

## ORIGINAL ARTICLE

# PREVALENCE OF TYPE-2 DIABETES MELLITUS AND ASSOCIATED RISK FACTORS IN AN URBAN SLUM OF PUNE CITY, INDIA

Reshma S Patil<sup>1</sup>, Jayashree S Gothankar<sup>1</sup>

**Authors' Affiliation:** <sup>1</sup>Bharati Vidyapeeth Deemed University Medical College, Pune, Maharashtra, India

**Correspondence:** Dr. Reshma S Patil, Email: reshsu2001@yahoo.co.in

## ABSTRACT

**Aim and Objectives:** To find the prevalence of known cases of diabetes in urban slum of Pune city and its association with risk factors.

**Material and Methods:** A cross sectional study was conducted in field practice area of Urban Health Training Center in the age group of 20 years and above comprising of total 1779 subjects. Risk factors like age, waist circumference, and family history of diabetes and physical activities were assessed to find their association with diabetes.

**Results:** Prevalence of type 2 Diabetes Mellitus found in present study was 4.6% with equal prevalence in both the sex. Higher prevalence of diabetes in males was found in the age group of >60 years while in females prevalence has occurred a decade earlier i.e. in 51-60 years. Abdominal obesity in females, family history of diabetes were found positively associated with diabetes while there was no significant association found between diabetes and physical activity.

**Conclusion:** Awareness regarding risk factors in community is necessary for control of diabetes in known cases of diabetes and for early diagnosis in future cases.

**Keywords:** Type -2DiabetesMellitus, Prevalence, urban

## INTRODUCTION

Diabetes is one of the major causes of premature illness and death worldwide. The prevalence of diabetes is rising all over the world. According to recent estimates, approximately 285 million people worldwide (6.6%) in the 20–79 year age group are with diabetes in 2010 and by 2030, 438 million people (7.8%) of the adult population, is expected to have diabetes. The global increase in the prevalence of diabetes is due to population growth, aging, urbanization and an increase of obesity and physical inactivity.<sup>1,2,3</sup> The real burden of the disease is however due to its micro and macro vascular complications which lead to increased morbidity and mortality and loss of productivity and foregone economic growth. The World Health Organization (WHO) predicted net losses in national income from diabetes and cardiovascular disease of 336.6 billion in India between 2005 and 2015.<sup>1,4,5</sup>

According to The International Diabetes Federation (IDF) estimation India will have rise in people living with diabetes up to 87.0 million by 2030 from 50.8 million (2010), making it the 'Diabetes Capital' of the world.<sup>1,6</sup>

This prevalence is increasing not only in urban but also in rural area. According to the World Health

Organization (WHO) criteria, the prevalence of known diabetes was 5.6% and 2.7% among urban and rural areas, respectively.<sup>7</sup>

Situation of diabetes in Maharashtra is not different. In Urban area an increasing trend is observed from 1.5% (1963) to 9.3% (2001) in Mumbai and in rural area a similar trend is seen i.e. 3.9% (1991) to 9.3% (2006). Also in Pune the prevalence of diabetes in 2007 was 8.5% as per the Indian Industrial Population study Group.<sup>8</sup>

For obtaining disease estimates the only reliable method is to conduct field studies. As the literature review doesn't reveal major studies from Pune area, to address this demand, the present study was undertaken with the objective of determining prevalence of diabetes.

## AIM & OBJECTIVES

Aim of the study was to find the prevalence of known cases of diabetes in urban slum of Pune city.

Objectives of this study were to identify the associated risk factors in the study population; and to assess the relationship of diabetes with risk factors like age, abdominal obesity, family history and physical activity.

**MATERIAL AND METHODS**

A Community based cross-sectional study was conducted during April 2010 to July 2010 among individuals of all age group in the form of family health survey. The family health survey was carried out by VIth semester students during their Community Medicine practical posting under the guidance of teaching faculty. The survey was carried out in the field practice area of Urban Health Training Center (UHTC) of a private Medical College in Pune, Maharashtra. In this survey, total 509 families were visited and total number of individuals contacted were 2599. As prevalence of type 2 diabetes mellitus is more in adult population, this study included the population above 20 years of age.

With the help of a predesigned questionnaire VI semester students conducted a house to house survey in the community and information was collected on sociodemographic characteristics, health problems, the needs perceived by the families etc. In Individuals with known cases of diabetes, information regarding risk factors viz. family history of diabetes, physical activity was asked and waist circumference was measured to judge the abdominal obesity.

**Exclusion Criteria** - Pregnant and lactating women up to 12 weeks postpartum were excluded due to possible impaired glucose tolerance status in this group, due to pregnancy.<sup>9</sup>

**Operational Definitions used:**

- 1) Known cases of diabetes – Person who gave history of diabetes or who is on drug treatment for diabetes.
- 2) Family History of diabetes – Subjects with either or both parents having diabetes were considered to have positive family history.
- 3) Physical Activity – Levels were graded as follows based on a Physical Activity questionnaire, which included job-related and specific questions on exercise.
  - a. Vigorous – vigorous exercise or activity that made the person feel breathless and have Palpitation e.g. manual laborers, service forces
  - b. Moderate– moderate exercise or not much breathless e.g. household workers, teachers, professionals, skilled workers

- c. Mild – mild exercise or no breathless e.g. housewives
  - d. Sedentary – no exercise or felt no variation in heart rate and respiratory rate e.g. elderly, retired executives, businessmen<sup>10,11</sup>
- 4) Waist circumference – measured to the nearest 1 cm at the midpoint between the tip of iliac crest and last costal margin in the back and at umbilicus in the front using a nonstretchable tape at the end of normal expiration with the subject standing erect in a relaxed position. Abdominal /central obesity was considered to be present when waist circumference >90cm in females and <100cm in males.<sup>9</sup>

**Statistical Methods:** Prevalence of Diabetes Mellitus and risk factors are presented as percentages. Relationship between diabetes and risk factors was assessed by Chi-square test.

**RESULTS**

Out of total 2599 study population, 1311 (50%) males and 1288 (49%) were females were included in survey (Table-1) while 820 (31.54%) were below 20 years of age which were excluded from actual study. Thus total study subjects (above 20 years) included for estimating prevalence of type 2 diabetes mellitus were 1779 of which 862 males and 917 were females. The prevalence of diabetes was 83 (4.6%) with 40 (4.6%) males and 43 (4.6%) females while total nondiabetics were 1696 with males 822 and females 874. In males maximum prevalence of 13 (32.5%) was found in the age group of 60 years and above while maximum diabetic females 15 (35%) found in the age group of 51-60 years. (Table-2)

**Table 1: Age and Gender wise distribution of study population**

Age group	Male	Female	Total
0-10	193 (14.72)	166 (12.90)	359 (13.81)
11-20	256 (19.52)	205 (15.90)	461 (17.73)
21-30	237 (18.10)	269 (20.90)	506 (19.56)
31-40	225 (17.16)	249 (19.33)	474 (18.23)
41-50	164 (12.50)	152 (11.80)	316 (12.15)
51-60	112 (8.55)	114 (8.85)	226 (8.69)
>60	124 (9.45)	133 (10.32)	257 (9.93)
Total	1311 (50.44)	1288 (49.55)	2599 (100)

**Table 2: Age and Sex wise Prevalence of DM**

Age group	Male		Female		Total (%)
	Diabetic (%)	Non Diabetic (%)	Diabetic (%)	Non Diabetic (%)	
21-30	3(7.5)	234(28.50)	1 (2.3)	268(30.65)	4 (4.81)
31-40	7(17.5)	218(26.52)	9(20.9)	240(27.45)	16(19.30)
41-50	8(20)	156(18.97)	9(20.9)	143(16.40)	17 (20.48)
51-60	9(22.5)	103(12.53)	15(35)	99(11.32)	24 (28.91)
>60	13(32.5)	111(13.50)	9(20.9)	124(14.18)	22 (26.50)
Total	40(4.6)	822(95.40)	43(4.6)	874(95.31)	83(4.6)

**Table 3: Distribution of subjects according to Central obesity**

Central obesity	Diabetic	Non Diabetic	Total
Present	34(40.96)	339(19.98)	373 (20.96)

Absent	49(59.04)	1357(80.02)	1406 (79.04)
Total	83 (4.6)	1696(95.40)	1779 (100)

$\chi^2=21.01$   $df=1$   $p>0.01$

In both, diabetic 49(59.04%) and nondiabetic 1357(80.02%) subjects, central obesity was absent. However after analysis we found that there was highly significant association between diabetes and central obesity. (Table -3)

**Table 4: Distribution of subjects according to family history of Diabetes Mellitus (DM)**

Family history	Diabetic	Non Diabetic	Total
Yes	53 (63.86)	227 (13.38)	280 (15.74)
No	30 (36.14)	1469 (86.62)	1499 (84.26)
Total	83 (4.6)	1696 (95.40)	1779 (100)

$\chi^2 = 151.98$   $df=1$   $p<0.01$

Maximum diabetic subjects had history of diabetes in their family whether it is either parent or both. This shows the importance of family history of diabetes in causing type 2 diabetes mellitus that can act as an alarming signal for those who are not suffering from diabetes currently. On analysis also highly significant association was found between family history of diabetes and type 2 diabetes mellitus.

**Table 5: Distribution of subjects according to Physical Activity**

Physical Activity	Diabetic	NonDiabetic	Total
Sedentary to mild	47 (56.62)	1104 (65.10)	1151 (64.69)
Moderate to severe	36 (43.38)	592 (34.90)	628 (35.31)
Total	83 (4.6)	1696 (95.40)	1779(100)

$\chi^2 = 2.484$   $df=1$   $p>0.05$

In our study we found that most of the 47(56.62%) diabetic subjects were involved in sedentary to mild physical activity and 36(43.38%) diabetics were involved in moderate to severe activity. Though it is proven from many studies that physical activity is required for control and prevention of type 2 diabetes mellitus, we did not find any association between physical activity and type 2 diabetes mellitus. (Table -5)

## DISCUSSION

Type 2 Diabetes Mellitus is surely a disease of millions. It is of public health importance on account of its long term effect leading to serious conditions like coronary heart disease, neuropathy and nephropathy, so it is important to detect and treat them before the occurrence of any complications.<sup>12</sup>

The prevalence of diabetes mellitus found in this study was 4.6%. Prevalence was found higher in elderly group i.e. above 50 year of age. Thus rising trend of diabetes was seen as age increases. (Table - 2). Rao C R et al, Shah S K et al, Arora V, Ramchandran A et al, Ravikumar P et al reported significant association between increasing age and diabetes.<sup>9,10,12,13,14</sup> Acemoglu

H et al, Anand K et al, Shrestha U K et al found increase in prevalence of diabetes as age increases.<sup>15,16,17</sup>

Most of the studies from various regions of India reported increasing prevalence in younger age group. The present study did not show any light on occurrence of diabetes mellitus in younger age.

In this study the prevalence of diabetes in both the sex was found equal. (Table- 2) Shah S K et al support this evidence.<sup>10</sup> Arora V et al, Acemoglu H et al, Anand K et al, Bener A et al reported higher prevalence in females compare to males.<sup>12,15,16,18</sup> and Ramchandran et al, Shrestha U K et al found higher prevalence in males than females.<sup>13,17</sup>

Central obesity is one of the important risk factor for diabetes mellitus but our study showed maximum diabetics with less central obesity. (Table - 3) Rao C R et al, Bener A et al, Singh R B et al found association between diabetes and abdominal obesity like current study.<sup>9,18,19</sup> Ramchandran A et al, Ravikumar P et al also reported significant association of central obesity with diabetes.<sup>13,14</sup>

Family history of type 2 diabetes mellitus is one of the major contributing factor in causing diabetes in next generation or it can act as one of the important preventing factor for those who are having positive family history and by this we can avoid the development of diabetes in early age. After analysis we found a highly significant association between family history of diabetes and type 2 diabetes mellitus. (Table -4) Similar findings were noted by Bener A et al in his study.<sup>18</sup> Rao CR et al, Shah S K et al, Ramchandran et al, Ravikumar P et al, Lee E T et al have also reported a significant association of diabetes with family history in their study.<sup>9,10,13,14,19</sup>

Our study showed that diabetes mellitus was more prevalent in sedentary workers or those who perform mild activity. Rao C R et al found maximum persons engaged in moderate activity.<sup>9</sup> while Singh R B et al showed significant association between sedentary activity and diabetes.<sup>20</sup> Shah S K et al reported decreasing physical activity was associated with diabetes.<sup>10</sup> Satman Ilhan et al found that diabetes was inversely associated with physical activity in his study.<sup>21</sup> Globally physical inactivity accounts for 14% of diabetes mellitus and it also acts as a major risk factor for obesity which again has significant relation with diabetes mellitus.<sup>22</sup>

## CONCLUSION

This study highlights the prevalence of diabetes mellitus in urban population of Pune city in Maharashtra, India and its association with some risk factors. The overall prevalence of Diabetes Mellitus found in this study was 4.6% which is less than the national averages of prevalence of DM. Risk factors like older age, family history of diabetes and abdominal obesity significantly contributed in the occurrence of diabetes. As similar

studies have not done in the past in the said region against which comparison could be made, future research is required.

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