ORIGINAL ARTICLE

STUDY OF THE PREVALENCE OF MICROALBUMINURIA AND RETINOPATHY IN PREDIABETES IN A TERTIARY CARE HOSPITAL

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ABSTRACT: BACKGROUND AND OBJECTIVE: Diabetes is a chronic disease that has a prolonged prediabetic phase. Indians develop diabetes 10 years earlier than other ethnic groups (mean age 42.5 years).[1] Diet, environment, genetics play a major role in development of diabetes. Complications of diabetes are directly proportional to the duration of diabetes and dysglycemia. Prediabetes is a condition is which glucose levels are high to be considered as normal, eventhough they do not meet the criteria for diabetes. 10%-50% of prediabetics may develop diabetes in 3-10 year period. Components of prediabetes include either an isolated impaired fasting glucose or impaired glucose tolerance or both. Microvascular complications can begin is the prediabetic stage itself. Present study has been done to know the prevalence of microalbuminuria and retinopathy is prediabetic stage and correlation of both in prediabetics. **MATERIALS AND METHODS:** This study was conducted in a tertiary care Hospital from June 2013 to May 2014. Screening was done and patients recruited into the study after fulfilling the inclusion and exclusion criteria. American Diabetes Association Criteria[2] was used for screening and results were correlated using various parameters to know the prevalence of microalbuminuria and retinopathy in prediabetes. Data was analyzed using statistical package for social sciences(spss) version 20.0. **RESULTS:** In this study, 500 patients were screened for diabetes. 100 patients were included in the study. Prevalence of prediabetes was seen in 20% of patients screened. 19% of prediabetics had microalbuminuria and 8% had retinopathy. Association of both conditions was seen is 7% of patients. **CONCLUSION:** Diabetic Microvascular complications like retinopathy and nephropathy in the form of microalbuminuria starts even in the prediabetic stage in a significant number of patients. Screening high risk individuals for diabetes and screening of prediabetics for microvascular complications is needed for prevention of overt diabetes, diabetic retinopathy and nephropathy by early intervention.
KEYWORDS: Microalbuminuria, Retinopathy, Prediabetes.

INTRODUCTION: Globally, as of 2013, according to International Diabetes Federation, an estimated 381 million people had Diabetes. Its prevalence is increasing rapidly and, by 2030 this number is estimated to double. India has more diabetics than any other country in the world. The disease affects more than 62 million Indians. Prediabetes is the state in which some but not all of the diagnostic criteria for diabetes are met.[3] It is often described as a gray area between normal blood glucose and diabetic levels. Impaired fasting glucose refers to a condition in which the fasting blood glucose is elevated above what is considered normal level but not high enough to be classified as diabetes mellitus. It is considered a prediabetic state. There is a 50% risk over 10 years of progressing to overt diabetes. Impaired glucose tolerance is a prediabetic state of

dysglycemia that is associated with insulin resistance. According to National Kidney Foundation, microalbuminuria defined as urine albumin excretion rate of approximately 30-300 mg/dl in atleast two of three consecutive samples of non-ketotic sterile urine, reflects a state of increased renal endothelial permeability, hence a marker of diffuse endothelial dysfunction, low grade inflammation and vascular disease and hence a significant risk of developing overt nephropathy. Hence early detection and therapeutic interventions can prevent its progression.[4] Retinopathy is the result of microvascular retinal changes. It may be present before the patient progresses to type 2 Diabetes mellitus. Early retinopathy may be a marker for more widespread vascular disease.

Early identification and treatment of persons with prediabetic conditions has the potential to reduce both the incidence of diabetes and related complications.

MATERIALS AND METHODS: The present cross-sectional Hospital based study was conducted in a Tertiary Care Hospital in Visakhapatnam, Andhra Pradesh. A total of 500 patients who attended the OPD during the period from June 2013 to May 2014 were recruited into the study. These patients were screened to know their glucose status by performing fasting blood glucose and 75 gm 2 h oral glucose tolerance test. After screening, a total of 100 patients with either impaired fasting glucose or impaired glucose tolerance or both were included in the study after fulfilling the inclusion and exclusion criteria. From all the patients who were included in the study, a detailed history, clinical examination, direct and indirect ophthalmoscopy, routine investigations and micral test for microalbuminuria was done. American Diabetes Association screening criteria was used.

INCLUSION CRITERIA: Patients above 30 years of age who were diagnosed as prediabetic either with impaired fasting glucose or impaired glucose tolerance after screening by fasting blood glucose and 2 hour OGTT according to ADA criteria, fasting plasma glucose 100mg/dl (5.6mmol/l) to 125mg/dl (6.9mmol) L (IFG) or 2-h plasma glucose in the 75 g OGTT 140 mg/dl (7.8mmolL) to 199mg/dl (11.0mmol/L) (1GT).[5]

EXCLUSION CRITERIA:

1 Patients with age less than 30 years.
2 Patients with hypertension (Blood Pressure > 140/90 mm Hg).
3 Patients with Renal Disease, Urinary tract infection.
4 Patients with Congestive Cardiac Failure.
5 Pregnant Patients.

INVESTIGATIONS:

1. Fasting blood glucose, 2h – OGTT.
2. Lipid Profile.
3. Serum Creatinine; Blood urea.
4. Urine examination.
5. Micral test for microalbuminuria.

STATISTICAL ANALYSIS: Data was analysed using statistical package for social sciences (ssps) version 20.0. Chi-square test, Z-test was the tests of significance and P value of <0.05 was taken as significant.

RESULTS: Out of the 500 patients screened, prediabetes either because of an impaired fasting glucose or impaired glucose tolerance or both was found to be present in 100 patients (20%). Diabetes was newly diagnosed in 49 (9.8%) patients. Among impaired fasting glucose and or impaired glucose tolerance i.e. prediabetes 19% patients had microalbuminuria.[6] Prevalence of microalbuminuria was more in impaired fasting glucose with impaired glucose tolerance patients compared to either isolated fasting glucose or isolated impaired glucose tolerance. Among prediabetics i.e., impaired fasting glucose and or impaired glucose tolerance 8% had very mild non-proliferative diabetic retinopathy.

Microalbuminuria and retinopathy were strongly associated with each other among prediabetic patients either impaired fasting glucose or impaired glucose tolerance or both in this study.

DISCUSSION: Development of overt hyperglycemia in type 2 diabetes is preceeded by many years of prediabetic state. There is evidence that IFG and or IGT is also associated with both renal and retinal injury. In the study, prediabetics were screened for microalbuminuria and fundus examination done for diabetic retinal changes. Anjana RM et al in ICMR-INDIAB study found prevalence of prediabetes in various states of India ranging from 6.2% to 14.6%, and study from Australia showed a prevalence of 16.4% and it was 12.6% to 22% in Malaysia.

In this study, the prevalence of diabetic retinopathy, and nephropathy in the form of microalbuminuria in 100 patients of prediabetes was evaluated and it was found that 19%of prediabetics had microalbuminuria and 8% had retinal changes.[7]

CONCLUSION: Microvascular complications such as microalbuminuria and retinopathy are found to be present in significant percentage of patients with prediabetes. In this study prevalence of microalbuminuria is 19% and retinopathy is 8%. Both microalbuminuria and retinopathy is 7%.Impaired fasting glucose and impaired glucose tolerance are not metabolically equal. Impaired glucose tolerance is more common and both together increase the risk for microalbuminuria and retinopathy.

Hence, screening for diabetes and screening for microvascular complications in prediabetes is useful for prevention of overt diabetes and its complications.

Glucose Status	No. of Patients	Percentage
IFG and/or 1GT (Prediabetes)	100	20%
Newly detected diabetes mellitus	49	9.8%
Normal glucose values	351	70.2%

Table I: Glucose status of 500 patients screened by FBS and 2h – OGTT[8]

Age group	With IFG and/ or IGT	%	Without IFG and/ or IGT	%	Total
30 – 40	12	11.53	92	88.46	104
40 – 50	18	16.98	88	83.01	106
50 – 60	20	18.34	89	81.65	109
60 – 70	24	25.53	70	74.46	94
> 70	26	29.88	61	70.11	87

Table II: Prediabetes, IFG and/ or IGT according to Age

Chi square – 12.5545.
'p' value – 0.013 (significant).

Age group	Male	%	Female	%	Total
30 – 40	5	40	7	60	12
40 – 50	10	55.55	8	44.44	18
50 – 60	9	47.36	11	52.63	20
60 – 70	14	56.52	10	43.47	24
> 70	18	66.66	8	33.33	26

Table III: IFG and/or IGT (Prediabetes) according to Age and Gender

Chi square – 3.8843.
'p' value – 0.421 (Not significant).

Family History of Type 2 Diabetes mellitus	Male	Female	Total
Present	36	29	65
Absent	20	15	35

Table IV: Association of Family History of Type 2 DM and IFG and/or IGT

Z value = 4.2426.
P = 0 (for total samples).

BMI	Male	Female	Total
< 18.5	1	3	4
18.5 – 25	47	32	79
> 25	8	9	17

Table V: BMI distribution in IFG and/or IGT (Prediabetes)

Lipid Parameters	Male	Female	Total
Hypercholesterolemia (>200mg/dl)	8	5	13
Hypertriglyceridmia (>150mg/dl)	13	11	24
Decreased HDL – Cholesterol (<40mg/dl)	9	10	19
Increased LDL-Cholesterol (>150mg/dl)	6	3	9

Table VI: Abnormal lipid profile in IFG and/or IGT (Prediabetes)

P < 0.05 (Not – significant).

Glucose tolerance	Male	Female	Total
IFG	18	14	32
IGT	20	18	38
IFG and 1GT	18	12	30

Table VII: Classification of IFG and/or IGT (Prediabetes) into isolated IFG, isolated IGT and IFG and IGT

Microalbuminuria	Male	Female	Total
Present	11	8	19
Absent	45	36	81

Table VIII: Prevalence of Microalbuminuria in IFG and/or IGT (Prediabetes)

Chi square = 0.0342.
'p' value = 0.8533 (Not significant).

Age group	Microalbuminuria	Microalbuminuria	Total
30 – 40	1	11	12
40 – 50	2	16	18
50 – 60	3	17	20
60 – 70	5	19	24
> 70	8	18	26

Table IX: Prevalence of Microalbuminuria according to age[4]

P > 0.05 (Not significant).

Retinopathy	Male	Female	Total
Present	5	3	8
Absent	51	41	92

Table X: Prevalence of Retinopathy in IFG and/or IGT (prediabetes)[9]

Chi square = 0.1491.
'P' value = 0.6993 (Not significant).

Fundus appearance	Male	Female	Total
Normal	51	41	92
Mild NPDR	5	3	8
Moderate NPDR	-	-	-
Severe NPDR	-	-	-
PDR	-	-	-

Table XI: Fundus appearance of patients with IFG and/or IGT (Prediabetes)

Age group	Retinopathy	Retinopathy	Total
30 – 40	0	12	12
40 – 50	0	18	18
50 – 60	1	19	20
60 – 70	3	21	24
> 70	4	22	26

Table XII: Retinopathy in IFG and/or IGT according to age group[5]

Chi square = 5.44.
'P' value = 0.2450 (Not significant).

Glucose Status	Retinopathy Present	Retinopathy Absent	Total
IFG	1	31	32
IGT	3	35	38
IFG and IGT	4	26	30

Table XIII: Retinopathy is isolated IFG, isolated IGT and IFG and IGT

Retinopahty	Microalbuminuria Present	Microalbuminuria Absent
Present	7	1
Absent	11	81

Table XIV: Relationship between Microalbuminuria and Retinopathy in IFG and/or IGT (Prediabetes)[10]

Chi square = 28.45
'P' value = < 0.00001 (Significant)

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