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PREVALENCE AND PREDISPOSING FACTORS TO DIABETES MELLITUS TYPE II AMONG FEMALES IN AURANGABAD CENTRAL ASSEMBLY CONSTITUENCY, BIHAR STATE

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ABSTRACT

This study examined the prevalence and predisposing factors of type II diabetes mellitus among females in Aurangabad Central Assembly constituency, Bihar State, India. Anchored on the Health Belief Model, the study aimed to assess the relationship between socio-behavioral factors—age, alcohol consumption, and smoking—and the occurrence of type II diabetes. A descriptive survey design was employed using multistage sampling to select 440 women of reproductive age from two healthcare facilities. Data were collected through hospital records and analyzed using SPSS v25.0, applying descriptive statistics for research questions and binary logistic regression for hypothesis testing at 0.05 significance level. Findings revealed a non-hereditary diabetes mellitus type II prevalence of 8.4%. Significant relationships were identified between diabetes prevalence and age ($p = .002$), alcohol consumption ($p = .000$), and smoking ($p = .000$). Notably, women aged ≥60 years were over eleven times more likely to be diabetic compared to those under 20, while alcohol consumers and smokers were 11 and 12 times more likely to be diabetic, respectively. The study concludes that modifiable lifestyle behaviors—especially in the context of increasing urbanization and sedentary living—significantly influence the likelihood of developing non-hereditary type II diabetes mellitus. It recommends routine diabetes screening during female clinical visits, broadening the diagnostic focus beyond older populations, and promoting physical activity and blood pressure monitoring among women, especially those in sedentary occupations. Addressing these factors may reduce the growing diabetes burden in the region.

Keywords: Type II Diabetes Mellitus, Female Health, Lifestyle Risk Factors, Public Health

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INTRODUCTION

Background to the Study

Diabetes mellitus type II is a non-communicable disease that relies on several factors for its development, often known as predisposing factors among which majority are modifiable lifestyles which influences its prevalence. Diabetes is a group of metabolic diseases in which a person has high blood sugar due to problems processing or producing insulin (or both conditions) (Gotter, 2017). It is of two types, diabetes mellitus type I or type II. Type I is characterized by a state of chronic hyperglycemia (high blood sugar) while type II diabetes is caused by inability to produce a functional insulin or the inability for insulin to be recognized by the tissue layer (Gropper et al, 2009). However, report showed that, they type II diabetes is more prevalent and a fast growing public health issue. A current report from the British Diabetic Association (2020) showed that, about 90% of people with diabetes have type II diabetes. Shaw et al., (2010) noted that, diabetes is a global health problem that is expected to reach pandemic levels by 2030 and that the prevalence of type II diabetes mellitus (T2DM) is now increasing rapidly around the world. In sub Saharan Africa, Dart et al., (2013) reported that, type II diabetes mellitus has been rising due to urbanization and changing lifestyle characteristics with several complications from it including blindness, renal disease and amputation among others. In India, a national survey by the World Health Organization (2012) showed that, 9% of 5,860 adults (25-64years) were found to have diabetes mellitus (raised fasting blood glucose).

Though diabetes could result from genetic predisposition, some modifiable lifestyles can also predispose an individual to its development. The National Institute of Diabetes, Digestive and Kidney Disease (2020) posited that, predisposing factors are those factors that put someone at risk of developing a problem; they may be characteristic, condition, or behaviour that increases the possibility of a particular disease, for type II diabetes mellitus they may include: body mass index, smoking, age 45 years or older, family history of diabetes, history of high blood pressure, history of gestational diabetes, dietary pattern, and physical inactivity. Similarly, Danquah et al. (2012) reported advanced age, obesity, family history of diabetes mellitus, smoking and alcohol, lack of physical activity, and poor nutrition as predisposing factors for type II diabetes mellitus. Other factor identified by Ruhembe, Mosha and Nyaruhucha (2014) was poor knowledge of diabetes.

Globally, the largest proportion of people with type II diabetes mellitus is between 40-59 years (Whiting et al., 2011). Age has been associated with diabetes mellitus. Study done by Ramachandran (2002) showed that, the prevalence of diabetes increases with age and maximum in 60 to 69 years age group. In the same vein, Danquah et al (2012) revealed that advanced age is associated with type II diabetes mellitus which could be due to the weakening of the immune system at an advance age influencing also the activities of pancreases in the production of functional insulin at normal concentration. Thus, it is important that, at each stage of life, particularly when there is an advancement in age, a keen consideration be made in dietary patterns which could also increase the risk of developing type II diabetes at such age. Agbogli et al (2017) has shown with empirical evidence that there is a positive association between the various diabetes and dietary patterns.

Body mass index is a measure of the body weight in relation to height. It is defined as a person's weight in kilograms divided by the square of the person's height in metres (kg/m2) (WHO, 2018). This makes the measurement of body mass index a priority in order to maintain a balance. The report of Amoah et al (2002) showed that, the most notable risk of developing type II

diabetes mellitus is body mass index and the risk attributed to obesity is as a much as 75%. The most useful way of expressing obesity is the body mass index (BMI). The index is the body weight divided by the square of the height in meters (weight/ (height)2). Ruhembe et al (2014) reported that, the mean body mass index was found to be significantly higher in females than males indicating increasing risk for developing type II diabetes mellitus among the females.

Studies have shown that the prevalence of type II diabetes mellitus was higher in females than males (Ekpenyong *et al* 2012; Ruhembe et al, 2014; Agbogli et al, 2017). Gotter (2017) explained the reasons diabetes affects more females than males as follows: women often receive less aggressive treatment for cardiovascular risk factors and conditions related to diabetes, some of the complications of diabetes in women are more difficult to diagnose, women often have different kinds of heart disease than men, the hormones and inflammation act differently in women and their sedentary lifestyle. Knowing the complications presented by type II diabetes mellitus, it becomes necessary to find out the factors predisposing women to it in order to map out what actions to be taken to minimize or prevent it among women. Thus, this study was aimed at investigating the prevalence and predisposing factors to diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.

Statement of the Problem

One major public health problem having a fast increasing prevalence is the Type II diabetes. This debilitating health condition has become a pressing health problem in recent time because of the high risk of morbidity and mortality it has presented to the sufferers in recent times following the corona virus pandemic, which made many to seat back at home due to restriction of movement and loss of jobs thereby, promoting a sedentary lifestyle which aggravates its prevalence. The recent increase in the surge of Type II diabetes mellitus could also be attributed to certain factors including high blood pressure, smoking, alcohol consumption, poor dietary patterns and obesity among others.

Its complications are enormous and pose a major threat to public health as it may result in a wide range of physiological as well as psychological problems including sexual disorder, severe vision loss, acute renal diseases which may require dialysis or kidney transplant, myocardial infarction otherwise known as heart attack, cerebrovascular diseases like stroke, and hypertension. Due to the intensity of the adverse effects of diabetes, it is important to find out the predisposing factors to address the issue in order to contribute to improving country health situation. Specifically, for women who are becoming less physically active due to modernization may be prone to some of the predisposing factors such as overweight or obesity. Observation in recent times showed increased death due to high blood pressure and diabetes. Yet, studies focusing on them in related issues are scarce. Thus, this study is necessary particularly for women in Bihar State who are faced with the high cost of living which could impede their practice of proper diet and to maintain an appropriate weight. Hence, this study investigated the prevalence and predisposing factors to diabetes mellitus type II among females in Aurangabad Central Assembly constituency, in Bihar State.

Aim and Objectives of the Study

The aim of this study was to investigate the prevalence and predisposing factors to diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State. Specifically, the study sought to achieve the following objectives:

1. To find out the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.

2. To ascertain if age is a predisposing factor to diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.
3. To determine if alcohol consumption is a predisposing factor to diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.
4. To find out if smoking is a predisposing factor to diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.

Research Questions

The study provided answers to the following questions:

1. What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State?
2. What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State based on age?
3. What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State based on alcohol consumption?
4. What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State based on smoking?

Hypotheses

The following null hypotheses stated to guide the study were tested at 0.05 alpha level:

1. There is no significant relationship between age and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.
2. There is no significant relationship between alcohol consumption and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.
3. There is no significant relationship between smoking and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State.

Literature Review

Concept of diabetes

Diabetes is a chronic, non-communicable disease, characterized by high levels of glucose in the blood. It occurs either because the pancreas stops producing the hormone insulin (Type 1 diabetes), or through a combination of the pancreas having reduced ability to produce insulin alongside the body being resistant to its action (Type II diabetes). Prevalence of type II diabetes mellitus (T2DM) is now increasing rapidly around the world and emerging as a global health problem that is expected to reach pandemic levels by 2030 (Shaw *et al.*, 2010). Diabetes is a silent disease in which many sufferers become aware that they are sick only when they develop one or more of its life-threatening complications. Complications from T2DM include blindness, renal disease and amputation among others (Dart *et al.*, 2013). According to Gotter (2017), diabetes is a group of metabolic diseases in which a person has high blood sugar due to problems processing or producing insulin. Diabetes can affect people of any age, race, or sex. It can affect people with any lifestyle. Very high level of blood glucose can overwhelm the pancreases over time and inhibit the ability to produce functional insulin at normal concentration causing diabetes which is a group of metabolic diseases in which a person has high blood sugar due to problems processing or producing insulin (or both conditions) (Gotter, 2017).

It is of two types, diabetes mellitus type I or type II. Type I is characterized by a state of chronic hyperglycemia (high blood sugar) while type II diabetes is caused by inability to produce a functional insulin or the inability for insulin to be recognized by the tissue layer (Gropper et al, 2009). Insulin is a hormone that comes from a gland situated behind and below the stomach (pancreas); the pancreas secretes insulin into the bloodstream; the insulin circulates, enabling sugar to enter your cells; insulin lowers the amount of sugar in your bloodstream; as blood sugar level drops, so does the secretion of insulin from the pancreas drop. On the other hand, glucose — a sugar — is a source of energy for the cells that make up muscles and other tissues. Glucose comes from two major sources: food and the liver. Sugar is absorbed into the bloodstream, where it enters cells with the help of insulin; the liver stores and makes glucose; when the glucose levels are low, such as when one hasn't eaten in a while, the liver breaks down stored glycogen into glucose to keep your glucose level within a normal range (Mayo Clinic, 2020). Though diabetes could result from genetic predisposition, some modifiable lifestyles can also predispose an individual to its development. Diabetes risk increases as one gets older. This may be because they tend to exercise less, lose muscle mass and gain weight as you age. But type II diabetes is also increasing among children, adolescents and younger adults. Also, gestational diabetes can be a risk factor (Mayo Clinic, 2020).

Physical inactivity and type II diabetes mellitus

Being physically inactive is associated with an increased risk of type II diabetes. Being physically inactive' means not doing enough physical activity while being 'sedentary' means sitting or lying down for long periods. Examples of such behaviour included working at a desk for long periods without standing up; sitting down while studying at school or home; sitting or lying down while watching television or playing video games and sitting while driving a vehicle, or while travelling among others (British Diabetic Association, 2020). Physical inactivity is another major risk factor for the development of type II diabetes. In part, this results from the tendency of sedentary people to accumulate triglycerides in their muscle cells and gain weight. Physical exercise is a powerful counterforce to insulin resistance. Regular exercise improves glycemic control and reduces the risk of developing cardiovascular complications in people with type II diabetes. "Furthermore, regular exercise may prevent type II diabetes in high-risk individuals" (ADA, 2015). The majority of people with diabetes have type II diabetes. This type of diabetes is largely the result of excess body weight and physical inactivity (WHO, 2020)

It is worthy of note that, physical inactivity can lead to over-weight or obesity. Excess body fat causes insulin resistance, and the risk for developing type II diabetes increases as the proportion of body fat increases. Body mass index (BMI) is used to measure the proportion of body fat to total body weight. The risk is higher when excess fat has accumulated inside the abdominal cavity, as opposed to under the skin. Excess intra-abdominal fat is a feature of more than 4 out of 5 patients with type II diabetes. Adipose tissue encourages insulin resistance in a number of ways. Excess fat, especially visceral fat, leads to higher blood levels of fatty acids, and fatty acids reduce glucose uptake, causing insulin resistance in skeletal muscle. Additionally, in obese individuals, adipose tissue releases less adiponectin, a hormone that reduces insulin resistance. Excess adipose tissue also secretes additional pro-inflammatory molecules (cytokines), which increase insulin resistance. The increased insulin resistance from all these causes leads to hyperinsulinemia, which further weakens dysfunctional beta cells (ADA, 2015).

Worthy of note is the fact that, poor dietary habits can lead to excess weight. Any dietary habits that lead to obesity also increase a person's chances of progressing from prediabetes to diabetes.

Age and diabetes mellitus

Type 1 diabetes can develop at any age, though it often appears during childhood or adolescence. Type II diabetes, the more common type, can develop at any age, though it's more common in people older than 40 (Mayo clinic, 2020). Women older than age 25 are at increased risk. One's risk increases if you have prediabetes — a precursor to type II diabetes — or if a close family member, such as a parent or sibling, has type II diabetes. You're also at greater risk if you had gestational diabetes during a previous pregnancy, if you delivered a very large baby or if you had an unexplained stillbirth.

Age is a key demographic factor that affects the prevalence of diabetes among individuals. This is because body mass index was observed to increase with an increase in age which influences the prevalence of type II diabetes mellitus. The study of Vuvor (2015) showed that, the highest percentage of respondents of a normal body mass index across the age groups was 26.5%, which was recorded by the 30–35 years' group, within the 45–50 years' group, the percentage that had a normal BMI was 22.5% and the highest rate of obesity (4.0%) was recorded by the 46–50 years' age group. Oladapo, Salako, Sodiq, Shoyinka, Adedapo and Falase (2010) documented that, as high as sixty percent of non-communicable diseases related death occurred in people below the age of 60 years in low and middle income countries, India inclusive. According to Rolfes, Pinna and Whitney (2014), the increased rate of obesity with respect to an increase in age could be due to the fact that older people are less physically active but maintain the same energy intake as during their earlier years. Hence, the excess energy that is not expended is stored as fat, increasing their chances of becoming obese.

Body mass index and diabetes mellitus type II

Body mass index is a measure of the body weight in relation to height. Gibson (2005) defined body mass index (BMI) as a measure of the human body weight in relation to the height which could be calculated by dividing the weight of a person in Kg by the square of the height in meters (m^2). It is classified as normal (18.5–25 kg/m^2), overweight (26–30 kg/m^2), and obese (>30 kg/m^2). It is defined as a person's weight in kilograms divided by the square of the person's height in metres (kg/m2) (WHO, 2018). This makes the measurement of body mass index a priority in order to maintain a balance.

A very brief history of BMI as given by the WHO (1995) showed that, BMI was formerly called the Quetelet index, used as a measure for indicating nutritional status. It was developed by Adolphe Quetelet during the 19th century. Initially it was not used for studying obesity, but rather classifying people based on their physical features. After the Second World War, the weight levels in the general population started to increase. Life insurance companies saw the connection between being morbidly overweight and an increased risk of death**,** so adopted the body mass index as a simple practical way of quantifying a person's relative body fat and hence their risk to insure. In 1995 BMI was adopted by the World Health Organization as a simple tool to get insights into body fat levels and trends among different populations. In children, BMI is calculated as for adults and then compared with z-scores or percentiles. During childhood and adolescence the ratio between weight and height varies with sex and age. It is defined as a person's weight in kilograms divided by the square of the person's height in metres (kg/m2). The World Health Organization's classification for body mass index is shown in the table below:

Concept of blood pressure and diabetes mellitus type II

Blood pressure is the force or pressure exerted by the blood as it flows through the blood vessels. According to Vuvor (2017), Blood pressure is the pressure of the resistance of blood flow against the walls of the arteries. Blood pressure is measured as both systolic and diastolic. Martin (2015) specified that, systolic blood pressure (SBP) is the top number which refers to the amount of pressure in the arteries during contraction of the heart muscle while diastolic pressure is the pressure required to allow constant flow in the blood vessels and filling of the ventricles before the next systole. He added that, a normal blood pressure is given as 120 mmHg (systolic)/80 mmHg (diastolic). However, Saxon, Etten and Perkins (2010) noted that, blood pressure is said to be high showing a systolic reading of ≥140 mmHg and/or higher over a diastolic reading of ≥90 mmHg. The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure classified SBP ≥140 mm Hg or DBP ≥90 mm Hg of individuals as stage 1 hypertension and SBP ≥160 mm Hg or DBP ≥100 mm Hg as stage 2 hypertension (Chobanian, Bakris & Black, 2003).

A brief history of blood pressure showed that, the initial understanding of central aortic pressure and therefore "blood pressure" dates back to 1733 when Stephen Hales directly measured intra-arterial pressure in a horse (Hales, 1733). Subsequently, it took almost a century to develop sphygmomanometric devices that could potentially measure blood pressure noninvasively and these devices were introduced into clinical practice in the late 1800s and early 1900s (Booth, 1977). Although the variability of blood pressure in response to various physical/emotional stimuli and sleep/wake periods gained attention even in the 1940's, it's significance became more evident towards the end of the 20th century when mercury manometers were replaced with electronic devices making blood pressure measurements safe and accessible.

Theoretical Framework

The Health Belief Model (HBM) is adopted as the theoretical framework for this study. The Health Belief Model (HBM) was propounded by Rosenstock in 1974 to predict and explain variations in health behavior. The HBM is an interpersonal framework that views humans as rational beings who use multidimensional approach to decision-making regarding whether to perform a health behaviour or not. Overall, the HBM's adaptability and holistic nature facilitate applications in diverse contexts with complex behaviors like use of health care services. The HBM emphasize modifiable factors, rather than fixed variables, which enable feasible interventions to reduce public health problems.

The HBM is related and relevant to the present study as it offers a comprehensive approach to health behaviour which are predictive of a health problem and provides a structure for individual's health behavior patterns and their dynamic developmental, cognitive and physical health needs within complex contexts. By considering all of these factors through the holistic model, it emphasize that, if individuals have a good knowledge of diabetes preventive practices and believes that the consequences of adopting unhealthy lifestyles such as smoking, drinking, physical inactivity are dangerous, they will be more likely to evade such factors that contribute to or increases their chances of diabetes. The constructs and the assumptions of the model are closely related to the variables of interest (age, knowledge, health behaviour which in this study are physical inactivity, smoking, drinking) which were included as the predisposing factors to diabetes mellitus type II among women in this study. Hence, this study is anchored on the Health Belief Model.

Empirical Review

Ruhembe et al. (2014) carried out a study on the prevalence of type II diabetes mellitus among adult population in Mwanza city, Tanzania. A cross-sectional research design was adopted for the study with a study population consisting of adults (males and females) aged ≥ 30 years residing in Mwanza city for at least 3 months prior to the study. A multistage random sampling technique was used to select a sample size of 640 for the study. A structured questionnaire was used for the collection of data and analysis was carried out using t-test for continuous variables and $\chi 2$ –test for categorical variables. Multiple regression analyses were conducted to control the effects of potential confounding factors. The result showed that, the prevalence of type II diabetes mellitus among the study respondents was 11.9%. The study concluded that, there was a very high prevalence of type II diabetes mellitus in the study area. This study was reviewed in this study because the variables considered in the study such as age, smoking, and knowledge of diabetes in relation to the prevalence of diabetes mellitus type II were closely related to the variables of the present study which were examined as predisposing factors

Marinho et al. (2013) investigated the risk for type II diabetes mellitus and associated factors. A cross-sectional study design was adopted for the study with a population consisting of all the users of the family health programme in Brazil. A sample size of 419 of was selected using a random sampling technique. Data was collected using a structured questionnaire and analyzed using percentage. The result of the study showed that, 25.3% of users were aged ≥45 years; There was a significant association between the risk of developing type II diabetes mellitus and sociodemographic variable such age. The study concluded that, several predisposing factors contribute to the prevalence of diabetes mellitus type II. This study was reviewed in this study because the variables considered in the study such as age, and diabetes mellitus type II were closely related to the variables of the present study which were examined as predisposing factors.

The study by Prasad et al. (2020) critically evaluates the disparities in diabetes-related complications based on socioeconomic status (SES) in the United Kingdom. Employing a quantitative, cross-sectional design, the research analyzed data from 5,000 individuals diagnosed with Type 2 diabetes, drawn from diverse SES backgrounds. The primary objective was to identify whether SES contributed to unequal health outcomes, particularly in terms of complications such as diabetic retinopathy, neuropathy, and foot ulcers. The findings revealed a significant correlation between lower SES and increased diabetes-related complications. Patients from deprived backgrounds were more likely to present with advanced complications at diagnosis and had poorer ongoing management outcomes. A major explanatory factor was limited access to high-quality healthcare, including delayed specialist referrals, fewer routine screenings, and poor follow-up adherence. The study also emphasized the financial burden associated with diabetes self-management, including the cost of monitoring supplies and dietary requirements, which proved prohibitive for many patients in lower-income brackets. Notably, the researchers pointed to the compounding effects of education and health literacy, suggesting that individuals with lower SES were less likely to understand the importance of early intervention and sustained self-care practices. The study highlighted that addressing healthcare access alone would not eliminate disparities unless systemic socioeconomic barriers were also addressed. Prasad et al. called for targeted community-based interventions, improved patient education programs, and enhanced accessibility to diabetic care services for low-income populations. The study offers compelling evidence on the intersection of poverty, healthcare inequality, and chronic disease progression.

Scholes et al. (2021) conducted a large-scale geographic and quantitative analysis to investigate the relationship between neighborhood deprivation and Type 2 diabetes prevalence and outcomes in the UK. Using data from 1.2 million patient records linked to regional deprivation indices, the study aimed to determine whether where a person lives significantly influences their risk of developing diabetes and the outcomes of disease management. The results confirmed that individuals residing in highly deprived neighborhoods had a higher prevalence of Type 2 diabetes and worse clinical outcomes compared to those in more affluent areas. The study found consistent associations between geographic deprivation and poorer glycemic control, higher hospitalization rates, and increased rates of diabetes-related complications. Factors such as poor access to healthy food options, limited green spaces for physical activity, and fewer healthcare resources were highlighted as contributors to these disparities. Interestingly, Scholes et al. also found that even in areas with similar healthcare service provision, residents of deprived neighborhoods fared worse. This suggested that the issue extended beyond just healthcare availability and into the broader social determinants of health, such as education, employment, and housing quality. The study underlined the importance of place-based public health strategies, emphasizing that national-level policies must be locally adapted to target specific neighborhood needs. The researchers concluded by advocating for greater investment in community infrastructure, improved access to preventive services, and tailored health promotion initiatives in deprived regions. This work provides robust evidence of how structural socioeconomic inequality is geographically embedded and affects diabetes at the population level.

Smith et al. (2022) explored how socioeconomic status influences adherence to Type 2 diabetes treatment regimens among ethnic minority groups in the UK. Utilizing a qualitative research design, the study conducted focus groups with 60 participants from African, Caribbean, and South Asian backgrounds who were living with Type 2 diabetes. The study aimed to capture lived experiences and uncover barriers to treatment adherence related to socioeconomic and cultural factors. Key findings revealed that SES played a profound role in shaping patients' ability to consistently follow treatment plans. Many participants reported difficulty affording medications, nutritious food, and transportation to clinic appointments. These financial pressures often led to skipping doses or delaying care. Moreover, limited time due to work demands and a lack of paid sick leave further compromised patients' ability to attend medical appointments and manage their condition effectively. In addition to financial barriers, the study identified health literacy and cultural disconnects between healthcare providers and patients as significant factors affecting adherence. Patients expressed that they often felt dismissed or misunderstood in clinical settings, which eroded trust and discouraged active engagement in self-care. Smith et al. emphasized the need for culturally sensitive and economically accessible interventions, such as community-based support programs, mobile clinics, and medication subsidies. The study contributes to the growing evidence that socioeconomic inequalities intersect with ethnicity to produce unique challenges in diabetes management and requires policy responses that are inclusive and responsive to these realities.

Taylor et al. (2022) conducted a systematic review of 25 studies focused on the effectiveness of public health interventions targeting Type 2 diabetes among low SES populations in the UK. The aim was to evaluate whether these interventions led to meaningful improvements in disease prevention, control, and health outcomes in disadvantaged groups. The review found that tailored interventions—those designed specifically for low-income or high-risk populations—were generally more effective than one-size-fits-all programs. These interventions included

community health worker-led initiatives, free screening programs, culturally tailored diabetes education, and mobile clinics. Evidence from several studies indicated that such efforts resulted in improved HbA1c levels, increased screening uptake, and enhanced patient engagement. However, the review also noted significant variation in the quality of implementation and sustainability of these interventions. Interventions that were embedded in local communities and had stakeholder involvement showed greater long-term success, whereas top-down policy interventions often faced challenges in reach and acceptability. Some studies reported difficulties in maintaining funding and consistent delivery, limiting the long-term impact. Taylor et al. concluded that intervention effectiveness is highly context-dependent, and success requires alignment with community needs, sustained investment, and interdisciplinary coordination. The review strongly advocates for multi-sectoral approaches, integrating health, education, and social services to tackle the root causes of SES-related disparities in diabetes.

Wilkinson et al. (2023) presented a longitudinal study examining how employment status and income levels influence Type 2 diabetes outcomes in the UK. The research followed 10,000 participants over a 5-year period and analyzed health outcomes in relation to their SES trajectory. The study found that unemployment and low income were associated with significantly worse glycemic control, higher incidence of complications, and increased hospital admission rates. These effects persisted even after controlling for age, ethnicity, and baseline health conditions. Participants who transitioned from employment to unemployment during the study period experienced a decline in self-management practices, suggesting a dynamic link between financial stability and health behavior. One striking finding was the emotional and psychological toll unemployment had on diabetes management. Many participants reported increased stress and depression, which negatively impacted their motivation to adhere to treatment and maintain healthy lifestyles. The study further found that patients in lower SES groups were less likely to receive timely referrals to specialist care, adding to disparities. Wilkinson et al. emphasized that employment policies, such as access to sick leave, job security, and workplace health programs, should be seen as public health tools. The study calls for policy integration between health and labor sectors to mitigate the socioeconomic burden of diabetes.

In their 2021 study, Taylor et al. examined the impact of national policy interventions aimed at improving diabetes outcomes in low SES communities across the UK. The researchers used a policy analysis framework to evaluate the design, implementation, and outcomes of key NHS and local government programs that focused on reducing diabetes-related health inequalities. The analysis found that policies targeting social determinants of health—such as improved access to healthy food, enhanced health education in schools, and increased funding for community-based health initiatives—showed moderate improvements in diabetes outcomes. However, the study noted significant challenges in implementation, particularly in deprived areas where infrastructure was weak and resource allocation was inconsistent. Taylor et al. argued that while the policy intentions were well-founded, many interventions lacked long-term funding and adequate monitoring mechanisms. The disconnect between policy design and ground-level execution was a recurrent theme, often due to top-down approaches that didn't sufficiently engage local stakeholders. The study concluded that future policy efforts must prioritize community engagement, cross-sector collaboration, and the development of localised health equity strategies to effectively address the persistent SES-related disparities in diabetes care. It offers a critical view of the policy landscape and provides direction for more impactful reforms.

Majgi et al. (2012) carried out a study on the risk factors of diabetes mellitus in rural Puducherry. A Cros-sectional study design was adopted with a study population consisting of all residents in rural Puducherry. A sample size of 1,403 was selected using a proportionate sampling technique. Data was collected using a pre-tested questionnaire and analyzed using 't' test, Chi square test/Fischer's Exact test, Somer's d test (for directional measure in ordinal variable contingency tables), Analysis of variance, Logistic. The findings of the study showed a significant association between age and prevalence of diabetes mellitus type II ($p<0.05$). The Prevalence of type II diabetes increased significantly with age. The highest prevalence of diabetes was in 50-59 years group. The study concluded that, identified risk factors are u

Methodology

The research design adopted for this study is a descriptive survey design. The population for the study consisted of 567, 861 women in Aurangabad Central Assembly constituency (India Bureau of Statistics, 2020). The sample size for the study consisted of 440 women of reproductive age which was determined using Taro Yamane's formula for calculation of sample size:

$$n = \frac{N}{1+ N (e)^2}$$

Where n = sample size
N = population size
e = level of significance

n = 399 approximately 400
adding 10% non-compliance rate, n = 440.

The multistage sampling procedure was adopted for the study comprising of cluster sampling and simple random technique. The technique involved four stages. At the first stage, the simple random sampling technique was used to select two municipal areas in the Aurangabad Central Assembly constituency (Aheriand Ahmednagar City); at the second stage, the simple random sampling technique was used to select two health care facilities from the two municipal areas, at the third stage, the proportionate sampling technique was used to determine the number of respondents from each of the facilities, and at the fourth stage, the systematic sampling technique was used to select the respondents from the health care facilities. The instrument for data collection was the hospital record showing the data of female attendants at the diabetes clinics of the selected health care facilities. The record showed the socio-demographic characteristics of the respondents such as age, occupation, marital status, educational level and religion. The record also specified other vital information such as blood pressure, smoking and alcohol consumption, weight, including the dependent variable which is diabetes mellitus type II with specification of been hereditary or non-hereditary.

The data collected was analyzed using the statistical product for service solution (SPSS) version 25.0 and data were presented using descriptive statistics to answer research questions and inferential statistics to test hypotheses at 0.05 alpha level. Descriptive statistics such as percentage were used to answer the research questions and inferential statistics such as logistic regression statistics at 95% confidence interval and 0.05 alpha level was used to test the null hypotheses

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Results

Socio-Demographic Characteristics

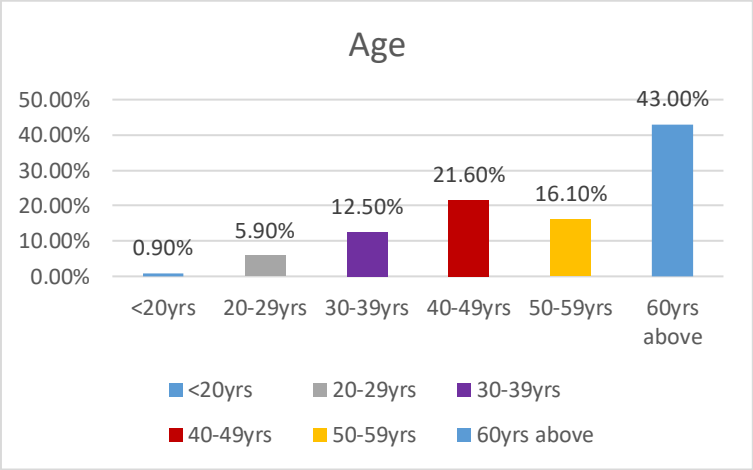

Fig 1: Bar chart showing the percentage distribution of the age of respondents

Fig 1 showed the percentage distribution of the age of respondents. The result showed that more of the respondents 189(43.0%) were aged 60 years and above, 95(21.6%) were aged 40-49 years, 71(16.1%) were aged 50-59 years, 55(12.5%) were aged 30-39 years and the fewest 4(0.9%) were aged less than 20 years with a mean age of 55.09±16.41.

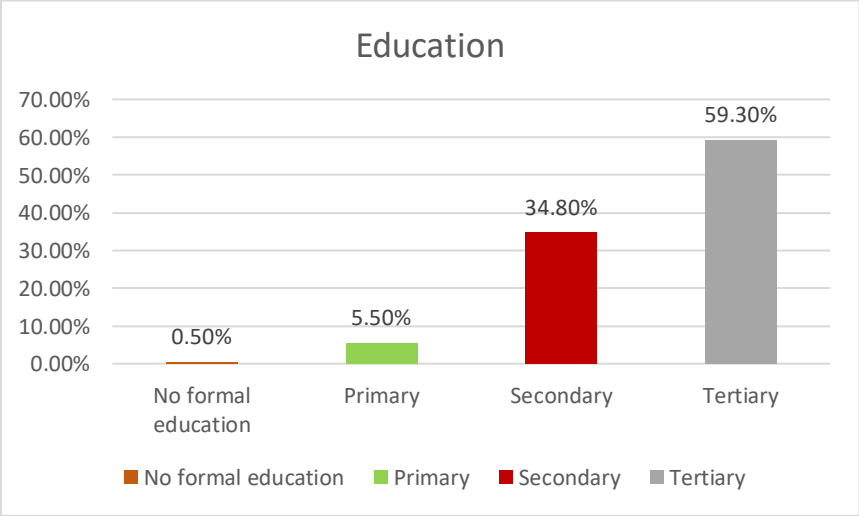

Fig 2: Bar chart showing the percentage distribution of the educational level of respondents

Fig 2 showed the percentage distribution of the educational level of respondents. The result showed that, more 261(59.3%) of the respondents had tertiary education, 153(34.8%) had secondary education, 24(5.5%) had primary while 2(0.5%) had no formal education.

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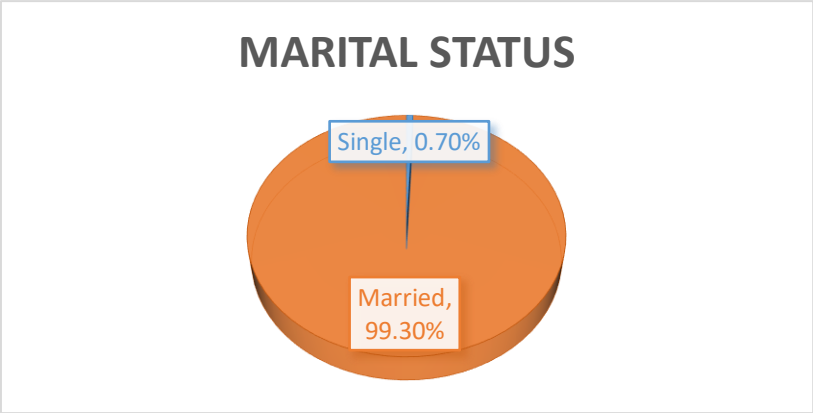

Fig 3: Pie chart showing the percentage distribution of the marital status

Fig 3 showed the percentage distribution of the marital status of respondents. The result showed that, majority 437(99.3%) of the respondents were married while 3(0.7%) were single.

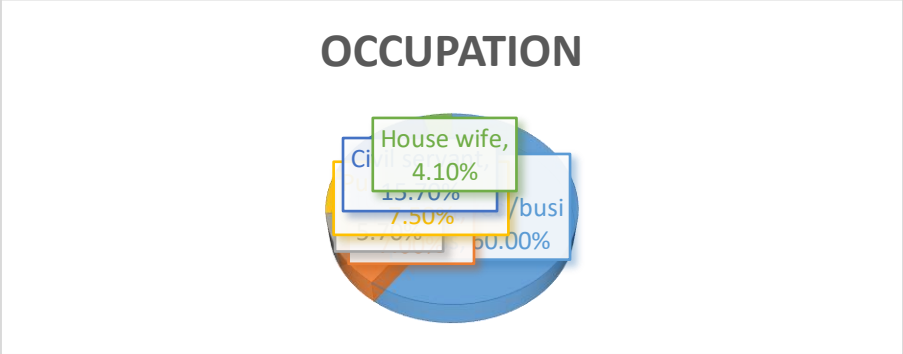

Fig 4: Pie chart showing the percentage distribution of the occupation

Fig 4 showed the percentage distribution of the occupation of respondents. The result showed that, more 264(60.0%) of the respondents were self-employed/business, 69(15.7%) were civil servants, 33(7.5%) were public servants and 18(4.1%) were house wives.

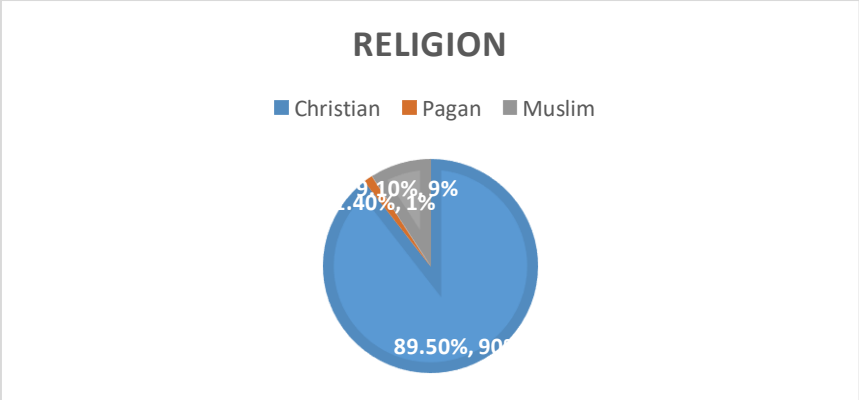

Fig 5: Pie chart showing the percentage distribution of the religion

Fig 5 showed the percentage distribution of the marital status of respondents. The result showed that majority 394(89.5%) of the respondents were Christians, 40(9.1%) were Muslims while 6(1.4%) were Pagans.

Analysis of Researc Questions

Research question 1: What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State?

Table 1: Prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency

Prevalence of diabetes mellitus type II among females	Frequency (F)	Percentage (%)
Hereditary	403	91.6
Not hereditary	37	8.4
Total	440	100.0

Table 1 showed the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency. The result showed that majority 403(91.6%) had diabetes mellitus type II by heredity while 37(8.4%) had non-hereditary diabetes mellitus type II. Thus, the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency was 8.4%.

Research question 2: What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State based on age?

Table 2: Age and prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency

Age	Prevalence of diabetes mellitus type II		Total
	Hereditary F(%)	Non-hereditary F(%)	F(%)
<20 years	4(100)	0(0.0)	4(100)
20-29 years	25(96.2)	1(3.8)	26(100)
30-39 years	49(89.1)	6(10.9)	55(100)
40-49 years	86(90.5)	9(9.5)	95(100)
50-59 years	65(91.5)	6(8.5)	71(100)
60 years and above	174(92.1)	15(7.9)	189(100)
Total	**403(91.6)**	**37(8.4)**	**440(100)**

Table 2 showed the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency based on age. The result showed that non-hereditary diabetes mellitus type II was more among those aged 30-39 years (10.9%), 9.5% were aged 40-49 years, 8.5% were aged 50-59 years while 3.8% were aged 20-29 years.

Research question 3: What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State based on alcohol consumption?

Table 3: Alcohol consumption and prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency

Alcohol consumption	Prevalence of diabetes mellitus type II		Total
	Hereditary F(%)	Non-hereditary F(%)	F(%)
Yes	16(84.2)	3(15.8)	19(100)
No	387(91.9)	34(8.1)	421(100)
Total	403(91.6)	37(8.4)	440(100)

Table 3 showed the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency based on alcohol consumption. The result showed that non-hereditary diabetes mellitus type II was more among those consumed alcohol (15.8%).

Research question 4: What is the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State based on smoking?

Table 4: Smoking and prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency

Smoking	Prevalence of diabetes mellitus type II		Total
	Hereditary F(%)	Non-hereditary F(%)	F(%)
Yes	1(20.0)	4(80.0)	5(100)
No	402(92.4)	33(7.6)	435(100)
Total	403(91.6)	37(8.4)	440(100)

Table 4 showed the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency based on smoking. The result showed that non-hereditary diabetes mellitus type II was more among those who were smoking (80.0%).

Test of hypotheses

Hypothesis One: There is no significant relationship between age and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State

Table 8: Binary logistic regression showing relationship between age and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency

Age	B	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
					Lower	Upper
<20 yrs	Ref.					
20-29 yrs	3.219	1	.002*	25.000	3.388	184.501
30-39 yrs	2.100	1	.000	8.167	3.499	19.064
40-49 yrs	2.257	1	.000	9.556	4.809	18.987
50-59 yrs	2.383	1	.000	10.833	4.694	25.000
≥60 years	2.451	1	.000	11.600	6.845	19.657

*Significant

Table 8 showed the Binary logistic regression analysis of the relationship between age and the prevalence of diabetes mellitus type II among females. The result showed that, there is a significant relationship between age and the prevalence of diabetes mellitus type II ($p = 0.002$). Those who were 20-29 years old and ≥60 years were twenty-five times (OR = 25.00; 95CI: = 3.388 – 184.501) and about eleven times (OR = 11.600; 95CI: = 6.84 – 19.657) respectively more likely to be diabetic than those who were aged <20 years. The result further showed that, the chances of been diabetic increases with increase in age ($B = 2.451$). Thus, the null hypothesis was rejected.

Hypothesis two: There is no significant relationship between alcohol consumption and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State

Table 9: Binary logistic regression showing relationship between alcohol consumption and the prevalence of diabetes mellitus type II

Alcohol consumption	B	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
No	Ref.					
Yes	2.432	1	.000*	11.382	8.016	16.162

*Significant

Table 9 showed the Binary logistic regression analysis of the relationship between alcohol consumption and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency. The result showed that, there was a significant relationship between alcohol consumption and the prevalence of diabetes mellitus type II (p = 0.000). Those who consumed alcohol were about 11 times (OR = 11.382; 95CI: = 8.016 – 16.162) more likely to be diabetic than those who did not consume alcohol. The result further showed that, the chances of been diabetic increases with increase in alcohol consumption (*B* = 2.432). Thus, the null hypothesis was rejected.

Hypothesis three: There is no significant relationship between smoking and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency, Bihar State

Table 10: Binary logistic regression showing relationship between smoking and the prevalence of diabetes mellitus type II

Smoking	B	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
					Lower	Upper
No	Ref.					
Yes	2.500	1	.000*	12.182	8.542	17.372

*Significant

Table 10 showed the Binary logistic regression analysis of the relationship between smoking and the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency. The result showed that, there was a significant relationship between smoking and the prevalence of diabetes mellitus type II (p = 0.000). Those who smokes were about 12 times (OR = 12.182; 95CI: = 8.542 – 17.372) more likely to be diabetic than those who did not smoke. The result further showed that, the chances of been diabetic increases with increase in the rate of smoking (*B* = 2.500). Thus, the null hypothesis was rejected.

Discussion of findings

The findings of the study are discussed below:

The result showed that majority 403(91.6%) had diabetes mellitus type II by heredity while 37(8.4%) had non-hereditary diabetes mellitus type II. Thus, the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency was 8.4%. The finding of this study is surprising because the study been carried out in the health care clinics for diabetic patients, it was expected that more non-hereditary diabetic cases be found but, conversely majority of the diabetes cases were hereditary. This is indicative that the high prevalence of diabetes among women was due to genetic factors or family history of the women. The finding of this study is in line with that of Ruhembe et al. (2014) whose study on the prevalence of type II diabetes mellitus among adult population in Mwanza city, Tanzania showed that the prevalence of non-hereditary diabetes mellitus type II. The finding of this study is also similar to

that of Majgi et al. (2012) whose study in rural Puducherry showed that, the prevalence of non-hereditary diabetes was less than 10%. The finding of this study is also similar to that of Nordstrom et al. (2016) whose study carried out in northern Sweden showed that the prevalence of diabetes mellitus type II was 9.1% which is in close range with the prevalence found in the present study. The finding of this study is also similar to that of Aynalem and Zeleke (2018) in Ethiopia, who reported a prevalence of 6.5%. The similarity found between these studies and the present one might be due to the fact that they were all focused on adult females. The findings of this study is at variance with that of Murad et al., (2014) whose study carried out in Saudi Arabia showed that, the prevalence of diabetes was 17.7%. The finding of this study is also different from that of Talukder and Hossain (2020) whose study in Bangladesh showed that the prevalence of diabetes was 33.3%. The finding of this study is also different from that Asiimwe et al. (2020) which showed a higher prevalence rate of diabetes mellitus II among women to be 22.8%. The finding of this study is also different from that reported in Kumasi Metropolis by Agbogli et al. (2020) where a much smaller prevalence (3.5%) was found. This variation could be explained by the fact that the present study was focused on diabetes mellitus type II whereas the previous study was a case-control study focused on gestational diabetes.

Age and the prevalence of diabetes mellitus type II

The result showed that, there is a significant relationship between age and the prevalence of diabetes mellitus type II ($p = 0.002$). Those who were 20-29 years old and ≥60 years were twenty-five times (OR = 25.00; 95CI: = 3.388 – 184.501) and about eleven times (OR = 11.600; 95CI: = 6.84 – 19.657) respectively more likely to be diabetic than those who were aged <20 years. The finding of this study is also similar to that of Majgi et al. (2012) whose study in rural Puducherry showed that, the there was a significant relationship between age and type II diabetes mellitus. Marinho et al. (2013) whose study on type II diabetes mellitus and associated factors in Brazil. showed that, 25.3% of users were aged ≥45 years; The finding of this study is in line with that of Ruhembe et al. (2014) whose study on the prevalence of type II diabetes mellitus among adult population in Mwanza city, Tanzania showed that age has a significant relationship with the prevalence of non-hereditary diabetes mellitus type II. The finding of this study is also in line with that of Murad et al., (2014) on the factors associated with type II diabetes mellitus in Jeddah where the findings showed a significant relationship between age and the prevalence of diabetes mellitus type II. The finding of this study is also similar to that of Nordstrom et al. (2016) whose study carried out in northern Sweden showed that the prevalence of diabetes mellitus type II was more among the older women. The finding of this study is also similar to that of Aynalem and Zeleke (2018) in Ethiopia, who reported a prevalence of 6.5% among which the age range was 15-78 years . The similarity found between these studies and the present one might be due to the fact that they were all focused on adult females.

Alcohol consumption and diabetes mellitus

The result showed that, there was a significant relationship between alcohol consumption and the prevalence of diabetes mellitus type II ($p = 0.000$). Those who consumed alcohol were about 11 times (OR = 11.382; 95CI: = 8.016 – 16.162) more likely to be diabetic than those who did not consume alcohol. The finding of this study is also similar to that of Majgi et al. (2012) whose study in rural Puducherry showed that, the there was a significant relationship between age and type II diabetes mellitus. Marinho et al. (2013) whose study on type II diabetes mellitus and associated factors in Brazil. showed that, 25.3% of users were aged ≥45 years; The finding of this study is in line with that of Ruhembe et al. (2014) whose study on the prevalence of type II

diabetes mellitus among adult population in Mwanza city, Tanzania showed that age has a significant relationship with the prevalence of non-hereditary diabetes mellitus type II. The finding of this study is also in line with that of Murad et al., (2014) on the factors associated with type II diabetes mellitus in Jeddah where the findings showed a significant relationship between age and the prevalence of diabetes mellitus type II. The finding of this study is also similar to that of Nordstrom et al. (2016) whose study carried out in northern Sweden showed that the prevalence of diabetes mellitus type II was more among the older women. The finding of this study is also similar to that of Aynalem and Zeleke (2018) in Ethiopia, who reported a prevalence of 6.5% among which the age range was 15-78 years. The similarity found between these studies and the present one might be due to the homogeneity of the study population.

The result showed that, there was a significant relationship between alcohol consumption and the prevalence of diabetes mellitus type II (p = 0.000). Those who consumed alcohol were about 11 times (OR = 11.382; 95CI: = 8.016 – 16.162) more likely to be diabetic than those who did not consume alcohol. This finding may not be surprising because alcohol consumption has been found to be correlated with several health problems including diabetes. The finding of this study is also similar to that of Majgi et al. (2012) whose study in rural Puducherry showed that, the there was a significant relationship between alcohol consumption and type II diabetes mellitus. The finding of this study is also similar to that of Aynalem and Zeleke (2018) in Ethiopia, who reported the prevalence of diabetes mellitus type II to be more among the alcohol drinkers. The finding of this study is also similar to that of Asiimwe et al. (2020) whose study on the prevalence and risk factors associated with Type II Diabetes in Kanungu District showed that one of the factors found to be significantly related to diabetes was alcohol consumption. The similarity found between these studies and the present one might be due to the homogeneity of the study population.

Smoking and the prevalence of diabetes mellitus type II

The result showed that, there was a significant relationship between smoking and the prevalence of diabetes mellitus type II (p = 0.000). Those who smokes were about 12 times (OR = 12.182; 95CI: = 8.542 – 17.372) more likely to be diabetic than those who did not smoke. This finding may not be surprising because smoking has been found to be correlated with several health problems including diabetes. The finding of this study is in line with that of Ruhembe et al. (2014) whose study on the prevalence of type II diabetes mellitus among adult population in Mwanza city, Tanzania showed that smoking has a significant relationship with the prevalence of non-hereditary diabetes mellitus type II. The finding of this study is also in line with that of Murad et al., (2014) on the factors associated with type II diabetes mellitus in Jeddah where the findings showed a significant relationship between smoking and the prevalence of diabetes mellitus type II. The finding of this study is also similar to that of Aynalem and Zeleke (2018) in Ethiopia, who reported the prevalence of diabetes mellitus type II to be more among the smokers. The similarity found between these studies and the present one might be due to the homogeneity of the study population. The finding of this study is also similar to that of Asiimwe et al. (2020) whose study on the prevalence and risk factors associated with Type II Diabetes in Kanungu District showed that one of the factors found to be significantly related to diabetes was smoking. The similarity found between these studies and the present one might be due to the homogeneity of the study population.

Conclusion

Based on the findings of the study, it was concluded that the prevalence of diabetes mellitus type II among females in Aurangabad Central Assembly constituency was high hereditarily, but low for non-hereditary type. The predisposing factors to diabetes mellitus type II among females in Aurangabad Central Assembly constituency found in this study were age, smoking, alcohol consumption, smoking blood pressure and occupation.

Recommendations

The following recommendations were made based on the findings of the study:

1. The medical professionals should make diagnosis for diabetes as one of the routine test made for females during their clinical visits since majority of the cases were hereditary, so that, such can be detected early with appropriate actions to minimize its chances of developing or becoming worse.
2. Physicians should take proactive measures or steps to ensure that the diagnosis for diabetes is not limited to older people alone as its prevalence was found to cut-across almost all age groups.
3. The females should also play their role to avoid engaging in occupations that predisposes them to diabetes mellitus, particularly, those doing sedentary work should find time to engage in physical exercise to gain a balance.
4. The females should also play their role by monitoring their blood pressure to ensure is within the recommended limit so that they will not be predisposed to health problems including diabetes.

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