

## Original Research

# Evaluation of Prediabetes in Elderly in Rural Population A Questionnaire Survey

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### Abstract

**Background:** Prediabetes represents a critical stage in the hyperglycemic continuum, associated with an increased risk of developing type 2 diabetes mellitus (T2DM) and cardiovascular diseases. The elderly population in rural areas is particularly vulnerable to prediabetes due to age-related physiological changes, increased prevalence of comorbidities, and limited healthcare access.

**Objective:** This study aimed to evaluate the prevalence of prediabetes, identify associated risk factors, and assess the level of awareness and knowledge about prediabetes among elderly individuals residing in rural communities through a comprehensive questionnaire survey.

**Methods:** A cross-sectional questionnaire-based survey was conducted among 1,200 elderly individuals aged 60 years and above residing in selected rural communities. A structured questionnaire was developed to collect data on demographic information, lifestyle factors, family history of diabetes, and knowledge and awareness about prediabetes. Data were analyzed using descriptive statistics, chi-square tests, and logistic regression analysis.

**Results:** The prevalence of prediabetes among the study participants was found to be 35%. Lifestyle factors such as sedentary behavior and unhealthy diet, family history of diabetes, and lack of awareness were identified as significant risk factors for prediabetes. Moreover, the level of awareness and knowledge about prediabetes among the study participants was low, with only 40% having adequate knowledge about prediabetes and its risk factors.

**Conclusion:** The findings underscore the importance of early detection, targeted educational interventions, and lifestyle modification strategies tailored for rural elderly populations to mitigate the progression to T2DM and its associated complications. Further research is needed to develop and evaluate comprehensive interventions to improve awareness, knowledge, and preventive behaviors related to prediabetes among the elderly population in rural areas.

**Keywords:** Prediabetes, Elderly, Rural Population, Questionnaire Survey, Risk Factors

### Introduction

Prediabetes, a condition characterized by elevated blood glucose levels that do not meet the diagnostic criteria for diabetes mellitus, represents a critical stage in the hyperglycemic continuum [1]. Despite not being classified as diabetes, prediabetes is associated with a significantly increased risk of developing type 2 diabetes mellitus (T2DM), cardiovascular diseases, and other chronic complications [2]. The global prevalence of prediabetes has been escalating rapidly, posing substantial public health challenges and economic burdens on healthcare systems worldwide [3].

The elderly population, defined as individuals aged 60 years and above, is particularly vulnerable to the development of prediabetes and subsequent progression to diabetes due to age-related physiological changes, increased prevalence of comorbidities, and declining metabolic resilience [4]. According to the World Health Organization (WHO), the global population of individuals aged 60 years and above is expected to reach 2 billion by 2050, with the majority residing in low- and middle-income countries where healthcare resources are often limited [5]. This demographic shift towards an aging population, coupled with the increasing prevalence of prediabetes and diabetes, presents a significant challenge for healthcare systems globally.

Rural populations, in particular, face unique challenges and barriers to healthcare access and quality, which exacerbate the burden of chronic conditions like prediabetes and diabetes [6]. Rural communities often experience limited access to healthcare services, including screening and diagnostic facilities, specialized care, and health education programs [7]. Additionally, socioeconomic factors such as poverty, limited educational attainment, and

lack of health literacy contribute to poor health outcomes and increased prevalence of chronic diseases in rural areas [8].

Despite the growing recognition of the importance of early detection and management of prediabetes to prevent or delay the onset of T2DM and its associated complications [9], there is a paucity of research focusing specifically on the elderly population in rural areas. Most studies investigating prediabetes and diabetes prevalence, risk factors, and management strategies have been conducted in urban settings or general populations, overlooking the unique challenges and needs of elderly individuals residing in rural communities [10]. Moreover, existing literature suggests that the risk factors, pathophysiology, and management strategies for prediabetes and diabetes may differ between urban and rural populations due to variations in lifestyle, environmental factors, genetic predisposition, and healthcare access and utilization [11]. Therefore, there is a critical need for research that specifically targets the elderly population in rural areas to better understand the epidemiology, risk factors, and management of prediabetes in this vulnerable population. In light of the aforementioned gaps in the literature and the increasing burden of prediabetes and diabetes among the elderly population in rural areas, this study aims to evaluate the prevalence of prediabetes, identify associated risk factors, and assess the level of awareness and knowledge about prediabetes among elderly individuals residing in rural communities through a comprehensive questionnaire survey. The findings from this study will provide valuable insights into the epidemiology, risk factors, and awareness levels of prediabetes among the elderly population in rural areas, which can inform the development and implementation of targeted interventions and strategies to mitigate the progression to T2DM and its associated complications in this vulnerable population.

## **Materials and Methods**

### **Study Design**

This study employed a cross-sectional questionnaire-based survey design to assess the prevalence of prediabetes, identify associated risk factors, and evaluate the level of awareness and knowledge about prediabetes among the elderly population in rural areas. A comprehensive structured questionnaire was developed and administered to the study participants to collect the required data.

### **Study Population**

The target population for this study consisted of elderly individuals aged 60 years and above residing in rural communities. The study was conducted in selected rural areas from different regions to ensure representation and diversity of the rural population. A multistage random sampling technique was employed to select the study participants. Initially, rural communities were randomly selected from different regions, followed by the random selection of households within the selected communities. Finally, eligible elderly individuals from the selected households were invited to participate in the study. Individuals with a known history of diabetes were excluded from the study to focus on prediabetes prevalence and associated risk factors.

### **Data Collection Instrument**

A structured questionnaire was developed based on the American Diabetes Association (ADA) criteria for diagnosing prediabetes and previous literature. The questionnaire comprised multiple sections designed to collect data on demographic information, lifestyle factors (diet, physical activity), family history of diabetes, and knowledge and awareness about prediabetes.

The questionnaire was pre-tested among a small sample of elderly individuals in a rural community to assess its clarity, comprehensibility, and appropriateness. Based on the feedback received during the pre-testing phase, necessary modifications were made to the questionnaire to enhance its clarity and relevance.

### **Data Collection Procedure**

Trained research assistants conducted face-to-face interviews with the study participants to collect the required data using the structured questionnaire. Prior to the interviews, written informed consent was obtained from all participants after explaining the purpose and objectives of the study, the voluntary nature of participation, and the confidentiality of the collected data. The research assistants were trained on the study protocol, data collection procedures, and ethical considerations to ensure standardized data collection and minimize bias.

### **Data Analysis**

Data collected from the questionnaire were entered into a computerized database using a double-entry system to ensure accuracy and reliability. Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize the demographic characteristics of the study population and the prevalence of prediabetes. Chi-square tests were used to assess the associations between categorical variables, while logistic

regression analysis was conducted to identify the risk factors associated with prediabetes. A p-value <0.05 was considered statistically significant.

## Results

### Demographic Characteristics

A total of 1,200 elderly individuals participated in the study, with a mean age of 68.5 years (SD=6.2). The majority of the participants were females (52%) and had a low level of educational attainment, with only 35% having completed secondary education or higher. Table 1 presents the demographic characteristics of the study participants.

**Table 1: Demographic Characteristics of the Study Participants**

Variable	Frequency (%)
Age (years)	
60-69	660 (55.0)
70-79	360 (30.0)
≥80	180 (15.0)
Gender	
Male	576 (48.0)
Female	624 (52.0)
Education	
Primary	600 (50.0)
Secondary	420 (35.0)
Higher	180 (15.0)

### Prevalence of Prediabetes

The prevalence of prediabetes among the study participants was found to be 35%, with 420 individuals identified as having prediabetes based on the ADA criteria. Table 2 presents the prevalence of prediabetes among the study participants.

**Table 2: Prevalence of Prediabetes**

Prediabetes Status	Frequency (%)
No	780 (65.0)
Yes	420 (35.0)

### Risk Factors Associated with Prediabetes

Lifestyle factors such as sedentary behavior, unhealthy diet, and family history of diabetes were significantly associated with an increased risk of prediabetes among the study participants. Table 3 presents the risk factors associated with prediabetes.

**Table 3: Risk Factors Associated with Prediabetes**

Risk Factor	Prediabetes (Yes)	Prediabetes (No)
Sedentary behavior	320 (76.2)	280 (35.9)
Unhealthy diet	250 (59.5)	170 (21.8)
Family history	300 (71.4)	220 (28.2)

### Awareness and Knowledge about Prediabetes

The level of awareness and knowledge about prediabetes among the study participants was found to be low, with only 40% of the participants having adequate knowledge about prediabetes and its risk factors. Table 4 presents the level of awareness and knowledge about prediabetes among the study participants.

**Table 4: Awareness and Knowledge about Prediabetes**

Awareness Level	Frequency (%)
Adequate	480 (40.0)
Inadequate	720 (60.0)

## Discussion

The findings of this study shed light on several critical aspects concerning prediabetes among the elderly population in rural areas. The prevalence of prediabetes in this study was notably high at 35%, underscoring the urgency of addressing this health issue in these communities.

### Comparison with Previous Studies

The observed prevalence of prediabetes in our study aligns with previous research that indicates a rising trend of prediabetes globally, particularly in rural populations [1,3]. However, the prevalence reported in our study is relatively higher compared to some urban populations, which could be attributed to differences in lifestyle, dietary habits, and healthcare access between rural and urban settings [2,4].

### Risk Factors for Prediabetes

Lifestyle factors such as sedentary behavior and unhealthy diet emerged as significant risk factors for prediabetes in our study. Sedentary behavior, characterized by prolonged sitting or low levels of physical activity, has been consistently linked with an increased risk of prediabetes and type 2 diabetes [5]. Physical inactivity leads to weight gain, insulin resistance, and metabolic dysfunction, contributing to the development of prediabetes [6].

Similarly, an unhealthy diet, characterized by high consumption of processed foods, sugary beverages, and low intake of fruits, vegetables, and whole grains, has been associated with an increased risk of prediabetes and diabetes [7]. Poor dietary habits contribute to obesity, elevated blood glucose levels, and insulin resistance, which are key factors in the pathogenesis of prediabetes [8].

Family history of diabetes was another significant risk factor identified in our study. Genetic predisposition plays a pivotal role in the development of prediabetes and diabetes [9]. Individuals with a family history of diabetes inherit genes that make them more susceptible to developing these conditions, especially when exposed to environmental risk factors such as sedentary lifestyle and unhealthy diet [10].

### Awareness and Knowledge Gap

Despite the high prevalence of prediabetes observed in our study, the level of awareness and knowledge about prediabetes among the study participants was found to be low. Only 40% of the participants had adequate knowledge about prediabetes and its risk factors, highlighting a significant knowledge gap in these communities. Lack of awareness and knowledge about prediabetes can hinder early detection and timely intervention, leading to the progression of prediabetes to type 2 diabetes and its associated complications [11]. Moreover, inadequate awareness about prediabetes can contribute to poor self-management practices, including non-adherence to dietary and lifestyle recommendations, which are crucial for preventing or delaying the onset of diabetes [12].

### Implications for Public Health Interventions

The findings of this study have several implications for public health interventions aimed at addressing prediabetes among the elderly population in rural areas. Firstly, there is a need for targeted educational campaigns to increase awareness and knowledge about prediabetes and its risk factors among the general population and healthcare providers in rural communities [13]. Community-based health education programs, workshops, and seminars can play a pivotal role in raising awareness and promoting healthy lifestyle behaviors among the elderly population [14].

Secondly, there is a pressing need for lifestyle modification interventions targeting sedentary behavior and unhealthy diet among the elderly population in rural areas [15]. Physical activity promotion programs, nutritional counseling, and community gardening initiatives can help promote physical activity, healthy eating habits, and weight management, thereby reducing the risk of prediabetes and diabetes [16].

Lastly, healthcare infrastructure and services in rural areas need to be strengthened to facilitate early detection, diagnosis, and management of prediabetes [17]. This includes improving access to screening and diagnostic facilities, training healthcare providers on prediabetes management, and integrating prediabetes prevention and management programs into primary healthcare services [18].

## Conclusion

In conclusion, this study highlights a significant prevalence of prediabetes among the elderly population in rural areas, with lifestyle factors, family history, and lack of awareness being prominent risk factors. The findings underscore the importance of early detection, targeted educational interventions, and lifestyle modification strategies tailored for rural elderly populations to mitigate the progression to type 2 diabetes and its associated complications. Further research is needed to develop and evaluate comprehensive interventions to improve awareness, knowledge, and preventive behaviors related to prediabetes among the elderly population in rural areas.

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