate the patient about dietary modifications and choosing healthy food. On multiple regression it was observed that educational qualification of study participants was associated with greater self-efficacy with coefficient of 0.38 (CI 0.008- 0.76). Occupation of subjects have impact on greater self-efficacy but it was not found statistically significant.

4. DISCUSSION

The present study has pointed out that though a few were unaware about causes of diabetes, patients with type 2 diabetics have fairly good amount of knowledge in line with previous studies[16-18]. Overall 54% of participants were having moderate to high knowledge which is similar to the findings of another study conducted in Kerala where 57% of participants were observed to have moderate to high knowledge[19]. Another study conducted in urban area in South India reported 4% of the participants obtained high score, 52% of the participants obtained moderate score and 44% of them showed poor knowledge on diabetes. In a recent study conducted by Karki *et al.* (2021), 66% participant reported to have moderate to good knowledge score[20]. The mean DKQ score was 13.2±2.2. Similar findings were also observed in a study on patients from an urban district where the mean knowledge score of 13.9±3.28 was reported[21]. In a study conducted in Peru, most of the participants (83%) had poor level of knowledge, with only a little over half the questions being adequately answered on average. The mean knowledge score was 12.9±4.8[22].

In the present study, majority of participants (91%) were aware that controlling blood glucose is essential and in untreated diabetes the amount of sugar in the blood usually increases. In contrast, in a study conducted by Gupta *et al.* only 51% of patients were aware about the health consequences of uncontrolled diabetes[23]. In the present study, 67% of the participants knew that it is importance to exercise in addition to medication. The finding of the present study is comparable to that of the study conducted by Zeb *et al.* (2017) in which it was observed that 68.35% of patients were aware of the importance of physical exercise for diabetes control[24]. Similar findings were also reported by another study in which 62% of the participants were aware about the importance of exercise besides medication[25]. The present study has observed that only 22% of the participants were aware about how to manage cuts and abrasions in Diabetes. Only 20% subjects were aware that tight elastic socks are not good for diabetics. In the present study, only a few Patients (12%) knew how to cleanse their feet. The findings of the present study can also be compared with the findings of Mohan *et al.* (2005) in South India, where 21.8% of participants and Dinesh *et al.* (2017) in Karnataka were aware of foot related complications of diabetes[26, 27]. Majority of patients (83%) were aware that diabetes can damage their kidney.

In the present study, no significant association of level of knowledge to gender, education and occupation was found. This result is in contradiction with the KAP study of diabetes in Bangladesh and UAE which stated that knowledge was significantly associated with level of education[28, 29]. A study conducted by Powers *et al.* (2015) suggests that the use of information technologies (mobile phones or computers) is limited, but information technologies have been perceived positively as a support for the education of patients with diabetes[30]. Another study conducted by González, Ramírez and Viadel (2015) showed that elderly subjects who use new technologies have a greater sense of empowerment regarding their disease; greater self-efficacy and well-being as compared to those who do not use them[31].

Moderate to good score can be attributable to the fact that majority of the patients have good educational status with nearly 66% Graduates or professionals in the study[32, 33]. Nearly 82% respondents believed that Diabetes can be cured, alike studies done in India[17, 33]. Such misbelieves must be removed by patient education as it may lead to non-compliance to treatment in years to come looking at the chronicity of disease, in a country like India where majority type 2 diabetics are non-complaint[34, 35]. More than 60% of patients were unaware about the symptoms of Hypoglycemia and Hyperglycemia. The highest lacunae in knowledge were with regard to diet in type 2 diabetes, where majority of patients believed that diabetes management requires inclusion of special foods in the diet. The same was observation regarding dietary

management among other type 2 diabetics as documented in a recent study[36]. This highlights ignorance of subjects regarding symptomology and modes of treatment, which may affect disease control adversely. The goals of management for patients with diabetes include optimization of blood glucose control, prevention of immediate complications, and prevention of long-term complications. All treatment factors, diet, drugs, and exercise, have to be carefully managed on a daily basis by patients themselves[37]. Patients must also be able to recognize when they need professional help. In the present study, it has been found that 81% of patients were confident that they can judge when they need to visit their doctor. Successful self-management depends heavily on initial education about the interaction of all the treatment factors and ongoing support and reinforcement. Education of patients about diabetes is considered a fundamental aspect of diabetes care[38].

This study finding showed that participants have good attitude towards diabetes management. Other studies from urban area of South India and UAE reported the similar findings that there is positive and good level of attitude among diabetic patients[28, 39]. Based on the analysis of DAS scores in relation to gender it can be concluded that the gender of patients has no significant impact on the attitude of the subjects ($p>0.05$). This finding of the present study is in agreement with several other studies conducted previously with patients with diabetes[29, 40]. In the present study, it was observed that education level and occupation of the patients have no impact on their attitude towards diabetes ($p>0.05$). Studies conducted by Goodarzi *et al.* (2012) and Islam *et al.* (2014) with patients with diabetes have also found no significant difference between educational status and attitudes towards diabetes in agreement with the current study[29, 40]. A study conducted by Al-Maskari *et al.* (2013), suggested that it is also important to take into account the socioeconomic status and lifestyle of patients and whether they have access to healthcare support when planning for a diabetes treatment[28]. Another study conducted by Karakurt *et al.* (2017) suggested reason for positive attitude of patients towards diabetes of both employed and unemployed patients. Employed diabetic patients can be assumed to have a positive attitude considering their socioeconomic status and the fact that they have social security. On the other hand, the cause of positive attitude of unemployed patients may be due to their lifestyles, the fact that they have more time on their hands for disease management, and that they have access to healthcare support[41].

In the present study, it has been found that more than 68% of patients never adhere to a written diet plan. The above said result of the present study is in disagreement with the result of a study conducted by Gupta *et al.* (2015), in which, it was observed that 47% of participants were following any diet control plan whereas 53% of participants were not following any diet control regime[23]. In this study only 22% patients check their blood glucose once or twice in a week, hence there is a need to make patient aware about the importance of self-monitoring of blood glucose in management of type 2 diabetes and steps should be taken to bring blood glucose monitoring in their regular habit. The findings of the present study are in contrast to the findings of Dinesh *et al.* who found that majority (60%) of the study participants checked their blood glucose levels regularly[27]. A meta-analysis suggests that clinical management of non-insulin treated diabetes using self-monitoring of blood glucose levels compared with no self-monitoring results in a reduction in HbA_{1c} level of around 2.7 mmol/mol (0.25%) over the period of 6 month[42].

On analysis of the practices of subjects related to adherence to meal plan, physical activity and self-monitoring of blood glucose, it was found that gender of the subjects does not have any impact on diabetes related practices mentioned above. The finding of the present study findings is similar to the studies conducted in USA, Peru and Egypt where gender of the study subjects does not have any impact on diabetes related behavior[43-45].

In the present study, one important information which emerged out was that majority of the participants felt the need for effective Patient-Healthcare provider communication. Successful diabetes care requires teamwork between physicians and patients[46]. Two components of successful teamwork are physician-patient communication and shared decision-making, both of which have been shown to improve patient satisfaction, adherence to treatment plans and health outcomes[47]. Males and females were not much different in their knowledge, attitude and practice score contradictory to other studies which found better scores in males than females[33, 48, 49].

CONCLUSION

Study participants had poor to moderate knowledge of diabetes; attitude of patients was moderate towards diabetes management, practices of study participants for diabetes management were sub-optimal when compared to the guidelines and Self-efficacy of participants was optimal in some areas but in many it was sub-optimal. Thorough and long-term patient education is required to bring changes in the knowledge and practices of patients and increase their self-efficacy towards type 2 diabetes management.

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APPENDIX

Item Wise Description of Diabetes Knowledge Score		
Knowledge Question	**Number of Subjects Giving Correct Response (n)**	**Number of Subjects Giving Incorrect Response (n)**
1. Eating too much sugar and other sweet foods is a cause of diabetes.	53	47
2. The usual cause of diabetes is lack of effective insulin in the body.	70	30
3. Diabetes is caused by failure of the kidneys to keep sugar out of the urine.	23	77
4. Kidneys produce insulin.	42	58
5. In untreated diabetes, the amount of sugar in the blood usually increases.	91	9
6. If I am diabetic, my children have a higher chance of being diabetic.	87	13
7. Diabetes can be cured.	18	82
8. A fasting blood glucose level of 210 is too high.	86	14
9. The best way to check my diabetes is by testing my urine.	46	54
10. Regular exercise will increase the need for insulin or other diabetic medication.	67	33
11. There are two main types of diabetes: Type 1 (insulin dependent) and Type 2 (noninsulin dependent).	65	35
12. An insulin reaction is caused by too much food.	32	68
13. Medication is more important than diet and exercise to control my diabetes.	51	49
14. Diabetes often causes poor circulation.	60	40
15. Cuts and abrasions on diabetes heal more slowly.	84	16
16. Diabetics should take extra care when cutting their toenails.	73	27
17. A person with diabetes should cleanse a cut with iodine and alcohol.	12	88
18. The way I prepare my food is as important as the foods I eat.	77	13
19. Diabetes can damage my kidneys.	83	17
20. Diabetes can cause loss of feeling in my hands, fingers and feet.	68	32
21. Shaking and sweating are signs of high blood glucose.	31	69
22. Frequent urination and thirst are signs of low blood glucose.	43	57
23. Tight elastic hose or socks are not bad for diabetics.	20	80
24. A diabetic diet consists mostly of special foods.	34	66

APPENDIX (CONT.)

Item Wise Description of Diabetes Attitude Scale							
Score Obtained	**5**	**4**	**3**	**2**	**1**	**Mean±SD**	**Range**
	n	**n**	**n**	**n**	**n**		
A. Need for special training						**3.97±0.29**	
1. Health care professionals who treat people with diabetes should be trained to communicate well with their patients	47	52	1	0	0	4.46±0.48	3–5
2. Health care professionals should be taught how daily diabetes care affects patients' lives.	3	86	10	1	0	3.91±0.44	2–5
3. It is important for the nurses and dietitians who teach people with diabetes to learn counseling skills.	2	86	12	0	0	3.9±0.31	3–5
4. Health care professionals should learn how to set goals with patients, not just tell them what to do.	3	79	17	1	0	3.84±0.40	2–5
5. To do a good job, diabetes educators should learn a lot about being teachers	3	66	31	0	0	3.72±0.45	3–5
B. Seriousness of type 2 diabetes						**3.36±0.35**	
6. People who do not need to take insulin to treat their diabetes, have a pretty mild disease	0	32	31	30	7	2.88±0.84	1–4
7. Older people with Type 2 diabetes do not usually get complications	4	36	52	7	1	3.35±0.76	1–5
8. People whose diabetes is treated by just a diet do not have to worry about getting many long-term complications.	0	18	61	21	0	2.97±0.64	2–4
9. Blood glucose testing is not needed for people with Type 2 diabetes.	5	70	18	7	0	3.73±0.71	2–5
10. Type 2 diabetes is a very serious disease.	7	72	11	10	0	3.76±0.73	2–5
11. Type 2 is as serious as Type 1diabetes.	2	30	62	6	0	3.28±0.55	2–5
12. People who take diabetes pills should be as concerned about their blood glucose as people who take insulin.	16	31	48	5	0	3.58±0.82	2–5
C. Value of tight control						**3.39±0.66**	
13. There is not much use in trying to have good blood glucose control because the complications of diabetes will happen anyway.	4	59	27	10	0	3.57±0.75	2–5
14. Keeping the blood glucose close to normal can help to prevent the complications of diabetes.	2	93	4	1	0	3.96±0.24	2–5
15. Almost everyone with diabetes should do whatever it takes to keep their blood glucose close to normal.	3	97	0	0	0	4.03±0.12	4–5
16. Low blood glucose reactions make tight control too risky for most people.	0	5	56	38	1	2.65±0.56	1–4
17. People who have Type 2 diabetes will probably not get much payoff from tight control of their blood glucoses.	2	80	13	4	1	3.78±0.67	1–5
18. Tight control is too much work.	0	10	15	71	4	2.31±0.58	1–4
19. Tight control of blood glucose makes sense only for people with Type 1 diabetes.	0	44	55	0	1	3.42±0.58	1–4
D. Psychosocial impact of diabetes						**3.80±.37**	
20. Diabetes affects almost every part of a diabetic person's life.	16	60	23	1	0	3.91±0.65	2–5

APPENDIX (CONT.)

21. The emotional effects of diabetes are pretty small.	4	53	15	26	2	3.31±1	1–5
22. Diabetes is hard because you never get a break from it.	13	81	5	1	0	4.06±0.44	2–5
23. Having diabetes changes a person's outlook on life.	6	68	20	6	0	3.74±0.67	2–5
24. It is frustrating for people with diabetes to take care of their disease.	4	52	33	11	0	3.49±0.77	2–5
25. Support from family and friends is important in dealing with diabetes.	34	63	3	0	0	4.31±0.48	3–5
E. Patient autonomy						**3.45±0.60**	
26. The important decisions regarding daily diabetes care should be made by the person with diabetes	1	26	69	4	0	3.24±0.53	2–5
27. Health care professionals should help patients make informed choices about their care plans.	2	86	12	0	0	3.9±0.31	3–5
28. People with diabetes should have the final say in setting their blood glucose goals.	1	18	75	6	0	3.14±0.51	2–5
29. The person with diabetes is the most important member of the diabetes care team.	4	82	11	3	0	3.87±0.52	2–5
30. People with diabetes should learn a lot about the disease so that they can be in charge of their own diabetes care.	10	83	4	3	0	4±0.43	2–5
31. What the patient does has more effect on the outcome of diabetes care than anything a health professional does.	15	64	20	1	0	3.93±0.51	2–5
32. People with diabetes have a right to decide how hard they will work to control their blood glucose.	4	26	60	10	0	3.24±0.66	2–5
33. People with diabetes have the right not to take good care of their diabetes.	1	4	19	73	3	2.27±0.68	1–5

Practices of Type 2 Diabetes Patients

Statement	Never	Once per Month or Less	2-3 Times/Month	1-2 Times per Week	4-6 Times/Week	1 or More/ Day
1. Use the information about the amount of carbohydrate, calories or fat in a food to make decisions about what to eat.	36	4	10	23	16	11
2.Use a written diet or meal plan to decide what foods to eat	68	5	2	11	10	4
3.Deliberately skip a meal or took small portion size or used sugar free food to cut calories or fat?	24	14	6	20	19	17
4.Resist the temptation to eat a food you want because it is too high in fat, sugar, or calories.	26	1	8	24	24	17
5.Eat your meals and snacks at the same time each day.	20	3	1	11	36	29
6.Deliberately eat more or less food to adjust for a change in your usual exercise or physical activity	54	11	10	20	3	2
7.How often do you set aside time to exercise?	Inactive	A little activity	Moderate activity	Active	Very active	
	20	30	35	12	3	

APPENDIX (CONT.)

8. How active is your daily routine?	I never exercise	A couple times a month	1 or 2 times a week	3 to 5 times a week	Once a day	
	25	8	8	29	30	
9. How frequently do you test your blood sugar?	Never	Occasionally as needed	A couple of times a month	1 or 2 times a week	3 to 6 times a week	Once a day or more
	9	43	9	22	7	6

Practices of Type 2 Diabetes Patients

Statement	Never	Once per Month or Less	2-3 Times/Month	1-2 Times per Week	4-6 Times/Week	1 or More/ Day
1. Use the information about the amount of carbohydrate, calories or fat in a food to make decisions about what to eat.	36	4	10	23	16	11
2.Use a written diet or meal plan to decide what foods to eat	68	5	2	11	10	4
3.Deliberately skip a meal or took small portion size or used sugar free food to cut calories or fat?	24	14	6	20	19	17
4.Resist the temptation to eat a food you want because it is too high in fat, sugar, or calories.	26	1	8	24	24	17
5.Eat your meals and snacks at the same time each day.	20	3	1	11	36	29
6.Deliberately eat more or less food to adjust for a change in your usual exercise or physical activity	54	11	10	20	3	2
7.How often do you set aside time to exercise?	Inactive	A little activity	Moderate activity	Active	Very active	
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8. How active is your daily routine?	I never exercise	A couple times a month	1 or 2 times a week	3 to 5 times a week	Once a day	
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2.Use a written diet or meal plan to decide what foods to eat	68	5	2	11	10	4

APPENDIX (CONT.)

3.Deliberately skip a meal or took small portion size or used sugar free food to cut calories or fat?	24	14	6	20	19	17
4.Resist the temptation to eat a food you want because it is too high in fat, sugar, or calories.	26	1	8	24	24	17
5.Eat your meals and snacks at the same time each day.	20	3	1	11	36	29
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9. How frequently do you test your blood sugar?	Never	Occasionally as needed	A couple of times a month	1 or 2 times a week	3 to 6 times a week	Once a day or more
	9	43	9	22	7	6

Item Wise Description of Diabetes Self-Efficacy Scale

Item	Mean Score ±SD	Patient Scoring ≤ 5 (n)	Patient Sscoring ≥6 (n)
1. How confident do you feel that you can eat your meals every 4 to 5 hours every day, including breakfast every day?	6.73±2.18	27	73
2. How confident do you feel that you can follow your diet when you have to prepare or share food with other people who do not have diabetes?	5.89±2.06	40	60
3.How confident do you feel that you can choose the appropriate foods to eat when you are hungry (for example snacks)?	5.97±2.37	39	61
4. How confident do you feel that you can exercise 15 to 30 minutes 4 to 5 times a week?	5.79±3.09	43	57
5. How confident do you feel that you can do something to prevent your blood glucose level from dropping when you exercise?	4.97±2.62	59	41
6. How confident do you feel that you know what to do when your blood glucose level goes higher or lower than it should be?	5.75±2.29	52	48
7. How confident you feel that you can judge when the changes in your illness mean you should visit the doctor?	7.05±1.88	19	81
8. How confident do you feel that you can control your diabetes so that it does not interfere with the things you want to do?	6.01±2.24	41	59