

Original article:

Study of Screening for Blood Sugar Levels at a Tertiary Care Teaching Hospital

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ABSTRACT:

INTRODUCTION: The goal and premise of diabetes management is the prevention of diabetes- associated complications, and this goal is best achieved when the disease is diagnosed at an early stage. Present study was conducted for early detection and initiate of appropriate treatment for those detected of diabetes.

MATERIALS & METHODS: Present study was conducted in outpatient department of Medicine, Saraswati Institute of Medical sciences, Hapur, Uttar Pradesh, India. All the male patients aged 20-30 years attending Medicine OPD from were asked to participate in the study. Written informed consent was taken from all participants. A total of 568 subjects (aged 20-30 years) consented to participate in the study. The consenting subjects were subjected to screening of blood glucose level by glucometer method.

RESULTS: A total of 568 subjects (aged 20-30 years) consented to participate in the study. The average age of the subjects was 24.39 years. 509 (89.6%) subjects had normal glycemic levels at the time of screening and 59 subjects (10.4%) had blood sugar levels above the normal. Of the subjects with abnormal sugar levels, 37 (6.5 %) had impaired glucose tolerance and 22 (3.9%) had blood sugar levels in the diabetic range. The mean blood glucose levels were 103 mg/dL, with a standard deviation was 43.9 mg/dL. For subjects with abnormal sugar levels; confirmatory Oral Glucose Tolerance Test (OGTT) was done. 23 subjects were confirmed to be having impaired glucose tolerance and 14 subjects OGTT results were normal. The subjects attending the same were given diabetes specific health education and put on non- pharmacological therapy. Of the 22 subjects diagnosed to be diabetic by the screening test, 19 of them were confirmed of diabetes. These subjects were put on pharmacological therapy for diabetes.

CONCLUSIONS: Early identification of the high risk individuals would help in taking appropriate intervention in the form of dietary changes and increasing physical activity, thus helping to prevent, or at least delay, the onset of diabetes. This means that identification of at risk individuals is extremely important if we have to prevent diabetes in India. Increasing awareness and empowerment of community can possibly help in the prevention of diabetes and other non-communicable disorders. Mass awareness programmes like public lectures, video clippings and distribution of educational pamphlets should be carried out.

KEY WORDS: Diabetes mellitus, Screening , Young adults.

INTRODUCTION

Over the past 30 yr, the status of diabetes has changed from being considered as a mild disorder of the elderly to one of the major causes of morbidity and mortality affecting the youth and middle aged people. It is important to note that the rise in prevalence is seen in all six inhabited continents of the globe.¹ Although there is an increase in the prevalence of type 1 diabetes also, the major driver of the epidemic is the more common form of diabetes, namely type 2 diabetes, which accounts for more than 90 per cent of all diabetes cases. Nowhere is the diabetes epidemic more pronounced than in India as the World Health Organization (WHO) reports show that 32 million people had diabetes in the year 2000.¹ The International Diabetes Federation (IDF) estimates the total number of diabetic subjects to be around 40.9 million in India and this is further set to rise to 69.9 million by the year 2025.² India has acquired the dubious distinction of being called “the diabetes capital of the world”.³ One in every sixth adult Indian is a diabetic. Diabetes, once a disease of the people in their forties and fifties is now being diagnosed increasing among the younger age people.⁴ The rising prevalence of diabetes in India⁵⁻⁹ and other developing countries¹⁰⁻¹² is chiefly attributed to urbanization. India will continue to have the largest number of diabetic subjects as a result of the rapid urbanization and economic development.¹³ Prevalence of impaired glucose tolerance (IGT) was also high. The epidemic of diabetes is seen even in rural areas undergoing socioeconomic development and urbanization.^{14,15} In adults, type 2 diabetes develops over a long period, and most, if not all, patients initially have impaired glucose tolerance, which is an intermediate stage in the natural history

of type 2 diabetes¹⁶ and predicts the risk of the development of diabetes and cardiovascular disease. With appropriate changes in lifestyle, progression from impaired glucose tolerance to frank diabetes can be delayed or prevented.^{17,18} The goal and premise of diabetes management is the prevention of diabetes-associated complications, and this goal is best achieved when the disease is diagnosed at an early stage. As many as 25% of people with a new diagnosis of diabetes already have established diabetic retinopathy or microalbuminuria, which has been interpreted to mean that there is on average a 7-yr gap between the actual onset and the diagnosis of type 2 diabetes.^{19,20} Present study was conducted for early detection and initiate of appropriate treatment for those detected of diabetes.

MATERIALS AND METHODS

Present study was conducted in outpatient department of Medicine, Saraswathi Institute of Medical sciences, Hapur, Uttar Pradesh, India. All the male patients aged 20-30 years attending Medicine OPD from were asked to participate in the study. Written informed consent was taken from all participants. A total of 568 subjects (aged 20-30 years) consented to participate in the study.

The consenting subjects were subjected to screening of blood glucose level by glucometer method. A standardized glucometer with sensor comfort strips were used for the study. The glucometers used for the study were calibrated and standardized before the start of the study. Study subjects were patients aged between 20-30 years attending the medicine OPD for any medical condition / ailments. Random blood sugar levels were tested using the glucometric sensor comfort strips. A minimum of 3 hours had to be elapsed after the last meal (breakfast or Lunch) before subjecting the subject for glucometric blood

sugar estimation.²¹Standardization of the glucometer and deciding the cut-off point for the purpose of screening of young adults during the study were done according to Ramakrishna S et al.²¹In this screening study, <142 mg/dL were considered as normal, 143 mg/dL to 161 mg/dL as Impaired glucose tolerance level and >162 mg/dL for diabetes mellitus. However, all the subjects in the abnormal sugar levels were called for fasting oral glucose challenge test and the results were confirmed.

RESULTS

A total of 568 subjects (aged 20-30 years) consented to participate in the study. The average age of the subjects was 24.39 years. Modified BG Prasad's socio-economic status classification was used for assessment of socio-economic status of the subjects. Majority of subjects 262 (46.1%) belonged to class III, 86 (15.1 %) to class IV, 101 (17.8 %) class II, 79(13.9%) to class I and 40 (7.1%) belonged to class V.

69 (12.1 %) of the subjects were illiterate. 191 (33.6 %) subjects had completed primary education, 121 (21.3 %) high school, 144 (25.4 %) had bachelor's

degree and 43 (7.6 %) had a master's degree.206 (36.3%) subjects gave history of at least one of their family member or a first degree relative, suffering from diabetes mellitus.

509 (89.6%) subjects had normal glycemic levels at the time of screening and 59 subjects (10.4%) had blood sugar levels above the normal. Of the subjects with abnormal sugar levels, 37 (6.5 %) had impaired glucose tolerance and 22 (3.9%) had blood sugar levels in the diabetic range. The mean blood glucose levels were 103 mg / dL, with a standard deviation was 43.9 mg /dL.

For subjects with abnormal sugar levels; confirmatory Oral Glucose Tolerance Test (OGTT) was done. 23 subjects were confirmed to be having impaired glucose tolerance and 14 subjects OGTT results were normal. The subjects attending the same were given diabetes specific health education and put on non- pharmacological therapy.Of the 22 subjects diagnosed to be diabetic by the screening test, 19 of them were confirmed of diabetes. These subjects were put on pharmacological therapy for diabetes.

Table 1: Results of present study according to blood sugar levels (N=568)

Blood glucose levels	n (%)
<142mg/dL	
Normal	509 (89.6%)
143-161mg/dL	
Impaired glucose levels	37(6.5%)
>162mg/dL	
Diabetes mellitus	22 (3.9%)
Mean \pm 2 SD in mg / dL	103 \pm 43.9
Total	568 (100.00%)

DISCUSSION

Indian Council Medical Research (ICMR, New Delhi) conducted a study between 1972 and 1975 on the prevalence of type 2 diabetes in India by the Screening in about 35,000 individuals above 14 yr of age, using 50 g glucose load. Capillary blood glucose level >170 mg/dl was used to diagnose diabetes. The prevalence was 2.1 per cent in urban population and 1.5 per cent in the rural population while in those above 40 yr of age, the prevalence was 5 per cent in urban and 2.8 per cent in rural areas.²² Subsequent studies showed a rising trend in the prevalence of diabetes across different parts of India. In 1988, a study done in south India reported a prevalence of 5 per cent.²³ The Eluru survey which looked at the prevalence of known diabetes in four villages in Andhra Pradesh showed a prevalence of 1.5 per cent. The prevalence of known diabetes was 6.1 per cent in individuals aged above 40 yr which was unexpectedly high at that time for a rural area with low socio-economic status and decreased health awareness.²⁴ A study done in 1988 in Chennai reported a prevalence of 8.2 per cent in the urban and 2.4 per cent in the rural areas.²⁵ A subsequent study in the same urban area done after five years showed an age standardized prevalence of 11.6 percent indicating a rising trend in prevalence of diabetes.²⁶ A very high prevalence of 16.3 per cent was reported in Thiruvananthapuram in Kerala State in the year 1999.²⁷ In the same year, a prevalence of 8.2 per cent was reported from Guwahati.²⁸ A cross-sectional population survey was done in the Kashmir valley in 2000 and the prevalence of 'known diabetes' among adults aged >40 yr was found to be 1.9 per cent.²⁹ It is important to note that the studies that have shown an increase in prevalence of diabetes have also reported a very high prevalence of undiagnosed

diabetes in the community. The individuals who are unaware of their disease status are left untreated and are thus more prone to microvascular as well as macrovascular complications. Hence, it is necessary to detect the large pool of undiagnosed diabetic subjects in India and offer early therapy to these individuals. Impaired glucose tolerance (IGT) and impaired fasting glucose (IFG) collectively called as prediabetic states, have a high risk of conversion to diabetes. Several studies have shown that these prediabetic states are also high risk stages for cardiovascular disease.^{30,31}

Several studies on migrant Indians across the globe have shown that Asian Indians have an increased risk for developing type 2 diabetes and related metabolic abnormalities compared to other ethnic groups.^{32,33} Although the exact reasons are still not clear, certain unique clinical and biochemical characteristics of this ethnic group collectively called as the "Asian Indian phenotype" is considered to be one of the major factors contributing to the increased predilection towards diabetes.^{34,35} Despite having lower prevalence of obesity as defined by body mass index (BMI), Asian Indians tend to have greater waist circumference and waist to hip ratios; thus having a greater degree of central obesity. Again, Asian Indians have more total abdominal and visceral fat for any given BMI and for any given body fat they have increased insulin resistance.³⁶⁻³⁸ Moreover, they have lower levels of the protective adipokine adiponectin and have increased levels of adipose tissue metabolites.³⁹ These findings suggest that Asian Indians are more prone to diabetes and related metabolic abnormalities. Genetic factors that determine body fat distribution and glucose metabolism have to be fully elucidated for the better understanding of the biochemical and molecular

mechanisms behind the aetiopathogenesis of diabetes.

Capillary finger prick blood method with electronic glucometer is a less invasive method for screening for early diabetes, requirement of trained manpower, cost of the procedure, were challenges we encountered. However, a yield of 10.4% abnormal sugar levels among the young adult males aged 20-30 years (study subjects) is a matter of grave concern. Ramakrishna. S et al (2012) recommended that every available outlet like waiting place at the OPD, waiting time in the OPD queue is used to dissemination appropriate Information, education and communication (IEC) for a healthy lifestyle among the young adults, including facilities for early

screening for diabetes. This move can help early diagnosis, appropriate treatment and prevention of complications due to diabetes.

Early identification of the high risk individuals would help in taking appropriate intervention in the form of dietary changes and increasing physical activity, thus helping to prevent, or at least delay, the onset of diabetes. This means that identification of at risk individuals is extremely important if we have to prevent diabetes in India. Increasing awareness and empowerment of community can possibly help in the prevention of diabetes and other non-communicable disorders. Mass awareness programmes like public lectures, video clippings and distribution of educational pamphlets should be carried out.

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