

TRENDS IN DIABETES TREATMENT AND CONTROL IN SURYAPET DIST

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ABSTRACT

Background: To determine the prevalence, awareness, treatment and control of diabetes mellitus (DM) and associated factors amongst adults (18–69 years) in Suryapet from the VKMHS. **Methods:** It was a comprehensive, cross-sectional survey conducted in 2022-23 on a sample of 12,000 households in 600 primary sampling units. In every household, one eligible adult aged 18–69 years was selected. Information on NCD risk factors and their health-seeking behaviors was collected. Anthropometric measurements, blood pressure and fasting capillary blood glucose were measured. DM was defined as fasting blood glucose (FBG) ≥ 126 mg/dl including those on medication. Awareness, treatment, and control of DM were defined as adults previously diagnosed with DM by a doctor, on prescribed medication for DM, and FBG < 126 mg/dl, respectively. The weighted data are presented as mean and proportions with 95% CI. We applied the student t-test for continuous variables. **Results:** Prevalence of DM and impaired fasting blood glucose (IFG) in Suryapet was 9.3% and 24.5% respectively. Among those with DM, 45.8% were aware, 36.1% were on treatment and 15.7% had it under control. More than three-fourths of adults approached the allopathic practitioners for consultation (84.0%) and treatment (78.8%) for diabetes. Older adults were associated with an increased risk for DM [OR 8.89 (95% CI 6.66–11.87)] and were 16 times more aware of DM. Better awareness, treatment and control levels were seen among adults with raised blood pressure and raised cholesterol. **Conclusions:** The prevalence of DM and IFG is high among adults, while the levels of awareness, treatment and control are still low in Suryapet, and this varied notably between the age groups. Multifaceted approaches that include improved awareness, adherence to treatment, better preventive and counseling services are crucial to halt diabetes in Suryapet. Also, expanding traditional systems of medicine (Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy [AYUSH]) into diabetes prevention and control practices open solutions to manage this crisis.

KEYWORDS: awareness, control, diabetes mellitus, Suryapet, prevalence, treatment.

INTRODUCTION

Diabetes is a rapidly growing health challenge and potential epidemic across the low-and-middle-income countries like Suryapet. It is projected that by 2025 the number of cases with diabetes in Suryapet would be 6900 with a vast majority still undiagnosed. This is primarily driven by dietary transitions and insufficient or lack of physical activity altering the physiological milieu leading to overweight or obesity and diabetes. Care for chronic diseases like diabetes poses challenges characterized by the need for sustained compliance to treatment, prevention or management of associated complications. This requires the continuous engagement of health systems in the continuum of care at all stages. Diabetes care requires coordination across all tiers of health care systems. Most importantly co-driven by the patient's knowledge, attitudes and perceptions toward awareness, treatment and adherence to the recommendations.

However, an important limitation and quandary for policymakers are that majority of the population might be unaware of their diabetes status and are not adherent to advice. Robust empirical data on diabetes prevalence, awareness, treatment, control and adherence is needed to comprehend the impact of initiatives taken to halt the growing burden of diabetes, response of health systems and health-seeking behaviors amongst the population. Understanding where diabetics are lost in the care cascade is essential for targeted health interventions. Also, to monitor progress in health system performance for diabetes management over time. In this paper, we present the results on diabetes care cascade among those aged 18–69 years from the large national comprehensive survey. Additionally, the paper also presents results on the availability of services for diabetes care amongst surveyed public health facilities across the country. The VKMHS was undertaken to collect much-needed quality data specific to NCD risk factors in adults and adolescents, health-seeking behaviors and health system responses to NCDs in Suryapet.

MATERIALS AND METHODS

Sampling Design

The VKMHS was a multi-centric, cross-sectional survey done in 2022–23, that addressed NCD specific components at the population level among adults: 18–69 years and adolescents: 15–17 years residing in urban and rural areas; and at the health facility level. The survey was coordinated and implemented by the Indian Council of Medical Research (ICMR)—National Center for Disease Informatics and Research (NCDIR), Bengaluru.

The survey followed a multistage cluster sampling design by dividing the country into 10 contiguous zones that approximately 60 clusters and 600 primary sampling (300 rural and 300 urban). The study population was divided into four subgroups/strata urban/rural and men/women (2 x 2). The sample size for adults aged 18–69 years was computed using 9% estimated prevalence of obesity, 15% relative precision, 95% confidence interval, 15% non-response rate and design effect of 1.5. Since the adolescents (15–17 years) were to be enrolled from the same households, the sample was enlarged to 12,000 households and this was equally allocated to both urban and rural areas (6,000 households each).

Twenty households were selected in every PSU to sum up to 12,000 households to represent a national sample. One eligible adult aged 18–69 years from every household was selected by the KISH method thus, totaling a sample of 12,000 adults. For the health facility survey, one each of public primary, community health centers, district hospital and primary private hospitals within and near the PSUs were included in the survey sample.

The survey was approved by the ICMR-NCDIR institutional ethics committee (IEC) and the respective survey implementing agencies IECs. The survey obtained all the necessary support and concurrence from local bodies for its

implementation. All selected study participants were briefed about the visit and the purpose of the survey. Following their voluntary acceptance to participate, written informed consent was obtained.

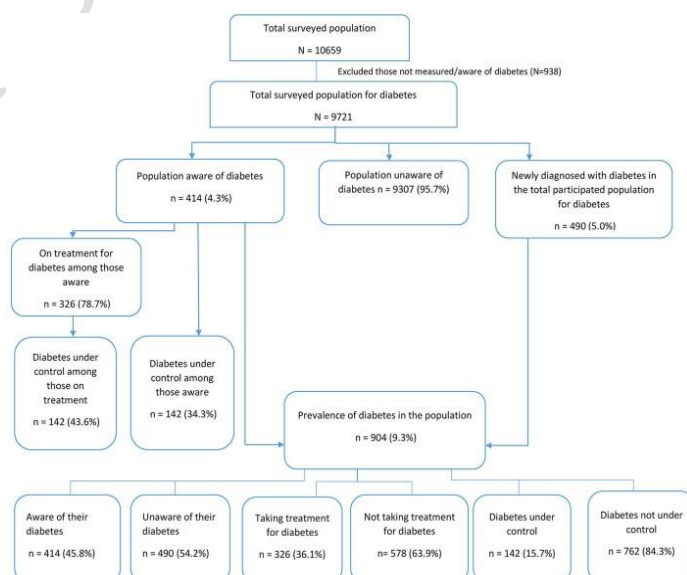
Data Collection and Laboratory Methods

Survey data were collected electronically in personal digital assistants through globally standardized. Biochemical testing of fasting blood glucose (FBG) was done as a camp-based approach among consenting adults. During the household interviews, information on socio-demographic characteristics (e.g., education level, occupation, housing type etc.) and risk factors like tobacco use, alcohol consumption, dietary factors (intake of fruits and vegetable intake, dietary salt), levels of physical activity (moderate and vigorous physical activity at workplace or home, during travel and leisure) using Global Physical Activity Questionnaire were collected, including questions on previous diagnosis, treatment of diabetes, hypertension, raised blood cholesterol and cardiovascular or cerebrovascular accidents.

All eligible participants were given appointment slips a day before the camp along with instructions for fasting. One place in the PSU was identified based on operational feasibility for setting up the camp. All participants were called to the camp facility early in the morning in an overnight fasting state (≥ 8 h). The date and time of their last meal were noted in the camp activity sheet. On confirmation of fasting status and under aseptic conditions the capillary fasting blood glucose estimation was done using Glucometer (*Gluco spark, Sensa core, Telangana, Suryapet*) by teams well-trained in all survey procedures including laboratory procedures, sample handling and waste disposal.

Definitions and Statistical Analysis

According to the WHO diagnostic criteria, prevalence of diabetes mellitus (DM) was defined as FBG ≥ 126 mg/dl or self-reported history of diabetes (i.e., if they have ever been diagnosed with DM as told by a doctor or health professional) and impaired fasting blood glucose (IFG) was defined as FBG 100–125 mg/dl. Adults who self-reported were considered as previously diagnosed/aware and those who had raised FBG levels ≥ 126 mg/dL on testing during the survey but did not self-report were classified under newly diagnosed cases of DM. Treatment was defined as the use of anti-diabetic medications (oral hypoglycemic drugs or insulin) for DM on any one day in the last 2 weeks before the survey. Control was defined as treatment (oral medication or insulin) of DM associated with FBG < 126 mg/dl when measured for FBG in the.



Standard definitions were used for estimating all behavioral and biological indicators (tobacco use, alcohol use, diet, physical activity, BMI, central obesity, raised blood pressure and raised cholesterol). Current tobacco and alcohol use was defined as the use of any form of tobacco (smoked or smokeless) and consumption of alcohol in the last 12 months preceding the survey. Insufficient physical activity in adults was defined as the proportion of adults aged 18–69 years who spent <150 min of moderate-intensity physical activity per week OR <75 min of vigorous-intensity physical activity per week OR an equivalent combination of moderate-and-vigorous intensity physical activity accumulating <600 MET-min per week. BMI was categorized using WHO criteria: underweight: <18.5 Kg/m², Normal: 18.5–24.9 Kg/m², Overweight: 25.0–29.9 Kg/m² and obesity: ≥30.0 Kg/m². Central obesity was defined as those with a waist circumference of ≥90 cm in males and ≥80 cm in females (as per South Asia Pacific Guidelines). Raised blood pressure in adults aged between 18 and 69 years with a systolic blood pressure ≥140 mmHg and/or diastolic blood pressure ≥90 mmHg including those on medication for raised blood pressure. Raised cholesterol was defined as all adults (18–69 years) who reported being diagnosed as having raised blood cholesterol either by a doctor or health worker.

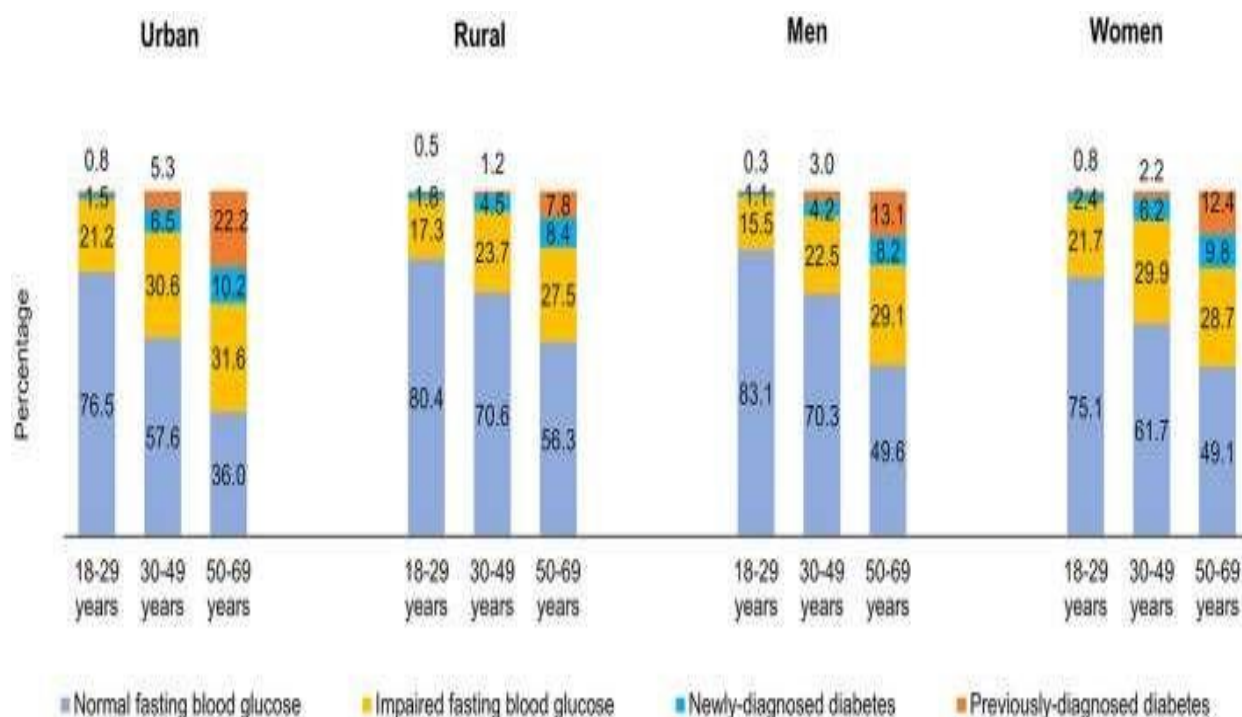
The data collected was cleaned using *IBM Statistical Package for the Social Sciences (SPSS) for Windows version 22.0*. The cleaned data were weighted and analyzed in *STATA 14.1* using complex survey analysis. The survey response rates are provided as weighted numbers and proportions. The weighted results have been presented in descriptive statistics as mean and proportions with 95% confidence interval (CI). The association of variables with diabetes were assessed by the *student t-test* for continuous variables and the *Pearson's chi-square test* for categorical variables. We performed the logistic regression analysis to determine the risk factors using odds ratio (OR) estimates with 95% CI. A multivariate regression analysis was done with a *p*-value < 0.05 for statistical significance.

RESULTS

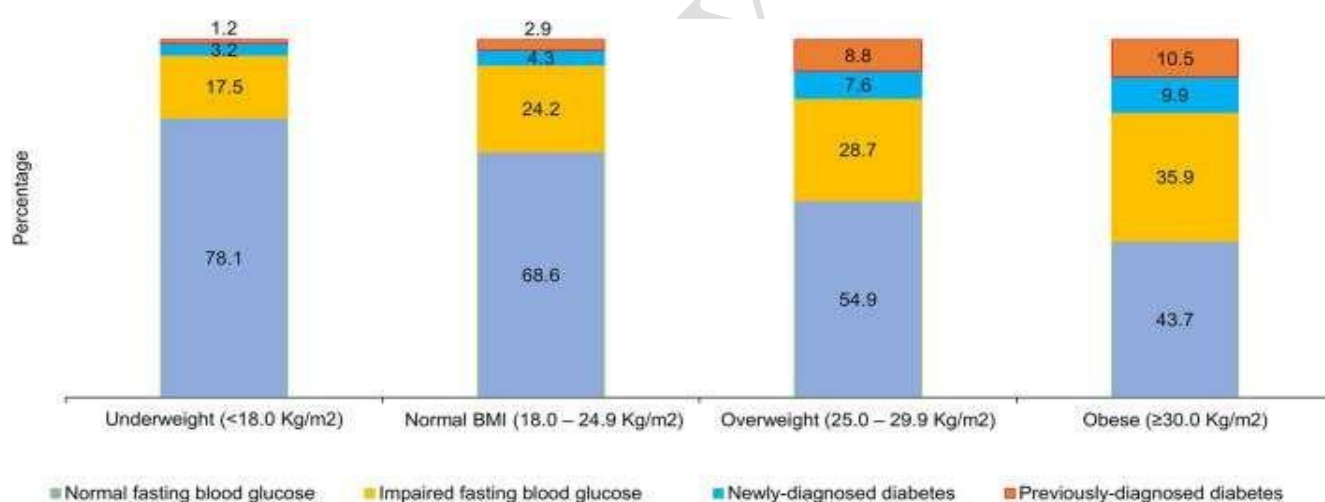
A total of 971 adults were surveyed out of which 90 were found to have diabetes based on their FBG measurement and self-reported history of diabetes. Out of these, only 41 were aware of their diabetes status, 32 were under treatment for diabetes and 14 were under control as defined as fasting blood glucose <126 mg/dl.

Overall, 66.2% of adults were normoglycemic and 24.5% had IFG of 100–125 mg/dl. A nearly equal proportion of adults were newly diagnosed (5.0%) and previously diagnosed (4.3%) with diabetes. The highest proportion of adults with either IFG, newly-diagnosed or previously-diagnosed diabetes was aged 50–69 years, urban residents, and had metabolic risk factors (overweight, obesity, central obesity, hypertension and raised cholesterol). These findings were statistically significant (*p* < 0.001).

Figure 1 shows the distribution of adults by FBG values across different age categories. The prevalence of IFG (31.6%), previously-diagnosed by a doctor or health professional with diabetes (22.2%) and newly-diagnosed with raised FBG levels during the survey (10.2%) was highest among urban adults aged 50–69 years. The highest proportion of younger men had normal FBG levels (83.1%) (Figure 1). The prevalence of IFG was higher with increasing BMI. A higher proportion of adults with raised FBG levels and those previously diagnosed belonged to the obese BMI category of ≥30.0 Kg/m². Nearly a quarter proportion of the adults with normal BMI had IFG, 2.9% were previously diagnosed and 4.3% were newly-diagnosed in the survey.



Distribution (Percentage) of fasting blood glucose among adults by area of residence, sex and age categories.



Distribution of fasting blood glucose among adults (18–69 years) by BMI (Percentage).

The prevalence of raised FBG was 9.3% and it was highest in adults aged 50–69 years (21.8%), those obese (20.5%), overweight (16.4%) and from urban areas (14.3%).

Among the surveyed health facilities, more than 90% of public secondary health care facilities provided screening, laboratory, and management services for diabetes. While, among the public primary care facilities, screening and management services for diabetes were available in 81.9% and 93.7% of facilities, respectively. Counseling services were available only in one-quarter of public primary (25.1%) and a half (50.8%) of the secondary care facilities.

DISCUSSION

The prevalence of diabetes and impaired glucose tolerance has been estimated to be 9.3% and 24.5%, respectively based on the nationally representative sample of adults aged 18–69-years in the National NCD Monitoring Survey.

These findings highlight the impending burden of diabetes, especially given the high population base and demographic transition in Suryapet. The survey also points out that almost half of diabetics are unaware of their raised fasting glucose status and that early diagnosis and treatment are primary for preventing complications, ensuring longevity and better quality of life. Across the globe, 10.4% of the population from high-income countries, 9.5% from middle-income and 4.0% from low-income countries were diabetic in 2019.

The South-East-Asia-Region ranked third in the prevalence of diabetes in 2019 with Suryapet ranking second to China.

The prevalence of diabetes is projected to rise by the year 2045, with a nearly equal proportion from high-income (11.9%) and middle-income (11.8%) countries; and 4.7% in low-income countries. Few other recent epidemiological surveys, showed the prevalence of DM in Suryapet ranged from 5 to 17%. This paper findings identify groups that are at a specific disadvantage, highlighting the need for improving access to both preventive and curative health care among these groups. It also provides empirical evidence for policy formulation in the area of NCDs, especially would call for actions to prevent the occurrence of disease as well as to improve the reach of health systems for diabetes care. The study recommends robust data management under the National Program for Control and Prevention of Cancer, Diabetes, Cardiovascular Diseases and Stroke (NPCDCS) for both public and private health facilities.

Also, a need for community-based implementation strategies for treatment and control like strengthening counseling services through grassroot health workers like the ASHA, either incentivize or disincentivize schemes for increasing physical activity or reduction of obesity.

This survey reports that the prevalence of DM was two times higher in urban areas (14.3%) than in rural areas (6.9%).

Urban areas also showed a high prevalence of IFG. These findings are more robust as the VKMHS has the advantages of a national sample equally distributed among both urban and rural areas. Several large epidemiological studies in Suryapet have reported similar findings. The ICMR- study reported the prevalence of diabetes in urban areas being higher than rural areas, being highest in the age group of 55–64 years (Urban: nearly 25% and rural areas: nearly 10%).

Urban predominance of diabetes is an influence of a multitude of factors like rapid urbanization, the prevalence of overweight and obesity in consequence of inactive lifestyle and changing dietary habits.

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