PREVALENCE AND ASSOCIATION OF VARIOUS RISK FACTORS WITH DIABETES MELLITUS IN LOCAL POPULATION OF GHAZIABAD, UTTAR PRADESH

Dr. Oinam Tomba Singh

Associate Professor of Statisitics, Dhanamanjuri University – Manipur - 795001

ABSTRACT

Background: These days, diabetes is a serious issue in our culture. In India in 2022, there were approximately 72,946,400 cases of diabetes, and the number is continually rising. Numerous risk factors for diabetes include having a favorable family history, using tobacco and alcohol, having high blood pressure, experiencing psychological stress, leading a stagnant lifestyle, being obese, and more.

Aim: To find out the prevalence and association of various risk factors with diabetes mellitus in Ghaziabad.

Methods and material: The study consists of 600 people randomly selected from Ghaziabad region. Demographic data of participants were collected with the help of glucometer, questionnaires and sphygmomanometer, Weighing machine and also statistical analysis was done.

Statistical analysis: Chi-square and t-test was done. P value less than 0.05 was significant.

Result: Overall prevalence of diabetes mellitus was found 5%. Male was more prone (6.35%) to diabetes than female (4.02%). Most of the subjects with diabetes (36.67%) belonged to the age group 41-50 years and maximum prevalence was seen in age group of 51-60 year (12.5%). Most significant risk factors were psychological stress (40%) followed by tobacco consumption (27%), positive family history (30%), Hypertension (24.24%) and obesity (23.53%). Diabetes Mellitus is more prone in those have these risk factors than those without risk factors. Persons with heavy physical activity were least prone (3.34%) to this disease.

Conclusion: Main risk factor of diabetes mellitus is psychological stress and middle age male group were more prone to this disease. Improved lifestyle and awareness of risk factors can decrease prevalence of diabetes.

Keywords: diabetes mellitus; risk factor; psychological stress

INTRODUCTION

Diabetes mellitus (DM) is a disease characterized by improper carbohydrate metabolism and increased blood glucose levels due to a malfunction in the body's capacity to create or respond to the hormone insulin. Chronic exposure to high glucose levels may be a primary cause of neuropathies, retinopathies, nephropathies, cardiovascular disease, and various other types of tissue harm [1].

In addition, obesity, dyslipidemia, hypertension, and vascular disease are caused by diabetes mellitus. Type 2 diabetes accounts for 95% of cases, but Type 1 diabetes accounts for only 4-

5%. [2]

According to the International Federation of Diabetes (IDF), 415 million people worldwide had diabetes in 2015 (IDF Diabetes Atlas, 2017), and the disease is directly responsible for about 1.5 million fatalities annually (World Health, 2016).

With an estimated 72 million cases in 2017, India currently accounts for 49 percent of the global diabetes burden. By 2025, that number is predicted to nearly quadruple to 134 million cases. [/3]

According to IDF estimations, India would surge to the top of the list by 2045, with 151 million people living with diabetes and 4352 million at risk of type 2 diabetes. [4]

Diabetes was substantially correlated with waist circumferences (WC), body mass index, smoking habit, hypertension, and total cholesterol level. It was possible to change these DM-related variables. Consequently, focusing the preventative strategy on these modifiable risk factors may help lower the local incidence of diabetes mellitus. (5)

Objective of the study was to find out prevalence rate and associated risk factors of diabetes mellitus in Ghaziabad.

METHODS
Study setting: The study was conducted in urban area of Ghaziabad town. It is a city present in state of Uttar Pradesh, India.

Sample size: A community based cross sectional study was done on 600 persons randomly selected from different areas of Ghaziabad.

Sample collection: Using a glucometer, the blood sugar levels of each participant in the study were determined. The subjects' demographic information was gathered by having them complete a questionnaire that asked questions about their age, tobacco use, smoking, and family history of diabetes, among other things. A weighing machine was used to calculate the subjects' weights. The sphygmomanometer is used to determine the subject's hypertension level. Body Mass Index (BMI) was calculated by BMI = Weight (kg)/height(m^2).

Statistical Analysis: chi-square test was performed to determine the degree of deviation of the experimental results from the expected results. t-test was done to know the significance of difference between two means of diabetic and non-diabetic subjects. P value less than 0.05 was considered significant.

RESULTS

This study was done from August 2018 to September 2019 on 600 people in which number of male and female subjects were 252 and 348 respectively. All the subjects were taken from different urban area of Ghaziabad city.

Table 1: Most of the subjects suffering from diabetes (36.67%) belonged to the age group 41-50 years followed by age groups 51-60 years (26.67%) and 31-40 years (20%).

Table 1: Age distribution of subjects

Age-group (years)	Total	male	female	Diabetic male (%)	Diabetic female (%)	Total-diabetic (%)
20-30	136	60	76	0 (0)	0 (0)	0 (0)
31-40	124	40	84	2 (12.5)	4 (28.57)	6 (20)
41-50	142	72	70	7 (43.75)	4 (28.57)	11 (36.67)
51-60	64	20	44	3 (18.75)	5 (35.71)	8 (26.67)
61-70	100	44	56	3 (18.75)	1 (7.15)	4 (13.33)
71-80	28	14	14	1 (6.25)	0 (0)	1 (3.33)
81-90	6	2	4	0 (0)	0 (0)	0 (0)
Total	600	252	348	16 (100)	14 (100)	30 (100)

Table 2: Overall prevalence of diabetes in the study population was found to be 5% and prevalence of diabetes among male and female population was found 6.35% and 4.02% respectively. Maximum prevalence was seen in age group 51-60 years (12.5%) followed by age group 41-50 years (7.77%).

Table 2: Prevalence of diabetes in different age group (%)

Age group	Male	Female	Total
21-30	0%	0%	0%
31-40	5%	4.76%	4.84%
41-50	9.72%	5.71%	7.775%
51-60	15%	11.36%	12.5%
61-70	6.82%	1.78%	4%
71-80	7.14%	0%	3.57%
81-90	0%	0%	0%
Total	6.35%	4.02%	5%

Table 3: Among the various risk factors present in this area, a high prevalence of diabetes was

seen among those with high level of psychological stress (20%) followed by those with positive family history (15%) consume tobacco (13.57%), hypertensive (12.12%), and obese (11.79%). Although Alcohol consumption is also a major risk factor for diabetes but in Uttar Pradesh liquor consumption has been diminished due to ban of alcohol, as implemented through the Uttar Pradesh government Prohibition and Excise act that came into effect on April 1, 2016; therefore presently it is not a significant risk factor in this area.

Table 3: Prevalence % of risk factors among all subjects

Risk Factors	Male% (n)	Female% (n)	Prevalence of risk factors in all subject% (n)	Prevalence of diabetes in factors% (n)
Positive family history	11.9 (30)	20.11(70)	16.67 (100)	15 (15)
Tobacco Consumption	45.24 (114)	7.47 (26)	23.33 (140)	13.57 (19)
Non-vegetarian	19.04 (48)	7.47 (26)	12.33 (74)	8.11 (6)
Obesity—BMI	11.9 (30)	10.92 (38)	11.33 (68)	11.79 (8)
Obesity—Waist circumference	23.81 (60)	21.84 (76)	22.67 (136)	8.83 (12)
Hypertension	19.84 (50)	23.56 (82)	22 (132)	12.12 (16)
Psychological Stress	8.73 (22)	16.67 (58)	13.33 (80)	20 (16)

Table 4: It was observed that the prevalence of diabetes was found to be comparatively more in any risk factors category than in those not having risk factors.

Table 4: Prevalence of Diabetes compared in those with the Risk Factors and those not having the risk factors %

Risk Factors	Prevalence of diabetes in those with risk factors % (n)	Prevalence of Diabetes without risk factors % (n)
Positive family history	15 (15)	3 (15)
Tobacco Consumption	13.57 (19)	2.39(11)
Non-vegetarian	8.11 (6)	4.57 (24)
Obesity—BMI	11.79 (8)	4.14(22)
Obesity—Waist circumference	8.83 (12)	3.88(18)
Hypertension	12.12 (16)	2.99 (14)
Psychological Stress	20 (16)	2.69 (14)

Table 5: Diabetes was comparatively more prevalent in subjects with light activities (7.96%) than moderate (3.95%) and severe (3.34%) activities, both in male and female.

Table 5: Prevalence of Diabetes among subjects with Light, Moderate and Heavy Physical Activity % (n)

Physical-activity	Male	Female	Total
Light	7.40 (4)	8.2(10)	7.96(14)
Moderate	7.85(8)	1.98(4)	3.95(12)
Heavy	4(4)	0(0)	3.34(4)
Total	6.35 (16)	4.02(14)	5(30)

Table 6: Result of this study showed that most significant risk factor for diabetes mellitus is psychological stress (p=0.000). Non- vegetarian diet (p= 0.1245) did not show any statistical significance, so it was not a significant risk factor for diabetes mellitus.

Table 6: significance of association of diabetes with the risk factors

Risk factors	occurrence	Diabetics (n)	Non-diabetics (n)	Chi-square value	P-value
Obesity (BMI)	Present	8	52	9.747	0.0018
	absent	22	518		
Tobacco consumption	Present	19	102	36.549	0.000
	absent	11	468		
Non-vegetarian diet	Present	6	62	2.360	0.1245
	absent	24	508		
Hypertension	Present	16	100	23.407	0.000
	absent	14	470		
Positive family history	Present	15	70	33.346	0.000
	absent	15	500		
Psychological stress	Present	16	48	60.330	0.000
	absent	14	522		
Obesity(WC)	Present	12	112	7.199	0.0073
	absent	18	458		

DISCUSSION

This study is a cross-sectional community-based screening of individuals living in Ghaziabad's urban regions who are at least 20 years of age. The study confirms the findings of other global studies and screenings, such as those conducted by the Indian Council of Medical Research (ICMR) and the International Diabetes Federation (IFD), which include the prevalence of diabetes, its rising prevalence, its increasing development at younger ages, and its association with obesity, hypertension, and other risk factors.The age group 51–60 years old has the highest prevalence of diabetes (12.5%). This age group experiences a slow peak in the prevalence of diabetes, which is rapidly followed by a fall towards older age groups. In the various age categories, the prevalence of diabetes is similar in both genders.

The National Public Health Institute in Helsinki, Finland reports that in Indian participants, the prevalence of diabetes rose with age, peaked between the ages of 60 and 69, and then began to fall at 70 years of age [6]. The younger age group of 31 to 50 years old has a higher prevalence of diabetes. In his population of study, S. Birhanu also emphasizes the earlier onset of diabetes in individuals. (7) The similar pattern is seen in both males and females here as well.

The study population had a prevalence of 16.67% for positive family history of diabetes, and 15% for those who have a positive family history of the disease. Three percent of the subjects with no family history of diabetes are affected by the disease. Diabetes mellitus has a known etiology that includes genetic susceptibility, which can result in family aggregation of the disease. The study's findings support the significance of this link in the population under investigation [8].

The participants' prevalence of tobacco use is 23.33%, while the prevalence of diabetes is rather low (2.39%) in those who do not use tobacco. Among those who use tobacco in any form— whether by chewing or smoking—it is 13.57%. According to a research by Ito H et al, 35% of people with type 2 diabetes now smoke[9]. About 20% of persons with type-2 diabetes who were 18 years of age or older also smoked at the time of the study [10].

12.33% of the participants in the current study are not vegetarians, and 8.11% of them have diabetes. However, it is 4.72% among vegetarians (87.67%). But the difference (p value=0.1245) is not statistically significant. Certain research have suggested that eating a vegetarian diet lowers the chances of developing diabetes [11, 12].

The prevalence of diabetes among individuals who engage in light, moderate, and heavy physical activity is 7.96%, 3.95%, and 3.34%, respectively. These numbers show that people who engage in light physical activity have a much greater incidence of diabetes than those who engage in moderate and heavy physical activity. People who engage in less physical activity are more likely to be diagnosed with diabetes, according to research by Akula Sanjeevaiah. Similar findings were found in this study. 13]

Two distinct anthropometric indicators, waist circumference (WC) and body mass index (BMI), were used to diagnose obesity. 11.33% of the subjects meet the BMI definition of obesity, whereas 22.67% meet the waist circumference definition. According to the BMI and WC classifications of obesity, diabetes is seen to be highly widespread. Diabetes affects 11.79% of BMI obese people. According to WC standards, 8.83% of obese people have diabetes. Diabetes prevalence is substantially lower (4.24%) in non-obese people. Diabetes has obesity as a known cause of the disease. In [14] According to the Chi square test, the association in this investigation is significant (p=0.0018). The majority of earlier research confirms this connection [15].

In this study, the prevalence of diabetes among hypertensives was shown to be four times greater than that of other populations. Gress et al. (2000) and Mullican et al. (2009) have both cited comparable numbers [16, 17]. Twenty-two percent of the participants in this study have hypertension. Of the hypertensives, 12.12% have diabetes.

The study population exhibits a 13.33% prevalence of psychological stress, with a corresponding 20% prevalence of diabetes. In contrast, the subjects who do not experience psychological stress have a 2.69% prevalence of diabetes.Diabetes and psychological stress are significantly correlated (p=0.00). According to Chida et al., there is a psychological element that is associated with the prognosis of diabetes and has an inclusive etiological influence [18]. After a 15-year follow-up, a different study on working women found that psychosocial work stress was an independent predictor of type 2 diabetes in women [19].

CONCLUSION

The inquiry revealed a 5% prevalence of diabetes mellitus, which was somewhat higher than the ICMR-INDIAB population-based examination report from 2017, which found that 4.3% of Uttar Pradesh's population had diabetes. Given that the incidence rate increased by 0.8% in just the last two years, this result is concerning. Men are more likely than women to get diabetes. The rising incidence of diabetes can be attributed to a number of factors, including a stagnant lifestyle, high rates of unemployment (37%), high rates of tobacco use (25.9%), and individual ignorance. One of the most important psychological stressors associated with diabetes is among these, followed by a favorable family history, tobacco use, high blood pressure, and obesity. Numerous elements related with diabetes were modifiable. So by spreading awareness among individuals the predominance of diabetes can be diminished around there.

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