Research Article

Prevalence of diabetes and its risk factors: a cross-sectional study in Ahmedabad, Gujarat

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Abstract

Background: World health Organization (WHO) reports refer India as the potential diabetic capital of the world, with number of patients in the disease expected to increase from three to six crores by 2025. Gujarat is second after Tamil Nadu on the fast track in acquiring diabetic patients. About lakhs of people being diabetic in the city of Ahmedabad alone. The control of diabetes will require modification of its risk factors and hence necessitates identifying the various risk factors of diabetes.

Objectives: To study the prevalence of diabetes and association with its risk factors.

Materials and Methods: It is a cross-sectional study conducted among 600 staff members of B.J. Medical College of Ahmedabad, Gujarat. Data were collected using a pre-tested questionnaire, and physical measurements were taken. Data analysis was done on Microsoft Excel and Epi-Info.

Results: In this study, prevalence of diabetes was 9% males and 10% females. 28.07% males and 24.61 % females were 55 years and above who reported history of diabetes. Individuals with waist circumference >90 cm in males and >80 cm in females had a risk of diabetes in comparison with individuals with normal waist circumference.

Conclusion: The high prevalence of risk factors diabetes in employees of government institute in urban area calls for a workplace-based health approach. Efforts should be made to establish surveillance mechanism at the individual level to monitor, evaluate, and guide policies and programs.

Key Words: prevalence, diabetes, risk factor, Ahmedabad

Introduction

Diabetes is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period.[1]

"In every country and in every community worldwide, we are losing the battle against this cruel and deadly disease," said Jean Claude Mbanya, President of the International Diabetes Federation (IDF). About 382 million people had diabetes in 2013 and without effective prevention and management programs this number is expected to rise to 592 million by 2035. About 80% of people with diabetes live in low- and middle-income countries.[2]

India leads the world with largest number of diabetic subjects earning the dubious distinction of being termed the "diabetes capital of the world." According to the Diabetes Atlas 2006 published by the International Diabetes Federation, the number of people with diabetes in India currently around 40.9 million is expected to rise to 69.9 million by 2025 unless urgent preventive steps are taken. The so-called "Asian Indian Phenotype" refers to certain unique clinical and biochemical abnormalities in Indians, which include increased insulin resistance, greater abdominal adiposity, i.e. higher waist circumference despite lower body mass index. This phenotype makes Asian Indians more prone to diabetes.

Studies carried out in past two decades employing standardized methodologies indicate that prevalence of diabetes is increasing in both urban and rural India varying from 5 to 15% among urban populations, 4 to 6% in semi-urban populations, and 2 to 5% in rural population.[3,4] Projection indicates

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currently 61.3 millions in India live with diabetes—a number which is expected to 101.2 million by 2030.[5]

Gujarat is considered as one of the rich and developed states of India. A diet rich in oil and sugar content has pushed Gujarat to the forefront of contributors of diabetic patients in India.

Gujarat is having the second highest number of diabetics in the country after Tamil Nadu. Though no exact figures were available for diabetics in the state, their number might be around 10% of the total population that is close to 50 lakhs. In Ahmadabad alone, the number could be around four to five lakhs; 14 out of every 100 people are diabetic in the country and their numbers were only increasing.[6]

The risk factors of today are the diseases of tomorrow. Identifying these risk factors in population occupies a central place in the surveillance system because of the importance of the lag time between exposure and disease. Therefore, public health strategies have to be driven by the motive of identifying risk factors in population and countries need to know the profile of risk factors of population in different settings.

Objective

This study was conducted with the same aim of identifying the prevalence of diabetes and its risk factors in Class III and Class IV government employees.

Materials and Methodology

Study design

Cross-sectional study.

Setting

B.J. Medical College and Civil Hospital, Ahmedabad, Gujarat.

Selection of participants

Total 300 males and 300 females were selected from B.J. Medical College and Civil Hospital, Ahmedabad working as Class III and Class IV government employees. Individual aged 25–60 years were included because the age of retirement is 58 years and 60 years in Class III and Class IV government employees, respectively.

In the pilot study, obesity was taken as one of the risk factor for diabetes and BMI > 25 kg/m^2 among Class III and Class IV government employees was found to be 45%. Considering this prevalence, sample size was calculated with the help of formula

Sample size $n = 4pq/L^2$

Allowable error L was taken 10%.

Calculated sample size was 488, but for the convenience of study, the sample size was decided to be 600.

Study period

From January 2013 to November 2014.

Data collection and processing

A predesigned and pre-tested questionnaire was used to collect demographic details. Physical measurement, such as height and weight, was recorded to calculate BMI (kg/m^2) and waist circumference (WC) was recorded to calculate waist–hip ratio (WHR). For measuring weight, the subject was asked to stand upright on the weighing scale bare footed and weight was recorded to the nearest 0.5 kg. For measuring height, the subject was made to stand erect looking straight on a level surface with heels together and toes apart without shoes. Height was recorded to the nearest 0.5 cm. Waist circumference was measured with the subject in standing position using a non-elastic plastic tape midway between the lower rib margin and the iliac crest to the nearest 1 mm. Hip circumference was measured around the widest portion of the buttocks. Blood pressure was measured using OMRON digital equipment recommended by Indian Council of Medical Research (ICMR) (OMRON-HEM7111, OMRON Healthcare Co. Ltd. Uky-Ku, Kyoto, Japan). Two readings were taken at an interval of 5 min, and the average value of the measurements was used for the analysis. Written consent want taken.

Data analysis

Data entry was done on Microsoft Excel and data were analyzed using Epi Info software (7.1.0.6).

Results

In total 600 subjects, 150 (25%) males and 150 (25%) females were taken from Class III and 150 (25%) males and 150 (25%) females were taken from Class IV employees.

Table 1: Baseline information of the study population (n = 600)

	Male (n = 300) No. (%)	Female (n = 300) No. (%)
Age (years)		
25–34	84 (28)	74 (24.67)
35–44	53 (17.67)	57 (19)
45–54	106 (35.33)	104 (34.67)
≥55	57 (19)	65 (21.67)
Type of family		
Joint	195 (65)	205 (68.33)
Nuclear	105 (35)	95 (31.67)
Religion		
Hindu	283 (94.33)	288 (96)
Muslim	15 (5)	8 (2.67)
Christian	2 (0.67)	4 (1.33)
Marital status		
Single	26 (8.67)	24 (8)
Married	274 (91.33)	240 (80)
Widow/widower	0 (0)	36 (12)
Education		
Illiterate	2 (0.67)	39 (13)
Primary	45 (15)	72 (24)
Secondary	64 (21.33)	42 (14)
Higher secondary	69 (23)	12 (4)
Diploma	6 (2)	36 (12)
Graduate	106 (35.33)	75 (25)
Post graduate	8 (2.67)	24 (8)

Table 2: Prevalence of self-reported diabetes among study population

Gender*	Class III (*n* = 150) No. (%)	Class IV (*n* = 150) No. (%)	Total (*n* = 300) No. (%)	
Male	19 (12.67)	8 (5.33)	27 (9.00)	χ^2 = 4.95, $p < 0.05$
Female	14 (9.33)	16 (10.67)	30 (10.00)	χ^2 = 0.148, $p > 0.05$

χ^2 = 0.174; $p > 0.05$ for diabetes, gender wise comparison.

Mean age was 43.60 ± 11.06 years in males and 43.50 ± 10.59 years in females ($p > 0.05$). Majority of participants belonged to joint family, Hindu and married [Table 1].

Table 2 shows history of diabetes was present in 27 (9.00%) males and 30 (10.00%) females. Among males, history of diabetes was more reported by Class III employees ($p < 0.05$). There was no class-wise significant difference in female diabetic employees ($p > 0.05$). There was no gender-wise significant difference in self-reported diabetes prevalence ($p > 0.05$).

Table 3: Age-wise distribution of self-reported diabetes cases

Age groups (in years)	No. participants		Self-reported cases (No.)		Prevalence rate (%)	
	Male	Female	Male	Female	Male	Female
25–34	84	74	0	0	0	0
35–44	53	57	0	2	0	3.51
45–54	106	104	11	12	10.38	11.54
≥55	57	65	16	16	28.07	24.61
Total	300	300	27	30	9.00	10.00

Table 4: Association of risk factors among diabetic population

Risk factors		Male		Female	
		Diabetes		Diabetes	
		Present (*n* = 27)	Absent (*n* = 273)	Present (*n* = 30)	Absent (*n* = 270)
Smokeless Tobacco consumption	Yes	9	92	4	10
	No	18	181	26	260
		Odds ratio: 0.98		Odds ratio: 4	
		95% CI: 0.43–2.27		95% CI: 1.12–8.12	
History of tobacco smoking	Yes	5	34	0	0
	No	22	239	30	270
		Odds ratio: 1.59		-	
		95% CI: 0.57–4.49			
History of alcohol consumption	Yes	2	19	0	0
	No	25	254	30	270
		Odds Ratio: 1.07		-	
		95% CI: 0.23–4.86			
Family history of diabetes	Yes	3	29	4	30
	No	24	244	26	240
		Odds ratio: 1.05		Odds ratio: 1.23	
		95% CI: 0.29–3.71		95% CI: 0.40–3.77	
Any type of moderate physical activities	Yes	9	122	22	210
	No	18	151	8	60
		Odds ratio: 0.62		Odds ratio: 0.78	
		95% CI: 0.27–1.43		95% CI: 0.33–1.85	
Vegetable Fruits consumption	Low	14	88	8	68
	High	13	185	22	202
		Odds ratio: 2.26		Odds ratio: 1.08	
		95% CI: 1.02–5.47		95% CI: 0.39–2.17	
On examination blood pressure	Normal	0	17	1	34
	Pre-hypertension	21	239	20	226
	Hypertension	6	17	9	10

Table 5: Association of BMI and waist circumference with diabetes

Physical measurement		Male		Female	
		Diabetes		Diabetes	
		Present (*n* = 27)	Absent (*n* = 273)	Present (*n* = 30)	Absent (*n* = 270)
BMI	Underweight	0	4	0	12
	Normal	3	84	4	89
	Overweight	5	61	5	43
	Obese	19	124	21	126
Waist circumference (cm)	>90 male >80 female	24	116	29	186
	Normal	3	157	1	84
		Odds ratio: 10.82 95% CI: 3.18–36.82		Odds ratio: 13.09 95% CI: 1.75–17.75	
Waist hip Ratio	>0.9 male >0.8 female	22	258	28	255
	Normal	5	15	2	15
		Odds ratio: 0.26 0.13–1.58		Odds ratio: 0.82 95% CI: 0.12–2.43	

Among studied population, prevalence of self-reported diabetes was found high in 55 years and above age group. 28.07% males and 24.61 % females were known case of diabetes in this group [Table 3].

Table 4 shows odds ratio, which is a measure of strength of association between risk factor and outcome. History of tobacco and alcohol consumption, family history of diabetes and low vegetables and fruits intake increase the risk of diabetes.

Table 5 shows diabetes was more found in obese persons. Individuals having waist circumference >90 cm in males and >80 cm in females had a risk of diabetes compared to individuals with normal waist circumference.

Discussion

A total of 600 employees were included as study participants. Both males and females constituted 50% of the sample. Age of employees ranged from 25 to 60 years with mean age of females 43.50 ± 10.59 years and that of males 43.60 ± 11.06 years. About 35% males and 25% females were graduates. About 65% males and 68.33% females belonged to joint family. About 94.33% males and 96% females were Hindus. About 91.33% males and 80.00% females were married. A study on risk-factor profile of NCDs among middle-income urban population, by Mehan et al.,[7] showed that males constituted 46.3% and females 53.7% of their sample, age ranged from 18 to 59 years, 84.3% belonged to nuclear family, and 94.2% participants were Hindus.

The prevalence of self-reported diabetes mellitus was found 9% among males and 10% among females. Studies from various parts of urban India reported that the prevalence of diabetes varies from 5.9% to 19.5%.[8] The prevalence of diabetes was reported 5.3% among males and 6.2% among females in a study done by Purty et al.,[9] in Puducherry.

A community-based study done in Ahmedabad by Nayak et al.[10] reported that prevalence of Type 2 diabetes as 13.8%. Another study done by Koria et al.,[11] in Ahmedabad, also reported prevalence of diabetes 7.33% in urban area. Mohan et al.[12] found the prevalence of self-reported diabetes in urban areas 7.3%.

Conclusion

Tobacco and alcohol consumption, less vegetables and fruits intake, overweight/central obesity, and family history had positive odds ratio association with the development of non-communicable diseases among all the participants. The high prevalence of risk factors diabetes in employees of government institute in urban area calls for a workplace-based health approach. Efforts should be made to establish surveillance mechanism at the individual level to monitor, evaluate, and guide policies and programs. Multiplicative nature of risk factors suggests need for behavioral and lifestyle-related interventions.

To reduce the modifiable risk factors, interventions, such as tobacco control (minimizing production and consumption), and regulation on sale of unhealthy foods and urban planning to promote physical activity need to be implemented. The health system has to forge partnerships within the different health programs and also with other departments dealing with food and agriculture, industry, labor, education, and urban planning. Results of the study highlight the need for different interventions and approaches for the prevention of risk factors of non-communicable diseases in employees of tertiary-level government hospitals and medical colleges.

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