

Prevalence of Diabetes Mellitus in Adult Population of Rawalpindi

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ABSTRACT

Introduction: The study was aimed at assessing the prevalence of diabetes mellitus and impaired glucose tolerance test (IGT) in the urban population of Rawalpindi by using a flexible postprandial plasma glucose (FPPPG) test as a screening test.

Study design: Cross Sectional Study

Subjects & methodology: The study was conducted at Department of Chemical Pathology and Endocrinology, Armed Forces Institute of Pathology, Rawalpindi from Nov 95 to Jul 96. Nine hundred and thirty eight subjects were randomly selected among which 406 were males and 532 were females. They all were screened by FPPPG test with time of sampling 30 – 120 min after breakfast/ snack/ meal.

Results: Screening of 406 males revealed 329 (81%) normal, 36 (8.87%) found diabetic and 41 (10.1%) individuals fell in IGT category whereas among 532 females 393 (73.87%) were normal, 66 (12.4%) declared diabetics and 73 (13.72%) had impaired glucose tolerance test.

Conclusion: The overall prevalence of diabetes mellitus for Rawalpindi population was 10.87 % and for IGT was 12.15%.

Key words: Prevalence, Diabetes mellitus, IGT, FPPPG

INTRODUCTION

Diabetes mellitus is a syndrome of chronic hyperglycemia. Diabetes mellitus type 2 - formerly non-insulin-dependent diabetes mellitus (NIDDM) or adult-onset diabetes - is a metabolic disorder that is characterized by high blood glucose in the context of insulin resistance and relative insulin deficiency or both.¹ It affects over 150 million worldwide and it is estimated that it will affect 370 million by the year 2030.^{2,3} WHO ranks Pakistan 7th on diabetes prevalence list. In Pakistan, 6.9 million people are affected by diabetes with the International Diabetes Federation estimating that this number will grow to 11.5 million by 2025 unless measures are taken to control the disease. In 2007, 246 million people world-wide suffered from diabetes making the disease one of the most common non-communicable global diseases and the fourth leading cause of death in the world according to IDF estimates.⁴ The classical symptoms of diabetes are polyuria, polydipsia, polyphagia, fatigue and weight loss. Diabetes is usually irreversible and although patients can have reasonably normal lifestyle, Long-term complications from high blood sugar can include increased risk of heart attacks, strokes, amputation, and kidney failure. Its late complications result in

reduced life expectancy and major health costs. The increasing prevalence of obesity and sedentary life styles are the major underlying causes of type II diabetes to become one of the fastest growing public health problems worlds wide, imposing a high financial burden on health care cost.⁵ Type 2 diabetes is due primarily to lifestyle factors and genetics.⁶ The World Health Organization definition of diabetes is for a single raised glucose reading with symptoms, otherwise raised values on two occasions, of either, fasting plasma glucose ≥ 7.0 mmol/l (126 mg/dl) or With a glucose tolerance test, two hours after the oral dose a plasma glucose ≥ 11.1 mmol/l (200 mg/dl).⁷ Diabetes screening is recommended for many people at various stages of life, and for those with any of several risk factors. Many healthcare providers recommend universal screening for adults at age 40 or 50, and often periodically thereafter. Earlier screening is typically recommended for those with risk factors such as obesity, family history of diabetes, history of gestational diabetes, high-risk ethnicity. Interest has arisen in preventing diabetes due to research on the benefits of treating patients before overt diabetes. In 2005, an evidence report by the Agency for Healthcare Research and Quality concluded that "there is evidence that combined diet and exercise, as well as drug therapy (metformin, acarbose), may be effective at preventing progression to diabetes in IGT subjects."⁸ Pakistan is a third world country with budget restraints. About 70% of the population is illiterate. The prevalence of type II diabetes is becoming one of the fastest growing public health

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problems in Pakistan and causing a great burden on its already meager health care budget so assessment of diabetes will be helpful in future national planning and service provision.

AIM AND OBJECTIVE

The study was aimed at assessing the prevalence of diabetes mellitus and IGT in urban population of Rawalpindi by using flexible postprandial plasma glucose (FPPPG) test with time of sampling between 30-120 min after breakfast / snack / meal as a screening test.

MATERIAL AND METHODS

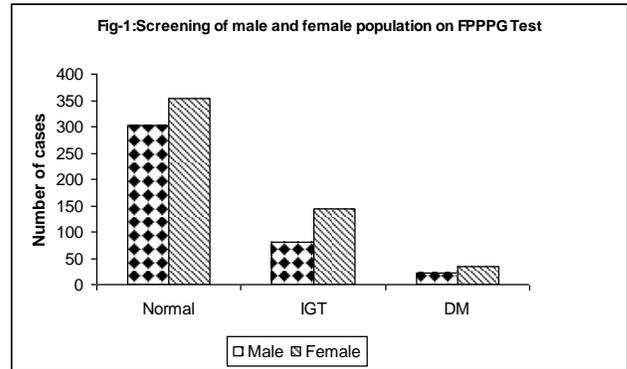
The study was conducted at Department of Chemical Pathology and Endocrinology, Armed Forces Institute of Pathology, Rawalpindi from Nov 95 to Jul 96. Four hundred and three adult males and five hundred and twenty seven adult females were randomly selected from clustered population of Saddar, Satellite Town and Chaklala Scheme III. All subjects under study performed the sedentary jobs and females were their housewives. Subjects were interviewed and only those who were willing to participate in the study were included.

The cross sectional study was designed to find out the prevalence of diabetes mellitus in adult males and females aged 30-60 years from population of Rawalpindi by using a single flexible postprandial plasma glucose test (FPPPG) with time of sampling between 30-120 min after breakfast/snack/meal. Subjects having blood glucose (30-120 min after breakfast/snack/meal) of $\geq 7-11$ mmol/l were subjected to OGTT. It was performed with individuals coming with 10-16 hours fast. First sample was collected in fasting state and the other two samples were collected after giving 75 grams oral glucose load. Results were interpreted according to WHO criteria. The data was processed by the computer special package for social sciences (SPSS). The level of significance was put at 0.05. Student (t) test and Chi-square test were used for statistical analysis.

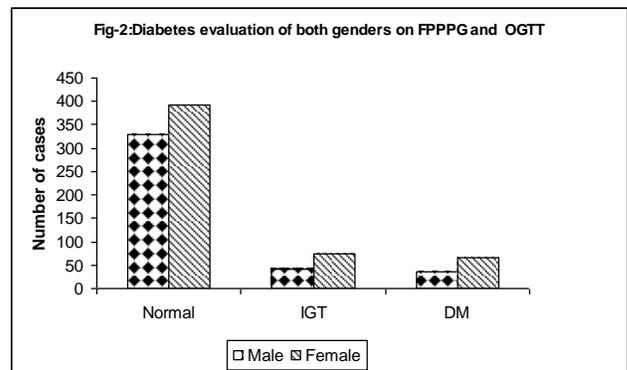
RESULTS

Four hundred and six male volunteers were selected for FPPG, among which eighty one (20.1%) had blood glucose levels between 7-11 mmol / l, three hundred and two (74.9%) had blood glucose below 7 mmol/l and twenty three had more than 11 mmol/l among which 3 were known diabetics. Eighty one persons having FPPG levels between 7-11 mmol / l were subjected to OGTT, out of which 41 had blood glucose level between 8.5-10.9 mmol/l, thirteen had level above 11 mmol / l and 27 had blood glucose level with

in normal range i.e. between 5.6-7.2 mmol/l. Thirteen persons were diagnosed as diabetics on OGTT and 23 on FPPG. Hence, 36 persons were diagnosed as diabetics (Fig.1).



Total of 532 female subjects were included in the study. Out of 532, three hundred and fifty three female volunteers had FPPPG levels < 7 mmol/l whereas one hundred and forty four had FPPG levels of (7-11) mmol/l and thirty five had blood glucose level more than 11mmol/l. The group of 144 persons having value between 7 – 11mmol/l was subjected to OGTT. Out of which, 73 had IGT with 2 h blood glucose ranging from (8.4-10.8) mmol/l, thirty one had blood glucose levels of > 11.1 mmol/l and 40 were found normal having 2 h blood glucose level ranging from (6.1 - 7.6) mmol/l. Finally thirty five persons had diabetes diagnosed on FPPPG whereas thirty one persons were diagnosed as diabetics on OGTT, so a total of 66 persons had diabetes. Overall prevalence of diabetes mellitus was 12.4% (n = 66) and IGT 13.7% (n = 73), (Fig.2).



The use of a flexible postprandial plasma glucose (FPPPG) test with time of sampling 30-120 min after breakfast/snack/meal as a screening test at the cut-off value of 7.0 mmol/l for detection of both diabetes and impaired glucose tolerance, showed sensitivity of 100 % for detecting diabetes, and specificity of 66.7% with the positive predictive value of 55%. While for the detection of IGT, the sensitivity was 83.3% and specificity was 91.4% with higher positive predictive value of 83.3%.

DISCUSSION

The overall prevalence of diabetes mellitus for Rawalpindi population was 10.87% and for IGT (impaired glucose tolerance) was 12.15% respectively. The prevalence of diabetes mellitus in our study is comparable with the published data from the other four provinces of Pakistan i.e. Punjab, Sindh, Baluchistan and North West Frontier Province (NWFP)⁹⁻¹². In Punjab study, the prevalence of diabetes was 12.14% in males and 9.83% in females. Overall total glucose intolerance (diabetes and IGT) was present in 16.68% males and 19.37% females. In NWFP, the overall prevalence of NIDDM and IGT in both male and female was 11.1% and 9.4% respectively. The gender-specific prevalence of diabetes was 9.2% in men and 11.6% in women. In Baluchistan, the prevalence of diabetes and IGT in both gender was 10.8 and 11.9% (urban) versus 6.5 and 11.2% (rural), respectively. The crude prevalence of diabetes in the urban versus rural area with gender specification was 11.1% in men and 10.6% in women and 10.3% in men and 4.8% in women. In Sindh province the prevalence of diabetes was 16.2% (9.0% known, 7.2% newly diagnosed) in men, and 11.7% (6.3% known, 5.3% newly diagnosed) in women. The prevalence of diabetes mellitus in our study is also comparable with other populations in developing countries like Oman 10%¹³, Iran 7.2%¹⁴, Palestinian 9.6%¹⁵, Argentina 6.7% Puerto Rico 9%¹⁶ and Taiwan 8.1%¹⁷. Similar in prevalence of diabetes mellitus and IGT have been noted in studies carried out by Martin et al¹⁸ which revealed prevalence of diabetes mellitus and IGT of 15.8% and 22% respectively. Similar prevalence of diabetes mellitus has been seen in Malaysia. The diabetes mellitus and IGT in population was 4.7% and 11.3% respectively. Hamman et al¹⁹ reported different prevalence of diabetes mellitus in two different ethnic groups (Hispanics and Anglos) living in similar conditions. Overall prevalence of diabetes was higher in Hispanics (6.6%) as compared to Anglos (3.6%). Such varied prevalence of this commonest endocrine disorder is because of environmental and social factors. Increased income, obesity and less exercise were related to high prevalence of diabetes mellitus. Few studies show low prevalence as in a rural Sri Lankan community where it is 2.5% and 8% respectively.²⁰ The low socioeconomic status, adequate physical exercise and the low prevalence of obesity appear to have not only contributed to the low prevalence of diabetes but also has prevented progression from IGT to overt diabetes. In a Yemeni study²¹ the overall prevalence of type II Diabetes Mellitus was 4.6% (7.4% in males and 2% in females). Prevalence of diabetes mellitus

varies among different countries and even within the same country is among different ethnic groups. Prevalence of diabetes mellitus in different racial groups in Pakistan is comparable to certain developing countries.

CONCLUSION

The overall prevalence of diabetes mellitus for Rawalpindi population was 10.87% and for IGT (impaired glucose tolerance) was 12.15%. In our study, the prevalence of diabetes mellitus is comparable with the data from the other four provinces of Pakistan and is also comparable with other populations in developing countries. The prevalence of type II diabetes is becoming one of the fastest growing public health problem in Pakistan, so assessment of diabetes prevalence will be helpful in future national planning and service provision.

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