RESEARCH ARTICLE

KNOWLEDGE ABOUT RISK FACTORS, SYMPTOMS AND COMPLICATIONS OF DIABETES AMONG ADULTS IN SOUTH INDIA

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ABSTRACT

Background: Diabetes is a major public health problem in India. However, awareness on diabetes is still remaining as a challenge in Indian population.

Aims & Objective: This study aimed to assess the knowledge about risk factors, symptoms and complications of diabetes and its association with socio-demographic factors.

Materials and Methods: The study was carried out at Neelambur, south India. A total of 500 adults were randomly selected and interviewed using a pretested specifically designed questionnaire.

Results: Of 500 participants interviewed, 42.4% perceived high consumption of sugar as an important risk factor for developing diabetes. Only 54.4%, 47.8%, 58.4%, 53.6% and 45.4% perceived presence of family history of diabetes, obesity, increasing age, physical inactivity and stress as risk factors for diabetes. Majority of them felt slow healing of wound as a symptom for diabetes, but feeling of thirst, frequent urination and tiredness as a symptom for diabetes were identified by only 58.6%, 73.8%, and 73.8% respectively. Only 59.6% of participants understood that diabetes could produce complications. A higher education and presence of family history of diabetes were found to be positively associated with more diabetes knowledge.

Conclusion: This study highlights that there is a lack of awareness of major risk factors for diabetes. Level of education and presence of family history of diabetes are the most significant factors associated with knowledge regarding risk factors, symptoms and complications of diabetes. Massive diabetes health education programs are urgently needed in this population.

Key Words: Diabetes Mellitus; Awareness; Knowledge; Complications

Introduction

There is a global increase in the prevalence of diabetes.[1-5] According to the recent World Health Organization (WHO) report, worldwide, the total number of individuals with diabetes is projected to rise from 171 million in the year 2000 to 366 million in the year 2030.[6] India has the largest number of individuals with diabetes.[7-11] India currently leads the world with over 32 million individuals with diabetes and this numbers is expected to increase to 79.4 million by the year 2030.[12]

Moreover, the WHO report predicts that while the main increase in diabetes would be individuals over 65 years old in developed countries, in India and other developing countries, the highest increase occurs in the age group 35-64 years old which includes individuals in the most productive year of their lives.[13] Demographic transition combined with urbanization and industrialization has resulted in drastic changes in lifestyles globally but the impact is felt more in developing countries.[12] One of the consequences of this transition is a change in disease patterns with communicable diseases being replaced by non-communicable or lifestyle related diseases like diabetes, obesity, cardiovascular disease and cancer.[12,14]

Of all the chronic non-communicable diseases, diabetes is associated with the highest co-morbidities and complications, and affects people from all socio-economic backgrounds.[15,16] Despite having such high prevalence, awareness on diabetes still remains as a major challenge, particularly in the context of developing countries like India. Prevention of diabetes is important because the burden of disease on health care and its economic implications are enormous.[16-18] Very few studies were carried out in Southern part of India to determine the prevailing knowledge about symptoms, risk factors and complications of diabetes.[7,12] Such data is extremely important for planning the health policies with specific reference to implementation of diabetes control programs.[12,19]

Even in other developing countries, such data have mainly focused on diabetic patients and are mostly clinic based which introduces referral bias.[12,20,21] Knowledge about the level of awareness about diabetes in a population is the first step in formulating a prevention

and control program for diabetes.[12] This current study is a step in this direction, whereby the knowledge about risk factors, symptoms and complications of diabetes were elicited from general population in the semi urban field practice area of P S G Institute of Medical Sciences and Research, Coimbatore. The study is also aimed to identify the social and demographic factors associated with the knowledge about risk factors, symptoms and complications of diabetes.

Materials and Methods

We conducted a cross-sectional community based study over a period of three months (May 2012 to July 2012), among residents of both sex, aged 18 years and above at Neelambur, South India. The population in this area was homogeneous in terms of occupation, socio-economic status and food habits and the findings could be extrapolated to all of the other locations. Study variables included socio-demographic characteristics, knowledge about risk factors, symptoms and complications of diabetes, and health related information including medical history of diabetes, hypertension, and high cholesterol, and family history of diabetes.

With an expected correct response to questions on diabetes knowledge as 50%[12], and with an allowable error of 5% and 95% confidence interval, the estimated sample size was 400. A non-response rate of 20% requires a sample size of 500 to be studied. As per the survey conducted in 2011, the total population of Neelambur was 4,466, the total numbers of households were 1,585 and the individuals aged 18 years and above were 2,900. In order to select 500 people, the total number of households required was 273. Hence every 6th houses were decided to be surveyed using systematic sampling. When there were multiple respondents from the same households, they were interviewed separately to avoid peer or family influence. With this procedure, we have surveyed a total of 255 households to set the required sample size.

Institutional Human Ethical Committee clearance was obtained for conducting the study. Written informed consent in the local language (Tamil) was obtained from all the participants. During house visits, the objectives of the study were explained to eligible household members and the data were collected by in-person interview using a pre-designed questionnaire. Individuals who confirmed a family history of diabetes mellitus among first degree relatives were considered to have positive family history of diabetes.

We measured the Socio Economic Status (SES) based on Modified Prasad's classification based on Annual Consumer Price Index (Industrial Work) (ACPI (IW)) for the month of June 2012 after rounding off to the nearest ₹ 10. Those with per capita Income per month ₹ 4310 and above were classified as class 1, those with per capita monthly income between ₹ 2160 to 4309 were classified as class 2, those with per capita income between ₹ 1290 to 2159 were classified as class 3, those with per capita income between ₹ 650 to 1289 were classified as class 4 and per capita income less than ₹ 650 as class 5.[22]

Statistical Methods

The association between study variables assessing (1) components of risk factor-relating to knowledge of diabetes (e.g., presence of family history of diabetes, excessive sugar intake, obesity, higher age, physical inactivity and stress) (2) symptoms of diabetes (e.g., feeling of thirst, frequent urination, slow healing of wound and tiredness) (3) complication of diabetes (e.g., affecting foot, kidney, eye, blood vessels, heart, brain and teeth) and (4) certain socio demographic characteristics (e.g., participants' gender, age, educational status, socio economic status, medical history of diabetes, and hypertension, positive family history of diabetes), were determined by estimating the difference in proportions, using Pearson Chi square analysis.

The relationship between various components of knowledge of diabetes (e.g., risk factors, symptoms, complications) and socio- demographic and clinical factors were evaluated separately using adjusted odds ratio with 95% confidence intervals. To accomplish, a composite score for knowledge of risk factors of diabetes was created for each component. For this, for all questions, correct answers were graded as 1, and incorrect answers inclusive of don't know as 0. A composite score in percentage was then derived by dividing each individual's score by the maximum score possible.

For each component of the knowledge, median score was then determined and those above the median score to each component of the knowledge were graded as having good knowledge and coded as 1, others coded as 0. Age, sex, educational level, income, medical history of diabetes and hypertension and positive family history of diabetes were entered into a multivariate logistic regression model. Odds ratio were assessed for significance using Wald statistics. All statistical tests

were two-tailed and a probability value of less than 0.05 was considered statistically significant. Analysis of variance (ANOVA) was performed to compare the mean composite score across various categories. All statistical analyses were performed using SPSS (19.0 version).

Results

The demographic and clinical characteristics of the participants are as shown in Table 1. A total of 500 individuals were surveyed, and 70% of the subjects were below the age of 50 years. Only 17% had an educational level of college or above. A positive family history of diabetes and medical history of diabetes were reported by 30.8% and 9% of the participants, respectively. No statistically significant gender differences in demographic and clinical characteristics were identified (p>0.05) in terms of self-reported diabetes, hypertension or family history of diabetes.

Rates of awareness regarding important diabetes risk factors like presence of family history of diabetes, excessive sugar intake, obesity, increasing age, physical inactivity and stress are shown in Table 2. About 54.4% perceived presence of family history of diabetes as an important risk factor. Only 42.4%, 47.8%, 58.4%, 53.6% and 45.4% perceived excess sugar intake, obesity, increasing age, physical inactivity and stress as risk factors for diabetes.

Awareness regarding physical inactivity as a risk factor was more common among subjects below 50 years old, those who have a college education or above and those who have positive family history of diabetes. Recognizing the presence of family history of diabetes as a significant risk factor for developing diabetes, was more common among those having a college education or above, and those having positive family history of diabetes.

Recognizing excessive sugar intake as a risk factor for diabetes was more common among those with hypertension.

Knowledge about common symptoms of diabetes relative to socio demographic and clinical factors is shown in Table 3. It shows that only 58.6% reported feeling of thirst as symptom of diabetes, whereas 73.8% reported frequent urination as a symptom of diabetes. Knowledge of the symptoms of diabetes was more common among those having a college education or above.

Knowledge about complications of diabetes relative to socio- demographic and clinical factors is shown in Table 4. 52.8% reported that it affects foot, 51.4% reported that it affects kidney, 49.2% reported that it affects eye, 42.8% reported that it affects blood vessels, 42% reported that it affects heart and only 32.2% reported that it affects teeth. In general, knowledge was more common among those having a college education or above, those having diabetes, those having positive family history of diabetes and those aged 50 years and below.

Logistic regression analysis (Table 5) revealed that those with a college education or above (OR 2.41, 95% CI 1.12, 5.17, P< 0.05) and those with positive family history of diabetes (OR 1.62, 95% CI 1.08, 2.42, P<0.05) have greater knowledge of risk factors of diabetes. However, participant's income level was not significantly associated with the knowledge about the risk factors of diabetes. Similar analysis was conducted for subject's knowledge about symptoms and complications of diabetes (not shown in table) and results were similar. The mean (SD) scores according to educational level are presented in Figure 1 and according to presence of family history of diabetes is presented in Figure 2.

Table-1: Socio-demographic and Clinical characteristics of the study population							
Characteristics		**Males**		**Females**		**Total**	**P value**
		n	%	n	%	n	%	
Age group (years old)	18-30	38	17	89	32.2	127	25.4	
	31-49	121	54	103	37.3	224	44.8	<0.001
	50 and above	65	29	84	30.4	149	29.8	
Educational levels	Illiterate	17	7.6	64	23.2	81	16.2	
	Up to higher secondary	172	76.8	162	58.7	334	66.8	<0.001
	College and above	35	15.6	50	18.1	85	17	
Socio economic status	Class I and II	114	50.9	129	46.7	243	48.6	
	Class III , IV and V	110	49.1	147	53.3	257	51.4	0.369
Self- reported diabetes	Yes	20	8.9	25	9.1	45	9	
	No	204	91.1	251	90.9	455	91	0.99
Self-reported hypertension	Yes	31	13.8	36	13	67	13.4	
	No	193	86.2	240	87	433	86.6	0.794
Family history of diabetes	Yes	75	33.5	79	28.6	154	30.8	
	No	149	66.5	197	71.4	346	69.2	0.245
Total		224	100	276	100	500	100	

Table-2: Knowledge about risk factors of diabetes by Socio-demographic factors

Characteristics		Presence of Family History		Excess sugar intake		Obesity		Higher age (> 40 years)		Physical inactivity		Stress	
		%	P	%	P	%	P	%	P	%	P	%	P
Sex	Males	57.6	0.207	44.2	0.468	54.5	0.009	62.9	0.068	61.2	0.003	49.6	0.104
	Females	51.8		40.9		42.4		54.7		47.5		42	
Age group (years old)	18-30	57.5	0.006	39.4	0.383	48	0.038	53.5	0.331	53.5	0.007	32.3	0.001
	31-49	59.8		41.1		53.1		61.6		60.3		53.6	
	50 and above	43.6		47		39.6		57.7		43.6		44.3	
Educational Levels	Illiterate	29.6	<0.001	51.9	0.069	32.1	0.001	59.3	0.679	33.3	<0.001	35.8	0.083
	Up to higher secondary	56.3		42.2		48.5		59.3		53.3		45.8	
	College and above	70.6		34.1		60		54.1		74.1		52.9	
Socioeconomic status	Class I and II	57.2	0.243	42	0.857	49.8	0.420	58.8	0.856	58	0.060	46.5	0.654
	Class III, IV and V	51.8		42.8		45.9		58		49.4		44.4	
Self- reported diabetes	Yes	53.3	0.877	42.2	1	46.7	1	60	0.875	55.6	0.876	73.3	<0.001
	No	54.5		42.4		47.9		58.2		53.4		42.6	
Self-reported hypertension	Yes	55.2	0.896	53.7	0.047	41.8	0.297	65.7	0.231	52.2	0.895	52.2	0.238
	No	54.3		40.6		48.7		57.3		53.8		44.3	
Family history of diabetes	Yes	66.9	<0.001	40.9	0.695	53.2	0.121	64.3	0.078	70.1	<0.001	59.1	<0.001
	No	48.8		43.1		45.4		55.8		46.2		39.3	
Total		54.4		42.4		47.8		58.4		53.6		45.4	

Table-3: Knowledge about symptoms of diabetes by Socio-demographic factors

Characteristics		Feeling of thirst		Frequent urination		Slow healing of wound		Tiredness	
		%	P	%	P	%	P	%	P
Sex	Males	67	0.001	79	0.019	96	0.129	78.1	0.052
	Females	51.8		69.6		92.4		70.3	
Age group (years old)	18-30	52.8	0.159	71.7	0.125	95.3	0.114	66.9	0.001
	31-49	62.9		78.1		95.5		81.7	
	50 and above	57		69.1		90.6		67.8	
Educational Levels	Illiterate	45.7	0.027	58	0.001	91.4	0.436	60.5	0.008
	Up to higher secondary	60.2		75.1		94.9		75.4	
	College and above	64.7		83.5		92.9		80	
Socioeconomic status	Class I and II	61.7	0.174	79.8	0.003	95.5	0.192	76.5	0.187
	Class III, IV and V	55.6		68.1		92.6		71.2	
Self- reported diabetes	Yes	71.1	0.082	88.9	0.013	100	0.097	88.9	0.013
	No	57.4		72.3		93.4		72.3	
Self-reported hypertension	Yes	67.2	0.143	74.6	1	92.5	0.580	76.1	0.765
	No	57.3		73.7		94.2		73.4	
Family history of diabetes	Yes	63	0.202	81.8	0.008	96.8	0.103	83.1	0.001
	No	56.6		70.2		92.8		69.7	
Total		58.6		73.8		94		73.8	

Table-4: Knowledge about complications of diabetes by socio demographic factors

Characteristics		Organs Affected by Diabetes													
		Foot		Kidney		Eye		Blood vessels		Heart		Brain		Dental	
		%	P	%	P	%	P	%	P	%	P	%	P	%	P
Sex	Males	61.2	0.001	62.1	<0.001	55.4	0.015	48.7	0.018	48.7	0.008	41.1	0.002	37.5	0.027
	Females	46		42.8		44.2		38		36.6		27.9		27.9	
Age group (years old)	18-30	44.1	<0.001	44.1	<0.001	38.6	<0.001	35.4	0.000	37.8	0.007	25.2	<0.001	25.2	0.003
	31-49	63.8		62.1		59.4		53.1		49.6		43.8		40.2	
	50 and above	43.6		41.6		43		33.6		34.2		26.2		26.2	
Educational Levels	Illiterate	29.6	<0.001	25.9	<0.001	29.6	<0.001	22.2	<0.001	16	<0.001	11.1	<0.001	12.3	<0.001
	Up to higher secondary	56		53.6		50.6		43.7		45.2		37.4		33.5	
	College and above	62.4		67.1		62.4		58.8		54.1		41.2		45.9	
Socioeconomic status	Class I and II	59.3	0.005	60.5	<0.001	58.4	<0.001	51.9	<0.001	53.5	<0.001	40.3	0.003	41.2	<0.001
	Class III, IV and V	46.7		42.8		40.5		34.2		31.1		27.6		23.7	
Self- reported diabetes	Yes	75.6	0.002	73.3	0.003	73.3	0.001	60	0.018	57.8	0.027	51.1	0.013	42.2	0.136
	No	50.5		49.2		46.8		41.1		40.4		32.1		31.2	
Self-reported hypertension	Yes	52.2	0.99	46.3	0.431	47.8	0.896	38.8	0.509	37.3	0.428	31.3	0.680	31.3	0.99
	No	52.9		52.2		49.4		43.4		42.7		34.2		32.3	
Family history of diabetes	Yes	65.6	<0.001	63.6	<0.001	61	<0.001	50.6	0.019	52.6	0.002	44.8	0.001	37.7	0.097
	No	47.1		46		43.9		39.3		37.3		28.9		29.8	
Total		52.8		51.4		49.2		42.8		42		33.8		32.2	

Table-5: Factors associated with knowledge of diabetes, based on multiple logistic regression analysis

Demographic factor		OR	95% CI	P value
Sex	Males	1		
	Females	1.33	0.904, 1.955	0.15
Age group (years old)	18-30	1		
	31-49	1.58	0.979, 2.558	0.06
	50 and above	0.97	0.531, 1.761	0.91
Educational Levels	Illiterate	1		
	Up to higher secondary	1.76	0.96, 3.229	0.07
	College and above	2.41	1.124, 5.178	0.02
Socioeconomic status	Class I and II	1		
	Class III, IV and V	0.91	0.618, 1.332	0.62
Self- reported diabetes	Yes	1		
	No	1.92	0.956, 3.844	0.07
Self-reported hypertension	Yes	1		
	No	1.27	0.711, 2.256	0.42
Family history of diabetes	Yes	1		
	No	1.62	1.081, 2.429	0.02
Total		54.4	1	
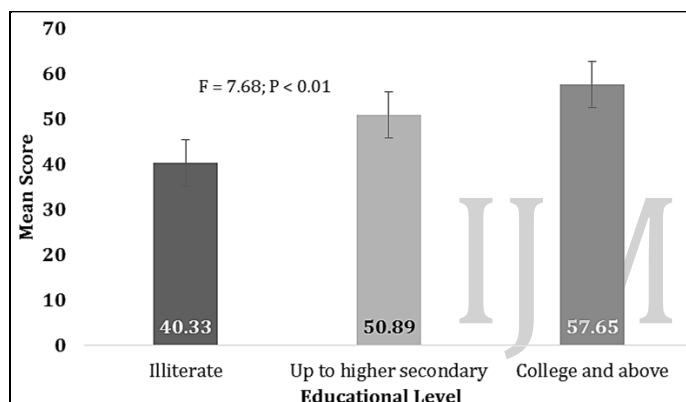
Figure-1: The mean knowledge composite scores (in percentages) of risk factors of diabetes according to the educational status
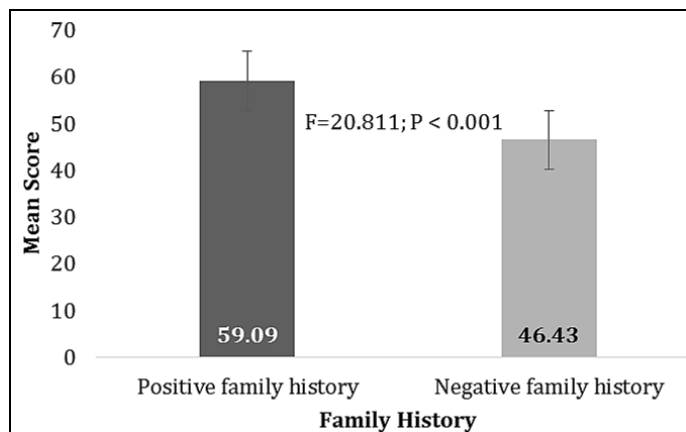
Figure-2: The mean knowledge composite scores (in percentage) of risk factors of diabetes according to the presence of family history of diabetes

Discussion

In the present study, we surveyed the catchment area of the PSG Institute of Medical Science and Research, regarding their knowledge of risk factors, symptoms and complications of diabetes. The elicited information was somewhat discouraging. More than half of the participants were unable to identify risk factors or complications of diabetes. The failure to recognize risk factors and symptoms may reflect public's significant lack of knowledge about diabetes. It is likely to have negative repercussions in terms of prevention or early diagnosis of diabetes. It can also have a huge negative impact on the economy of developing countries. This study underscores the urgent need to improve the knowledge and awareness about diabetes particularly in developing countries like India. Studies from India had shown that repeated exposures to healthy lifestyle education were necessary for achieving compliance with treatment recommendations.[7,23- 25]

Facilities for such integrated patient education modalities are not available in countries like India where prevalence of diabetes is increasing.[7,26] Creating awareness about the disease, its causes, treatment and complications is the first step in the crusade against the disease. For countries like India having a huge burden of diabetes,[7,27] a structured national program for creating awareness about the disease should be considered as a public health priority.

It is widely acknowledged that excessive sugar intake is a risk factor for diabetes.[28,29] However, only 42% of the participants surveyed perceived high consumption of sugar as an important risk factor for diabetes. Studies consistently have shown that there is a discrepancy between one's attitude and behaviours.[28,30] Therefore, it remains to be seen whether knowledge regarding the adverse effects of excessive sugar intake will translate into personal decisions to curtail excessive sugar even among these population.

Regular annual screening for diabetes allows treatable diseases to be identified.[16,31] People's lack of knowledge about diabetes complications can hamper ability of early detection and treatment of their diseases and the complications. Eye complication from diabetes was stated only by 50% of the participants. Awareness on other complications of diabetes was also found to be poor, which highlights the need for these aspects to be focused in diabetes education programs.

The knowledge about diabetes complications was significantly higher among those with self-reported diabetic than non-diabetic subjects. But even among the diabetic patients, the knowledge about complications

was poor indicating that the patient have not been taught about the complications of diabetes by their physicians. This may be due to several factors such as inappropriate ways of providing information or may be due to the lack of time due to the heavy patient loads. This also re-emphasizes the need for continuing medical education programs in diabetes for doctors and also for developing a large number of diabetes educators in developing countries in order to improve diabetes education for patients and the general public.

The present study indicates that one's level of education has a direct influence on the level of knowledge regarding risk factors, symptoms and complications of diabetes. This supports the previous findings[28,32,33], and suggests that knowledge about diabetes is conducive to heath education.[28] In addition to education, a family history of diabetes also appears to influence one's level of knowledge and perceptions of diabetes.[28,34] Individuals with a positive medical history of diabetes may develop a personal sense of vulnerability which, in turn, may increase their awareness as was revealed in the present study.[28,35] Our findings supported the view of Harwell et al reporting that family history of diabetes is the factor most significantly associated with the perceived risk of developing diabetes.[28,36]

There are several limitations in using a questionnaire for assessing the knowledge of a disease in the community.[12] It often depends on the recall memory, which is a subject to bias. However, for such a community based study, use of a questionnaire is perhaps the only feasible way to obtain such data.

Conclusion

In conclusion, this present study from a representative sample in South India indicates that seeing limited public knowledge of diabetes, diabetes education programs could play a crucial role in controlling the emerging epidemic of diabetes. This raises optimism that health education could be a powerful tool, as we strive to develop strategies to combat the problems which are often amenable to life-style modifications.

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