Awareness and Knowledge of Diabetes in Chennai - The Chennai Urban Rural Epidemiology Study [CURES - 9]

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Abstract

Background and Aim : There are virtually no epidemiological studies from India assessing the level of awareness of diabetes in a whole population. The aim of the present study was to assess the awareness of diabetes in an urban south Indian population in Chennai.

Methods : The Chennai Urban Rural Epidemiology Study (CURES) is an ongoing population based study conducted using a systematic sampling method on a representative population (aged ≥ 20 years – 26001 individuals) of Chennai [formerly Madras], the largest city in Southern India. A structured questionnaire was used to obtain information related to demography, education and medical history. The questionnaire included five questions on diabetes awareness.

Results : Of the total 26,001 individuals, only 75.5% (19642/26001) of the whole population reported that they knew about a condition called diabetes or conversely nearly 25% of the Chennai population was unaware of a condition called diabetes. 60.2% (15656/26001) of all participants and 76.7% (1173/1529) of the self reported diabetic subjects knew that the prevalence of diabetes was increasing in India. Only 22.2% (5764/26001) of the whole population and 41.0% (627/1529) of the known diabetic subjects were aware that diabetes could be prevented. Knowledge of the role of obesity and physical inactivity in producing diabetes was very low, with only 11.9% (3083/26001) of study subjects reporting these as risk factors for diabetes. Only 19.0% (4951/26001) of whole population knew that diabetes could cause complications. Even among the self reported diabetic subjects, only 40.6% (621/1529) were aware that diabetes could produce some complications.

Conclusion : Awareness and knowledge regarding diabetes is still grossly inadequate in India. Massive diabetes education programmes are urgently needed both in urban and rural India. ©

INTRODUCTION

Demographic transition combined with urbanization and industrialization has resulted in drastic changes in lifestyles globally but the impact is felt more in developing countries because of their more rapid pace of growth. One of the consequences of this transition is a change in disease patterns with communicable diseases being replaced by non-communicable or life style related diseases like diabetes, obesity, cardiovascular disease and cancer.[1] Until a decade ago, diabetes was not considered a major public health problem in developing countries like India but the situation has now dramatically changed. According to the recent World Health Organization report (WHO), India today leads the world with over 32 million diabetic patients and this number is projected to increase to 79.4 million by the year 2030.[2] Recent surveys indicate that diabetes now affects a staggering 10 - 16% of the urban population in India.[3-5] Diabetes has thus become a great economic challenge as it drains between 5 – 25 % of the family income of an average Indian,[6] which translates to 2.2 billion US dollars per annum.[7,8] The quality of life is also greatly affected particularly in young adults, the group which is predicted to see the greatest increase in diabetes prevalence in developing countries.[2]

There is very little data on the level of awareness about diabetes in developing countries like India. Such data is extremely important to plan the public health polices with specific reference to implementation of national

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diabetes control programs. A literature search on knowledge about diabetes in developing countries yielded very few studies actually dealing with the awareness of diabetes among people with the disease[9,10] and virtually no data on a whole population. Even in other developing countries, such studies have mainly focused on diabetic patients and are mostly clinic based which introduces referral bias.[10-12] Knowledge about the level of awareness about diabetes in a population is the first step in formulating a prevention programme for diabetes. This study is a step in this direction where the awareness and knowledge of diabetes in urban Chennai in southern India was assessed in a population-based study.

METHODS AND MATERIAL

The study subjects were recruited from the Chennai Urban Rural Epidemiology Study (CURES), an ongoing epidemiological study conducted on a representative population (aged ≥ 20 years) of Chennai (formerly Madras) the fourth largest city in India. The methodology of the study has been published elsewhere.[13] Briefly, in Phase 1 of the urban component of CURES, 26,001 individuals were recruited based on a systematic sampling technique covering the whole population of Chennai. Self reported diabetes (n=1529) was diagnosed if the subjects stated that they had diabetes and or if they were on treatment with anti-diabetic drugs.[14]

A detailed questionnaire was used to obtain basic data regarding awareness, knowledge, traditional beliefs, treatment practices and other issues. Educational status was graded as illiterates, middle school, high school, graduates, postgraduates and professionals.

Table 1 shows a partial set of questions used for the survey which was administered both in English as well as local language (Tamil).

Table 1 : Questions used for obtaining data regarding knowledge of diabetes

Questions

1. Do you know what diabetes is?
    Yes ☐   No ☐
2. Do you think, in general, more and more people are getting affected with with diabetes nowadays?
    Yes ☐   No ☐   Don't know ☐
3. What are the factors you think that contribute to diabetes?
a. Obesity ☐   b. Decreased physical activity ☐
c. Family history of diabetes ☐   d. Mental stress ☐
e. Consuming more sweets ☐
f. Others (name) _____
4. Do you know that diabetes can cause complications in other organs?
    Yes ☐   No ☐   Don't know ☐
a) If yes, what are they?
1 ._____   2 ._____   3 ._____   4 ._____
5. Can diabetes be prevented?
    Yes ☐   No ☐   Don't know ☐

Composite score for knowledge of diabetes

The answers to the questions were analyzed and a scoring system was used as follows:

a) For closed questions,[1,2,4,5] correct answers were graded as 1 and incorrect answers (inclusive of "don't know") as 0.

b) For question No. 3 which was on causative factors for diabetes, highest score of 4 was awarded for subjects who ticked obesity, decreased physical activity or family history of diabetes, 3 was given for consuming sweets and other high calorie or junk foods, 2 for 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 had obtained 2 correct answers, for the closed question [1,2,4,5] and ticked mental stress (score = 2) for question no. 3, then the composite score would be $4 / 8 \times 100 = 50\%$

RESULTS

Knowledge about diabetes and its prevalence

Only 75.5% (19642/26001) of the whole population reported that they knew about a condition called diabetes or conversely nearly 25% of the Chennai population was unaware of a condition called diabetes. 77.6% (9956/12838) of males knew about diabetes compared to 73.6% (9684/13163) of females. 60.2% (15656/26001) of participants felt that the prevalence of diabetes was increasing (62.6% of males (8032/12838) and 57.9% (7624/13163) of females). Even among self-reported diabetic subjects, only 76.7% (1173/1529) knew that the prevalence of diabetes was increasing in India [Fig. 1].

Knowledge of prevention of diabetes
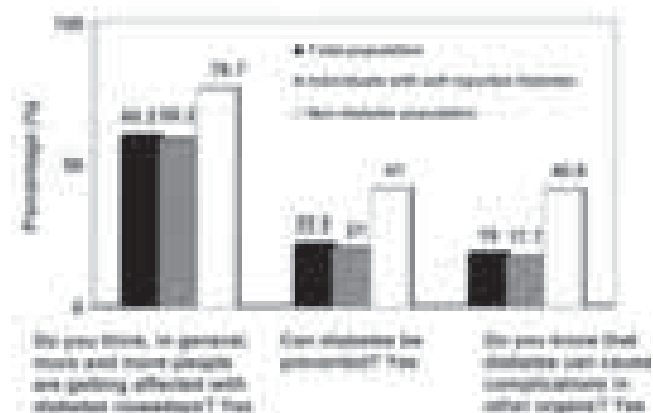
Only 22.2% (5764/26001) of the whole population

Fig. 1 : Knowledge about diabetes in subjects with and without self reported diabetes.

Table 2 : Various causes of diabetes as stated by the participants

Causes	Individuals with self reported diabetes (n = 1,529)	Non-diabetic population (n = 24,472)	Total population (n = 26,001)
Family history of diabetes n(%)	584 (38.2)	7627 (31.2)	8211 (31.6)
Consuming more sweets n(%)	341 (22.3)	5194 (21.2)	5535 (21.3)
Lack of physical activity n(%)	143 (9.4)	1851(7.6)	1994 (7.7)
Obesity n(%)	98 (6.4)	1107 (4.5)	1205 (4.6)
Mental stress n(%)	80 (5.2)	954 (3.9)	1034 (4.0)

The numbers will not add up to 100% as some of the participants ticked multiple risk factors.
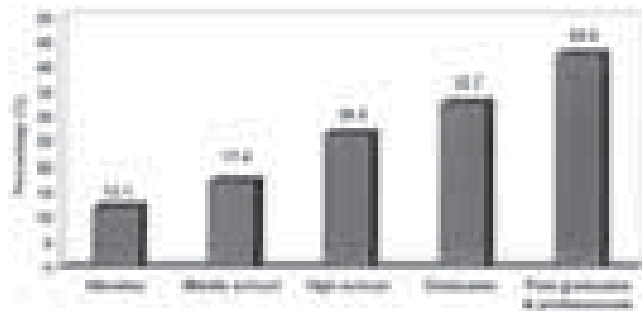

Fig. 2 : Response to the question on diabetes prevention in related to education levels.

and 41.0% (627/1529) of the known diabetic subjects were aware that diabetes could be prevented. As expected, knowledge about prevention of diabetes increased with the level of education. However, even among postgraduates and professionals which included lawyers and doctors, only 42.6% (102/185) felt diabetes was preventable [Fig. 2].

Knowledge about risk factors for diabetes

The list of causes of diabetes as stated by the participants is shown in Table 2. Only 31.2% (7627/26001) of the participants felt that family history of diabetes was one of the causes of diabetes and 21.2% (5197/26001) listed consuming sweets and high calorie foods as the main reason for diabetes. Even among self reported diabetic subjects, only 38.2% (584/1529) felt that family history of diabetes was a cause of diabetes. Knowledge of the role of obesity and physical inactivity in producing diabetes was very low, with only 11.9% (3083/26001) of study subjects reporting these as risk factors for diabetes. The other causes of diabetes stated by the participants were overeating 0.08% (22/26001), alcohol consumption 0.01% (3/26001), smoking 0.01% (3/26001) and vitamin deficiency 0.004% (1/26001). Thirty seven percent of study subjects (9612/26001) did not provide any answer for this question.

Awareness of complications of diabetes

Only 19.0% (4951/26001) of whole population knew that diabetes could cause complications. Even among those who knew that diabetes could cause complications, 55.7% (2756/4951) were not able to specify a single organ which could get affected. Among those who knew about diabetic complications, the most common complications reported by the non-diabetic

Table 3 : Knowledge of diabetic complications

Complications	Individuals with self reported diabetes (n = 621)	Non-diabetic population (n =4330)	Total population (n = 4951)
Foot problems n(%)	143 (23.0)	942 (21.8)	1085 (21.9)
Kidney disease n(%)	108 (17.4)	688 (15.9)	796 (16.1)
Eye disease n(%)	91 (14.7)	704 (16.3)	795 (16.1)
Hypertension n(%)	43 (6.9)	412 (9.5)	455 (9.2)
Heart attack n(%)	36 (5.8)	253 (5.8)	289 (5.8)
Stroke n(%)	12 (1.9)	96 (2.2)	108 (2.2)

Note : Only 4951 (19.0%) of the whole population and 621 (40.6%) of the self reported diabetic subjects answered 'Yes' to the question "Do you know that diabetes can cause complications in other organs?"

Table 4 : Composite knowledge score of diabetes

Composite score	Individuals with self reported diabetes (n =1529)	Non-diabetic population (n =24472)	Total population (n = 26001)
0 n(%)	—	3523 (14.4)	3523 (13.5)
1-24 n(%)	107 (7.0)	2200 (9.0)	2307 (8.9)
25-49 n(%)	339 (22.2)	4845 (19.8)	5184 (19.9)
50-74 n(%)	385 (25.2)	6628 (27.1)	7013 (27.0)
75-99 n(%)	543 (35.5)	6577 (26.9)	7120 (27.4)
100 n(%)	155 (10.1)	699 (2.9)	854 (3.3)

population were foot problems (21.8%), kidney disease (15.9%) and eye disease (16.3%). Other complications like heart attacks, hypertension and stroke were occasionally mentioned. Even among the self reported diabetic subjects, only 40.6% (621/1529) were aware that diabetes could produce some complications. Foot problems (23.0%) and kidney disease (17.4%) were the most commonly reported complications (Table 3).

Composite score for knowledge about diabetes

The mean percent score of the total population regarding knowledge of diabetes was 47.5%. Among the non diabetic population, 14.4% (3523/24472) obtained the least score (0%) and only 2.9% (699/24472) obtained the maximum score of 8 (100%) [Table 4]. Even among the self reported diabetic subjects, only 10.1% (155/1529) could get the maximum score. Table 5 shows the mean value of composite scores (percent) in relation to levels

Table 5 : Mean composite score (percent) values according to education in the total population

Composite score	Individuals with self reported diabetes (n =1529)	Non-diabetic population (n =24472)	Total population (n = 26001)
Illiterates	54.7 ± 26.7	37.5 ± 29.7	38.8 ± 29.9
Middle school	59.2 ± 27.5	43.6 ± 29.9	44.6 ± 30.0
High school	65.1 ± 25.8	49.6 ± 29.6	50.4 ± 29.6
Graduates	66.3 ± 26.1	56.1 ± 28.9	56.5 ± 28.8
Post graduates and professionals	67.1 ± 21.6	58.7 ± 28.6	59.3 ± 28.2

of education. The mean percent score increased with level of education, with professionals scoring the highest.

DISCUSSION

The major finding in the study is the lack of awareness of diabetes among the Chennai residents. This is worrying in the context of the fact that India currently leads the world with over 32 million diabetic subjects and these numbers are expected to increase to 79.4 by the year 2030.[2] Moreover, the WHO report predicts that while the main increase in diabetes would be in the >65 years age group in developed countries, in India and other developing countries, the highest increase would occur in the age group of 45 – 64 years which includes people in the peak of their lives. This can have a huge negative impact on the economy of developing countries. This underscores the urgent need to improve the knowledge and awareness about diabetes particularly in developing countries like India.

In this context, it is noteworthy that nearly 25% of Chennai residents were not even aware of a condition called diabetes. Not surprisingly, knowledge about complications of diabetes was even worse. Table 4 shows that the knowledge scores by self reported diabetic subjects were not very much higher than non diabetic subjects. The fact that even among self reported diabetic subjects, knowledge about diabetes including awareness of complications of diabetes was poor indicates that the majority of patients have not been taught about diabetes by their physicians. This may be due to several factors such as inappropriate ways of providing information and most importantly lack of time due to the huge patient loads and lack of appropriately trained support staff like educators[15]. This emphasizes the need for more continuing medical education programmes on diabetes for doctors and also for developing a cadre of diabetes educators in developing countries in order that better diabetes education is imparted to patients.

Recent studies like the Diabetes Prevention Programme,[16] the Finnish Diabetes Prevention Study[17] and the Da Qing study [18] have clearly demonstrated that diabetes is preventable. Yet even among highly qualified professionals, less than 60% knew that diabetes could

be prevented, and even among known diabetic subjects less than 50% knew that the disease is preventable. This shows that the results of path breaking clinical trials percolates down to the community very slowly and extra efforts must be made to transmit important public health messages through the popular press and media. It is also clear that unless individuals with diabetes know that the disease can be transmitted to the offspring, steps cannot be taken to prevent diabetes in the next generation, which would be the target high risk group.

The questions related to risk factors for diabetes revealed that many misconceptions were present and more worrisome was the fact that only 12% were aware that obesity and physical inactivity could predispose to diabetes. Traditionally in poor and developing economies being overweight is considered as a sign of health, wealth and power. This perception drives food habits, eating and exercise behavior. As prevention of diabetes is primarily dependent on altering lifestyle and increasing levels of physical activity, changing societal perceptions of 'health' and improving knowledge about the risk factors of diabetes and steps to promote physical activity must receive urgent attention of policy makers and health care planners.

It is likely that the results of the study represent only the 'tip of the iceberg' and indeed probably perhaps reflects the 'best scenario' in India as Chennai is traditionally considered to be the one of the best cities in India in terms of diabetes education activities for several reasons. One of the first diabetic clinics in India was established at the Government Stanley Hospital, Chennai in the year 1948. Two of the senior most diabetologists of India worked tirelessly for nearly 50 years promoting the cause of diabetes and trained several diabetologists who practice in Chennai. Currently there are atleast five major private diabetes care centres in addition to several government run diabetic clinics in Chennai, one of the highest in any city in the country. In addition, three major diabetes exhibitions have been organized in Chennai during the last 6 years which have been attended by several thousand people.[19] With all these well organized diabetes activities, Chennai is considered the model city for diabetes related activities in India. One can therefore safely assume that the situation in other cities in India is probably much worse, not to speak of rural areas where knowledge regarding diabetes could be expected to be abysmally poor. This emphasizes the need for carrying the right messages regarding diabetes right down to the masses and also extending diabetes education activities to rural areas as well where the prevalence rates of diabetes have already begun to rise.[20]

There are several limitations in using a questionnaire such as this for assessing knowledge of a disease in the community: open-ended questions often depend on the verbal ability and recall memory while some closed

questions can be guessed by the respondent. However, for large population based studies such as this, use of a questionnaire is perhaps the only feasible method to obtain such data. Moreover, the fact that it was conducted on a large representative sample of Chennai and the absence of such data from any developing country, make the results significant.

In conclusion, this study done on a large representative sample of Chennai city in southern India reflects the poor knowledge and awareness about diabetes in urban India. This emphasizes the need for increasing diabetes awareness activities in the form of mass media campaigns, public lectures and door to door campaigns on a massive scale in both urban and rural India.

Acknowledgement

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