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Screening of Rural Adults (30 Years and Above) for Fasting Glycemic Status of Marathwada Region of Maharashtra, India

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ABSTRACT

Background: Fasting blood glucose (FBG) is useful in screening of type 2 diabetes (T2DM) as well as in management of T2DM. The study conducted to screen the rural adults (30 years and above) for fasting glycemic status by using glucometer.

Material and methods: The present cross-sectional study was conducted among 184 adults during Oct 2017 to Dec 2017. A camp was organized in three villages of Nanded district in Marathwada region, Maharashtra, India. As per WHO criteria, fasting glycemia i.e. blood glucose < 110 g/l, ≥ 110 to < 126 g/l and ≥ 126 g/l was considered as normal, impaired fasting glucose(IFG) and high risk for T2DM respectively. A predesigned questionnaire was used for data collection. The data was analyzed by using SPSS Version 16 for percentages and binary logistic regression etc.

Results: Out of 184 adults, 143 (77.7%) had normoglycemia. 24(22.9%) adults had IFG whose age group was >45 years. Out of 93 males, 25 (26.9%) had IFG while out of 91 females, 16 (17.6%) had IFG. Binary logistic regression showed that no risk factor was significantly associated with IFG.

Conclusion: To conclude, the 22.3% participants had IFG which is alarming signal for the public health specialist to search the further.

Keywords: T2DM, fasting blood glucose, impaired fasting glucose, normoglycemia, glucometer

INTRODUCTION

Impaired fasting glycemia (IFG) is a risk category for the future development of diabetes and cardiovascular disease. Fasting blood glucose (FBG) testing is useful in screening of type 2 diabetes (T2DM) [1], and with a cutoff point of 7.0 mmol/L (126 mg/dl) as a valid test for the diagnosis of T2DM as recommended by the World Health Organization[2]. Despite the insensitivity of Fasting Plasma Glucose in identifying a majority of diabetic individuals, there is practical interest in finding ways to utilize information obtained from a single fasting blood draw to identify individuals with diabetes[3]. So it was decided to undertake the present study with the objective to screen the rural adults (30 years and above) for fasting glycemic status by using glucometer.

MATERIAL AND METHODS

The present cross-sectional study was conducted among 184 adults in Oct to Dec 2017. A camp was organized in three villages namely Andegaon, Vadepuri and Sonkhed of Nanded district in Marathwada region on various days to know the magnitude of problem of IFG. Fasting was defined as no consumption of food or beverage other than water for at least 8 hours before testing.[4] One day prior to the camp the investigator had communicated well about the importance of testing of fast-

ing glycemic status and information about T2DM in all three villages. All the adults(30 years and above) were invited to attend the camp and participate in the study. Those who could not attend the camp on first day were called on second day. If they did not attend the camp on second day, were excluded from the study. The known cases of T2DM patients and pregnant women were excluded. This study was approved by Institutional Ethics Committee. The informed consent was obtained from every participants before commencing the study. A predesigned questionnaire was used for data collection which included information like name, age, sex, address, height, weight etc. The height and weight were measured as per standard guidelines of WHO and Body Mass index (BMI) was calculated[5]. The Free Style, Optium H Glucometer[6] was used for testing fasting blood glucose level. As per WHO criteria[1] fasting glycemia i.e. blood glucose < 110 g/l, ≥ 110 to < 126 g/l and ≥ 126 g/l was considered as normoglycemia, impaired fasting glucose and high risk for T2DM respectively. Health education was given to all participants about prevention of T2DM after the camp. The data was analyzed by using SPSS Version 16 for percentages, chi square test and binary logistic regression.

RESULTS

The mean FBG level was 98.22 g/l and standard deviation of 24.33 g/l. The FBG ranged from 60 g/l to 230 g/l. Out of 184 adults, 143 (77.7%) had normoglycemia. Seventeen (9.2%) adults had IFG and 24(13%) were high risk individuals for T2DM. Due to the less numbers in the category of 'IFG' and 'High risk individuals for T2DM', henceforth we have clubbed both category in one named IFG(≥ 110 g/l) to simplify the results and for statistical purpose.

Most of the adults i.e. 24(22.9%) adults had IFG whose age group was >45 years. Remaining adults i.e. 17 (21.5%) had IFG with age group of ≤ 45 years. The chi-square test did not show any association between age group and FBG (P=0.829) (Table 1).

Table 1: Distribution of various factors according to fasting blood glucose

Variables	Normoglycemia (<110 g/l) (n=143) (%)	IFG (≥110g/l) (n=41) (%)	Total (n=184) (%)	P value	OR	95% CI
Age						
≤ 45	62(78.5)	17(21.5)	79(42.9)	0.829	1.0806	0.5345 to 2.1845
>45	81(77.1)	24(22.9)	105(57.1)		Ref	
Gender						
Female	75(82.4)	16(17.6)	91(49.5)	0.130	1.7233	0.8488 to 3.4988
Male	68(73.1)	25(26.9)	93(50.5)		Ref	
BMI grading						
Underweight	44(73.3)	16(26.7)	60(32.6)	0.537	1.37*	0.4695 to 1.6647
Normal BMI	70(78.7)	19(21.3)	89(48.4)			
Overweight	29(82.9)	6(17.1)	35(19.0)		Ref	

IFG=mpaired fasting Glycemia; *Underweight and Normal weight rows were pooled for calculation of OR and 95% CI

Table 2: Binary logistic regression to predict risk factor for fasting glycemic status

Variable	Odd's ratio	95% CI	P value
Age	1.01	0.985-1.035	0.445
Female	1.796	0.871-3.705	0.113
BMI	0.927	0.851-1.01	0.082

Out of 184 participants, 93 were males and 91 were females. Out of 93 males, 25 (26.9%) had IFG while out of 91 females, 16 (17.6%) had IFG. The chi-square test between sex and FBG did not show any association (P=0.130) (Table 1).

Out of 184, most i.e. 48.4% were with normal BMI while 35 (19 %) were overweight. Sixteen (26.7%) out of 60 underweight participants had IFG. Similarly out of 89 with normal BMI 19 (21.3%) and out of 35 with overweight 6(17.1%) had IFG. The chi-square test between BMI and FBG did not show any association (P=0.537)(Table 1).

The binary logistic regression was used by Enter method to assess the independent risk factors for fasting glycemic status. We used age, sex and BMI as independent risk factors and fasting glycemic status (normal/abnormal) as a dependent variable. The males were assumed as reference category. Binary logistic regression showed that no risk factor was significantly associated with IFG (Table 2).

DISCUSSION

The present study was conducted in three villages of Nanded District where a camp was organized and the participants were screened for fasting glycaemic status with the help of glucometer.

Table 3: Details of comparable studies

Study	Publication year	Age group (Years)	Place	Sample Size	WHO/ADA criteria	IFG For prevalence
Basit et al[9]	2002	≥25	Baluchistan	2032	ADA	3%
Gu D et al[10]	2003	35-74	China	15236	ADA	7.3%
Abu Sayeed M et al[11]	2004	≥20	Bangladesh	1287	ADA	8.5%
Hussain A et al[12]	2006	≥20	Bangladesh	4757	WHO	4.68%
Kumar S et al[13]	2008	20-60	India	2160	ADA	6.2%
Rahim MA et al[14]	2010	≥20	Bangladesh	3981	WHO	1.3%
Sahai S et al[15]	2011	16-65	India	100	ADA	18%
Kumar P et al[16]	2013	20-59	India	1817	WHO	1.1%
Qi L et al[17]	2014	≥18	China	3721	WHO	9.8%
Sagna Y et al[18]	2014	>20	Burkina Faso	467	WHO	5.9%
Reviriego J et al[19]	2016	IQR (29-44)	Spain	371997	ADA	10.4%
Irazola V et al[20]	2017	35-74	Latin America	7407	WHO	3.5%- Barros Blancos 6.8% in Marcos Paz
Worede A et al[21]	2017	>20	Ethiopia	392	ADA	12%

IFG-Impaired Fasting Glucose, WHO-World Health Organization, ADA-American Diabetes Association; IQR- Interquartile range

Present study showed that 77.7% participants had normoglycemia, 22.3% had IFG. A Kolar community based study[7] published in year 2013 revealed the 75.4% had normoglycemia, 14.1% had IFG and 4.9% were high risk individuals for T2DM. A study from rural Bangladesh[8] published in 2017 showed the prevalence of IFG and undiagnosed DM among participants were 12% and 2.3% respectively. Comparing the IFG from present study with two other studies[7,8], the percentages of IFG were higher in the present study. This might be due to the urbanization of rural area in Nanded district. The other comparable studies[9-21] reported the percentages of IFG were 3%, 7.3%, 8.5%, 4.68%, 6.2%, 1.3%, 18%, 1.1%, 9.8%, 5.9%, 10.4%, 3.5%, & 6.8% and 12%. The details of other comparable studies are given in the table 5. The difference in the percentages of IFG among comparable studies and comparison with the present study might be due to different age group, geographical study setting, criteria to assess the prevalence of IFG, screening test etc.

In our study, those who had normal FBG, the health education about dietary guidelines, importance of physical activity and regular check up of blood glucose level was given. All the participants who had IFG were advised to visit to medical college hospital for the definitive diagnosis.

Venous and capillary samples will give the same result in the fasting state but in the non-fasting state capillary will give higher results than venous samples. Fasting plasma glucose alone fails to diagnose approximately 30% of cases of previously undiagnosed diabetes[22].

Carnevale Schianca GP et al[23] reported in their research that both FBG and 2h Blood Sugar are useful diagnostic tools, since their combined use allows the stratification of subjects like isolated IFG, isolated Impaired Glucose Tolerance(IGT), and combined IFG/IGT. This distinction may help clinicians in choosing strategies to prevent cardiovascular disease and diabetes.

The study might not reflect the true magnitude of IFG as we could not enroll all the eligible participants in the study. Another study with large sample after ensuring of all the participants is needed to address this issue.

CONLCUSION

To conclude, the 22.3% participants had IFG which is alarming signal for the public health specialist to search the further.

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