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KNOWLEDGE AND PREVALENCE OF DIABETES MELLITUS AMONG RURAL AND URBAN POPULATIONS

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ABSTRACT

Diabetes mellitus is a growing global health challenge, particularly in developing countries like India. This study aimed to assess prevalence among rural and urban populations aged 30 years and above. A quantitative descriptive design with non-probability convenience sampling was adopted. The sample size comprised 100 participants, with ethical approval and informed consent obtained. Knowledge was assessed using a structured questionnaire, and random blood sugar measured (>200 mg/dl). Results showed rural residents had inadequate knowledge (34%), moderate (60%), and adequate (6%). Urban participants demonstrated slightly higher mean knowledge scores (14±18 vs. 12±16). Prevalence was higher in urban (74%) compared to rural (70%) populations, especially above 40 years. Chi-square analysis revealed significant associations with demographic variables ($p < 0.05$). The study concludes that lifestyle changes demand community screening, health education, and preventive interventions.

Keywords: Prevalence, Diabetes mellitus, Rural and urban population, ADA

I. INTRODUCTION

Diabetes mellitus was identified and described over thousands of years by multiple figures: Ancient Indian physicians Sushruta and Charaka (6th century BC) first identified 'honey urine' (Madhumeha), while Aretaeus of Cappadocia (2nd century AD) coined the term "diabetes" and Thomas Willis (17th century) added mellitus. Mathew Dobson confirmed that the sweet taste of the urine of diabetics was due to an excess of sugar in the urine and blood of people with diabetes. Joseph von Mering and Oskar Minkowski in 1889 discovered the role of the pancreas in diabetes. The pancreas is a vital gland behind the stomach that serves two primary functions: it acts as an exocrine gland to aid digestion by secreting enzymes that break down food, and as an endocrine gland to regulate blood sugar levels by producing hormones like insulin and glucagon. Beta cells produce insulin, which decreases blood glucose by promoting uptake into tissues (muscle, adipose) and storing it as glycogen. Alpha cells produce glucagon, which raises blood glucose by stimulating glycogenolysis (glycogen breakdown) and gluconeogenesis (glucose production) in the liver. Delta cells secrete somatostatin, which inhibits the release of both insulin and glucagon. Pp cells (pancreatic polypeptide cells or F-cells) secrete pancreatic polypeptide to regulate appetite. Diabetes mellitus is a chronic metabolic disorder characterised by high blood sugar resulting from inadequate insulin production (type 1) or insulin resistance (Type2most common). Main causes Type1 is an autoimmune destruction of pancreatic insulin- producing cells. Type 2 results from cells failing to properly use insulin (insulin resistance) coupled with reduced insulin production over time, Gestational diabetes: hormonal imbalances during pregnancy the placenta releases hormones that cause insulin resistance. Risk factors include obesity, physical inactivity, age above 35 years, family history, and genetic predisposition. The symptoms of diabetes mellitus include: increased thirst(polydipsia) and dry mouth, frequent urination, fatigue, blurred vision, unexplained weight loss, Numbness or tingling in your hands or feet, slow- healing

sores or cuts, frequent skin and/vaginal yeast infections. Acute diabetic complication: Hyperosmolar hyperglycaemic state this complication mainly affects people with Type2 diabetes. It happens when your blood sugar levels are very high(over 600 milligrams per decilitre or mg/dl) for a long period, leading to severe dehydration and confusion. Diabetic related ketoacidosis this complication mainly affects people with Type 1 diabetes this leads to laboured breathing, vomiting and loss of consciousness. Hypoglycaemia is very low blood sugar, it mainly affects people with diabetes who use insulin. Signs include blurred or double vision, clumsiness, disorientation and seizures. long term diabetes complications: cardiovascular issues are the most common type of long term diabetes complication. They include coronary artery disease, heart attack, stroke, atherosclerosis. Other diabetic complications include: nerve damage(neuropathy), which can cause numbness, tingling and /pain. Nephropathy, which can lead to kidney failure, retinopathy, which leads to blindness, diabetes related foot conditions, skin infections, amputations, sexual dysfunction due to nerve and blood vessels damage, such as erectile dysfunction or vaginal dryness, gastroparesis, hearing loss, oral health issues, such as gum (periodontal) disease. Living with diabetes can also affect the mental health.

BACKGROUND AND NEED FOR THE STUDY

Diabetes is one of the world's major health crises of this century,4 placing in the top 10 leading causes of death with CVD, respiratory disease and cancer. [1,2] Noncommunicable diseases (NCD) were the cause of death in 74% for all deaths that occurred throughout the world in 2019.[3] Diabetes led to, according to the World Health Organisation (WHO). [2] It is predicted that there will be approximately 592 million deaths due to diabetes by the year 2035. [3] Type 2 DM accounts for approximately 90% of all diabetes mellitus cases. Diabetes is a progressive disorder that leads to serious complications, which are associated with increased costs to the family, community, and healthcare system. Uncontrolled diabetes leads to increased risk of vascular disease, and much of the burden of type 2 diabetes is caused by macrovascular (cardiovascular (CV), cerebrovascular, and peripheral artery disease) and microvascular (diabetic retinopathy, nephropathy, and neuropathy) complications. [5,6]
Diabetes mellitus is one of the metabolic disorders that lead to insufficient insulin secretion or to insulin that is generated but not used by the body. Worldwide, among adults, 537 million were affected by diabetes mellitus at the age of 20 - 79 years. (10.5% of all adults in this age range). Globally, in 2030, 643 million people will have diabetes mellitus, increasing to 783 million by 2045. The rising burden of diabetes in India places significant pressure on health care systems and carries serious socio-economic consequences. In line with the Sustainable Development Goals, India has pledged to reduce premature deaths from non-communicable diseases (NCDs) by one-third. Furthermore, the national health policy introduced in 2017 focuses on reducing the incidence of NCDs through comprehensive preventive and treatment strategies, ensuring free access to essential NCD medications within the public healthcare sector through the national programme for non-communicable diseases. An extensive review of the literature highlights several findings related to the global diabetes burden. Worldwide, the prevalence of diabetes continues to increase steadily due to factors such as demographic transitions, changing lifestyles, and longer life expectancy (12). Research indicates that urbanisation and related lifestyle patterns, including physical inactivity and poor dietary habits, significantly contribute to the growing diabetes epidemic, especially in developing nations (13,14). In the Indian context, the impact of diabetes is further intensified by socioeconomic determinants. Shifts from traditional dietary practices to energy-dense, nutrient-poor foods have been associated with higher rates of diabetes. Moreover, genetic vulnerability has been identified as an important factor, with the South Asian populations showing greater susceptibility to the disease. In 2022, 14% of adults aged 18 years and older were living with diabetes, an increase from 7% in 1990. More than half (59%) of adults aged 30 years and over living with diabetes were not taking medication for their diabetes in 2022. Diabetes treatment coverage was lowest in low- and middle-income countries.

Statement of the problem

A Comparative study to assess the knowledge and Prevalence of Diabetes Mellitus Among Rural and Urban Populations at Gogalur, Gobichettipalayam. Tamil Nadu.

Objectives Of the Study

- To assess the prevalence of diabetes mellitus among the rural population
- To assess the prevalence of diabetes mellitus among the urban population
- To compare the prevalence of diabetes mellitus among the rural and urban populations

- To associate the prevalence of diabetes mellitus among rural and urban populations with selected demographic variables.

Hypothesis

- H1: There is a significant difference in the prevalence of diabetes mellitus between the rural and urban populations
- H2: There is a significant association between knowledge of diabetes mellitus among the urban and rural populations with selected demographic variables.

II. REVIEW OF LITERATURE

The global prevalence of diabetes among adults(20-79years) was estimated at approximately 11.1% in 2024, according to the IDF Diabetes Atlas. 40.1 million estimated number of people with diagnosed or undiagnosed diabetes in the United States,2023. 12.0% estimated percentage of the U.S. population with diabetes. 29.1 million estimated number of people with diagnosed diabetes in the united states, including 28.8million adults aged ≥18 years. 27.6% estimated percentage of adults aged more than 18 years with diabetes who are undiagnosed, representing 11.0 million people.115.2 million estimated number of U.S. adults aged ≥18 years with prediabetes. 31.3million estimated number of people aged 65 years or older (52.1%) with prediabetes. National ICMR – INDIAB data have shown urban diabetes prevalence to be higher than rural prevalence across the studied Indian.

India is experiencing a rapid diabetes epidemic, with an estimated 101 million people living with diabetes and another 136 million classified as prediabetic as of 2023. In global position Second highest in the world after China. More than 50% of people with diabetes in India are unaware of their condition. Demographic prevalence is higher in urban areas, though rising in rural areas. Regional variation Southern and western states generally show a higher burden compared to Northen and Northeastern regions.

As of early 2025, Tamil Nadu continues to face a high diabetes burden, with prevalence rates estimated around 13% or higher. Studies high light significant risks from high BMI(Obesity) and a high incident rate (392.41 per100,000 in 2021). A study in a tribal population showed a 7.8% prevalence, indicating the spread of the condition to rural areas. Erode district shows significant concern, with one study revealing a very high rate (potentially 100% in some surveyed groups), driven by factors like sedentary lifestyles, obesity, and hypertension, especially in rural areas, indicating a critical health issue. Because of this statistic report the researcher selected to assess the knowledge and the prevalence of diabetes mellitus among rural and urban areas to do the investigation.

III RESEARCH METHODOLOGY

3.1 Research approach: A quantitative descriptive comparative research approach was employed to systematically evaluate differences in the prevalence of diabetes mellitus among rural and urban populations.

3.2 Research design: A comparative descriptive research design to identify and compare the prevalence of diabetes mellitus among the rural and urban populations

Setting of the study: the study was conducted at rural and urban communities of the Erode district.

3.3 Population: the study population comprised adults aged 30-70 years who were residing in permanent rural and urban communities.

3.4 Sample size: The total sample consisted of 100 population, which included 50 population from rural, 50 populations from urban communities.

Sampling technique: the population were selected using a non-probability convenience sampling technique.

3.5 Inclusion criteria:

- Adults aged 30-70 years
- Both male and female populations
- Individual residing in the selected area for more than one year
- Those who were willing to participate in the study

3.6 Exclusion criteria

- Pregnant women
- An individual suffering from a serious illness
- Individuals who were not available at the time of data collection

3.7 Variables

Dependent variables: prevalence of diabetes mellitus

Independent variables: Age, Gender, education, socioeconomic status, dietary pattern, physical activity, family history of diabetes mellitus, and previous knowledge of diabetes mellitus.

3.8 Tool for data collection

Data were collected using a structured instrument divided into three sections

Section A: Socio-demographic variables

Section B: knowledge on the prevalence of diabetes mellitus among rural and urban populations

Section C:

- Random blood glucose level with glucometer.
- Diagnostic criteria RBS ≥ 200mg/dl

Section D: Comparing the prevalence of diabetes mellitus among rural and urban populations

Section E: Associate the prevalence of diabetes mellitus with selected demographic variables

3.9 Data collection procedure

After obtaining formal permission from the concerned authorities, data were gathered by the investigator through direct interviews using a structured questionnaire. Blood glucose measurements were taken with the help of a glucometer while strictly following standard infection control precautions. The collection process was carried out over a period of two weeks.

IV. RESULTS AND DATA ANALYSIS

SECTION A: TO ASSESS THE DEMOGRAPHIC VARIABLES AMONG RURAL AND URBAN POPULATION

Table 1: Demographic variables in percentage

Variable		Rural (%)	Urban (%)
Age	**(41–50 yrs highest)**	38	46
Gender	**(Male majority)**	58	54
Education	Primary Secondary Higher	64 36 0	10 30 60
Physical Activity	Sedentary Moderate	60 30	56 44
Socio-economic Status	<5000 5–10k 10–20k >20k	12 12 40 36	10 0 34 56
Dietary Pattern	Veg Non-veg	12 88	10 90
Knowledge on Diabetes	Mobile 72 TV 28 Newspaper	72 28 0	66 20 14

Table 1: The majority of both rural and urban populations belonged to the 41–50 years age group, followed by 51–60 years, with the least in 61–70 years. Males predominated in rural areas (58%), while females were slightly higher in urban areas (54%). Educational attainment was low in rural communities, with 64% having only primary education, whereas 60% of urban residents had higher education. Sedentary lifestyles were common in both settings, though heavy workers were found only in rural areas. Socioeconomic status showed rural populations clustered in the Rs 10,000–20,000 range, while over half of urban residents earned above Rs 20,000. Most participants in both groups followed a non-vegetarian diet, and prior knowledge of diabetes was widespread, mainly through mobile phones and television in rural areas, and additionally newspapers in urban areas.

SECTION B: TO ASSESS THE KNOWLEDGE ON THE PREVALENCE OF DIABETES MELLITUS AMONG RURAL AND URBAN POPULATION

Table 2: knowledge in percentage

SCORING	RURAL	%	URBAN	%
Inadequate knowledge	17	34 %	3	6 %
Moderate knowledge	30	60 %	40	80 %
Adequate knowledge	3	6 %	7	14 %

Table 2: Among the rural population, 34% of the population had inadequate knowledge, 60% had moderate knowledge, and only 6% had adequate knowledge about the prevalence of diabetes mellitus. This indicates that most rural populations had only a moderate level of awareness, with more than one-third lacking sufficient knowledge.

In the urban population, a comparatively better level of knowledge was observed. Only 6% of the population had inadequate knowledge, while the majority (80%) possessed moderate knowledge. Additionally, 14% of urban populations demonstrated adequate knowledge regarding the prevalence of diabetes mellitus.

SECTION C:TO ASSESS THE RANDOM BLOOD SUGAR ESTIMATION

Table 3: random blood sugar estimation in percentage

n=100

Variables	Frequency	Percentage
Rural	13	26%
Urban	37	74 %
Male	35	70 %
Female	15	30 %

Table 3 shows that most of the population was from urban areas (74%), while 26% belonged to rural areas. Male populations constituted 70%, whereas females accounted for 30%. This indicates a higher proportion of urban residents and males among those who underwent random blood sugar estimation

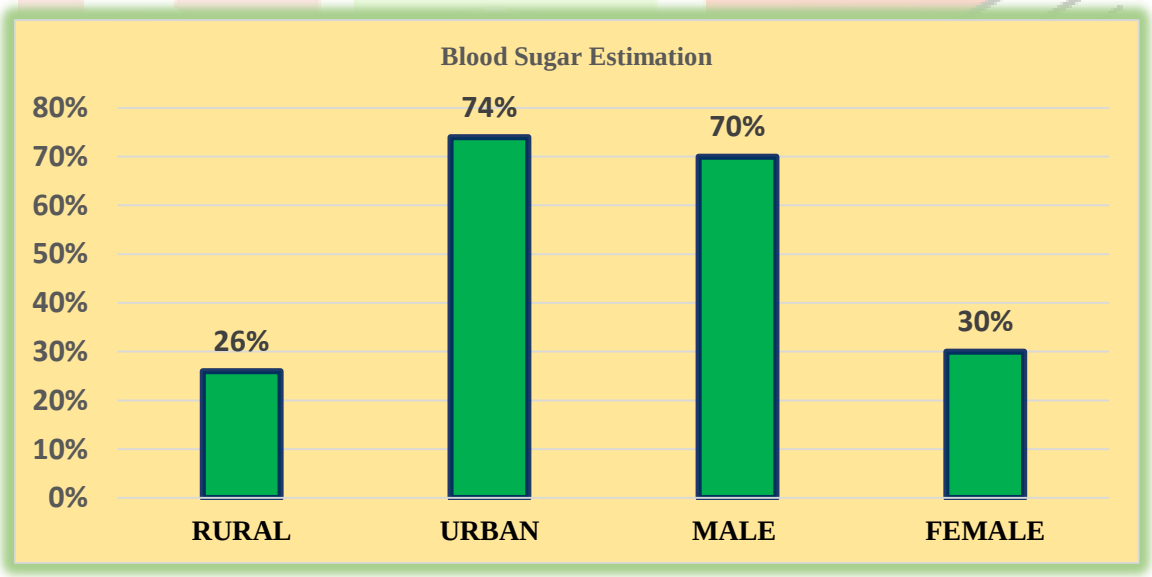

figure :2 blood sugar estimation in percentage

SECTION D: TO COMPARE THE PREVALENCE OF DIABETES MELLITUS AMONG RURAL AND URBAN

The comparison of the prevalence of diabetes mellitus in rural and urban populations using correlation analysis. The mean score among rural populations was 12±16, while the urban populations showed a slightly higher mean score of 14±18. The correlation coefficient (r=1) indicates a perfect positive correlation between rural and urban prevalence of diabetes mellitus, suggesting that changes in prevalence were directly proportional in both groups.

SECTION E: TO ASSOCIATE THE PREVALENCE OF DIABETES MELLITUS WITH SELECTED DEMOGRAPHIC VARIABLES

The association between the prevalence of diabetes mellitus and selected demographic variables was analysed using the chi-square test. The findings revealed that age, educational status, place of residence, and family history of diabetes mellitus showed a statistically significant association with the prevalence of diabetes mellitus at the 0.05 level of significance.

Individuals aged 40 years and above had a higher prevalence of diabetes mellitus compared to those below 40 years. Populations with lower educational status showed a higher prevalence of diabetes, indicating the influence of education on disease awareness and lifestyle practices. A significantly higher prevalence was observed among rural residents when compared to urban residents. Furthermore, populations with a family history of diabetes mellitus had a markedly higher prevalence of diabetes, suggesting a strong genetic predisposition.

V. DISCUSSION

Overall, the findings suggest that knowledge regarding the prevalence of diabetes mellitus was higher among the urban population compared to the rural population. The higher proportion of inadequate knowledge among rural populations highlights the need for improved health education and awareness programs in rural areas. However, gender did not show a statistically significant association with the prevalence of diabetes mellitus, indicating that the occurrence of diabetes was similar among males and females in the present study. However, gender did not show a statistically significant association with the prevalence of diabetes mellitus, indicating that the occurrence of diabetes was similar among males and females in the present study.

VI. CONCLUSION

The study concludes that diabetes mellitus is more commonly observed among the urban population compared to the rural population. However, the risk of diabetes among rural communities is also increasing due to changing lifestyle patterns. Regular community-based screening programs, health education, and preventive interventions are essential to minimise the burden of diabetes mellitus.

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