ORIGINAL ARTICLE

A Cross-Sectional Study Evaluating Disparities in Knowledge and Awareness Regarding Diabetes Amongst Patients, Family and General Population in Rural India

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Abstract

Background: The data regarding the knowledge and awareness regarding diabetes among patients, their family members, and the general population is sparse in India, especially from the rural population. We conducted this study to ascertain the knowledge and awareness regarding diabetes in the rural population and to find the disparities that exist in knowledge between the diabetic patients, their family members and the general population.

Material and Methods: A community-based cross-sectional study was conducted over 2 years amongst respondents selected by convenience sampling. Data was collected using pretested structured face-to-face interviews after taking informed written consent The respondents were categorized as people with diabetes, their family members and the general population.

Results: A total of 4244 persons were interviewed. Only 51.8% of the respondents had knowledge of diabetes, with glaring disparities between the three groups. Amongst the general population, only 27.4% had knowledge of diabetes. Similarly, the awareness of prevention, complications and risk factors of diabetes was much lower in the general population compared to diabetics and their families, and this group had a significantly lower composite knowledge score of diabetes.

Conclusion: Nearly half of the rural community in the study was found to have inadequate knowledge of diabetes. Even amongst the diabetics and their families, the knowledge and awareness were poor. A greater emphasis on the dissemination of community education regarding symptoms, prevention and risk factors for diabetes is necessary.

Keywords: Asian, Diabetes, Non-diabetes, Population, Risk.

Introduction

One-fifth of all the adults with diabetes in the world reside in the South-East Asia Region, with India having the second-highest prevalence of diabetes among adult population.[1] Currently, data from population studies indicates that 9.1% of the adult population; which is around 463 million people have diabetes, of which 88 million reside in India. This burden is expected to expand to 115 million by 2030, accounting for 12.1% of the adult population. Currently, around 31 million people are estimated to be having impaired glucose tolerance, and this may increase to around 50 million by the year 2050.[1]

Around 1.1 million people die from diabetes-related illnesses in India every year.[1] Unfortunately, more than half (56.1%) of all people with diabetes in India remain undiagnosed, and even among the known diabetes patients, less than one-third have their diabetes under good control.[2,3] Evidence suggests that poor access to health care, poverty, coupled with low education, are associated with a higher rate of diabetes-related complications.[4,5] Education remains one of the key measures for ensuring better treatment and control of diabetes. There is also evidence to show that increasing knowledge regarding diabetes and its complications can lead to an increase in compliance with therapy, thereby reducing the complications of diabetes.[6,7]

Nearly 70% of the Indian population still resides in rural areas and growing urbanization and changing lifestyle habits (e.g. higher calorie intake, increasing consumption of processed foods, sedentary lifestyles) contribute to the increasing prevalence of type 2 diabetes at a societal level. While the global prevalence of diabetes in urban areas is

higher, this gap is closing with the rural prevalence being on the rise.[1] There is evidence to suggest that diabetes mellitus and its related complications show a threefold rise in rural areas.[8] While there have been studies on the subject of diabetes awareness in India, there is a paucity of studies from the rural belt. Morever, most of these studies were hospital-based rather than at population level. Hence, the data available is not representative of the country as a whole. There is a need to assess the knowledge and awareness among people living in rural areas to steer the future development of awareness programs and techniques for effective health education and patient counselling. Identification of lacunae in the knowledge amongst diabetic individuals will help us in providing a better insight towards further management and education. Hence, this study was aimed to ascertain the knowledge and awareness in the rural population and to find the disparities that exist in knowledge between the diabetic patients, their family members and the general population.

MATERIAL AND METHODS

The present study was a single centre study done at Uttar Pradesh University of Medical Sciences (UPUMS), Saifai, Etawah, Uttar Pradesh. It was conducted to ascertain the prevalence of diabetes in nearby rural areas of Western Uttar Pradesh, India, between 1 January 2018 and 31 December 2019.[9] This study was a part of our ongoing project on the evaluation of prevalence of diabetes and its complications in rural India. The study was approved by the Institutional Ethics Committee (192/UPUMS/DEAN/ 2016-17). After excluding non-responders, a total of 4244 participants were recruited for the study via the health camp approach i.e. non-probability or convenience sampling. Village heads and local panchayats were consulted to ensure maximum participation. After obtaining a written informed consent, data was collected using a pre-tested structured questionnaire used previously in the ICMR-INDIAB study (after obtaining due permissions).[10] Specific questions were asked to assess the participant's knowledge regarding the risks of diabetes, causative factors, complications and prevention of complications. Knowledge of causative factors and complications of diabetes was assessed using open-ended questions. The questionnaire was translated into hindi and administered by an interviewer trained for the same. The questionnaire used and calculation of KAP composite score is shown in ***Appendix 1***.

Individuals diagnosed by a physician and receiving anti-diabetes medications (self-reported) and/or those who had 2-h post-prandial glucose value ≥200 mg/dL and/ or fasting blood glucose ≥126 mg/dL were classified as having diabetes.

Statistical analysis: Statistical analysis was carried out using SPSS version 24 (SPSS Inc., Chicago, IL, USA). Data were presented as numbers (%) and mean (±SD). Quantitative variables that followed normal distribution were compared using ANOVA. *P* value <0.05 was considered significant.

RESULTS

A total of 4244 participants were included in the study, of which 2328 (54.85%) were male and 1916 (45.15%) were females. Amongst them, 341 (8.03%) were diabetics, 598 (14.1%) were their family members (non-diabetic) and the remaining 3305 were part of the general population. The mean age of diabetics (51.6 years) was higher than the other two groups. ***Table I*** summarizes the data regarding the demographic profile and awareness regarding diabetes amongst the study participants.

Overall, a total of 1713 (51.8%) participants reported that they knew about the illness called diabetes. However, on including only the general population, just 907 (27.4%) reported that they knew about diabetes. Even amongst the family members of diabetics, 133 (22.2%) did not know about diabetes. Amongst those who had heard about diabetes in the general population, 59.8% thought that more people were being affected by diabetes, 55% answered that diabetes can affect other organs and 48.6% reported that diabetes could be prevented. Corresponding numbers for the diabetic groups were 95.8%, 71.2% and 52.5%; while amongst the family members the numbers were 85%, 61.9% and 60.2%, respectively. Interestingly, more participants' family members thought that diabetes could be prevented as compared to the other two groups.

The knowledge of the risk factors for diabetes in the participants has been shown in ***Table II***. The major risk factor for diabetes was stated as consuming more sweets by 71.7%, whereas overweight or obesity was listed by 49.8%, family history of diabetes by 38.1%, high blood pressure by 29.3%, lack of physical activity by 21.8% and mental stress by 15.2% of the general population. The knowledge regarding risk factors for diabetes was better among the known diabetic subjects (consuming more sweets 84.2%; obesity 60.2%; family history of diabetes 54.6%; high blood pressure 56.2%; lack of physical activity 51.6%; and mental stress 41.2%). Amongst the family group, lack of physical activity and family history was significantly higher than the diabetes group (67.3% and 65.2% respectively, *P*=0.001 for both)

Among the preventive factors, diet modification was reported by 65.2% of the diabetics and exercise by 58.1%. There was no significant difference between the distribution of participants reporting exercise as a preventive measure amongst the three groups. See ***Table II***.

TABLE I. Demographic Features and Awareness Regarding Diabetes of the Study Participants

	Diabetics (n=341)	*Family members (n=598)*	*General population (n=3305)*	*P value*
Age distribution (years)				
18-30	8.2%	17.4%	25.7 %	>0.05
30-39	9.4%	19.2%	22.2%	>0.05
40-49	22.6%	21.1%	19.6%	>0.05
50-59	29.3%	19.2%	18.1%	>0.05
60-69	21.7%	17.6%	10.8%	>0.05
>70	8.8%	5.5%	3.4%	>0.05
Mean age (years)	51.6	43.8	38.9	0.001
Sex				
Male	50.7%	48.2%	56.5%	>0.05
Female	49.3%	51.8 %	43.5%	>0.05
Awareness				
Have you heard of a condition called diabetes?	341 (100%)	465 (77.8%)	907 (27.4%)	0.01
If yes, do you think in general more and more people are getting affected with diabetes nowadays?	327 (95.8%)	395 (85%)	542 (59.8%)	0.001
Do you think diabetes can affect other organs?	243 (71.2%)	288 (61.9%)	498 (55%)	0.02
Can diabetes be prevented?	179 (52.5%)	280 (60.2%)	441 (48.6%)	0.01

Knowledge of the organs affected by diabetes is shown in ***Table III***. On comparing the composite knowledge score of diabetes amongst the three groups, the mean composite score (±SD) of the general population was 17.9 (±4.0), of the family members was 45.2 (±30.5), while the diabetic population had a significantly higher score of 68.2 (± 45.2) (*P*=0.001). The least score of "0" was obtained by 72.6% of the general population and 22.2% of the family members. The maximum score of "100" was obtained by 2.7% of the general population and 10.2% of the diabetic population and 8% of the family members.

DISCUSSION

In the current study, we assessed the knowledge and awareness amongst 4244 participants with the help of a pre-validated questionnaire. Previously a few studies assessing the knowledge of diabetes have been reported from India, but most of these studies are hospital-based. There is a paucity of data from rural India. The major finding in the study is the lack of knowledge and awareness regarding diabetes among the rural population with just over half (51.6%) knowing about diabetes. What

TABLE II. Risk Factors And Preventive Factors of Diabetes As Stated By The Participants

Risk factors	*Diabetics (n=341)*	*Family (n=465)*	*General population (n=907)*	*P value*
Consuming sweets	84.2%	78.8%	71.7%	0.011
Family history	54.6%	67.3%	38.1%	0.004
Obesity	60.2%	54.9%	49.8%	0.014
Hypertension	56.2%	38.5%	29.3%	0.003
Lack of physical activity	51.6%	65.2%	21.8%	0.03
Mental stress	41.2%	39.6%	15.2%	0.001
Preventive factors	*Diabetics (n=179)*	*Family (n=280)*	*General population (n=441)*	
Balanced diet	65.2%	69.4%	52.6%	0.01
Exercise	58.1%	60.2%	58.9%	0.32

TABLE III. Knowledge of Organs Affected by Diabetes Among The Study Participants

	Diabetics (n=243)	*Family (n=288)*	*General population (n=498)*
Eyes	61.5	53.4	32.6
Kidneys	68.9	46.8	45.3
Nerves	55.3	41.2	22.3
Hands	45.8	19.3	12.5
Lungs	2.5	1.0	1
Stomach	6.8	2.6	3.6
Feet	48.9	36.5	18.6
Brain	7.9	6.5	11.2
Heart	23.5	12.6	17.8
Any other relevant answer	2.1	1.2	3.8

Values expressed as %.

is more worrisome is that 72.6% of the general population is unaware of diabetes itself. This is worrying in the context of the fact that India has a mostly rural population, and an estimated 56.1% of the diabetics in India remain undiagnosed. Even amongst the family members of diabetics, 22.2% did not know about diabetes. ICMR-INDIAB study reported a 36.8% awareness of diabetes in the rural areas with figures ranging from 55% in rural Tamil Nadu to 16.5% in rural Jharkhand.[10] This is in contrast to findings reported by Islam, *et al* who reported a much higher proportion of 93% in rural areas of Bangladesh.[11] Mohan, *et al* reported a higher awareness of diabetes, albeit from an urban area in India.[2] A lower score in our study could be a reflection of the lower literacy rate in rural areas.

A finding of great public health importance in the study was that even amongst those who knew about diabetes, 59.8% of the general population reported that there was an increasing prevalence of diabetes and less than half amongst these (48.6%) reported that diabetes was preventable; a still lower proportion were aware of the major risk factors of diabetes. Even amongst those who thought diabetes was preventable, only 58.9% were aware of the effects of exercise and 52.6% were aware of the role of diet in prevention of diabetes. The people will transform their behaviour and attitude regarding diabetes only if they think themselves to be at high risk. Even amongst diabetics, only 52.6% reported that diabetes is a preventable disease despite evidence for the same having been reported by many studies such as the Finnish Diabetes Prevention Study[12] and the Diabetes Prevention Programme.[13] This points towards a need to ensure robust participation of the population under the already undergoing National Program for Control of Diabetes, Cardiovascular Disease and Stroke, and this can help improve diabetes awareness levels at the rural level.

In the diabetic population, the knowledge regarding prevention, risk factors and complications of diabetes was higher than both the other groups, but it still paints a dismal picture. Among the risk factors, obesity was considered by most (60.2%), while diet as a preventive measure was reported by only 65.2%. Amongst the diabetic complications, renal involvement was reported maximum at 68.9%. This reflects a poor attitude towards patient counselling and education regarding various aspects of diabetes. It should be well understood that diabetic care involves intensive education and counselling along with medical management. This forms a strong basis for recommending the presence of a diabetes educator at each centre that caters to diabetics.

On considering the composite score, the disparities between the diabetic group and the general population come to the fore with a vexatious difference of 68.2 vs 17.9. This reveals an unsettling knowledge gap regarding diabetes in the general population. Such data gives an indication of the various levels at which public health policies need to be planned and aimed at for preventing diabetes at the rural level.

The strengths of our study are its large sample size and representation of data from a usually poorly represented population. There are a few limitations of our study. Ours was a questionnaire-based study wherein the respondents may try to guess answers and verbal ability also becomes a deciding factor. While a health camp-based approach may be convenient, it does not ensure accurate representation of the population.

To summarize, this study provides a glimpse of the current status of knowledge and awareness of diabetes from rural India. There is an increasing need to conduct diabetic awareness activities in the rural population which can be done via public talks, use of mass media and use of local resources such as leaders, religious assemblies and door-to-door campaigns to increase awareness regarding diabetes.

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CONTRIBUTORS: HSh and NR: Conception and drafting of the study and collection of data; VR, MK and PI: Literature search and drafted the manuscript. HSo: Analyzed the data and interpreted the results. All authors approved the final version of the manuscript and are accountable for the manuscript.

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Appendix 1. Questionnaire and Calculation of KAP Composite Score (Reproduced with permission from ICMR-INDIAB with permission)[10]

The Interview Schedule consisted of 7 questions which were closed or semi-closed as follows: 1 Have you heard of a condition called diabetes? Yes/ No 2 If yes, do you think in general more and more people are getting affected with diabetes now a days? Yes/No 3 Do you think diabetes can affect other organs? Yes/No 4 If yes, which organs? Eyes/Heart/Lungs/Stomach/Kidneys/Feet/Brain/Hands/ Nerves/Others (Specify)/Don't know 5 What are the risk factors for diabetes? Overweight/High blood pressure/ Family history of Diabetes/Consuming more sweets/Lack of physical activity/Mental stress/Others (Specify)/Don't know 6 Can diabetes be prevented? Yes/No/ 7 If yes, how can it be prevented? Diet/Exercise/Others (Specify)

A composite score for knowledge of diabetes was used for this study. 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 causative factors for diabetes, the highest score of '4' was awarded to subjects who ticked obesity, high blood pressure, lack of physical activity or family history of diabetes, '3' was given to those who ticked "consuming sweets," '2' to those who ticked "mental stress" and '1' for any other answer which made sense or was close to the above answers, while all other answers were scored '0'. (c) Thus the least possible score was '0' if all answers were incorrect, and the maximum score was '8' if all answers were correct. (d) A composite score in percentage was then derived by dividing each individual's score by the maximum score possible. E.g., if an individual's score was '6', then the composite score would be $6/8 \times 100 = 75\%$. Questions 4 and 7 were not included in the score.