

Prediabetic State Awareness: A Pilot Study in Randomly Selected Semi-Urban Population

Shabir Ud Din Lone¹, Riyaz Ahmad Lone¹, Sheikh Junaid Aziz², Humairah Shafi³, Sheikh Imran Sayeed⁴

¹Associate Professor, ²Lecturer, ³PG Student, ⁴Professor and Head, Department of Physiology, SMHS Govt. Medical College, Srinagar, J & K, India.

ABSTRACT

Introduction: Impaired Glucose tolerance (IGT), a Prediabetic condition, which has now increased to an epidemic level and involved a huge population, ultimately leads to a full flagged disease state i.e., Diabetes Miletus (DM). From Normal Glucose tolerance (NGT) to Impaired Glucose tolerance (IGT), it is an awareness which makes a difference and makes it possible to halt the progression of disease state.

Methods: This study was conducted in a randomly selected Srinagar population who came to hospital in different OPDs as follow ups. To assess the prevalence of IGT and its relationship with anthropometry and family history of diabetic mellitus, a total of 250 subjects among both sexes, who fit in the inclusion criteria, were selected. Their blood sugar, BMI and WHR were measured. The data was collected and statistically analysed.

Results: The study showed the prevalence of IGT is 9.03%.

Conclusion: Subjects with family history of DM and BMI irrespective of gender showed an association with IGT.

Keywords: Body-Mass Index (BMI), Waist-Hip Ratio (WHR), Outpatient Department (OPD).

*Correspondence to:

Dr. Sheikh Junaid Aziz,
Lecturer, Department of Physiology,
SMHS Govt. Medical College, Srinagar, J & K, India.

Article History:

Received: 09-11-2021, Revised: 03-12-2021, Accepted: 27-12-2021

Access this article online

Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2022.8.1.021	

INTRODUCTION

World in present times is facing a challenge of major health problem in the form of diabetic mellitus which represents a large spectrum of metabolic disorders that has affected the worldwide population at epidemic levels. Prediabetes is an intermediate state of hyperglycemia with glycemic parameters above normal but below the diabetes threshold and it remains a state of high risk for developing diabetes with yearly conversion rate of 5%-10%.¹ The conversion rate of individuals from prediabetes to diabetes changes with population characteristics and the criteria used to define prediabetes.^{2,3}

The world-wide prevalence of IGT in 2010 was estimated to be 343 million (7.8%) ranging from 5.8% in Southeast Asia to 11.4% in North American and Caribbean Countries of the nation's population. International Diabetes Federation projects an increase in prevalence of prediabetes to 471 million globally by 2035.⁴

In India, unprecedented economic development, rapid adoption of western culture, urbanization has led to a shift in health problems. Earlier Indians suffered basic communicable disease, now a huge population suffered from a reasonably modifiable non-communicable disease i.e., metabolic disorder. Diabetic mellitus and cardiovascular diseases top the list. During the year 2025 World Health Organization (WHO) has predicted that India will be

the "Diabetic Capital" of the world. The predisposing factors like weight gain, obesity, rise in blood pressure, dyslipidaemia, and sedentary lifestyle, for such a notorious disease, there figures will be much higher.^{5,6}

This non-communicable disease can be modified by primary preventive strategies. The aim is to first recognize the unhealthy lifestyle pattern, whether it is obesity, alcohol, eating behaviour, exercise pattern, living in conflict zones, excessive irrational medications, WHR in males/females, childhood food patterns etc. Over the years the IGT conversion rates to full flagged diabetes exists.⁷ So, we need to have an awareness of early testing so as to diagnose early and have possible intervention to prevent the progression of IGT to a full-blown diabetes mellitus.

Our study forms the base where we have attempted to determine the risk factors for diabetes in native Kashmiris who have shown increased trend in metabolic disorders in recent times because of the prevailing political disturbance.

MATERIALS AND METHODS

After a proper approval from ethical committee, the study was conducted in different medical and surgical OPDs of SMHS Govt. medical college and hospital, Srinagar.

The subjects residing in the Srinagar city were selected and before enrollment written well informed consent was obtained. The laid inclusion criteria were followed. Only the subjects in the age group of 25 to 50 years among both genders were chosen. The persons having some sort of illness like fever, cough, hypertension, diabetes, thyroid dysfunction, facial/pedal edema, COPD, asthma, dyspeptic disorder and on any history of medications like steroids, oral contraceptives or antihypertensives, were excluded from this study.

The subjects were asked to report empty stomach next day in the Department of Physiology GMC Srinagar. Anthropometric assessment of the subjects was done. Height in cms and weight in Kgs were measured. BMI was calculated by kg/m² and the results are interpreted as per WHO guidelines as shown in table 1:⁸

Waist was measured at the level of Umbilicus below floating ribs using standard table. Hip was measured at the level of greater trochanter of the head of femur in the middle of buttock.⁹ Normal values as shown in Table II.

Table 1: Classification of BMI

S. No.	BMI	Result
1.	18.5-22.9	Normal
2.	23-24.9	Overweight
3.	>25	Obese

Table II: Normal values in of waist-hip ratio:

Gender	WHR	Result
Male	0.88m	Normal
Female	0.81m	

After anthropometric measurements the blood sampling was done under all aseptic conditions. After an overnight fasting venous blood samples were taken from antecubital vein labelled as sample 1. Then in same subject 75gm of glucose dissolved in

250ml of water were given, again sample II were taken at 2 hours interval. Plasma glucose level was estimated by glucose oxidase-peroxidase method at F-block biochemistry laboratory of Govt. Medical College using autoanalyzer. The results were taken as per ADA guidelines shown in Table III:

We study the 2 hours post prandial or post glucose challenge plasma glucose concentration as per American Diabetes Association criteria of 140mg% - 199mg% as impaired.¹⁰ All the data of the subject collected were statistically analysed. Statistical Analysis was done. Data was expressed in Mean ± SD. Glucose level and anthropometric measurements were assessed. Their association calculated using Pearson's correlations. Level of significance was taken as P<0.05.

RESULTS

Statistically there was no significant difference in the prevalence of IGT between males and females, gender specific prevalence of IGT in male group was 11 and 9 in female group. Subjects having IGT in the age group of >38yrs was 12 and subjects having IGT in the age group of <38yrs was 9 (Table IV) and it was found statistically insignificant. Prevalence of IGT in the randomly selected Srinagar people was 9.03%. The subjects having 2 hr post prandial glucose tolerate were of the group having BMI >23. A statistically significant difference (p<0.05) was found between normal and overweight subjects having Impaired 2h glucose tolerance (2 hr PPG). (Table V) The good number of subjects who had impaired 2 hr PPG were found in the abnormal WHR group than normal. A statistically significant difference was found between group with normal WHR and group with higher WHR in males (P<0.05) and reverse was found in females and no significant difference were between group with normal WHR and group with higher WHR in females. The number of subjects having positive family history of diabetes mellitus with abnormal 2 hr PPG level was more and it was statistically significant.

Table III: Result of normal glucose tolerance, IGT and DM.

	Normal Glucose Tolerance	Hyperglycaemia	
		Pre-diabetic (Impaired Fasting Glucose/ Impaired glucose tolerance)	Diabetes Mellitus
Fasting Plasma Glucose (FBG)	<5.6 mmol/L (100mg/dL)	5.6 – 6.9 mmol/L (100-125 mg/dL)	>= 7 mmol/L (126 mg/dL)
2 hours post prandial (PPG)	<7.8 mmol/L (140mg/dL)	7.8 – 4 mmol/L (140 – 199 mg/dL)	>= 11.1 mmol/L (200 mg/dL)

Table IV: Basal parameters among male and female subjects.

Parameter	Male (N=125) Mean ±SD	Female (N=125) Mean ±SD	P Value
Age (yrs)	37.10±4.31	36.23±5.02	0.1428
Blood Pressure			
(SBP)	108±5	107±4	0.0820
(DBP)	79±3	75±3	0.0001
BMI (Kg/m ²)	23.06±2.60	24.80±3.06	0.0001
2hr PPG level (mg%)	120.01±60	119.10±50.41	0.2049

*p value <0.05 is significant

Table V: Relationship between 2 hr PPG level with BMI and WHR

	Male		Female	
	r	p	r	p
2 hr PPG level vs BMI	0.158	0.089	0.246	0.019
2 hr PPG level vs WHR	0.350	0.001	0.162	0.078

*p value <0.05 is significant

DISCUSSION

The study was taken to know how on spot questioning to a people of different background, who are having different lifestyle, different food habits, socio-economic status and irrespective of their qualification has an awareness about the pandemic called Diabetic mellitus, which is almost harbouring in our lives at its pre-stage level called Impaired glucose tolerance.

In contrast to Zarger et al who had shown 8.09% of IGT.¹¹ our study showed the prevalence of IGT in randomly selected mostly urban Srinagar population was 9%. It goes in accordance with Jaiganesh et al who reported the prevalence of 8.5% in a randomly selected south Indian population.¹²

Some reported about 5.9% (Mohan et al) while the study of Ramachandran et al has shown the IGT of 14%.⁵ The prevalence of IGT in our study among males was 11% and in females it was 9%.

These findings go in accordance to the study of Jaiganesh et al¹² and Hilary et al who reported 9%, 8% and 10.5%, 8% in males and females respectively.¹³

In our study there was no difference while analysing the prevalence of IGT related to gender or age between the groups of <38yrs and >38yrs old. This was in accordance with the study of Ramachandran et al and it may be because in the selected population the level of education, awareness, physical activity is similar.¹⁴ Majority of IGT studies outside country reviewed by WHO showed that IGT are more common in men than women. But in our study, we have a convincing association between obesity and IGT.

Obesity and Insulin Resistance

Increased WHR indicates obesity, which is an important marker for insulin resistance thereby, for glucose intolerance. In our study there was a significant association between WHR and IGT in males compared to females where no significant association was found. Some of the research papers published here has witnessed an association between Diabetes incidence and WHR.^{15,16}

CONCLUSION

This study has shown a prevalence of IGT in a randomly selected sub-urban population of about 9%. Body mass index, obesity, family history of metabolic syndrome esp. Diabetes Mellitus has an association with IGT. As far as impaired WHR is concerned this short study has shown prevalence of IGT more in males compared to females and no association as far as different age groups are concerned.

Timely intervention and large population-based studies are need of hour and also to account other various variables like nutritional status etc, so that preventive measures were to be taken on natural level to reduce the morbidity and mortality associated with metabolic syndrome esp. DM.

ACKNOWLEDGEMENTS

We are grateful to Prof. Dr Imran Sayeed, HOD, Department of Physiology, Government Medical College, Srinagar, for his cooperation and aspiration to complete the study. Also, the cooperation of the staff in Physiology Department is greatly acknowledged.

LIMITATIONS OF THE PRESENT STUDY

Includes small sample size and limited to urban population only. Further studies of longer duration and involving larger sample size will provide a more comprehensive outcome.

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Source of Support: Nil. **Conflict of Interest:** None Declared.

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Cite this article as: Shabir Ud Din Lone, Riyaz Ahmad Lone, Sheikh Junaid Aziz, Humairah Shafi, Sheikh Imran Sayeed. Prediabetic State Awareness: A Pilot Study in Randomly Selected Semi-Urban Population. *Int J Med Res Prof.* 2022 Jan; 8(1): 98-101. DOI:10.21276/ijmrp.2022.8.1.021