Original Article

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Knowledge, Attitude and Practices regarding Diabetes Mellitus among Type 2 Diabetes Mellitus Patients in a Tertiary Care Hospital in Nortwest Rajasthan

Internal Medicine Section

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ABSTRACT

Introduction: As per the International Diabetes Federation (IDF) statistics, around 463 million people are presently living with diabetes worldwide, and this is anticipated to be 578.4 million by 2030. Awareness regarding diabetes is a major determinant for early detection and prevention of diabetes. Information regarding Knowledge, Attitude, and Practice (KAP) among diabetics from Northwest Rajasthan, India is not readily available.

Aim: This study was designed to assess KAP regarding diabetes among patients with Type 2 Diabetes Mellitus (T2DM).

Materials and Methods: This hospital based, cross-sectional study was conducted over a period of one and half years from July, 2018 to December, 2019 in a Tertiary Care Center in Northwest Rajasthan, India among 960 patients with T2DM. KAP was assessed by a structured questionnaire derived from a validated set of questionnaires and was categorised as poor, average, and good. Bivariate and multivariate analyses were done to assess the association between diabetes-related KAP and sociodemographic variables.

Results: The mean age of the subjects was 55.45±11.64 years. The proportion of good, average, and poor knowledge scores among subjects were 10.83%, 65.84% and 23.33%, respectively. The corresponding values for attitude scores were 9.16%, 74.17% and 16.67%, respectively. Subjects from young age group, urban habitats, higher educational background, upper socioeconomic class, longer duration of diabetes, with a family history of diabetes, those who attended diabetes education program and with higher Body Mass Index (BMI) demonstrated significantly greater KAP score (r=0.73, p=0.001). Better knowledge was associated with a better attitude and practice (r=0.81, p=0.001) and better attitude was associated with better practice (r=0.77, p=0.001).

Conclusion: The overall level of KAP regarding diabetes was average. To prevent diabetes and its complications, there is an urgent need to carry out extensive awareness programs with a prioritised focus on poorer, rural and less educated groups.

Keywords: Awareness, India, Non insulin-dependent diabetes

INTRODUCTION

Diabetes is one of the largest global public health problems of the 21st century. According to the International Diabetes Federation, around 463 million people are currently living with diabetes worldwide, and this is projected to 578.4 million by 2030, out of which 80% of people with diabetes live in low and middle income countries where knowledge about diabetes is poor. India is home to the second largest number of adults with diabetes worldwide, with 77 million people living with diabetes, and this is projected to increase to 101 million by 2030. Half of the adults living with diabetes are unaware that they have the condition. Diabetes and its complications result in one death every eight seconds and almost half of deaths are in people of the working age group [1].

Education is one of the important factors for better treatment and control of diabetes [2]. Knowledge, attitude and practices are positively interrelated and dependent on each other. KAP regarding diabetes is influenced greatly by socioeconomic conditions, cultural beliefs, and habits [3]. Knowledge of diabetes helps to prevent chronic complications of diabetes, which have a significant impact on the quality of life of a patient with diabetes. Information regarding diabetes helps people to estimate their risk of diabetes and motivates them for proper treatment and care of diabetes [4].

It is essential to understand the awareness level of a disease in a population, which plays a key role in the early detection and prevention of disease. Prevention is crucial as the burden of diabetes and its complications on healthcare and its economic implications are huge, especially for a developing country like India [5-8]. Information regarding KAP among diabetics from Northwest Rajasthan is not readily available. This study was designed to assess KAP regarding diabetes among people with T2DM and correlate the same with sociodemographic factors.

MATERIALS AND METHODS

The present study was a hospital based, cross-sectional study conducted in the Department of Medicine, SP Medical College, Bikaner, a Tertiary Care Center in Northwest Rajasthan, India. A sample size of 947 was calculated based on a diabetic prevalence rate of 10.4% in India, according to IDF atlas 2019 [1] with a permissible error of 20% using the statistical formula, n=4pq/L2 (p=prevalence; q=100-prevalence; L=p×permissible error). In the present study, 960 type 2 diabetic patients aged ≥18 years attending Diabetes Center and Medicine Outpatient Department (OPD) were interviewed over one and a half year period from July 2018 to December 2019. Ethical clearance from the Institutional Review Board {No: F.29. (Acad) SPMC/2019/3868} and informed consent from each subject were taken.

Inclusion criteria: Patients with T2DM aged 18 years or more attending the Medicine OPD and diabetic clinic for follow-up or general treatment, with at least one year duration of diabetes (one year was to ensure that patients have attended at least one session of the diabetes education program) who were willing to participate in the study were included.

Exclusion criteria: Individuals with diabetes other than T2DM (type1 diabetes, pancreatic diabetes, secondary diabetes, gestational diabetes), age younger than 18 years, and those unable to answer the questionnaire because of deafness, dementia, or psychosis, those with diabetes-related complications (such as diabetic retinopathy, nephropathy, neuropathy, and diabetic foot, because they are more aware of diabetes and its complications) were excluded from this study.

Procedure

This was a questionnaire-based cross-sectional study. A structured, bilingual questionnaire derived from a validated set of questionnaires were used. Each participant was interviewed face-to-face by the principal investigator and enough time was provided. The questionnaire was divided into six main categories, including, sociodemographic information, anthropometric measurement, diabetes history, KAP-related information.

Sociodemographic information included age, gender, marital status (married, unmarried, widowed/divorced), residential area (urban, rural), education (illiterate, primary, high school, graduate), occupation (unemployed, labourer, retired, homemaker, service, business), type of family (nuclear, joint) and socioeconomic status. Illiteracy and type of family were defined according to standard definition [9]. Residential areas were defined according to the census of India 2011 [10]. Modified BG Prasad scale was used to measure the socioeconomic status and to classify the status into five classes [11].

Anthropometric measurements including height, weight, and BMI were done using standard technique and appropriate formula. A BMI of 23 and 27.5 was taken as the cut-off for the overweight and obese, as defined by the World Health Organisation (WHO) for this population [12]. Diabetes history included duration of diabetes, family history of diabetes, and diabetic educational programs attended or not.

KAP Questionnaire

The questions regarding knowledge were derived from the Chennai Urban Rural Epidemiology Study [5]. A total of eight questions were included. The scoring was done as follows: (a) For closed questions, correct answers were graded as one and incorrect answers (inclusive of "don't know") as zero; (b) For multiple choice questions, score one for each correct response and zero for incorrect answers (inclusive of "don't know"); (c) Thus, the least possible score was '0' if all answers were incorrect and the maximum score was '24' if all answers were correct; (d) A composite score in percentage was calculated by dividing each subject's score by the maximum possible score; e.g., if an individual's score was '15', then the composite score would be 15/24×100=62.5%.

The questions regarding attitude and practice were derived from Asmelash et al., study [13]. Eight questions were included for each attitude and practice regarding diabetes. Each positive response was assigned a score of '1' and each negative response with a score of '0'. For the eight attitudes and practice related questions the maximum attainable score was '8' and the minimum score was '0'. The composite score in percentage was then derived. Poor KAP corresponded to a score of (<Mean±1SD); average KAP corresponded to a score between (Mean±1SD); good KAP corresponded to a score of (>Mean±1SD) [3].

Questions used for obtaining data regarding knowledge of diabetes were as follows [5]:

1. Have you heard of a condition called diabetes? Yes/No
2. If yes, do you think, in general, more people are getting affected with diabetes now-a-days? Yes/No/Don't know
3. What are the symptoms of Diabetes? Increased thirst/Frequent urination/Poor wound healing/Weight loss/Numbness
4. Do you think diabetes can affect other organs? Yes/No/Don't know
5. If yes, which organs? Eyes/Heart/Stomach/Kidneys/Feet/Brain/Nerves/Don't know
6. What are the risk factors for diabetes? Overweight/High blood pressure/Family history of Diabetes/Consuming more sweets/Lack of physical activity/Mental stress/Don't know
7. Can diabetes be prevented? Yes/No/Don't know
8. If yes, how can it be prevented? Diet/Exercise/Weight loss/Don't know

Questions evaluating attitude towards diabetes were as follows [13]:

1. Do you think regular exercise can help to control DM?
2. Do you think smoking causes poor glycaemic control?
3. Do you think glycaemic control prolongs life expectancy?
4. Do you think diet alone is better than medication with the diet for glycaemic control?
5. Do you believe fruits and vegetables are good for glycaemic control?
6. Do you think alcohol and smoking can increase the complications of DM?
7. Do you think insulin/drugs have harmful effects on the organs of the body?
8. Do you think traditional treatments are better than modern medicines for DM?

Questions evaluating the practice of diabetes control and management were as follows [13]:

1. Eat vegetables daily
2. Daily physical exercise
3. Medication/treatment adherence
4. Regular blood sugar check-up
5. Cigarette smoking
6. Do you drink alcohol/smoke cigarettes?
7. Do you eat food on time?
8. Eye/foot care

STATISTICAL ANALYSIS

The data were analysed using Statistical Package for the Social Sciences (SPSS) version 16.0. Data were presented as mean, standard deviation, and proportion. ANOVA and t-test were used to test the equality of means between various groups. Pearson's correlation coefficient was used to measure the strength of association between KAP. Multiple linear regression analysis was used to determine the variable associated with diabetes-related KAP. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 960 patients with Type 2 DM were included in the study. The mean age of study participants was 55.45±11.64 years. Among them, a male (57.5%) preponderance was observed. The majority of the respondents(60.83%) were urban inhabitants. The majority (80%) had some formal education with only 20% being illiterate. A higher proportion of the respondents (68.33%) lived in joint families. More than half (58.33%) of the respondents belonged to socioeconomic class II. The mean duration of diabetes was 5.73±2.94 years. More than half (54.17%) of the respondents had a duration of diabetes 5-10 years. The majority (79.17%) had a family history of T2DM. Forty-five percent of the respondents attended the diabetes education program once and 13.33% of the respondents never attended any diabetes education program. The mean BMI of the study participants was 25.66±5.64 and almost half (48.33%) were overweight and obese [Table/Fig-1].

The mean KAP scores of the respondents were 67.46±16.81, 63.75±15.52, and 49.17±15.29, respectively. Among the

Variables	Categories	Frequency	Percent (%)	95% CI*
Age	Mean±SD	55.45±11.64		
	≤30 years	40	4.17	2.21-5.72
	31-50 years	248	25.83	20.38-28.28
	51-70 years	592	61.67	61.57-70.30
	>70 years	80	8.33	4.36-8.88
Gender	Male	552	57.5	53.04-61.85
	Female	408	42.5	38.15-46.96
Marital status	Married	848	88.33	85.15-90.91
	Unmarried/ Widowed/Divorced	112	11.67	9.09-14.85
Residential area	Urban	584	60.83	56.40-65.10
	Rural	376	39.17	34.90-43.60
Education	Illiterate	192	20	16.67-13.81
	Primary	136	14.17	11.33-17.57
	High school	392	40.83	36.53-45.29
	Graduate and above	240	25	21.34-29.06
Occupation	Unemployed	58	6.04	4.61-7.62
	Laborer	69	7.18	5.81-9.11
	Retired	33	3.44	2.55-4.91
	Homemaker	248	25.83	22.22-29.93
	Service	368	38.33	34.09-42.76
	Business	184	19.18	15.90-22.93
Type of family	Nuclear	304	31.67	27.66-35.96
	Joint	656	68.33	64.04-72.34
Socio economic class	I	168	17.5	14.36-21.15
	II	560	58.33	53.87-62.66
	III	136	14.17	11.33-17.57
	IV	96	10	7.63-13.01
Duration of diabetes	Mean±SD	5.73±2.94		
	<5 years	336	35	30.87-39.37
	5-10 years	520	54.17	49.59-58.57
	>10 years	104	10.83	8.36-13.93
Family history of diabetes	Yes	760	79.17	75.21-82.56
	No	200	20.83	17.44-24.69
Educational programs	Attended once	432	45	37.34-46.13
	Attended regularly	400	41.67	40.61-49.67
	Never attended	128	13.33	10.58-16.67
BMI (Kg/m²)	Mean±SD	25.66±5.64		
	Underweight (<18.5)	24	2.50	1.47-4.42
	Normal (18.5-24.9)	472	49.17	45.81-54.42
	Overweight (25-29.9)	342	35.62	29.97-38.52
	Obese (≥30)	122	12.71	10.26-16.35

[Table/Fig-1]: Characteristics of study respondents (n=960).
*: Confidence interval; ANOVA and t-test were used to test the difference of means between various groups.

respondents, the level of knowledge was poor in 23.33%, average in 65.84%, and good in 10.83% of the respondents. The levels of the attitude of the study participants were found to be poor in 16.67%, average in 74.17%, and good in 9.16% respondents. The levels of practices were also described accordingly as poor in 12.5%, average in 78.33%, and good in 9.17% respondents.

The knowledge of diabetes was found to be better among the respondents aged less than 30 years (p=0.012), but attitude and practices were not significantly different among various age groups. Males had better knowledge compared to female counterparts (p=0.033), while females had a better attitude (p=0.008). Respondents living in the urban areas showed a better attitude and practices compared to those living in rural areas. In general, respondents from upper socioeconomic class, with higher educational background, with longer duration of diabetes, with a family history of diabetes, those who attended diabetes education program and with higher BMI demonstrated significantly greater scores in terms of KAP (p<0.05). Respondents with business as their occupation had better KAP scores (p<0.05) compared to other occupational groups. Respondents living in joint families had a higher attitude score while those living in nuclear families had higher practice scores (p<0.05) [Table/Fig-2]. On correlation analysis, knowledge was positively correlated with attitude (r=0.73, p=0.001) and practices (r=0.81, p=0.001): and attitude were positively correlated with practices (r=0.77, p=0.001).

Multiple linear regression analysis showed that the predictors that influenced KAP scores were age, gender, education, occupation, socioeconomic status, type of family, family history, diabetes duration, and educational program [Table/Fig-3].

DISCUSSION

The KAP regarding diabetes is greatly influenced by socioeconomic conditions, cultural beliefs, and habits. Understanding these variables help to design prevention and management strategies for diabetes [3]. Insufficient knowledge and awareness regarding complications of diabetes may lead to a high economic burden in terms of the management of complications [14]. In the present study, the respondents' knowledge was assessed based on their understanding of diabetes, which included risk factors, symptoms, prevention, and complications options. The diabetes-related knowledge level was found to be average in 65.84%, good in 10.83%, and poor in 23.33% respondents, respectively. Similar findings were reported by Fatema K et al., Rahaman KS et al., and Farzana S et al., [3,14,15]. On the contrary, Khaznadar AA et al., and Tejaswi P et al., reported good KAP scores among patients with T2DM [16,17]. Whereas other studies have reported that knowledge about diabetes is generally poor among diabetic patients [18-20]. The majority of the participants had an average attitude (74.17 %) and practice (78.33%) score. There were a small number of patients, who were able to manage their health conditions to avoid further complications. These findings are in line with Islam FM et al., study [21]. Whereas, other authors (Tejaswi P et al., and Alsous M et al.,) reported a good attitude and practice score towards diabetes [17,22].

Better knowledge is associated with a better attitude (r=0.73, p=0.001) and practice (r=0.81, p=0.001) and better attitude is associated with better practice (r=0.77, p=0.001). This suggests that the higher their knowledge the better their attitude towards diabetes. These findings were consistent with other previous studies [3,17,22,23], while, Banu H et al., reported significant strong correlation between knowledge and attitude, significant weak correlation between knowledge, and practice and significant moderate correlation between attitude and practice [24].

In the current study, KAP was better among the younger age group, which could be explained by better internet accessibility by younger people in the present era. This finding is similar to other previous studies [16,25] and is contradictory to the study of Niroomand et al. in which KAP improved with age [26]. We observed a gender gap in knowledge and attitude regarding diabetes. There were inequalities in health services and education, with the literacy and access to healthcare facilities of females were lower than that of their male counterparts. Males showed significantly higher levels of knowledge, while females showed better attitude scores compared to males. This finding is similar to previous studies where a wide gender gap was observed in KAP regarding diabetes [3,15,20,21,27]. On the contrary, Murata G et al., showed no significant gender difference [28].

Variables	Knowledge		Attitude		Practice	
	Mean±SD#	p-value	Mean±SD#	p-value	Mean±SD#	p-value
	67.46±16.81		63.75±15.52		49.17±15.29	
Age, years						
<30	80.20±9.31	0.012*	71.87±5.59	0.122**	56.25±6.46	0.184**
31-50	67.12±17.02		64.42±15.63		48.15±14.78	
51-70	66.60±16.91		63.04±16.01		48.73±15.24	
>70	64.58±17.82		61.45±12.04		46.87±14.40	
Gender						
Male	69.36±16.05	0.033*	62.14±16.78	0.008*	48.55±15.74	0.305**
Female	66.06±17.26		65.93±13.38		50.00±14.68	
Marital status						
Married	67.33±16.64	0.641**	63.91±15.69	0.522**	50.00±16.51	0.665**
Unmarried/Widowed/Divorced	68.45±18.23		62.50±14.30		49.05±15.15	
Residential area						
Urban	68.55±16.39	0.07**	64.89±14.15	0.0438*	50.68±15.21	0.006*
Rural	65.77±17.38		61.96±17.33		46.80±15.17	
Education						
Illiterate	42.53±10.04	0.001*	42.70±11.98	0.001*	30.20±9.53	0.001*
Primary	58.82±11.94		57.35±10.63		44.85±11.48	
High school	75.16±9.43		69.64±10.12		53.57±12.40	
Graduate	79.72±6.17		74.58±8.25		59.58±10.08	
Occupation						
Unemployed	63.35±16.21	0.001*	63.21±16.28	0.001*	49.21±16.24	0.001*
Labourer	62.32±16.54		62.21±16.58		48.62±16.04	
Retired	65.64±16.04		64.62±16.02		49.24±16.74	
Homemaker	66.66±16.77		62.50±12.75		47.58±15.43	
Service	65.94±17.10		62.22±16.42		48.91±14.97	
Business	72.46±15.17		67.93±15.65		51.63±14.50	
Type of family						
Nuclear	68.55±16.39	0.479**	61.51±16.11	0.003*	50.68±15.21	0.001*
Joint	66.67±16.07		64.79±15.16		46.71±13.08	
Socioeconomic class						
I	71.82±16.31	0.0269*	67.26±15.26	0.03*	51.19±14.98	0.0154*
II	69.36±13.35		69.37±14.70		53.67±13.49	
III	65.95±17.22		64.70±12.39		47.68±15.30	
IV	65.97±18.69		61.21±16.24		47.91±16.47	
Duration of diabetes						
<5 years	61.30±16.14	0.001*	58.33±14.90	0.001*	44.34±13.73	0.001*
5-10 years	67.69±15.84		64.42±15.41		48.84±14.85	
>10 years	86.21±6.87		77.88±5.31		66.34±9.10	
Family history of diabetes						
Yes	74.20±11.36	0.001*	69.60±11.14	0.001*	54.21±12.26	0.001*
No	41.83±6.09		41.50±7.71		30.01±9.40	
Educational programs						
Attended once	65.95±17.22	0.001*	59.72±11.73	0.001*	45.13±9.15	0.001*
Attended regularly	81.17±7.98		75.76±8.08		61.00±10.22	
Never attended	62.88±11.68		39.84±7.99		25.78±10.41	
BMI						
Underweight	58.33±12.80	0.003*	58.33±16.28	0.0016*	45.83±6.15	0.001*
Normal	65.32±18.26		61.65±16.60		47.24±17.72	
Overweight	70.41±14.68		67.50±13.67		51.56±12.28	
Obese	70.50±15.64		63.72±14.01		50.61±13.39	

[Table/Fig-2]: Bivariate Regression Analysis was performed between various parameters and KAP regarding diabetes mellitus.
#: Standard deviation; *: Significant; **: Not significant; KAP: Knowledge, attitude, practice

Variables	Knowledge			Attitude			Practice		
	Coef.	95% CI*	p-value	Coef#	95%CI	p-value	Coef.	95%CI	p-value
Age	0.90	1.12-1.19	0.001	0.91	1.07-1.13	0.001	0.89	0.82-0.87	0.001
Gender	0.52	60.34-71.77	0.001	0.52	56.73-67.54	0.001	0.51	44.28-52.81	0.001
Marital status	0.11	51.24-85.64	0.001	0.12	46.19-78.80	0.001	0.11	37.23-62.76	0.001
Residential area	0.59	63.43-73.76	0.001	0.60	60.09-69.70	0.001	0.59	46.88-54.48	0.001
Education	0.50		0.001	0.49		0.001	0.50		0.001
Occupation	0.71		0.001	0.72		0.001	0.71		0.001
Type of family	0.29	57.31-76.00	0.001	0.28	52.62-70.40	0.001	0.26	39.64-53.77	
Socioeconomic class	0.76		0.001	0.74		0.001	0.75		0.001
Duration of diabetes	0.81	9.31-10.15	0.001	0.81	8.73-9.54	0.001	0.80	6.82-7.46	0.001
Family history of diabetes	0.90	72.01-76.40	0.001	0.89	67.44-71.92	0.001	0.88	52.39-56.02	0.001
Educational programs	0.93		0.001	0.91		0.001	0.92		0.001
BMI (Kg/m^2)	0.90	2.43.2.58	0.001	0.90	2.29-2.43	0.001	0.87	1.76-1.89	0.001

[Table/Fig-3]: Multivariate Regression Analysis was performed between various parameters and KAP regarding diabetes mellitus. In Education, Occupation, Socioeconomic Class and Educational programs, there are more than two groups and so CI cannot be calculated.
*: Confidence interval; #: Coefficient

Subjects living in urban areas had better knowledge and attitude regarding diabetes. This finding is similar to previous studies [16,29]. This may be due to better education and easy access to healthcare facilities in urban areas. We observed that business persons had better KAP score than other occupational groups, which might be due to better access to healthcare facilities. This finding was contradictory with findings of Khaznadar AA et al., and Murugesan N et al., where professionals or those with executive jobs had higher scores [16,30]. It is important to note that subjects from obese and overweight groups had significantly better KAP scores ($p<0.05$) compared to the normal and underweight groups. This may be because obese and overweight subjects are more counselled by healthcare professionals because obesity is a significant cardiovascular risk factor. Similar findings were reported by Niroomand M et al., and Fatema K et al., [3,26]. This is contrary to a study done by Farzana S et al., [15].

Good KAP was seen among respondents with higher socioeconomic status. Similarly educational status had a significant association with good KAPs. This could be explained by the fact that subjects with higher socioeconomic status have better access to education and healthcare facilities and educated subjects are able to read necessary information easily compared to the illiterates. These findings were consistent with other studies [3,17,18,22,31]. Contrary to this, Khaznadar AA et al., found that mean practice scores were higher among illiterate subjects [16]. In the present study, the duration of diabetes was a significant predictor of KAP. This finding was consistent with the study done by Rahaman KS et al., and Niroomand et al., and contradictory to the study done by Khamseh ME et al., [14,26,32]. This may be due to regular counselling and contact with diabetes specialists.

Attending a diabetes education program was significantly associated with better KAP s in the present study. This finding was consistent with a study done by Rahaman KS et al., [14]. It is worth to mention that providing education to vulnerable groups could become a costeffective public health strategy and proper diabetes education programs could provide awareness about diabetes even for less educated people. A family history of diabetes was associated with better KAP, which are consistent with the findings of Rahaman KS et al., andNiroomand M et al., and contradictory with the findings of Balagopal P et al., [14,26,33]. Receiving information from the family members with diabetes might influence the patient's KAP, yet, such information is not always reliable [26]. Subjects living in joint families had a higher attitude score whereas those living in the nuclear families had higher practice scores ($p<0.05$) but no difference in knowledge scores. This could be explained by the fact that subjects living in nuclear families have fewer responsibilities and hence enough time to take care of their diabetes while subjects living in a joint family have a better approach regarding diabetes due to information received from family members. No studies comparing the type of family and KAP regarding diabetes was found in literature.

Limitation(s)

Few limitations of this study need mention. Since, the current study was based on a single center, the results may not be truly representative of all diabetic patients in this region. The use of questionnaires for measuring KAP levels could be another limitation because of the risk of social desirability bias.

CONCLUSION(S)

Poor KAP levels were found particularly in rural habitats, illiterates, unemployed, and low income groups, and they need greater attention in diabetes education and counselling. There is a need to carry out extensive awareness programs, after identifying the suitable measures to disseminate the message to the general public. It is possible to improve practice by providing adequate information, increasing the availability of educational materials, and proper guidance towards diabetes management. The information collected in this study will also be helpful in the dissemination of knowledge on the preventive aspects of diabetic complications. In conclusion, a good knowledge is associated with better attitude and practices. Consequently, active participation and empowerment of the people with diabetes by continuous education and support is mandatory using available mass media.

REFERENCES

[1] International Diabetes Federation. BelmaMalanda, SuviKaruranga, PouyaSaeedi, ParaskeviSalpea, editors. Diabetes Atlas. 9th ed. 2019:32-61.
[2] Rani PK, Raman R, Subramani S, Perumal G, Kumaramanickavel G, Sharma T. Knowledge of diabetes and diabetic retinopathy among rural populations in India, and the influence of knowledge of diabetic retinopathy on attitude and practice. Rural Remote Health. 2008;8:838.
[3] Fatema K, Hossain S, Natasha K, Chowdhury HA, Akter J, Khan T, et al. Knowledge attitude and practice regarding diabetes mellitus among Nondiabetic and diabetic study participants in Bangladesh. BMC Public Health. 2017;17:364.
[4] Moodley L, Rambiritch V. An assessment of the level of knowledge about diabetes mellitus among diabetic patients in a primary healthcare setting. South African Family Practice. 2007;49(10):16-16d.
[5] Mohan D, Raj D, Shanthirani C, Datta M, Unwin N, Kapur A, et al. Awareness and knowledge of diabetes in Chennai-the Chennai urban rural epidemiology study. J Assoc Physicians India. 2005;53:283-87.
[6] Deepa M, Bhansali A, Anjana RM, Pradeepa R, Joshi SR, Joshi PP, et al. Knowledge and awareness of diabetes in urban and rural India. Indian J Endocr Metab. 2014;18(3):379-85.
[7] Mathew AC, Jacob N, Jose S, Rathan P, Suvetha K, Senthil Kumar R, et al. Knowledge about risk factors, symptoms and complications of diabetes among adults in south india. Int J Med Sci Public Health. 2014;3(9):1086-92.
[8] Bhutani G, Kalra S, Lamba S, Verma PK, Saini R, Grewal M. Original Article Effect of diabetic education on the knowledge, attitude and practices of diabetic patients towards prevention of hypoglycaemia. Indian J EndocrMetab. 2015;19(517):383-86.

[9] Park K. Park's Textbook of Preventive and Social Medicine. 23rd Ed. Jabalpur, India: Banarsidas Bhanot publishers; 2015: 485, 684-85.
[10] Census of India 2011. [Internet]. Available from: http://censusindia.gov.in. Last seen 25/04/2020.
[11] Pandey VK, Aggarwal P, Kakkar R. Modified BG Prasad's Socio-economic Classification-2018: The need of an update in the present scenario. Indian J Comm Health. 2018;30(1):82-84.
[12] World Health Organization. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. (WHO expert consultation). Lancet. 2004;363(9403):157.
[13] Asmelash D, Abdu N, Tefera S, Baynes HW, Derbew C. Knowledge, attitude, and practice towards glycaemic control and its associated factors among diabetes mellitus patients. Journal of Diabetes Research. 2019;19(20):01-09.
[14] Rahaman KS, Majdzadeh R, Naieni KH, Raza O. Knowledge, Attitude and practices regarding chronic complications of diabetes among patients with type 2 diabetes in Dhaka. Int J Endocrinol Metab. 2017;15(3):e12555.
[15] Farzana S, Mumu SJ, Ferdous A, Liaquat A, Sharmin H, Ahmed KR. Knowledge, attitude and practice of type 2 diabetic patients regarding obesity: Study in a tertiary care hospital in Bangladesh. J Public Health Africa. 2012;3(1):e8.
[16] Khaznadar AA, Al-Banna HI, Rahim Saeed NH. Diabetes-related knowledge, attitude, practice and beliefs among adult diabetic patients attending diabetic consultation clinic in Sulaimania. JSMC. 2015;5(2):129-37.
[17] Tejaswi P, Dhakre S, Reddy P, Goyal C. Evaluation of the knowledge, attitudes and practices of diabetic patients in a tertiary care hospital in Central India. Int J Med Res Rev. 2018;6(01):24-32.
[18] Shah VN, Kamdar P, Shah N. Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat. Int J Diab Developing Countries. 2009;29(3):118-22.
[19] He X, Wharrad H. Diabetes knowledge and glycaemic control among Chinese people with type 2 diabetes. Int Nurs Rev. 2007;54(3):280-87.
[20] Brown SA, Harrist RB, Villagomez ET, Segura M, Barton SA, Hanis CL. Gender and treatment differences in knowledge, health beliefs, and metabolic control in Mexican Americans with type 2 diabetes. Diabetes Educator. 2000;26(3):425-38.
[21] Islam FM, Chakrabarti R, Dirani M, Islam MT, Ormsby G, Wahab M, et al. Knowledge, attitudes and practice of diabetes in rural Bangladesh: The Bangladesh Population based Diabetes and Eye Study (BPDES). PLoS One. 2014;9(10):e110368.
[22] Alsous M, Abdel Jalil M, Odeh M, Al Kurdi R, Alnan M. Public knowledge, attitudes and practices toward diabetes mellitus: A cross-sectional study from Jordan. PLoS ONE. 2019;14(3):e0214479.
[23] Ng SH, Chan KH, Lian ZY, Chuah YH, Noora A. Reality vs illusion: Knowledge, attitude and practice among diabetic patients. Int J Collab Res Internal Med. 2012;4(5):723-32.
[24] Banu H, Shireen N. Assessing knowledge, attitude, practice (KAP) of diabetic subjects residing in Hyderabad city, India. International Journal of Research and Review. 2019;6(9):48-58.
[25] Rafique G, Azam SI, White F. Diabetes knowledge, beliefs and practices among people with diabetes attending a university hospital in Karachi, Pakistan. EMHJ. 2006;12:590-98.
[26] Niroomand M, Ghasemi SN, Karimi-Sari H, Kazempour-Ardebili S, Amir P, HosseinKhosravi M. 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):S114-19.
[27] Al-Maskari F, El-Sadig M, Al-Kaabi JM, Afandi B, Nagelkerke N, Yeatts KB. Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. PLoS One. 2013;8(1):e52857.
[28] Murata G, Shah J, Adam K, Wendel C, Bokhari S, Solvas P, et al. Factors affecting diabetes knowledge in type 2 diabetic veterans. Diabetologia. 2003;46(8):1170-78.
[29] Masooda I, Saleema A, Hassanb A, Kalsooma UE, Ziaa A, Khana AT. Evaluation of diabetes awareness among general population of Bahawalpur, Pakistan. Prim Care Diabetes. 2016;10:03-09.
[30] Murugesan N, Snehalatha C, Shobhana R, Rogilic G, Ramachandra A. Awareness about diabetes and its complications in the general and diabetic population in southern India. Diabetes Research and clinical Practice. 2007;77(3):433-37.
[31] Feleke SA, Alemayehu CM, Adane HT. Assessment of the level and associated factors with knowledge and practice of diabetes mellitus among diabetic patients attending at felegehiwot hospital, northwest Ethiopia. Clin Med Res. 2013;2(6):110-20.
[32] Khamseh ME, Vatankhah N, Baradaran HR. Knowledge and practice of foot care in Iranian people with type 2 diabetes. Int Wound J. 2007;4(4):298-302.
[33] Balagopal P, Kamalamma N, Patel TG, Misra R. A community-based diabetes prevention and management education program in a rural village in India. Diabetes Care. 2008;31(6):1097-104.

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