



AWARENESS TOWARDS TYPE 2 DIABETES MELLITUS IN URBAN POPULATION OF PUNE, MAHARASHTRA, INDIA

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ABSTRACT

India has earned a dubious distinction of global diabetes capital. In this view, the present study was designed to assess awareness level of diabetes among the population of western Maharashtra. A cross-sectional study was carried out in and around Pune City. Normoglycemic adult Indian citizens were included in the study. About 49% of the population belonged to a group reporting increased incidence of type 2 diabetes mellitus (20-30 yrs.). With access to specialist treatment and income of individuals being positively correlated ($r^2=0.8$), awareness about regular health check-up was quite low (20%-35.71%). The 12% of subjects, who never had medical check-up, had at least two symptoms of metabolic disorder and 30% of these had family history of type 2 diabetes. Literacy level and knowledge about different methods of blood glucose checking were positively correlated ($r^2=0.96$). About 60% of the survey population believed that sweets or sugar intake causes diabetes. The study indicates an urgent need for raising awareness about this metabolic disorder in general population through all possible means to mitigate future burst and epidemiological burden.

KEYWORDS: Awareness, India, Survey research, Type 2 diabetes mellitus.



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INTRODUCTION

With its dramatically increasing global prevalence and the high clinical and social costs associated with it, diabetes mellitus is one of the major public health concerns worldwide¹. Diabetes mellitus is a common and potentially disabling chronic disease². With the rapid economic and urban transformation of India, the country is currently witnessing a rapid and widespread rise in the prevalence of diabetes (predominantly driven by type 2 diabetes). It is estimated that India is home to the largest number of people with diabetes worldwide³. Diabetes is rapidly emerging as a major health care problem in India, especially in urban areas. The prevalence of type 2 diabetes has been steadily increasing in urban areas from a low 2.1 percent reported in early 1970⁴ to 12.1 per cent in 2000⁵. Nowhere is the diabetes epidemic more pronounced than in India as the World Health Organization (WHO) reports show that 32 million people had diabetes in the year 2000¹. The International Diabetes Federation (IDF) estimates the total number of diabetic subjects to be around 40.9 million in India and this is further set to rise to 69.9 million by the year 2025⁶. A study done in western India indicated age standardized prevalence of 8.6 per cent in urban population⁷. A more recent study reported a high prevalence (9.3%) in rural Maharashtra⁸. Diabetes mellitus is one of the five leading causes of death worldwide⁹. Moreover; individuals with diabetes are at a higher risk of heart disease, stroke, high blood pressure, blindness, kidney disease, nervous system disease, amputations, dental disease, and complications of pregnancy¹⁰. Lifestyle behaviors, such as physical activity and nutrition, have been shown to play an important role in reducing the complications related to hypertension and diabetes^{11, 12, 13}. Knowledge and awareness about DM, its risk factors, complications and management are important aspects for better control and better quality of life^{1, 13}. Therefore, information on the level of public knowledge of diabetes will be useful for planning an effective educational program. To the best of

our knowledge, there is no published study of the level of knowledge of diabetes in the India public. Thus, the objectives of this study were to 1) evaluate the level of knowledge of diabetes among the population in India ; 2) identify areas of knowledge deficiency requiring additional education effort; and 3) evaluate whether factors such as sex, older age, education level, own self having diabetes, and having family member with diabetes are associated with knowledge of diabetes.

METHODS

(i) Study area

The study was conducted in the rural as well as urban areas of Pune, Maharashtra. Most of the survey samples were from a unique region situated at the borderline of urban and rural areas. This area specifically was selected since the population represented both urban and rural areas with varying educational and economical backgrounds.

(ii) Inclusion criteria, instrument and delivery of questionnaire

Total of one hundred Indian citizens participated in this study. Inclusion criteria for the study subjects were Indian citizens of age 18 years or above who have neither been diagnosed as diabetic nor using any hypoglycemic medication. A well structured questionnaire was delivered to the respondents by trained researchers in the language understood by the participants, in their homes/offices and at a time convenient to the participants. The respondents were asked to select the most appropriate or closest match of their reply from the questionnaire without suggestive probing. The questionnaire consisted of both, option lists, as well as ended questions. Information collected was recorded on structured forms codified for computer and statistical analysis. The questionnaire contained a series of questions related to participant's social status (10 questions), economic status (7 questions), medical status (10 questions), diet status (8

questions), lifestyle and exercise status (8 questions), psychological status (4 questions) and general awareness about diabetes (23 questions). Data was subjected to statistical analysis using SPSS software (Version 17.0).

RESULTS AND DISCUSSION

Mean age of the study population was reported to be 33.85 ± 10.8 years. Nearly half of the study population (49%) belonged to the age group of 20-30 years. The population consisted of 73% males and 27% female respondents. Eighty percent of the population had education at least upto graduation level (Table 1). Average BMI of the population was 22.83 ± 2.62 and 22.37 ± 3.69 for males and females respectively. Out of the one hundred respondents, 78 had normal BMI while 22 respondents were overweight (BMI 25-29 kg/m²) or obese (BMI 30 kg/m² or above). About 71% and 28% males and females were found to be overweight and 80-100% of the overweight respondents were urban residents (Table 2). It was found that the awareness about regular health check-up, even among the older participants was quite low. Only about 20% and 35.71% of the population from the age group 41-50 and 51-60 years opted for regular medical check-up with a frequency of at least once in a year. Around 50% of this population preferred general practitioners as against 31% which were seeking specialist treatment. A significantly positive correlation was observed between access to specialist treatment and income of the individuals ($r^2=0.8$). Out of the complete study population, only 21% were regularly being seen by their clinicians once (85.71%) or twice (14.28%) a year. Seventy nine percent of the population did not think it necessary and never underwent thorough clinical check-up. It can be noted that 55% of the individuals not opting for a regular medical check-up were aged 30 or more. Out of this population, 12% of the individuals had at least two symptoms of frequent urination, night sweat, craving for food, unexplained weight loss or fatigue in the immediately preceding month while around 10% had hypertension, dyslipidemia, stroke, heart attack or gestational

diabetes. Mental and physical stress and being overweight were reported to be probable reasons for these ailments by the respondents. The respondents (29.11%) who never had a full medical check-up or did not think it necessary reported that they had a family history of type 2 diabetes mellitus.

Lifestyle patterns and exercise is known to be very important in management of metabolic disorders like type 2 diabetes mellitus. This study included a set of questions addressing the lifestyle and exercise status of the respondents. It was found that, irrespective of the rural or urban origin of the respondents, 89% were involved in a job or business which had significant sedentary activity and 61.79% of these subjects reported that they exercised on regular basis. But only 52% of the subjects with sedentary lifestyle did walking, aerobics, jogging or exercise training in professional gymnasium and only 25% of these did the exercise for more than 30 minutes a day and for four or more days a week. The general awareness about the metabolic disorders and associated conditions was found to be much lower in the study population. Only about 70% of the subjects were aware about the conditions like type 2 diabetes mellitus, cardiovascular diseases and hypertension. About 48% of the respondents were aware about the availability of electronic devices for blood sugar monitoring. Taking into consideration a lower age of onset of metabolic disorders, only 7.14% of the subjects aged 30+ checked their glucose levels regularly. The level of education and knowledge about different methods and importance of blood glucose checking was found to be positively correlated with level of education ($r^2=0.96$). 92.68% of the subjects with the awareness of the methods to check blood glucose, had education upto graduation or more. Figure 1 indicates the responses of the survey population in relation to the questions pertaining to general awareness about type 2 diabetes mellitus. It was seen that only around 70% of the survey population was aware of the condition called diabetes. About 60% of the survey population said that the intake of sweets or sugar causes diabetes. Only about 54% of the population knew the normal fasting

and PP glucose levels. There was very little awareness about the different government schemes for patients suffering from diabetes and only 8% of the survey population said that they opt for such schemes. Ramchandran et al. 2007¹⁴ have shown that the urban and rural diabetic subjects spend significantly high amount of their income on diabetes management in India. The present study shows that there are only 21% of the subjects who undergo regular annual or biannual medical check. The regular medical check-up may turn up to be much more cost effective in detecting metabolic

predisposition to this disorder as well as crafting individualized plan to delay the onset of the disease. Mohan et al. 2007¹⁵ have demonstrated that there is disturbing trend of more young subjects being diagnosed with diabetes in India and the main factor for this increase is changes in the dietary and exercise patterns. The present study also indicates the least interest of the subjects in the age group of 30+ towards regular medical check-up. There are very few studies in Maharashtra in relation to population awareness, incidence and management and care of type 2 diabetes mellitus^{8, 14, 16, 17}.

Table 1
Sociodemographic structure of the survey population

| Socio-demographic structure | | |
|-----------------------------|--------|---------------|
| Age Group | Number | Mean Age ± SD |
| 20-30 | 49 | 25.44±2.96 |
| 31-40 | 27 | 34.41±3.08 |
| 41-50 | 10 | 44.30±3.23 |
| 51-60 | 14 | 54.71±2.81 |
| Sex | Number | |
| Male | 73 | |
| Female | 27 | |
| Education | Number | |
| PG+Diploma | 18 | |
| PG | 24 | |
| UG+Diploma | 02 | |
| UG | 36 | |
| Matriculate | 15 | |
| School | 05 | |

Table 2
Body mass index (BMI) and distribution of BMI among survey population

| Cumulative BMI considerations | | | |
|---|----------------|----------------------------|------------------------------|
| Sex | Average BMI±SD | | |
| M | 22.83±2.62 | | |
| F | 22.37±3.69 | | |
| Distribution of BMI among survey population | | | |
| BMI (kg/m ²) | Number | Male (%) U (%) R (%) | Female (%) U (%) R (%) |
| Upto 24 (Normal) | 78 | 57 (73.08) | 21 (26.92) |
| | | 28(49.12) | 15 (71.43) |
| | | 29(50.88) | 06 (28.57) |
| 25-29 (Overweight) | 21 | 15 (71.43) | 6 (28.57) |
| | | 12 (80) | 6 (100) |
| | | 3 (20) | Nil(Nil) |
| 30 and above (Obese) | 1 | 1 (100) | Nil (Nil) |
| | | Nil (Nil) | Nil (Nil) |
| | | 1 (100) | Nil (Nil) |

U: Urban; R: Rural; SD: Standard Deviation

General awareness about type 2 diabetes mellitus among the survey population

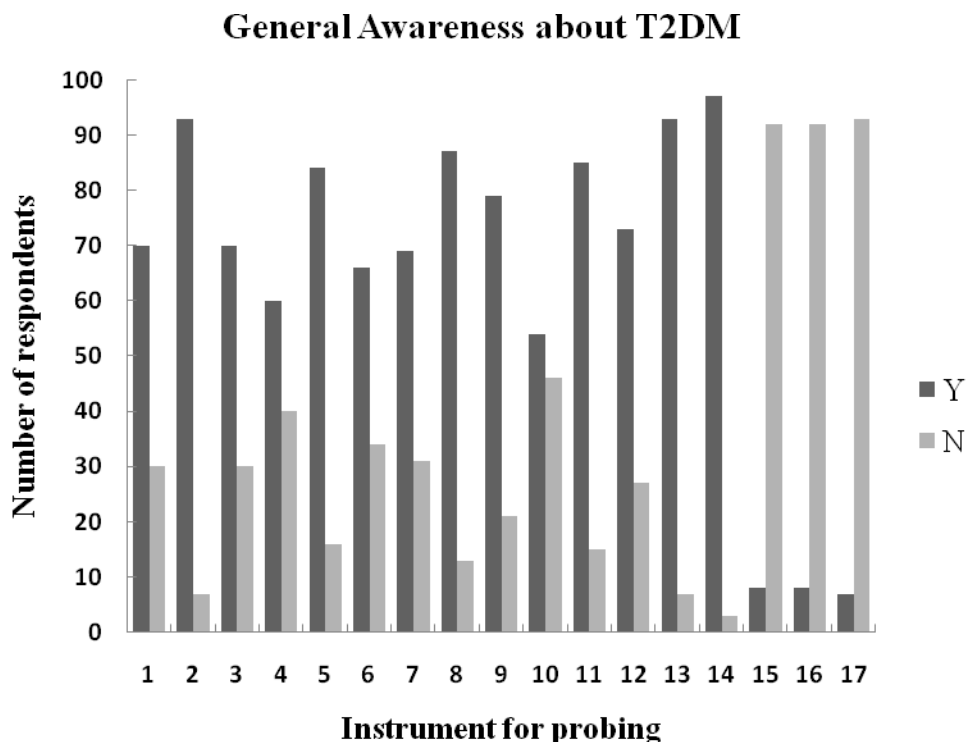


Figure 1

Axis labeled “Instrument for probing” indicates 17 different questions from a well structured questionnaire delivered to one hundred healthy normoglycemic adult Indian individuals to assess the awareness about metabolic disorders, in general and type 2 diabetes mellitus, in particular. Only 70% of the survey population was aware of the condition called diabetes. About 60% of the survey population believed that intake of sweets or sugar causes diabetes. The 54% of population knew normal fasting and PP glucose levels. There was very little awareness about different government schemes for patients suffering from diabetes.

CONCLUSIONS

There is an urgent need for creating strong awareness about diabetes in general public by various means. The importance of regular medical check-up after the age of 30 should be highlighted. The diabetes awareness can be effectively created by awareness campaigns, workshops, street plays and wide media

coverage. Private and public health care professionals should join hands in completing this task and the local governing bodies should draft a robust plan for these measures so as to make sufficient awareness about this serious and abundant metabolic disorder.

REFERENCES

1. Wild S, Roglic G, Green A, Sicree R and King H, Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diab Care*, 27: 1047 – 1053, (2004).
2. Harris MI, Flegal KM, Cowie CC, Eberhardt MS, Goldstein DE and Little RR, Wiedmeyer H, Byrd-Holt DD, Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in US adults. *Diab Care*, 21: 518 – 524, (1998).

3. Shaw JE, Sicree RA and Zimmet PZ, Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Pract*, 87(1): 4 – 14, (2010).
4. Ahuja MMS, Epidemiological studies on diabetes mellitus in India. In: Ahuja MMS (ed) *Epidemiology of diabetes in developing countries*, Interprint, New Delhi, (1979).
5. Ramachandran A, Snehlata C, Kapur A, Vijay V, Mohan V, Das AK, Rao PV, Yajnik CS, Prasanna Kumar KM and Nair JD, High prevalence of diabetes and impaired glucose tolerance in India. National Urban Diabetes Survey. *Diabetologia*, 44: 1094 – 1101, (2001).
6. Sicree R, Shaw J and Zimmet P, Diabetes and impaired glucose tolerance. In: Gan D (ed) *Diabetes Atlas*. International Diabetes Federation. 3rd edn. International Diabetes Federation, Belgium, (2006).
7. Gupta A, Gupta R, Sarna M, Rastogi S, Gupta VP and Kothari K, Prevalence of diabetes, impaired fasting glucose and insulin resistance syndrome in an urban Indian population. *Diabetes Res Clin Pract*, 61: 69 – 76, (2003).
8. Deo SS, Zantye A, Mokal R, Mithbawkar S, Rane S and Thakur K, To identify the risk factors for high prevalence of diabetes and impaired glucose tolerance in Indian rural population. *Int J Diab Dev Countries*, 26: 19 – 23, (2006).
9. Caliskan D, Ozdemir O, Ocaktan E and Idil A, Evaluation of awareness of diabetes mellitus and associated factors in four health center areas. *Patient Educ Couns*, 62: 142 – 147, (2006).
10. Akinci F, Healey BJ and Coyne JS, Improving the health status of US working adults with type 2 diabetes mellitus. *Dis Manag Health Outcomes*, 11: 489 – 498, (2003).
11. Roberts CK, Vaziri ND and Barnard RJ, Effect of diet and exercise intervention on blood pressure, insulin, oxidative stress, and nitric oxide availability. *Circulation*, 106: 2530 – 2532, (2002).
12. Steyn NP, Mann J, Bennett PH, Temple N, Zimmet P, Tuomilehto J, Lindstrom J and Louheranta A, Diet, nutrition and the prevention of type 2 diabetes. *Public Health Nutr*, 7: 147 – 165, (2004).
13. Ard JD and Svetkey LP, Diet and blood pressure: Applying the evidence to clinical practice. *Am Heart J*, 149: 804 – 812, (2005).
14. Ramachandran A, Ramachandran S, Snehalatha C, Augustine C, Murugesan N, Viswanathan V, Kapur A and Williams R, Increasing expenditure on health care incurred by diabetic subjects in a developing country: a study from India. *Diab Care*, 30(2): 252 – 256, (2007).
15. Mohan V, Sandeep S, Deepa R, Shah B and Varghese C, Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res*, 125: 217 – 230, (2007).
16. Jonas JB, Panda-Jonas S, Vinay N, Joshi PP and Matin A, Diabetes mellitus in rural India. *Epidemiology*, 21: 754 – 755, (2010).
17. Anjana RM, Pradeepa R, Deepa M, Datta M, Sudha V, Unnikrishnan R, Bhansali A, Joshi SR, Joshi PP, Yajnik CS, Dhandhanika VK, Nath LM, Das AK, Rao PV, Madhu SV, Shukla DK, Kaur T, Priya M, Nirmal E, Parvathi SJ, Subhashini S, Subashini R, Ali MK and Mohan V, Prevalence of diabetes and prediabetes (impaired fasting glucose and/or impaired glucose tolerance) in urban and rural India: phase I results of the Indian Council of Medical Research-India DIABetes (ICMR-INDIAB) study. *Diabetologia*, 54(12): 3022 – 3027 (2011).