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Study on the Prevalence of type 2 diabetes Mellitus among women population of Bangalore, India

Dr. K. Uthramani[1*], Aghila S. B.[2]

[1]Associate Professor, Department of management, M.SC (N), M.SC (Psy), PhD. (N), Shri Venkateshwara

Email : University, (Uttar Pradesh)

[2]Research Scholar, Department of management, Shri Venkateshwara University, (Uttar Pradesh)

Email: Aghilasbv@Gmail.Com

Abstract - Today, type 2 diabetes mellitus is the most common form of the disease in India, and the prevalence is rising at an alarming rate (T2DM). The fast urbanization of the suburbs is to blame for the increased incidence of diabetes mellitus. Increasing urbanization, ageing populations, dietary shifts, decreased physical activity, and other bad habits are all leading to an increase in diabetes mellitus cases. The most effective therapy for decreasing complications and early mortality in women with T2DM is to develop and maintain good lifestyle practices. Bengaluru's female population is still lacking data on the prevalence of T2DM and its related variables. In light of this, researchers in Bengaluru, Karnataka, set out to find out how common diabetes mellitus is among women and whether or not it's linked to any of a number of risk factors. Among women under the age of 40, diabetes was found to be widespread, and it was shown to be prevalent among all three types of workers. BMI more than 25 and WHR greater than 0.85 were reported in the majority of diabetics, both of which raise the possibility of diabetes developing. Most of them had a good genetic profile and did not engage in physical activity or adhere to any food regimen. There was a strong link discovered between being older, having a lower level of education, being obese, having a larger waist circumference, and having diabetes. Women having a history of diabetes and other risk factors were shown to have a higher chance of getting the disease.

Keywords - Type 2 Diabetes Mellitus, BMI, WHR, Risk factors, prevalence

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INTRODUCTION

Throughout the 21st century, diabetes is becoming a serious public health issue. Diabetic disease has gone from being a minor health problem for the elderly to a severe health problem for young and middle-aged persons during the last 30 years. By 2025, the 84 million people now living with diabetes in SEAR are estimated to make up 20% of the global burden. Diabetes is expected to rise at the fastest rate in India, according to the WHO. According to the International Diabetes Federation, an estimated 40.9 million Indians have diabetes, and that number is anticipated to rise to 69.9 million by the year 2025 (IDF). In the National Urban Diabetes Survey, diabetes and prediabetes prevalence was 12.1% and 14.2%, respectively. At an annual cost of US$850 per patient, the Bangalore Urban Diabetes Study found that patients seeking hospital treatment for diabetes incurred direct and indirect expenditures of US$850. Medical expenses in the U.S. are expensive compared to those in other nations, particularly when taking purchasing power parity into consideration. Diabetes and pre-diabetes were found to be prevalent in the city of Bangalore, India, and risk factors linked with both illnesses were examined in this research. Because of India's rapidly changing demographic and socioeconomic makeup, the nation has become a global hub for diabetic mellitus (DM) (Unnikrishnan et al., 2016). Type 2 diabetes mellitus (T2DM) affects 69.1 million Indians, the second-highest number in the world after China (Tripathy, 2017). Deficiencies in insulin uptake and insulin receptor mutations are the primary causes of diabetes. The insulin receptor mutation also has an impact on glucose metabolism. Three types of diabetes mellitus have been defined by the American Diabetic Association: Type 1, Type 2, and gestational. Type 2 diabetes affects around 5 to 10 percent of adults with diabetes, This is brought about by the pancreatic beta cell degeneration (Maahs et al., 2010). Eighty percent to ninety percent of those with bipolar I disorder are youngsters or teenagers

(Mohan, 2004). Type I diabetes is caused by the T-cell-mediated death of pancreatic beta cells by the immune system. Type II diabetes occurs, target cells become resistant to insulin absorption. Type II diabetes affects people in their 20s until their 80s. Diabetes mellitus is becoming more prevalent among India's middle- and lower-class working people (DM), according to a study published in 2016. According to Metzger et al., diabetes is becoming more common among Indian women(2008). T2DM may be triggered by a number of reasons, including obesity, urbanization-related lifestyle changes, a large number of genetically related people, and insulin resistance (Mehta et al., 2009). The increased consumption of animal fats, complex carbs, and low fiber in Western diets has resulted in an impaired glucose tolerance in the Indian population, increasing their risk of diabetes (Mitra et al., 2019). According to Rimm et al. (1993), Chopra et al. (2013), and Agrawal et al. (2016), women with T2DM are more likely to smoke, gain weight, or be obese (2015).

LITERATURE REVIEW

Agrawal, S. (2015). Recent studies have indicated that dietary habits, particularly the frequency and kind of meals consumed, may help avoid the onset of diabetes. Indian adults are more likely to develop type 2 diabetes if they eat a specific kind of cuisine on a regular basis. This study's methodology was based on data from India's third National Family Health Survey, which was conducted in 2005-06 and comprised 99,574 women and 61,361 men aged 20 to 49. Estimating the link between food intake frequency (such as daily, weekly, occasionally or never) and diabetes prevalence was done using stratified multivariable logistic regression models adjusted for body mass index, tobacco smoking, alcohol consumption, television viewing habits and socioeconomic and demographic characteristics.In comparison to men who didn't consume milk/curd, pulses/beans, and fruits, those who consumed these foods had a decreased chance of acquiring diabetes; pulses, or fruits. This research confirms results from high-income nations that frequent eating of vegetarian foods, such as pulses, beans, fruits, and dairy products, may reduce the prevalence of diabetes in adult Indians. Uncontrolled confounding, on the other hand, cannot be ruled out as a reason for the connection since this is an observational discovery. In order to verify the results, further epidemiological research in poor countries is required, including more accurate estimates of dietary consumption and clinical indicators of diabetes.

Al Mansour, M.A. (2018). In Saudi Arabia, diabetes mellitus is a major health concern, affecting people, families, and whole communities and generating a significant financial burden. Researchers in Saudi Arabia studied a semiurban population to discover the prevalence of type 2 diabetes and its associated risk factors. The research was conducted in Majmaah, Saudi Arabia, at five primary health care facilities (PHCCs). The research had 353 participants in all. After receiving ethical clearance, data was gathered using a pre-tested questionnaire. For testing glucose levels and other parameters, blood samples were obtained. The most current version of SPSS was used to examine the data. There was a prevalence of 34.6 percent of the population with type 2 diabetic mellitus. It was more prevalent in the elderly than in younger age groups (44.6 percent versus 15.6 percent).Men and women were shown to have a statistically insignificantly different rate of contracting disease(34.9 percent vs 34.2 percent). Age (44 percent), commercial and profession in a personal capacity (38.5 percent), more than half (56.3%) of the patients were either divorced or widowed or had poor incomes (42.4 percent). High triglyceride (43.4 percent), low HDL (37.3 percent), and high total cholesterol were some of the risk factors for heart disease and stroke among the study participants (23.7 percent).In individuals with and without diabetes, these risk variables differed significantly. Obesity, high TG, low HDL, and high total cholesterol are all risk factors for heart attack or strokeare all connected with the condition, which is more common among the elderly.

Al-Goblan, A.S., (2014) Obesity is significantly connected to diabetes and insulin resistance. Nonesserified fatty acids, glycerol, proinflammatory markers, and other compounds associated to insulin resistance are all higher in obese individuals. Type 2 diabetes occurs when the pancreas' -islet cells, which control blood glucose, are destroyed. Diabetes is more likely to develop when insulin resistance and pancreatic -islet cell loss occur together. Weight gain and increased body mass are the primary causes of both type 1 and type 2 diabetes. Obesity is connected to insulin resistance and pancreatic cell dysfunction in this review of the literature. Obesity-related diabetes must be explored and investigated based on the facts, according to this review.

Anwer, Z., (2011) Diabetic and hypertensive disorders are on the rise. Patients with diabetes need to keep their blood pressure under strict control, according to research. Hypertension treatment in people with concomitant diabetes is not well understood. Both diseases significantly increase the likelihood of early microvascular and macrovascular problems in most individuals. More than seventy percent of persons with type 2 diabetes have high blood pressure, which is difficult to manage properly. In recent years, randomized, controlled studies have revealed new insights on how to improve treatment outcomes. It has now been shown that the previously recommended goal blood pressure (130/80 mm Hg) is in fact too high. Multiple antihypertensive medications are often required to meet therapeutic objectives.

Arun, N., (2016) The number of people with diabetes has increased dramatically during the last three decades, with type 2 diabetes accounting for the vast majority of those newly diagnosed. Type 2 diabetes is anticipated to rise by more than 150 percent across South Asia between 2000 and 2035. In many developing nations, an unfavorable intrauterine environment and the accompanying epigenetic modifications might possibly play a role in the fast growth, in addition to aging, urbanization, and related lifestyle changes. There were 382 million individuals with diabetes in 2013, according to the International Diabetes Federation, a figure that was more than the organization had previously predicted. More than 60% of diabetes sufferers reside in Asia, with China and India accounting for over half of the total. Over 138.2 million individuals have diabetes in the Western Pacific, and that figure will climb to 201.8 million by 2035. For most countries in the area, this situation offers enormous social and economic issues and has the potential to obstruct national and even global progress. To confront the expanding global public health "tsunami," more effort is needed to understand the causes of the pandemic and give a justification for preventative initiatives. Social, economic, and health care issues will only become worse unless significant efforts are taken to halt the rising inclinations in all countries via national preventive initiatives.

RESEARCH METHODOLOGY

An organized survey was distributed to Bengaluru-based women through email, personal messaging, and other social media channels as a consequence of the ongoing pandemic. Sections of the questionnaire were separated into two. A few information about yourself may be found in Section 1. The report's second section included a variety of topics related to general health. The questionnaire included questions about socioeconomic status, demographics, personal history, past history, blood pressure and sugar level, lifestyle practices (smoking and tobacco chewing, as well as alcoholism and diet), physical activity (duration of work of more than 90 minutes per day, 60–90 minutes per day, 30–59 minutes per day, and sedentary) as well as the presence of disease and age at the time of the study. Height, weight, and hip and waist circumference were all calculated using anthropometrics. The BMI is calculated by dividing one's weight in kilograms (Kg) by one's height in meters squared (m2). The waist-to-hip ratio was computed by taking the average of two separate measurements of waist and hip circumference (WHR). Those with a history of diabetes or those on oral hypoglycemic medicines or insulin were categorized as having DM. Only women above the age of 18 were polled in the study. Hyperglycemia due to other organic diseases or conditions was not included in the analysis of the study participants. These conditions included pregnancy, corticosteroid medication, and other pharmacotherapies that might induce hyperglycemia (e.g., chronic calcific pancreatitis). For statistical reasons, the data was analyzed using the Statistical Package for the Social Sciences 21.0. Number and percentage were used to represent categorical variables. SPSS for Windows, version 21, was used to enter and analyze the data.We employed descriptive statistics and chi-square tests to determine the significance of our comparisons of qualitative data. A p value of less than 0.05 was required to be considered statistically significant.

DATA ANALYSIS

Women in Bengaluru, Karnataka, provided 128 complete and useable questionnaire replies for this research. As may be seen in Figure 1, a total of six people (4.7%) has been diagnosed with diabetes.

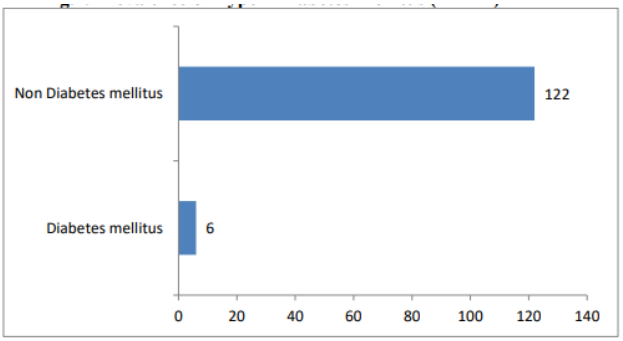

Fig.1. Type 2 Diabetes Mellitus (T2DM) prevalence (DMT2)

Socio-demographic Findings Associated with Type 2 Diabetes

Diabetes has been shown to be linked to a range of socioeconomic characteristics in Table 1. The prevalence of diabetes was shown to rise as the subjects became older. The majority of those who took part in the survey (75.8%) were under the age of 25, while just 4.6% were above the age of 40. Four of the survey participants under the age of 40 had diabetes. Only 8.6% of people had earned a postgraduate degree, compared to a national average of 39.8%. Diabetic incidence was highest among those with just a high school education, despite the fact that the majority of those with diabetes had a doctoral degree or above (18.1 percent). Diabetes was shown to be more common (14.2 percent) among professionals, despite the fact that the vast majority of those surveyed being students (67.2 percent). Nearly one-fifth of married people with diabetes were diagnosed with type 2.

There are a number of factors that increase the risk of developing type 2 diabetes

The current investigation found that high blood pressure (hypertensive), obesity (obese and overweight), and a history of diabetes in one's family were all linked to the condition. Table 2 shows that those who were slim (10.5 percent) or

overweight (10.3 percent) were more likely to have diabetes than those who were not. In contrast, just one (1.4 percent) of the normal respondents developed diabetes mellitus Type 2 (D2). 65 respondents (50.8 percent) had a family history of diabetes, with one or both parents having the disease, whereas 63 (49.5 percent) did not have a history of the disease. Sedentary or inactive, 59 (46.1 percent) of the participants were, and four of them had diabetes (6.8). Diabetes mellitus was found in 50% of those with hypertension. Two diabetic women (6.6%) had a larger waist circumference (>88cm) than the IDF's conventional cutoff, which was used in this investigation. Five (11.6 percent) of the 128 women who took part in the study had diabetes, they had greater WHRs or were truncal obesity, and this was the case for these ladies. For those with diabetes, smoking or drinking did not increase their likelihood of acquiring diabetes statistically. Diabetic complications were linked to a variety of health conditions, including thyroid dysfunction and irregular menstruation, as well as polycystic ovary disease (PCOD), gestational diabetes, juvenile diabetic state, kidney disease and nephropathy, amongst other things. (Thirty-three percent.)

Table 1: A Study of the Association Between DMT2 and a Range of Sociodemographic Factors

Covariates	Frequency (%)	Diabetic (%)	Non Diabetic (%)	Total	P value
Age					
18-25	75.8	0 (0)	97 (100)	97	
26-30	3.9	1(20)	4(80)	5	0.0263, S
31-40	15.6	3 (15)	17 (85)	20	
41-50	2.3	0 (0)	3 (100)	3	
51-60	2.3	2(66.7)	1(33.3)	3	
above 60	0	0 (0)	0(0)	0	
Education					0.0213, S
School education	39.8	2(18.1)	9 (81.9)	11	
Graduate	35.9	0(0)	20(100)	20	
Post graduate	8.6	1(1.9)	50(98.1)	51	
Doctorate	15.6	3(6.5)	43(93.5)	46	
Occupation					0.0301, S
Business	5.5	1(14.2)	6(85.8)	7	
Service	18	1(4.3)	22(95.7)	23	
Labourer/ Household worker	0	0(0)	0(0)	0	
Housewife	7	0(0)	5(100)	5	
Student	67.2	4(4.4)	86(95.6)	90	
Unemployed	2.3	0(0)	3(100)	3	
Retired	0	0(0)	0(0)	0	
Marital status					0.0223, S
Married	23.4	6(20)	24(80)	30	
Unmarried	75.8	0(0)	97(100)	97	
Separated/ Widowed	0.8	0(0)	1(100)	1	
Place of residence (in Bengaluru)					0.0157, S
Urban	83.6	5(4.7)	102(95.3)	107	
Rural	16.4	1(4.8)	20(95.2)	21	

Key: S-Significant

Table 2: Factors that increase the chance of developing Type 2 Diabetes Mellitus

Covariates	Frequency (%)	Diabetic	Non diabetic	Total	P value
BMI					0.0213, S
Thin	14.8	2(10.5)	17(89.5)	19	
Normal	57	1(1.4)	72(98.6)	73	
Overweight	22.7	3(10.3)	26(89.7)	29	
Obese	5.5	0(0)	7(100)	7	
Hypertension					0.0199, S
Normal: 90/60mmHg-120/80mmHg	83.6	3(2.8)	104(97.1)	107	
Higher: >140/90mmHg	3.1	2(50)	2(50)	4	
Lower: <90/60mmHg	13.3	1(5.9)	16(94.1)	17	
Physical Activity					0.0238, S
Vigorous	8.6	1(9.1)	10(90.9)	11	
Moderate	28.1	0(0)	36(100)	36	
Mild	17.2	1(4.5)	21(95.5)	22	
Least Physical activity	46.1	4(6.8)	55(93.2)	59	
Smoking					0.157, NS
Yes	0.6	0(0)	2(100)	2	
No	88.4	6(4.8)	120(95.2)	126	
Alcohol					0.257, NS
Yes	7	1(11.1)	8(88.9)	9	
No	93	5(4.2)	114(95.8)	119	
Family History					0.0157, S
Yes	50.8	4(6.2)	61(93.8)	65	
No	49.2	2(3.2)	61(96.8)	63	
Waist Circumference					0.0132, S
Less (< 88cm)	74.2	4(4.1)	94(95.9)	98	
Greater (> 88 cm)	25.8	2(6.6)	28(93.3)	30	
Waist – Hip Ratio					0.0223, S
<0.85	66.4	1(1.2)	84(98.8)	85	
≥0.85 (Truncal obesity)	33.6	5(11.6)	38(88.4)	43	
Fasting Blood Sugar					0.0223, S
3.9 mmol/l (70 mg/dl) to 6.0 mmol/l (108mg/dl)	71.7	1(1.2)	85(98.8)	86	
6.1 (110mg/dl) to 6.9 mmol/l(124 mg/dl)	22.6	3(7.7)	36(92.3)	39	
Greater than or equal to 7.0 mmol/l (126mg/d)	5.7	2(66.7)	1(33.3)	3	
Risk of being Diabetic					0.0265, S
Family History	42.1	4(7.4)	50(92.6)	54	
Diet and life style	15.6	0(0)	20(100)	20	
Lack of physical activity	24.2	1(3.2)	30(96.8)	31	
Stress factors	15.6	0(0)	20(100)	20	
Associated risk factors	2.3	1(33.3)	2(66.7)	3	
Age of Diagnosis					0.0285, S
<18 years	0	0(0)	0(0)		
18-25	75.7	0(0)	97(100)	97	
26-30	3.9	1(20)	4(80)	5	
31-40	14.8	3(15.8)	16(84.2)	19	
41-50	2.3	0(0)	3(100)	3	
>50	2.3	2(66.7)	1(33.3)	3	

Key:S-Significant, NS-NotSignificant

This demographic has a high prevalence of type 2 diabetes, with a prevalence rate of 4.7%. For those under 40, the frequency was 35%, while for those over 50, it was 66.7 percent. People above the age of 65 were found to have diabetes mellitus (P 0.05). Patil and Gothankar also came to the same conclusion (2019).Ahmad et al. discovered a nearly threefold rise in diabetes mellitus prevalence beyond the age of 60. (2011).

CONCLUSION

Diabetes and pre-diabetes rates in this region are comparable to those in other sections of the country, according to this research. According to our study, increasing age, female gender, a family history of diabetes, inactivity, and central obesity were the most important risk factors. All three types of workers, heavy, moderate, and sedentary, were found to have diabetes in the majority of women under 40 years of age. BMI >25 and WHR > 0.85 were found in the majority of those with diabetes, indicated that the condition was more likely to

occur. The majority of women with diabetes had no history of the disease running in their families, and they did not engage in any physical activity or adhere to any dietary restrictions. There was a slew of risk factors associated with type 2 diabetes mellitus in the study subjects.Obesity, a larger waist circumference, and diabetes mellitus have all been linked to diabetes mellitus. There was a substantial link between diabetes mellitus and family history of diabetes, WHR in women, and WHR in males, but no link was found between smoking or drinking and diabetes. In light of the findings, it's clear that DMT2 isn't only a sickness of cities. According to a study published in the journal Diabetes Care, becoming older and having a family history of diabetes mellitus are both unchangeable risk factors for developing the disease. There is an urgent need in India for diabetes mellitus screening programs for high-risk populations and comprehensive health education campaigns for women. Despite the fact that many professional women are on their feet for the most of the day, they nonetheless engage in relatively little physical exercise. Many variables, including lack of understanding of dietary limitations and lifestyle changes and stress in managing both a professional and family life among working women, might contribute to the development of type 2 diabetes. Individuals who have a positive family history of diabetes are advised to implement stress management in the job, engage in regular physical activity, and get regular health checkups.Further thorough and prospective longitudinal studies are required to further understand the underlying reasons of this change in the female population and to study risk variables and their relationship or causal effects on the prevalence of DMT2. The study might be widened by doing physical surveys and investigations of low-income neighborhoods.

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Corresponding Author

Dr. K. Uthramani*

Associate Professor, Department of management, M.SC (N), M.SC (Psy), PhD. (N), Shri Venkateshwara