Original article:

Prevalence of type 2 diabetes mellitus in candidates contesting for municipal corporation elections in an urban industrialized town

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ABSTRACT:

Introduction: The present study was planned to study prevalence of Diabetes Mellitus, Hypertension and Hyperlipidaemia in candidates contesting for municipal elections and to study Prevalence of type 2 diabetes with other metabolic conditions like Hypertension and Dyslipidaemia in study group.

Methods: In 2012, a cross-sectional survey was conducted among 117 (women: 37; men: 80) candidates who were randomly selected from candidates contesting for Pimpri Chinchwad (PCMC) municipal elections, Pune, Maharashtra, India. After obtaining informed consent brief history was taken, general and systemic examination was performed and recorded. Following hematological investigations were performed such as blood sugar level (BSL), Lipid Profile, Renal Function Tests (RFT) and anthropometric measurements Height, Weight and BMI (Body Mass Index)] were calculated. Those who were already on drugs for DM and/or having fasting plasma glucose (FBS) $\geq$ 126 mg/dl were considered as DM; those with FBS 100–125 mg/dl were considered as IFG (Impaired Fasting Glucose). Pearson's Chi-Square test was used for statistical analysis.

Results: The prevalence of DM was 27.35 percent (men: 32.5 percent and women: 16.22 percent). That of IFG was 9.4 percent [8.75 percent (7/80) among men and 10.81 percent (4/37) among women]. The prevalence of hypertension, hypercholesterolemia (fasting total serum cholesterol $\geq$ 200 mg/dl) and central obesity [WHR $\geq$ 0.80 (women) and $\geq$ 0.90 (men)] was 22.2 percent, 6.83 percent and 76.06 percent respectively. Adjusted for age and sex, DM was significantly associated with positive central obesity 1.69 (0.68 – 4.21), BMI 2.003 (0.69 – 5.83), Hypertension high systolic BP 2 (0.69 – 5.83) and high diastolic BP 2.82 (1.22 – 6.51).

Conclusion: Prevalence of Diabetes in the study population was high. Raised blood pressure, decreased HDL levels and increased central obesity were other metabolic conditions associated with Diabetes.

Keywords: Hypertension, Type 2 Diabetes Mellitus , Body Mass Index

INTRODUCTION

The global prevalence of Diabetes in age groups 20-79 years in 2011 was 8.3% and projected to rise 9.9% in 2030As per IDF (International Diabetes Federation) number of people with diabetes till 2011 were 336 million and projected to rise 552 million in 2030.The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of people with diabetes is

projected to rise from 171 million in 2000 to 366 million in 2030 [1] The CPR (Crude prevalence rate) in the urban areas of India is apparently 9 %[2] In rural areas the prevalence is approximately 3 per cent of the total population [3]. According to the International Diabetes Federation, 61.3 million people in India had diabetes and 77.2 million were prediabetics in 2011. That figure is projected to rise to 101.2 million by 2030 [3]. IDF data reveal that India has more diabetes than the United States. In fact, India is ranked second in the world in diabetes prevalence, just behind China.

The prevalence of IGT (Impaired Glucose Tolerance) is thought to be around 8.7 % in urban areas and 7.9 % in rural areas, although this estimate may be too high. It is thought that around 35 % of IGT sufferers go on to develop type 2 Diabetes, so India is genuinely facing a healthcare crisis. [5] India actually has the highest number of diabetics of any one country in the entire world. India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the "diabetes capital of the world" [6]

As of 2011 India census, Pimpri Chinchwad had a population of 1,729,320[male population (9.45 lakh) and female population (7.83 lakh)]. Pimpri Chinchwad has an average literacy rate of 87.19, higher than the national average of 74.04%.

In India, the type of diabetes differs considerably from that in the Western world. Type 1 is considerably more rare, and only about 1/3 of type 2 diabetics are overweight or obese. The only published nationally representative study on burden of diabetes mellitus in India is Prevalence of Diabetes in India Study – PODIS (2002), a multi-centric study (49 urban and 59 rural centers) on 41,000 Indian people. PODIS has estimated the age and gender standardized prevalence of diabetes mellitus in India to be 3.3 percent [7].

This study is carried out to estimate the prevalence of DM, hypertension, hyperlipidemia in candidates contesting in election for pimpri chinchwad municipal corporation (PCMC) in pune district. And we also want to define the effect of election stress on these values so we collected the details and information during election.

MATERIALS AND METHODS

The study participants belonged to pimpri chinchwad municipal corporation area, in pune district in Maharashtra. The participants are 117 people contesting for the municipal elections in PCMC. In all Municipal Corporation in Maharashtra PCMC has fastest decadal growth rate. Presently, PCMC has 108 wards for which the elections were conducted in January 2012. The selection of the study area was primarily decided by it nearness to Dr. DY PATIL HOSPITAL AND RESEARCH CENTRE. The study was also prompted by the recent changes in the past few years in the PCMC area, demographically and economically. There is a drastic change in the lifestyle of the people residing in this area due to rapid industrialization. Thus, we anticipated that the study in this population, that too in the political people who are representing the population as corporators would be very much apt and perfect and also would yield the adequate and appropriate results.

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STUDY DESIGN

We conducted a cross sectional survey among the participants in PCMC elections. A list of every candidates contesting for PCMC elections was made and 117 willing candidates were selected by random selection Among them 80 were men (68.37%) and 37 were women (31.62%). We attempted to contact every listed participant and gathered the values regarding the study during election. We used a pre-tested questionnaire that explored demographic details, past history, family history, diet pattern, physical activity of the candidate. An informed written consent was obtained prior to data collection from each candidate. Anthropometric measurements and blood pressure of each candidate was recorded. Trained nurses collected fasting blood sugar, fasting lipid profiles and HbA1C samples and values were determined and preserved.

The data collection extended from 23rd January 2012 to 23rd April 2012.

FASTING PLASMA GLUCOSE:

A Type 2 diabetes mellitus (DM): Known diabetics and/or with fasting BSL$\geq$ 126 mg%.

B Impaired fasting glycaemia (IFG): Fasting BSL b/t 100–125 mg%.

C Normoglycaemia: BSL < 100 mg%.

BLOOD PRESSURE (B.P)

A Systemic hypertension: Known hypertensives not on R[x], SBP $\geq$140mm of Hg, and/or DBP $\geq$90 mm of Hg.

B Pre-hypertension: Candidates not on R[x] with SBP 120 -139 mm of Hg and/or DBP 80 - 89 mm of Hg.

C Normotension: Known hypertensives not on R[x] , SBP 90 to 120 mm of Hg and DBP to 80 mm of Hg.

LIPID Profile :

A. Hypercholesterolemia: Those on R[X] for elevated cholesterol, and/or having fasting serum TC $\geq$200 mg%.

B. Normal serum cholesterol: Those not on R[X] having fasting serum TC < 200 mg%.

C. Hypertriglyceridemia: > 160 mg/dl (N.R- 40-160 mg/dl).

D. HDL-C: < 35 mg/dl is low (N.R- 35-60 mg/dl).

E. LDL-C: > 130 mg/dl is high. (N.R - < 130 mg/dl).

Waist-to-Hip Ratio (WHR)

A. Central obesity: WHR $\geq$ 0.80 in women, WHR $\geq$ 0.90 in men

B. Normal WHR: WHR < 0.80 in women, WHR < 0.90 in men

Body Mass Index (BMI)

Table 1: Prevalence of type 2 diabetes by demographic category in study group

Category	Total Number	Type 2 diabetes (%)	P Value
Age (Yrs)			>0.05
18 – 29	11	0	
30 – 44	68	22 (32.35)	
45 – 59	35	10 (28.57)	
60 & above	3	0	
Sex			>0.05
Male	80	26 (32.50)	
Female	37	6 (16.22)	

Table 2: Prevalence of type 2 diabetes with other morbid condition in study group

Category	Total Number	Type 2 diabetes (%)	P Value
SBP			<0.05
Normal	28	5 (17.86)	
Pre-hypertension	59	13 (22.03)	
Hypertension	30	14 (46.67)	
DBP			<0.01
Normal	69	13 (18.84)	
Pre-hypertension	1	1 (100)	
Hypertension	47	18 (38.29)	
Family history			<0.0001
Present	13	9(69.2)	
Absent	114	13 (10.5)	
Cholesterol level			>0.05
Normal	109	30 (27.52)	
Hypercholesterolemia	8	2 (25)	
Triglyceride			>0.05
Normal	100	27 (27)	
Abnormal	17	5 (29.41)	
HDL			<0.05
Normal	106	32 (30.19)	
Abnormal	11	0	
LDL			>0.05
Normal	106	30 (28.30)	
Abnormal	11	2 (18.18)	

BUL Normal Abnormal	 108 9	 29 (26.85) 3 (33.33)	>0.05
Creatinine Normal Abnormal	 116 1	 31 (26.72) 1 (100)	>0.05
BMI Normal/Underweight Overweight Obese	 28 58 31	 5 (17.86) 16 (27.59) 11 (35.48)	>0.05
Waist to hip ratio Normal Central obesity	 28 89	 10 (35.71) 22 (24.72)	>0.05

Table 3: Odd ratio for type 2 diabetes among subjects with known risk factors in study group

Risk factor	Reference category	Odd Ratio (95%CI)
SBP	Normal blood pressure	2 (0.69 – 5.83)
DBP	Normal blood pressure	2.82 (1.22 – 6.51)
Cholesterol level	Normal cholesterol	0.88 (0.17 – 4.59)
Triglyceride	Normal Triglyceride	1.13 (0.36 – 3.49)
BUL	Normal BUL	1.36 (0.32 – 5.81)
BMI	Normal/Underweight	2.003 (0.69 – 5.83)
Waist to hip ratio	Normal	1.69 (0.68 – 4.21)

RESULTS

Among 117 participants, 80 (68.37 %) were men and 37 (31.62 %) were women. The mean age of the study population was 40.81±13.25 years, age was grouped into categories <30 years, 30-44 years, 45-59 years and ≥60 years. Details of baseline demographic characteristics of the study population are given in Table 1. The prevalence of type 2 diabetes was 27.35 % (32/117) [men-32.5 % (26/80) and women-16.2 % (6/37)]. Among the 32 diabetics, 17 (14.5% of the population) were already known diabetics and 15 (12.82% of the population) were newly detected by the survey. The prevalence of hypertension was 22.22 % (26/117) out of which 20 % (16/80) men and 16.21 % (6/37) women were hypertensive. The prevalence of Dyslipidemia was 14.52 % (17/117) men were 15 % (12/80) and

women were 13.51 % (5/37). The prevalence of central obesity was76.06 % (89/117) among them men were 83.75 % (67/80) and women were 59.45 % (22/37)

DICUSSION

Our prevalence estimate of 27.35 % for type 2 diabetes is one of the highest reported from any Indian State. The prevalence in the urban areas of India is thought to be 9 %.

In rural areas, the prevalence is approximately 3 % of the total population [5]. Earlier study was done in Narayana Medical College and Hospital, Nellore prevalence of type 2 Diabetes was 5.2 % [8]. We presume that the changes in lifestyle, election stress, cutting across socio-economic barriers, have contributed much to this. These changes include those of diet as well as physical activity. About 6.83 % of population fell into the category having hypercholesterolemia in which the proportion of men (7.5 %) outnumbered that of women (5.4 %).Earlier study showed prevalence 38.7% were males and 23.3% were females [9].

The prevalence of hypertriglyceridemia is 14.52 % (men-16.25 %, women- 10.81 %). Earlier study showed prevalence (men-42.6% women-17.2%) [9]. The mean cholesterol of the study population was comparable to that reported among urban western Indian population [5]. More than two-third of this population had a BMI over 25.

We found significant association of DM in patients with positive family history of DM and other conditions like increased SBP, DBP, TG, BMI, High levels of serum triglycerides, high blood pressure, and obesity along with high levels of blood sugar, constitute elements of what is known as the metabolic syndrome, and this is well known to be a precursor of coronary heart disease.

One major limitation was that we did not estimate the prevalence of impaired glucose tolerance. There is evidence that the proportion of people with impaired fasting glucose is different from that of those with impaired glucose tolerance. Had we done post-prandial glucose estimation too our prevalence estimate could have further been high.

However, doing a glucose challenge test would have entailed considerably greater resources in time and money.

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