



OPPORTUNISTIC SCREENING AMONGST 30 YEARS AND ABOVE WITH GLUCOMETER TO DETECT HIGH RISK INDIVIDUALS FOR DEVELOPING TYPE II DIABETES MELLITUS

Vijay K Dimple¹, Rujuta S Hadaye², Satish K Wadde³

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Author's Affiliation:

¹Asst Prof, Dept of Community Medicine, Dr. Shankarrao Chavan Govt Medical College, Nanded, Maharashtra; ²Prof, Dept of Community Medicine, Seth G. S. Medical College & KEM Hospital, Mumbai (M.S.); ³Asst Prof, Dept of Community Medicine, Govt Medical College, Latur, Maharashtra

Correspondence:

Dr Dimple Vijay Kishanrao
drdigvijay@yahoo.co.in

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ABSTRACT

Introduction: Prevalence of Type II Diabetes Mellitus (T2DM) is increasing globally and has reached epidemic proportions in many countries. Objective of this study was to detect high risk individuals for developing T2DM amongst the adults (30 years and above) with glucometer.

Material and methods: This cross sectional study was carried out at Urban Health Training Center, Shivajinagar, Nanded between January 2016 to July 2016 amongst 506 individuals aged ≥ 30 years of age. The participants were interviewed by using predesigned questionnaire after obtaining verbal informed consent. The participants were asked to test random blood sugar (RBS) level by Freestyle Abbott Optium H Glucometer. The data were analyzed by Epi Info™ 7 Version.

Results: Of the 506 study subjects, 332(65%) participants had RBS > 110 mg/dl having greater risk for developing type 2 diabetes mellitus and 174 (35%) participants had RBS within normal range i.e. < 110 mg/dl. In high risk group, 280 (55.34%) had RBS > 110 mg/dl - ≤ 199 mg/dl and 52 (10.28%) had RBS ≥ 200 mg/dl. **Conclusion:**

Conclusion: This present study has observed about 1/3rd participants to be at risk for development of T2DM.

Key words: Opportunistic screening, Random Blood Sugar, Glucometer, High Risk, Type 2 diabetes Mellitus

INTRODUCTION

Type 2 diabetes mellitus (T2DM) is now a global epidemic. It has progressed beyond the point where it can simply be considered a "medical problem"¹. Prevalence of T2DM is increasing globally and has reached epidemic proportions in many countries. The recent estimates by the International Diabetes Federation showed that the number of adults affected by the disease in 2011 was 366 million which was projected to increase to 552 million by 2030². The age of onset in India has been shifting towards ever younger people³. Diabetes mellitus has a serious impact on those af-

ected and their families. There is need for early detection and prompt and adequate management. Early detection can be enhanced by screening people for the disease on an incidental basis when consulting for other reasons⁴.

One of the strategy of National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular diseases and Stroke is early diagnosis of chronic non communicable diseases will consist of opportunistic screening of persons above the age of 30 years at the point of primary contact with any health care facility, be it the village, community health center, district hospital, tertiary care hospi-

tal etc⁵. Furthermore, the glucometer has been found to have a precision similar to that of routine laboratory systems⁴.

Literature review conducted using keywords viz. 'screening' or 'opportunistic screening', 'type 2 diabetes mellitus' or 'T2DM' or 'diabetes', 'random blood sugar' and 'glucometer' on various databases and other print journals for searching the similar studies. But there are very few studies published on this topic⁶⁻⁸.

Availability of sparse literature on the topic has given impetus for undertaking this current study to detect high risk individuals for developing T2DM amongst the adults (30 years and above) visiting Urban Health Training Center (UHTC), Shivajinagar, Nanded with the help of glucometer.

MATERIAL AND METHODS

This cross sectional study was conducted from January 2016 to July 2016. UHTC, Shivajinagar located in the city centre which is a field practice area of Department of Community Medicine, 8 km away from Dr. Shankarrao Chavan Government Medical College and Hospital, Vishnupuri, Nanded, a rural medical college in Marathwada region of Maharashtra, India.

Recent study published by Rathod HK et al (2014)⁹ reported the prevalence of T2DM was 9.1%, with absolute precision 5 and confidence level 99.99% and considering this the calculated sample size was 501 by using Open Epi software version 3.01. Total 506 adults aged ≥ 30 years who met the inclusion and exclusion criteria were included.

Adult ≥ 30 years of age visiting UHTC, Shivajinagar, Nanded for any health problem other than Type I and II Diabetes Mellitus and the persons accompanying these patients were included in the study.

Known cases of diabetes mellitus (Type I and Type II Diabetes Mellitus) and pregnant & lactating mothers up to 12 weeks postpartum were excluded from the study.

The study was approved by Institutional Ethics Committee. The participants were informed to about the purpose of study and invited to participate in the study. Queries if any, raised by the participants were answered. The study subjects demonstrating RBS >110 mg/dl, were referred to our tertiary care center i.e. Dr. S. C. Government Medical College and hospital, Vishnupuri, Nanded for further workup.

A predesigned questionnaire was used for data collection including socio-demographic and preliminary clinical data by interviewing them. Height

and weight were measured by WHO recommended methods. Body mass index and socioeconomic status by Modified B G Prasad Classification¹⁰ was calculated and RBS level was determined with the help of glucometer.

The participants were asked to test RBS level by Freestyle Abbott Optium H Glucometer^{7&11}. Verbal informed consent was taken from the participant before going for actual testing. Blood sugar level was measured by the trained laboratory technician and the instrument was standardized every day. The participants were categorized on the basis of reading as Normal (if RBS up to 110 mg/dl), High risk (RBS > 110 mg/dl).¹² High risk individuals were further classified into two categories viz. RBS levels >110 mg/dl to ≤ 199 mg/dl and ≥ 200 mg/dl.

Data were entered in Microsoft excel sheet and analyzed by statistical software Epi InfoTM Version 7¹³ (Atlanta, Georgia, USA) for frequencies, percentages and chi-square test.

RESULTS

Out of 506 study subjects screened, 332(65%) participants had RBS > 110 mg/dl (i.e. showed greater risk for developing T2DM) and 174 (35%) participants had RBS within normal range i.e. <110 mg/dl. In high risk group, patients having RBS ≥ 200 mg/dl are more prone for developing T2DM (Table 1). Out of 506 study subjects, 280 (55.34%) had RBS >110 mg/dl - ≤ 199 mg/dl and 52 (10.28%) had RBS ≥ 200 mg/dl.

Out of 506 study subjects, maximum i.e. 150 (29.64%) were from age group 30 to 39 years followed by 60 to 69 years i.e. 124 (24.5%) while only 50 (9.88%) individuals were ≥ 70 years of age. The maximum study subjects i.e. 77(15.21%) were from age group 30-39 years who had RBS >110 mg/dl- ≤ 199 mg/dl as compared to only 1(0.19%) from ≥ 70 years who had RBS ≥ 200 mg/dl. The observed difference between age group and RBS was statistically significant ($P=0.0407$).

Table 1: Distribution of participants according to random blood sugar level

RBS Level	Participants (%)
Normal(≤ 110 mg/dl)	174 (34.39)
High risk	
>110 mg/dl - ≤ 199 mg/dl	280 (55.34)
≥ 200 mg/dl	52 (10.28)
Total	506 (100)

266 (52.56%) were females and 240(47.43%) were males. Of these 266 females 146(28.85%) were having RBS >110 mg/dl to ≤ 199 mg/dl and 29(5.73%)

had RBS ≥ 200 mg/dl. Of these 240 males, 134(26.48%) were having RBS >110 mg/dl to ≤ 199 mg/dl and 23(4.54%) had RBS ≥ 200 mg/dl. The observed difference between sex and RBS was not statistically significant ($P = 0.8873$).

Most of the study subjects 158(31.22%) were having BMI ≥ 40 Kg/m² while only 1(0.19%) was having BMI <18.50 Kg/m². Out of 506 individuals, maximum study subjects i.e. 89(17.58%) were having BMI ≥ 40 Kg/m² who had RBS >110 mg/dl-

≤ 199 mg/dl, and 1 (0.19) was having BMI <18.50 Kg/m² who had RBS >110 mg/dl- ≤ 199 mg/dl.

Most of the individuals, 146(28.85%) were from socioeconomic class V and 22(4.34%) were from socioeconomic class I. 114 (22.52%) study subjects were from class IV socio-economic status who had RBS >110 mg/dl- ≤ 199 mg/dl while only 3(0.59%) from class I socio-economic status who had RBS ≥ 200 mg/dl (Table 2). Chi square revealed no statistically significant difference ($P=0.3171$) in the comparison.

Table 2: Profile of participants according to random blood sugar level

Variables	Normal ≤ 110 mg/dl	High Risk		Total
		>110 mg/dl- ≤ 199 mg/dl	≥ 200 mg/dl	
Age group*(Years)				
30-39	59(11.66)	77(15.21)	14(2.76)	150(29.64)
40-49	44(8.69)	65(12.84)	09(1.77)	118(23.32)
50-59	24(4.74)	31(6.12)	09(1.77)	64(12.64)
60-69	34(6.71)	71(14.03)	19(3.75)	124(24.50)
≥ 70	13(2.56)	36(7.11)	01(0.19)	50(9.88)
Sex#				
Male	83(16.40)	134(26.48)	23(4.54)	240(47.43)
Female	91(17.98)	146(28.85)	29(5.73)	266(52.56)
Body Mass Index(BMI)				
<18.50	0(0)	01(0.19)	0(0)	01(0.19)
18.50-24.99	07(1.38)	14(2.76)	0(0)	21(4.15)
25.00-29.99	37(7.31)	45(8.89)	03(0.59)	85(16.79)
30.00-34.99	50(9.88)	65(12.84)	12(2.37)	127(25.09)
35.00-39.99	36(7.11)	66(13.04)	12(2.37)	114(22.52)
≥ 40.00	44(8.69)	89(17.58)	25(4.94)	158(31.22)
Socio-economic status according to BG Prasad Classification^{@10}				
I	07(1.38)	12(2.37)	03(0.59)	22(4.34)
II	05(0.98)	23(4.54)	05(0.98)	33(6.52)
III	39(7.70)	48(9.48)	06(1.18)	93(18.37)
IV	75(14.82)	114(22.52)	23(4.54)	212(41.89)
V	48(9.48)	83(16.40)	15(2.96)	146(28.85)
Total	174(34.38)	280(55.33)	52(10.27)	506(100)

* $\chi^2=16.12$ d(f)8 $P=0.0407$, # $\chi^2=0.23$ d(f)2 $P=0.8873$, @ $\chi^2=9.3$ d(f)8 $P=0.3171$

DISCUSSION

We propose the practice of screening adult persons (30 years and above) in the population for unusual RBS level using a glucometer to detect high risk. In the present study, the age group was 30 years and more whose mean age was 48.70 ± 13.35 years. Ramakrishna et al⁶, in their study included the age group of 20-30 years only and mean age was 25.53 years. Venugopal et al⁷, in their study the age group was similar to the present study where mean age, i.e. 51 ± 13.4 years slightly higher than the present study. The mean age in a study by Shewade et al⁸ was 47.4 years; similar to present study. Female participants were more than males in the present study. Ramakrishna et al⁶, in their study included only males. Venugopal et al⁷ enrolled 64% females in the study. Shewade et al⁸ found 66.7% female participants in their study. In present study,

majority of participants were from class IV socio-economic status i.e. 41.89% while Ramakrishna et al⁶ found 44.88% participants from class III socio-economic status. In present study, 31.22% participants had BMI ≥ 40 kg/m². Venugopal et al⁷, in their study revealed 36.8% study subjects with normal BMI.

In our study, 34.39% participants had normal RBS level and 65% participants were having high RBS level and at high risk for developing T2DM. Ramakrishna et al⁶ found 92.84% participants were with normal (<142 mg/dl) RBS, 4.68% participants had impaired glucose levels (143-161 mg/dl) and 2.48% participants had diabetes mellitus (>162 mg/dl). Venugopal et al⁷ found that 20.3% study subjects had RBS ≥ 140 mg% while Shewade et al⁸, in their study revealed 54.5% participants with RBS greater than or equal to 6.1 mmol/L The difference

between percentages of at high risk individuals might be due to variation in cut off level of RBS as we considered the individuals at risk if RBS >110 mg/dl¹². Ramakrishna et al⁶, Venugopal et al⁷ and Shwade et al⁸ considered cut off RBS as >142 mg/dl, ≥140 mg/dl and ≥6.1 mmol/L respectively. These researchers also used different types of glucometers. We and Venugopal et al⁷ used Free style, Optum H glucometer while Ramakrishna et al⁶ used Accucheck and one touch select simple glucose meter was used by Shewade et al⁸.

This present study has observed about 1/3rd participants to be at risk for development of T2DM. It can be fairly interpreted that, simple and convenient screening measures for unusual RBS levels shall be an important contribution in the management of this mammoth elephant of T2DM, now epidemic proportions in different regions of the world, including India.

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