Original Article

Frequency of Pre-Diabetes in Patients Attending Medical Units in a Tertiary Care Hospital

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ABSTRACT

Objective: The objective of study was to determine the frequency of prediabetes at Liaquat University Hospital, Hyderabad.

Material & Methods: This Cross sectional study was conducted in Medical unit-IV of Liaquat University Hospital, Hyderabad with a duration of one year (Jan-Dec 2009). Total 500 subjects aged either 45 year and above or if below 45 years than had another risk factor for diabetes like: Blood pressure >140/90, HDL cholesterol 35mg/dl or less, Triglyceride 250mg/dl or more, history of first degree relative with diabetes, history of gestational diabetes or history of delivery of large baby (weighing more than 9 pounds) were enrolled for the study. All diagnosed patients of diabetes were excluded from study. Initially demographic information, history regarding first degree relative with diabetes, gestational diabetes and delivery of large baby were obtained. Later, a physical examination was performed, including measurement of blood pressure, body mass index and waist-to-hip ratio (WHR). Fasting blood samples were drawn and analysed for glucose, triglyceride and HDL cholesterol. Blood samples were also obtained and analysed for oral glucose tolerance test. Fasting blood glucose (FBG) <100mg/dl and blood glucose level in OGTT<140mg/dl were considered normal, while FBG > 100mg/dl but <126mg/dl and / or OGTT level > 140 mg/dl but <200mg/dl was considered prediabetes, and FBG > 126 mg/dl and / or OGTT > 200 mg/dl were considered diabetes. The collected data was analysed on SPSS version 17.0.

Results: This study was performed on 500 subjects (61.2% males and 38.8% females). Overall 29.4% had prediabetes, 17% had undiagnosed diabetes and 53.6% had normal glucose metabolism.

CONCLUSION: Prediabetes seems fairly common in local population so early detection and subsequent management of this condition is essential to control the long term effects of diabetes mellitus.

Key Words: Prediabetes, IGT IFG- OGTT.

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INTRODUCTION

Diabetes Mellitus is a group of metabolic diseases characterised by hyperglycemia resulting from defects in insulin secretion, insulin action or both[1].

Type 2 diabetes, the most prevalent form of the disease represent more than 90% of all cases of diabetes, is often asymptomatic in its early stages and can remain undiagnosed for many years[2].

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diseases characterised by hyperglycemia resulting from defects in insulin secretion, insulin action or both[1].

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The current estimates suggest that some 194 million people worldwide have diabetes and that this will increase to 333 million by the year 2025[3]. It is also predicted that by the year 2025 the largest number of persons with diabetes would be in South East Asian region with about 82 million people with diabetes[4].

The disease imposes huge human and economic cost on patients, their families, local communities, health care systems and societies including lost work days, permanent disability and early mortality, risk of death in persons with diabetes is approximately twice as high as that in individuals who do not have diabetes[4,5].

The National Diabetes prevalence survey of Pakistan has shown that over 10% of people in the age group 25 years and above are diabetic and an equal number are suffering form impaired glucose tolerance[6].

Current evidence suggest that opportunistic screening to detect IFG or IGT should be considered in individual >45 years of age and is strongly recommended in those >45 years of age and over weight (BMI >25kg/m2)[7].

Screening should also be considered for peoples who are <45years of age and over weight and if they have an other risk factor, such as first degree relative with diabetes or previous gestational diabetes or macrosoming in one or more children or if they are of an ethnicity other than caucasian or have dyslipidimia or hypertension. Asian should be considered for screening at lower levels of BMI (e.g 23kg/m2)[8].

Pakistan is 7th in the world according to latest estimates of prevalence of diabetes with 7 million peoples suffering from diabetes and by the year 2025, the country is expected to be 4th with 15 million people suffering form diabetes, representing a 2 fold increase in case load[3,6], so we can help to reduce the onset of diabetes by detecting prediabetes and recommend life style modification like: weight reduction, diet intervention and regular exercise.

MATERIAL AND METHODS

This single center Cross sectional study was conducted at OPD and Medical Unit IV of Liaquat University Hospital, Hyderabad from January to December 2008. A total of 500 patients were selected for this study via non-probability convenience sampling. Patients were selected if they were 45 years or older, or if they were < 45 years if having another risk factor for diabetes such as: Blood pressure over 140/90 mmHg, HDL cholesterol 35mg/dl or less, triglyceride level =250mg/dl, history of first degree relative with diabetes, history of gestational diabetes or history of delivery of large baby (weighting more than 9 lbs). All known cases of diabetes were excluded. All the data was transferred to specific proforma for this study. A thorough medical history regarding first degree relative with diabetes, gestational diabetes, delivery of large baby and physical examination including of blood pressure, BMI by measuring height in meters (m) and weight in kilogram (kg) and waist circumference in centimeters (cm) and waist to hip ration (WHR) was carried out and entered into proforma. Blood samples were taken for over night eight hour fasting blood glucose and two hour glucose tolerance test, these samples were collected in test tubes containing no preservative and was transported within half an hour to Liaquat University Hospital Laboratory, the method used

was "PAP" enzymatic calorimetric test, also twelve hour fasting blood samples were taken for HDL cholesterol and triglyceride level and sent to same laboratory. All this information was filled on proforma. Data analyzed on SPSS version 17.0. Overall frequency & percent calculated for normal, prediabetes and undiagnosed diabetes in total 500 subjects and separately in males and females. Also frequency and percent of normal, prediabetes and undiagnosed diabetes calculated in subjects with history of first degree relative with diabetes, with history of gestational diabetes and with history of delivery of large baby.

Mean and Standard deviation for age, height, weight, BMI, waist circumferences, waist to hip ratio (WHR), systolic blood pressure, diastolic blood pressure, HDL cholesterol level, triglyceride level, fasting blood glucose level and oral glucose tolerance test level calculated for normal, prediabetes and undiagnosed diabetes separately in males & females & overall in both sexes in total 500 subjects.

RESULTS

A total of 500 subjects were examined in this cross-sectional study. The mean age was 49.42 (SD ±7.73), 306 (61.2%) were males and 194 (38.8%) were females. Baseline variables of the study are presented via Table No: 1. Figure No: 1 represents the main outcome variable of the study. Overall 29.4% had prediabetes, 17% had undiagnosed diabetes and 53.6% had normal glucose metabolism. A total of 306 males 95 (31.0%) had prediabetes, 60 (19.6%) had undiagnosed diabetes and 151 (49.3%) had normal glucose metabolism, while in total 194 females, 52 (26.8%) had prediabetes, 25 (12.9%) had undiagnosed diabetes and 117 (60.3%) had normal glucose levels.

A total of 156 patients had a history of first degree relative with diabetes, out of which 56 (35.9%) had prediabetes, 29 (18.6%) hadundiagnosed diabetes and 71 (45.5%) had normal glucose levels. A total of 32 patients had a history of gestational diabetes and out of these 9 (28.1%) had prediabetes, 3 (9.4%) has

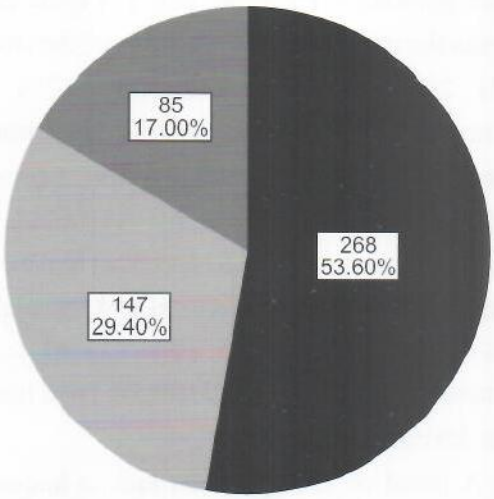
TABLE NO: 1

BASELINE VARIABLES OF THE STUDY (CONTINUOUS VARIABLES)

n=500

S. No	VARIABLE	MEAN	STANDARD DEVIATION
1.	Age	49.42	7.7
2.	Height (m)	1.7	0.06
3.	Weight (Kg)	82.34	8.3
4.	BMI (kg/m2)	28.14	1.8
5.	Waist Circumference (cm)	103.3	5.0
6.	Waist to Hip Ratio	0.83	0.04
7.	Systolic Blood Pressure	128.36	16.9
8.	Diastolic Blood Pressure	79.9	12.2
9.	HDL Cholesterol (mg/dl)	42.6	4.5
10.	Triglycerides (mg/dl)	184.4	14.7
11.	Fasting Blood Sugar (mg/dl)	97.5	19.2
12.	Oral Glucose Tolerance Test (OGTT) Highest Value (mg/dl)	154.74	35.8

undiagnosed diabetes and 20 (62.5%) had normal glucose levels. Another 32 subjects had history of delivery of large baby and in these 10 (31.3%) had prediabetes, 2 (6.3%) had undiagnosed diabetes and 20 (62.5%) had normal glucose metabolism.



Distributioin of Normal, Prediabetic & Undiagnosed Diabetic Subjects

- Normal
- Pre Diabets
- Undiagnossed Diabetics

DISCUSSION

In this study, frequency of prediabetes was 29.4%, and undiagnosed diabetes 17% in subjects aged either 45 years and above or if below 45 years than they have had another risk factor for diabetes like; history of first degree relative with diabetes, history of gestational diabetes, history of delivery of large baby, high blood pressure (≥ 140/90mmHg), low HDL cholesterol (≤35mg/dl) or high triglyceride level (≥ 250mg/dl); which is higher as compared to that reported by the National Diabetes Prevalence survey of Pakistan which showed that over 10% of people in the age group 25 years and above are diabetic and equal number are suffering from prediabetes and further that prevalence of diabetes among adult population in Sindh was 13.9% and 11.1% have impair glucose tolerance 9. In this study, the frequency of prediabetes is higher in males than in females[9], NHANES-III also showed that higher proportion of male than female had prediabetes (55.4% versus 44.6%).

History of first degree relative with diabetes was recorded and showed positive association with frequency of prediabetes (35.9%). In NHANES-III prevalence of prediabetes was high (44.3%) in person with positive family history of diabetes [10]. People who have one first degree relative suffering from prediabetes have a 40% risk of having this disease. If diabetes is seen in both parents, the risk is doubled [11].

History of gestational diabetes and history of delivery of large baby were also recorded from subjects and showed positive association with frequency of prediabetes, also shown by a study that 36% of women who were diagnosed with gestational diabetes mellitus had persistent abnormal glucose tolerance [12].

In this study age was risk factor for prediabetes and undiagnosed diabetes with mean age increasing from prediabetes to undiagnosed diabetes in both sexes. The prevalence of diabetes rose with age [13]. In NHANES-III, the prevalence of diagnosed and undiagnosed diabetes was 1.6% in men aged 20 to 39 years, rising to 21.1% in men older than 75 years of age [14]. Similarly in the Framingham study, glucose intolerance or diabetes present in 30% to 40% of study subjects older than 65 years of age [15]. Consistent with these studies, we found that the frequency of undiagnosed diabetes was high in the subjects over 50 year age in both sexes; it was also seen in other studies done in the sub continent [16,17].

While prediabetes was seen more than a decade earlier than diabetes in both sexes.

In this study there was positive association between obesity and prediabetes and undiagnosed diabetes. Several longitudinal cohort studies have demonstrated the association between obesity and

glucose intolerance [18]. Data from NHANES-II show that 67% of those with type 2 diabetes have BMI that meet the criteria for being over weight, and almost half have BMI that meet the definition of obesity [19] In this study, systolic and diastolic blood pressure increased from normal to prediabetes to undiagnosed diabetes. Masoumeh Sadeghi et al [20] and A. Basit et al [21] also show same association of blood pressure to prediabetes and diabetes. Epidemiological studies report at least 2 fold incidence of high blood pressure in diabetes [22].

In this study, HDL cholesterol level decreased from normal to prediabetes to undiagnosed diabetes while the triglyceride level increased. Type 2 diabetic often have elevated triglyceride and depressed HDL cholesterol, which is likely to be accompanying abnormalities of lipids in type 2 diabetes. It develop concomitantly with the failure of insulin activity, which in turn leads to the release of fatty acids from adipose tissue, increased delivery of free fatty acids to the liver, and increased hepatic synthesis of very low density lipoprotien NHANES-III shows high prevalence of prediabetes in dyslipidimics which is 94.9%[11]. Dyslipidimia is associated with markedly increased cardio vascular risk among diabetic patients[21].

CONCLUSION

This study showed a meaningful relationship between obesity, hypertension, dyslipidimia, history of first degree relative with diabetes gestational diabetes or delivery of large baby and prediabetes and undiagnosed diabetes.

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