



A Study of Prevalence of Diabetes at an Outpatient Clinic in Chennai City

KEYWORDS

Diabetes, epidemic proportion, Prevalence is increasing, urban India, lifestyle changes

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ABSTRACT *Background : Diabetes is growing health problem around the world. Its prevalence has reached epidemic proportions.*

Objective : To assess prevalence of diabetes at a private clinic in urban areas of Chennai city.

Methods : Patients attending a private clinic in Chennai were enrolled. Prevalence of diabetes was assessed by using fasting and postprandial blood sugar levels. Data was analyzed for prevalence of diabetes. Comparison between the two genders was also done for further analysis.

Results : Around 395 patients were enrolled in the study. However, blood glucose data was available for 373 patients. 87 patients out of the enrolled patients suffered from diabetes. The prevalence was found to be around 23 percent. Prevalence in males was higher as compared to females but the difference was not statistically significant. Other parameters were found to be normal.

Conclusion : Prevalence of diabetes in our study was higher in our study as compared to previous studies. Various health measures need to be implemented to control the epidemic increase in diabetes.

Introduction

Diabetes is a growing epidemic in all parts of the world. About 62 million people diagnosed with diabetes currently live in India. India topped the world with number of people diagnosed with diabetes in 2000.^{1,2} Wild et al has predicted that the global prevalence of diabetes is going to be doubled in 2030 as compared to 2000 with maximum impact of increase in India i.e. in the year 2000 about 31.7 million people were afflicted with type 2 diabetes and this number is expected to go up to 79.4 million in 2030.^{3,4} Potential burden imposed by diabetes makes the future of the country uncertain. For facilitation of life style changes, it is necessary to identify the factors affecting prevalence of the disease. Pattern of diabetes is related to geographic distribution in India. Prevalence of diabetes in rural India is about one-fourth as compared to urban India.^{5,6} The dramatic rise in prevalence of diabetes could be attributed to rapid lifestyle changes brought about by rapid urbanization in last 50 years.^{5,6}

There has been tremendous advance in the field of cardiovascular diseases. However, the prevalence of type 2 diabetes continues to increase and also there is parallel increase in associated dyslipidemia. About 70-80% of diabetics die because of cardiovascular disease.⁷ Dyslipidemia is associated with increased cardiovascular mortality and it is one of the major risk factors of cardiovascular disease.⁸ Most patients of type 2 diabetics have dyslipidemia which is related to insulin resistance. Profile consistent with diabetic dyslipidemia is decreased high density lipoprotein (HDL), increased triglycerides, and increased low density lipoprotein (LDL). The LDL particles are more dense and small. Also increased are amounts of intermediate lipid particles like very low density lipoprotein (VLDL) and intermediate density lipoprotein (IDL).⁹ Result is an increase in non-HDL cholesterol which is associated with an even higher risk of cardiovascular diseases than increased LDL levels. Production of small dense LDL is increased by IDL

and VLDL which is very atherogenic.¹⁰

Despite of wider prevalence of the disease, the studies on diabetes prevalence have been few throughout the nation and the world. Also, the studies are been marred by heterogeneity of the study population in the country considering differences in cultures, socioeconomic status and ethnicity. Quantification of diabetes prevalence is important for resource allocation and rational planning. Various studies on prevalence of diabetes in Southern India have shown different prevalence values. The Chennai Urban Rural Epidemiological Study (CURES) was conducted in a representative population in Chennai. The study showed that the prevalence of diabetes increased by about 39% in 6 years.^{11, 12} The following study was conducted to know about actual prevalence of diabetes at a private clinic in Chennai. This study also gave us an opportunity to compare the change in prevalence rates in the city over the decades. On comparison with previous studies the changing trend of the disease can be known.

Methods

The following study was conducted in out-patient set up in a private clinic in urban area of Chennai city. Patients of both genders were enrolled in the study. Patients attended the outpatient department of the private clinic. Thorough history about present illness, medications and concomitant illness was taken. After giving consent for the study, blood sample was analyzed at a laboratory for various parameters. Blood glucose i.e. fasting and postprandial levels were estimated, while in some patients random blood sugar (RBS) was estimated. As per WHO 2006 recommendations, patients having fasting blood glucose levels more than 126 mg/dl or postprandial levels higher than 200 mg/dl were diagnosed to be suffering diabetes, while those having fasting blood glucose less than 126 mg/dl and postprandial blood glucose between 110 mg/dl and 200 mg/dl were said to be having impaired glucose tolerance

(table 1). A patient having apparent symptoms of diabetes and RBS value more than 200 mg/dl was also diagnosed to be suffering from diabetes. Other parameters recorded were serum levels of urea, creatinine, SGPT, SGOT, serum total protein including serum albumin levels. All the parameters were recorded in Microsoft excel worksheet version 2007. Unpaired t test was used for intergroup comparisons while qualitative was compared using Fisher's exact test. Graph pad demo version 3.0 was used for detailed analysis of the obtained data.

Table1. WHO diagnostic criteria for diabetes

Classification	Serum glucose levels
Diabetes	
Fasting glucose (8 hour fasting)	>126 mg/dl (>7 mmol/l)
OR	OR
2 hour postprandial glucose	>200 mg/dl (>11.1 mmol/l)
Impaired glucose tolerance	
Fasting glucose	>126 mg/dl (>7 mmol/l)
AND	AND
2 hour postprandial glucose	<200 mg/dl (<11.1 mmol/l)

Results

Demographic details

A total of 395 patients were enrolled in the study. Out of the enrolled patients, about 192 were males and 203 were females. Mean age of the study population was 42.77 ± 13.3 years. Mean age of females was 45.03 ± 38.26 years while mean age of the males was 43.79 ± 13.19 years. Minimum age of the enrolled patients was 18 years and maximum was 74 years.

Laboratory parameters

Blood glucose

Blood glucose values were available for 373 patients. Out of 373 patients, data was available for 188 females and 185 males. Values for fasting and postprandial blood glucose both were available for 300 patients while only FBS values were available for 63 patients and RBS values were available in 10 patients. Remaining 22 patients were excluded from further analysis. Mean fasting glucose level was found to be 110 ± 61 mg/dl while mean postprandial glucose levels was 165 ± 77 mg/dl. Mean RBS value of 10 patients was 108 mg/dl. In males, mean fasting blood sugar levels were found to be 112 ± 47 mg/dl, while mean postprandial blood sugar level was found to be 173 ± 84 mg/dl. In females, mean fasting blood sugar value was 109 ± 42 mg/dl while, mean postprandial level was 158 ± 69 mg/dl. On comparison, there was no statistical difference between the two genders, neither for fasting blood glucose nor for postprandial blood glucose levels.

Out of the 373 patients in whom further analysis was done, 87 patients had blood sugar levels higher than those required for diagnosis of diabetes. Hence, about 23 percent of the enrolled patients were diagnosed to be suffering from diabetes. Out of the 87 diabetic patients, 49 (56%) were males and 38 (44%) were females.

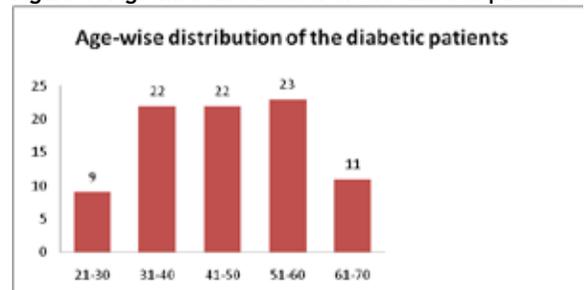
Number of males diagnosed with diabetes was high in our study. Hence out of 185 enrolled males, 49 were diabetic, while 136 were non-diabetic. Also, out of 188 enrolled females, 38 were diabetic and 150 were non-diabetic. Mean age of patients diagnosed with diabetes was 47.54 years. The mean age amongst diabetics was comparable in males and females (48.6 vs. 47.4). Majority of diabetics belonged

to age group of 31-60 years (Figure 1). Percentage prevalence was 26 percent in males and 20 percent in females. Percentage prevalence was also high among males in our study as compared to females. However, the difference in diabetes prevalence was not statistically significant on comparing the two genders

Table 1. Demographic details and blood glucose characteristics of the enrolled patients

Parameter	Males	Females	Total
Number of enrolled patients	185	188	373
Mean fasting blood glucose levels (Mean ± SD)	112 ± 47 mg/dl	109 ± 42 mg/dl	110 ± 61 mg/dl
Mean postprandial blood glucose levels (Mean ± SD)	173 ± 84 mg/dl	158 ± 69 mg/dl	165 ± 77 mg/dl
Number of diabetic patients	49 (56%)	38 (44%)	87
Percentage of diabetic patients (Approx)	26	20	23
Mean age of diabetic patients	48.6	47.4	47.54

Figure 1. Age-wise distribution of the diabetic patients



Other parameters

Other parameters assessed were serum urea, uric acid, creatinine, SGPT, SGOT and total protein including serum albumin. In all the patients the values were within normal limits. No significant alterations were found in any of the parameters (table2)

Table2. Mean values of the other laboratory parameters measured in the study.

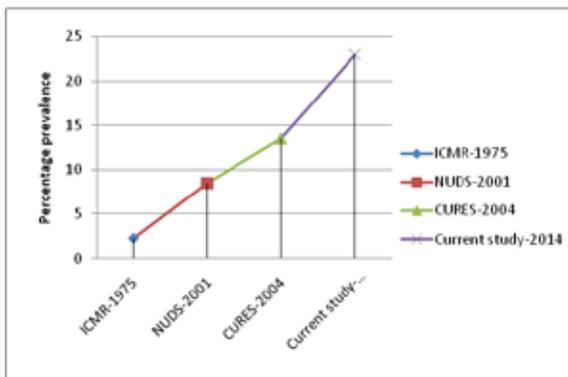
Parameter	Values (mean ± SD)
Serum Urea	22.9 ± 10.9
Serum creatinine (mg/dl)	1.02 ± 0.6
Serum Uric acid (mg/dl)	5.33 ± 4.4
SGOT (units)	26.03 ± 12.56
SGPT (units)	22.29 ± 17.8
Total protein (mg/dl)	6.75 ± 1.04
Serum albumin (mg/dl)	3.85 ± 1.85

Discussion

Diabetes is a non-communicable disease caused by absolute or relative deficiency of insulin. It is a non-communicable disease which has assumed epidemic proportions. Prevalence of the disease is increasing day by day and it is

one of the most important health problems of today. Our study was conducted at a private clinic in Chennai city to know about diabetes prevalence. Our study enrolled 395 patients, out of which blood sugar values were available for 373 patients. Out of available values blood sugar was found to be elevated in 87 patients i.e. they were in the diabetic range. Out of 87 diabetics 49 were males and 38 were females. Prevalence of diabetes in males was about 26%, while prevalence in females was around 20%. Overall prevalence of diabetes in our study was 23%. Other parameters were in the normal range.

India has about 31.7 million people living with diabetes which is the highest in the world.³ Our study reported the prevalence of diabetes to be around 23% in the enrolled patients. A national study by ICMR on diabetes in 1975 estimated the prevalence of diabetes to be around 2.3%.¹³ Another study in 1988 reported the prevalence to be around 8.5% in the city.¹⁴ In 2001, National Urban Diabetes Study (NUDS), a population based study estimated diabetes prevalence in Chennai to be around 13.5%.¹⁵ The Chennai Urban Rural Epidemiology study (CURES) in 2004, estimated the prevalence of diabetes to be around 15.5 percent.¹¹ The prevalence rate in our study was 23%, which is higher than all other previously mentioned epidemiological studies. The noted increase in diabetes prevalence is about 70% (13.5% to 23%) which is alarming. This increase of 70% is seen in last 10 years (Figure 2).



The increase in prevalence may be due to a number of factors. Due to control of infections people tend to have increased life expectancy and there is a corresponding increase in the aging population. It is well known that the prevalence of diabetes increases with age. Environmental factors associated with urbanization like sedentary lifestyle, increased consumption of diet rich in saturated fats and a corresponding increase in obesity.¹⁶ Indians have a genetic susceptibility for developing diabetes and also increased susceptibility for environmental risk factors.¹⁷ Neel's thrifty gene suggests that areas where famine is quite common, the genes of natives are developed so as to survive in limited food supply. However, when the same individuals when fed calorie rich diet, turn obese and develop diabetes.¹⁸ This may be the reason for explosive increase in diabetes prevalence in Native Americans and Pacific Island communities. The same results may be extrapolated to Indian population where famines are common. Also, as the sample size of our study was small there may be error in prediction of prevalence of diabetes.

Conclusion

Diabetes, a non-communicable disease, has assumed epidemic proportions. Prevalence of the disease is increasing at an alarming rate and it is one of the most important health problems of today. Our study was conducted at a private clinic in Chennai city to study diabetes prevalence. Prevalence of the disease was found to be 23%, which means about every one in four individuals suffers from diabetes in urban Chennai. This is about 70% increase as compared to CURES study of 2004. The prevalence noted in our study is quite alarming. Steps need to be taken to stop or decrease this steep rise in disease prevalence. Various health programs need to be started by the government to increase awareness in the general population about the disease. Lifestyle interventions need to be implemented early to inculcate healthy lifestyle measure starting from small children. However, the sample size of our study was small and keeping this limitation in mind we need to confirm the results in large scale population based study.

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