

Original Research Article

## **Obesity- A key risk factor for diabetes among government employees, Gandhinagar, Gujarat**

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**Abstract:** Diabetes mellitus (DM) is a chronic metabolic disease. The prevalence of Diabetes is reaching epidemic levels worldwide, more so in developing countries like India due to rapid urbanisation and presence of lifestyle-related risk factors like obesity and with this objective, the present study was conducted to measure the prevalence of obesity and diabetes and its association with government employees of Gandhinagar. A cross-sectional study was carried out by randomly selected 590 employees working in new Sachivalay, Gandhinagar, and Gujarat. The predesigned and pretested questionnaire was used to collect data regarding socio-demographic profile and standard procedures were followed for anthropometric examination and blood sugar estimation. Out of the 590 study participants, 87.2% were males and 12.8 % were females. The prevalence of Diabetes was found to be 13.39% and it was more common among that above age of 50 years followed by 41-49 years. Prevalence obesity which is a modifiable risk factor is 34% as per Waist to Hip Ratio and 42% as per Body Mass Index criteria. An association between obesity and diabetes was found to be statistically significant. The prevalence of diabetes and obesity was found to be high in government employees of new Sachivalaya. Lifestyle modification, regular monitoring of Diabetes and treatment of it will definitely reduce the burden of Diabetes Mellitus and other non-communicable diseases.

**Keywords:** Prevalence, Diabetes, Obesity, Body Mass Index, Waist to Hip Ratio.

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### **INTRODUCTION**

Non-communicable diseases are on rising in the world due to urbanisation, which leads to a sedentary lifestyle. Obesity, Age, less physical activity is a major risk factor for non-communicable diseases like Diabetes. Recent analyses have shown that numbers of diabetics will escalate to more than 642 million by the year 2040[1]. The rise of diabetes has been from 11.9 million in 1980 to 64.5 million in India in 2014. Prevalence of diabetes has more than doubled in India 3.7% to 9.1% [2]. In India, the prevalence of diabetes has reached epidemic proportions during the past few decades as result of rapid urbanisation and other lifestyle-related risk factors. Besides their reduced productivity, diabetes further imposes a high economic burden in terms of healthcare expenditure, lost productivity and foregone economic growth [3]. The total direct cost of management of diabetes has doubled in 2005 compared to 1998 levels [4]. Gujarat is one of the most developed and urbanised states of India and

thus data regarding the prevalence of NCD and associated risk factors should be studied to improve existing health policy. Gandhinagar is the capital of the Gujarat and headquarters of all government departments are situated in new Sachivalay campus. Most of the employees are doing office work and thus the nature of work is sedentary. In this backdrop, it is expected that the prevalence of non-communicable disease like diabetes and hypertension influenced by sedentary and stressful lifestyle would be higher among these employees and prevalence of this disease could vary across different cadres. Thus far, no study has been conducted in Gujarat to study the health profile of this large, heterogeneous group of employees, working under one roof and with this background, we have conducted a study to assess the prevalence of obesity and diabetes and its association among employees of new Sachivalay, Gandhinagar.

**MATERIAL AND METHODOLOGY**

A cross-sectional study was conducted in the employee of a government office in Gandhinagar. There are about 22 departments under various ministries of the Government of Gujarat in new Sachivalay. The total strength of employees working in new Sachivalay is around 4000. These employees are divided into four cadres based on their designations and out of 4000 employees study, participants were selected as per stratifies random sampling. At an expected prevalence of Diabetes in adults of urban India of 14% [5], with an absolute precision of 3% and a design effect of 1 at 95% significance level, the required sample size was calculated as 535. Anticipating a refusal rate of 10-20%, the final sample size obtained was 588. Venous blood was collected for fasting and postprandial blood glucose estimation by using Oral Glucose Tolerance Test. The Same investigator measured anthropometric measurement using calibrated weighing scale and measuring tape and a pre-tested & pre-designed

questionnaire was used to collect data. Weight and height were measured by standard techniques using calibrated an adult weighing scale and stadiometer respectively. WHO Standard definitions were used to measure, Body Mass Index (BMI) and diabetes. The collected data were entered and analysed in Microsoft Office Excel and Epi-Info-7.

**RESULT**

Out of 590 subjects examined, 87.2% were males and 12.8 % were females. Out of 590 employees interviewed, 61.5% belonged to cadre III and 9.8% belonged to cadre I. In all the cadres, the highest proportion of the employees was in the 41-50 age groups and the lowest proportion was in the ≤40 age group. The mean age of the study population was 46.72 years (46.73 years for males and 46.64 for females) and the percentage of employees above the age of 40 was very high (88.2%).

**Table 1: An association between BMI and gender**

		Male	Female	Total	X <sup>2</sup> Value	P- Value
BMI	Normal	302	41	342	8.83	P<0.05
	Overweight	185	20	207		
	Obese	31	11	41		
	Total	518	72	590		

Table:-1 shows that out of 590 study participants, 205(34.74%) were found to be overweight and 42 (7.11%) were obese. 58.3% of male and 57%

female have BMI within normal range. There is statistically significant difference were found between BMI and gender as per chi-square test. (X<sup>2</sup> test p<0.05)

**Table 2: An association between gender and WHR**

		Male	Female	Total	X <sup>2</sup> Value	P- Value
WHR	Normal	347	46	393	0.273	p>0.05
	higher	171	26	197		
	total	518	72	590		

Table:-2 shows that out of 590 study participants, 197(33.38%) were found to be overweight and 393 (66.61%) were having normal Waist to Hip Ratio. 67% of male and 64% of female study

participants have WHR within normal range. There is statistically significant association were found between WHR and gender as per chi-square test. (X<sup>2</sup> test p<0.05)

**Table 3: An association between Gender and Diabetes**

	Diabetic	Non-diabetic	Total	X <sup>2</sup> Value	P- Value
Male	71	447	518	0.367	P >0.05
Female	8	64	72		
Total	79	511	590		

Table:-3 shows that out of 590 study participants, 518 (%) were male and 42 (%) were female. Out of total 79 diabetics, 71 are male and 9 are female. The overall prevalence of diabetes was found to

be 13.38% (13.70% in male and 11.11% in female). There is no statistically significant association were found between BMI and gender as per chi-square test. (X<sup>2</sup> test p>0.05)

**Table 4: An association between BMI and Diabetes**

		Diabetic	Non-diabetic	Total	X <sup>2</sup> Value	p-value
BMI	Normal	38(11)	304(89)	342(58)	4.162	P<0.05
	Overweight	34(17)	173(83)	207(35)		
	Obese	7(17)	34(83)	41(7)		
	total	79	511	590		

Table:-4 shows that 58.1% participants have normal BMI (BMI≤25) & prevalence of diabetes among them was 10.8%, 34.8% were overweight (BMI=25.1 to 30) & prevalence of diabetes among them was 17.1% and 7.1% were obese (BMI>30) &

prevalence of diabetes among them was 16.7%. When the prevalence of diabetes was compared among normal individuals & with overweight and obese the difference was statistically significant. (X<sup>2</sup>=4.26, p<0.05)

**Table 5: An association between WHR and Diabetes**

	Diabetic	Non-diabetic	Total	X <sup>2</sup> Value	P- Value
Normal	31(09)	362(91)	393(67)	30.721	P<0.05
Higher	48(24)	149(76)	197(33)		
Total	79	511	590		

Table:-5 shows that out of 590 study participants, 79(%) were found to be diabetic and 197(33%) were having higher Waist to Hip Ratio. There is an association found between BMI and gender which is statistically significant as per chi-square test. (X<sup>2</sup> test p<0.05). Out of 518 male employees screened for diabetes 66.98% had no central obesity (WHR≤95)& prevalence of diabetes among them was 8.1% on another hand 33.01% had central obesity (WHR>95)& prevalence of diabetes among them was 25.1% which is about three times higher than those who had no central obesity. This difference was found statistically significant (X<sup>2</sup>=26.82, P=0.0000).

Out of 72 female employees screened for diabetes 63.9% had no central obesity (WHR≤85)& prevalence of diabetes among them was 6.5% on another hand 36.1% had central obesity (WHR>85)& prevalence of diabetes among them was 19.1% which is about three times higher than those who had no central obesity. This difference was not found statistically significant (X<sup>2</sup>=1.58, P=0.20).

## DISCUSSION

This study presented observational data from employees of new Sachivalay, Gandhinagar. Our main motivation for this study to know the prevalence of obesity and the prevalence of diabetes and to find out the association between diabetes and obesity in the study group. Our study has shown that majority of the patients were in the geriatric age group. A study by Patel *et al.*; [6] in a private hospital from the city of Ahmedabad in Gujarat has shown the proportion of

geriatric patients (defined as >55 years in their study) to be only one forth. The difference may be because the awareness among the population served by the hospital in the study by Patel *et al* may be high so that patients are detected at an early age. The present study highlighted the significant association between BMI and presence of diabetes among the government employees. Obesity had long been accepted as a risk factor for diabetes and the risk was related to both the duration and degree of obesity. Similar findings were observed by Chou P *et al.*; [7]. The cutoff values for ideal body weight applicable to western population might not hold well in the generally lean Indians. Moreover, insulin resistance which was found to be a characteristic feature of Asian Indian, despite their lean body mass, could be adversely affected by an even small increase in the body mass. In other words, higher BMI, rather than obesity appeared to be a risk factor in Indians. With regard to the nutritional status the findings of our study, more than 7% of our patients were in the obese category as per their BMI whereas in the study by Patel *et al* has shown a higher number of their patients were in the obese category. A study by Shrivastava *et al.*; [8] from Reva city in Madhya Pradesh showed that 55% of their patients were obese and another 22% was overweight. More than 50% of patients are found to be obese as per WHR. The difference between the prevalence of two studies might be due to two different study population and their different socio-demographic variables. The study conducted in central Gujarat by Rana HM *et al.*; [9] has shown the prevalence of high WHR 75% and 74% of study participants were in the category of overweight

and obese, which is higher than our study results. The present study was conducted on employees but the study by Rana HM *et al.*; was conducted on diabetes which might be a reason for the higher prevalence of higher Waist to hip ratio. The study conducted by Patil PS [10] in Dharwad, Karnataka has shown the prevalence of obesity 41% and prevalence of diabetes 17.3% and the association between diabetes and obesity was found to be statistically significant. Our study has shown similar findings of the prevalence of obesity and diabetes which was reported 33.38% and 13.38%. The association between obesity and diabetes also found statistically significant in a recent study. The study conducted in West Bengal by Baijayanti *et al.*; [11] shown Prevalence of diabetes more among those who had BMI 25 or more, whereas the proportion of diabetes was less among the persons having BMI less than 18.5. This association between BMI and diabetes was found to be statistically significant which shows similar findings to our study.

#### CONCLUSION AND RECOMMENDATIONS

The overall prevalence of diabetes is found to be 13% in the study population. Prevalence of obesity & overweight is found 44% as per BMI and 34% as per WHR. There is a higher rate of diabetes in an obese patient in comparison of non-obese which is statistically significant as per chi-square test. Overall the prevalence of diabetes in the study population is found high than normal national and state figures<sup>[12]</sup> Obesity is significantly associated with diabetes in the study population. Regular periodical check-up should be done for individuals who are over 40 years of age for early detection of diabetes and its risk factors. Awareness programs should be launched to motivate the employees to lose weight. This could be achieved through talks by eminent physicians, cardiologists, dieticians and Physiotherapists.

#### Limitations of the present study

The current study was conducted in a government office with small sample size, hence the results may not be fully representative the community. Only selected variables of interest are included in this study.

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