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Original Research Article

Prevalence of undiagnosed and uncontrolled diabetes mellitus among adults in South Chennai

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ABSTRACT

Background: Nearly 69.2 million people were living with diabetes as per 2015 WHO data. Prevalence of diabetes in Chennai is always on the rise and it nearly around 12%. The objectives of the study were to estimate the prevalence of undiagnosed diabetes and also to study about the uncontrolled diabetes among known case of diabetes.
Methods: A cross sectional descriptive record based study done on 1361 adult population attending medical camps in various locations of South Chennai. The data regarding capillary blood sugar (CBG), age, gender, place, type of treatment and duration of treatment were collected from the camp register. A RBS Glucometer value of >200 mg/dl was defined as having diabetic. Descriptive analysis and chi square test done to see the statistical significance between various parameters. T test was done to compare the mean RBS values between various variables.
Results: Among the study population nearly 62.9% were females. The mean age of the study population was 49.8±13.3 years. Nearly 22% were known case of diabetics and 10.3% were newly diagnosed diabetics. The mean random blood sugar of the study population is 174.3±95.3 mg/dl. 65.4% of the known case of diabetics had uncontrolled sugar values of >200 mg/dl. The prevalence of diabetes in age group >50 years (43.9%) and <50 years (20.3%) [p=0.0001]. The mean blood sugar values among patients taking treatment in government (283.5 mg/dl) versus private (249.2 mg/dl) [p=0.0001, among known diabetics (262.5 mg/dl) versus new diabetics (296.6 mg/dl) [p=0.002].
Conclusions: The prevalence of newly diagnosed diabetes was 10.3% and uncontrolled diabetes among known case is 65.4%. So more screening camps for early detection of diabetes and organizing health awareness programmes are needed in this population to reduce the disease burden.

Keywords: Diabetes mellitus, Undiagnosed, South Chennai

INTRODUCTION

India as a developing country has been facing the threat of both communicable and non communicable diseases in the recent past. However, there has been a real challenge with an increase in the burden of non communicable diseases. A majority of the deaths today are due to cardiovascular causes, and they have been predisposed by some of the other non communicable diseases like diabetes mellitus, hypertension, dyslipidemia, etc. Among these, type 2 diabetes mellitus has been one of the leading disorders in most urban populations across the world. The slow onset of the disease, with a long pre-detection period and heavy influences of dietary and lifestyle habits make the disease far more common in developing economies. Worldwide, there is a projected increase in the prevalence of diabetes mellitus to 592 million (10.1%) by 2035.[1]

In the past few decades, India has deemed to be a diabetic capital of the world. With the country's growing urbanization, there has been an increase in the population

migration which has in large disrupted the lifestyle and eating patterns of these people. This has indirectly predisposed a large number of people to lifestyle diseases like diabetes and hypertension. Moreover, the proportions of people who remain undetected are also on the rise. According to World Health Organization, 69.2 million (8.7%) of the global population remain undiagnosed for type 2 diabetes mellitus in 2015.[2] Several studies done in India show alarming rates of the rise in the proportion of population with undiagnosed diabetes mellitus. A study done by Joshi et al showed that 7.2% of the populations in over eight states in India were undetected with diabetes mellitus. In Chennai, Raja et al in 2010-11 reported a prevalence of 11.1% of undetected diabetes while CURES study reported a prevalence of 9.1% in Chennai at the same time.[3-5]

Majority of the patients with diabetes mellitus go through a pre diabetic phase for several years which is an intermittent stage which increases the risk of undiagnosed diabetes and overt diabetes mellitus. This may also be referred to as abnormal glucose regulation (AGR).[6] It is essential that the population is targeted at this stage with adequate screening programme, to detect diabetes at an early stage. The American Diabetes Association (ADA) recommends that adults at normal risk for diabetes must undergo every three years and adults with a positive family history and other risk factors should undergo screening at one or two year interval.[7] Studies have proven that one-thirds of all the people with diabetes remain undiagnosed and more than 60% of the newly diagnosed individuals are unaware of the condition until a complication appears.[8]

There is a growing need for the early detection, due to the nature of pathogenesis of the disease. Diabetes mellitus is bound to result in severe complications of the vascular system, affecting multiple organs. Several Indian studies have reported about 34% prevalence of diabetic retinopathy, which is a significant micro vascular complication of the disease.[9] Hence early detection is the key to prevent the onset of complications, and reduce the morbidity and mortality associated with diabetes.

Objectives

- To estimate the prevalence of undiagnosed and uncontrolled type 2 diabetes mellitus.
- To compare the mean blood sugar values with certain variables.

METHODS

Type of study

Cross sectional record based study.

Period of study

1st May 2017 to 15th August 2017.

Sample size calculation and sampling technique

Based on the prevalence of 11.1% from a previous study.[4] for undiagnosed diabetes mellitus, at 95% confidence limits and 16% relative precision, the sample size was calculated as 1216. Accounting 10% for non response, the final sample size was calculated as 1361. Sampling technique used was convenient sampling

Study settings

Urban and Rural areas of South Chennai patients attending medical camps conducted by a private medical college.

Inclusion criteria

Patient who have attended medical camps in South Chennai region and have undergone a CBG check by glucometer.

Data collected

RBS values, age, gender, previous history of diabetes, type of treatment, and place of treatment were collected from the camp register (1st May 2017 to 15th August 2017). An operational definition of RBS glucometer values of >200 mg/dl was defined as having diabetic.

Justification for using RBS values >200 mg/dl for diagnosing diabetes

We followed the Mayo Clinics, diagnostic criteria for diabetes as using RBS values >200 mg/dl.[10] Even WHO have mentioned RBS values greater than 200 mg/dl can be used as a screening tool for diagnosing diabetes in resource poor settings and practical consideration of the existing situations.[11]

Data analysis

Data were entered and analyzed using SPSS ver.20 software. Descriptive analysis, Chi square test and pooled t test were done to see the statistical significance between various parameters.

Ethical clearance

The ethical clearance was obtained from the Institutional Ethical Committee and Institutional Review board of a private medical college in Chennai.

RESULTS

Baseline characteristics

This study was carried out among 1361 adults of South Chennai. 62.9% of the study participants were females. Mean age of the study participants was 49.8±13.3 years nearly 74.9% of the participants had blood glucose levels less than 200 mg/dl.

The prevalence of undiagnosed diabetes was nearly 10.3%. Nearly 65.4% of the known case of diabetics had uncontrolled blood sugar values of >200 mg/dl. Mean random blood sugar among all the participants was 174.3±95.3 mg/dl. The other baseline characteristics of the study participants are given in Table 1.

Table 1: Baseline characteristics (n=1361).

S. No	Characteristics		Frequency	Percentage (%)
1	Gender	Male	505	37.1
		Female	856	62.9
2	Diabetic status	Newly diagnosed (undiagnosed)	140	10.3
		Known diabetics (old case)	300	22
		Non diabetics	921	67.7
3	Age (in years)	<35	158	11.6
		35-50	511	37.5
		50-65	470	34.5
		>65	222	16.3

N= Numbers, % = Percentage.

Table 2: Health seeking pattern of known diabetics among the study participants (n=300).

S. No	Characteristics		Frequency	Percentage (%)
1	Duration of diabetes	<5 years	162	54
		5-10 years	67	22.3
		>10 years	71	23.7
2	Place of treatment	Government	118	39.3
		Private	182	60.7
3	Type of treatment	Only tablets	270	90
		Tablets and Insulin	30	10

N= Numbers, % = Percentage.

Table 3: Comparison between mean blood sugar levels and health seeking pattern among known diabetics.

S. No	Characteristics		Mean sugar	Mean difference	T value	P value
1	Place of treatment	Government	283.5	34.4	2.5	0.016*
		Private	249.2			
2	Duration of treatment	<5 years	262.8	0.6	0.046	0.631
		>5 years	262.2			
3	Type of treatment	Insulin/tablets	318	60.9	2.6	0.0001*
		Tablets only	257			

(*statistically significant).

Health seeking pattern of known diabetics among the study participants

The known case of diabetics were 300 (22%) in number. The duration of diabetes was over 10 years for 23.7% of the known diabetics. Moreover, 60.7% of them undertook treatment from private hospitals, and 90% of known diabetics were only on oral hypoglycemic drugs. The health seeking pattern of known diabetics is given in Table 2.

Comparison between mean blood sugar levels and health seeking pattern among known diabetics

It was observed that place and type of treatment were significant predictors of mean blood sugar values. Patients obtaining care in private hospitals had a significant lower mean blood sugar values (249.2 mg/dl) compared to those taking treatment in government hospitals (283.5 mg/dl) and this difference was statistically significant (p=0.016).

The mean blood sugar values of patients taking both Insulin and tablets (318 mg/dl) were high when compared with those taking only tablets (257 mg/dl) and the difference was statistically significant.

Mean RBS among known diabetics was 262.5±114.5 mg/dl. Mean RBS among newly detected diabetes was 296.6±89.6 mg/dl. The mean blood sugar value among the newly diagnosed diabetics were comparatively higher than known case of diabetics and the findings were also statistically significant (p=0.002). The comparison between the mean blood sugar values and the health

seeking pattern among known diabetics is given in Table 3.

DISCUSSION

This community based study was carried out to measure the burden of undetected diabetes mellitus in the population. Our study reported a prevalence of 10.3% of undiagnosed diabetes mellitus. A study done by Joshi et al reported a prevalence of 7.2% while a study done by Raja et al reported a prevalence of 11.1% in Chennai city.[3,4] The above findings are similar to our study findings. This study also reported the prevalence of uncontrolled blood sugar levels among known diabetics, which was found to be 65.4%. In a study done by Mahapatra et al, the prevalence of uncontrolled diabetes was 46.43%, which was lesser than our findings.[12] In another study done by Kanungo et al the prevalence of uncontrolled diabetes was 47%, which was also lesser when compared with our study findings.[13] The difference in prevalence of uncontrolled diabetes can be attributed to different study settings, different criteria for uncontrolled diabetes and different geographical locations.

There are several factors which could be attributed to the existing scenario of diabetes care and burden as observed in our study. The key focus in diabetes management is early detection and adequate control. Studies have reported that diabetes control worsens with increase in the duration of the disease beyond 10 years.[14] It is a well known fact that poor glycemic control increases the risk for micro and macro vascular complications. However, achievement of glycemic control poses a significant challenge to not only the patients, but also to the physicians. Our study reported that care in private hospitals significantly reduced the mean glucose levels compared to patients taking treatment in government hospitals. This is well substantiated by the fact that the availability of resources to monitor the blood glucose levels like HbA1c is lacking in certain government infrastructure. Moreover, there has been a reported 'lack of inertia' in initiating insulin therapy from both the doctors and patients side.[15,16] There is also a possibility that the doctor patient ratio may not be similar in government and private sectors. Since the case load is very high in government settings when compared to the private hospitals, there is also a possibility the doctors may not be able to spend more time with the patients in government hospitals. Our study also showed that patients taking both insulin and tablets had high mean RBS values than those who were only on tablets. This finding can be attributed to possibility of more severely diabetic patients were in the category of taking both insulin and tablets.

CONCLUSION

The prevalence of undiagnosed diabetes is 10.3%. Prevalence of uncontrolled diabetes among known case is 65.4%. The mean RBS values were high among newly diagnosed diabetics when compared with known cases of diabetics. This finding shows the importance of early diagnosis and bringing the patients into care at an early stage. The mean RBS values were also high among patients taking treatment from government hospitals and those who were on both insulin and tablets type of treatment. The patients on insulin should be reviewed frequently and their insulin dosages should be upgraded depending on the CBG values.

Limitations

The prevalence of diabetes mellitus in this study was estimated from the first level screening test which may not be a confirmatory diagnostic measure. Therefore there is a need for a follow up measurement of fasting and post prandial blood sugar values for confirming their diabetic status in newly diagnosed diabetics.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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