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Original Article

A study on assessing microalbuminuria and dyslipidemia in subjects with prediabetes

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Diabetes is a chronic disease that has a prolonged phase of prediabetes. Prediabetes includes individuals whose glucose levels, although not meeting criteria for diabetes, are nevertheless too high to be considered normal. Isolated-Impaired fasting glucose, Isolated-Impaired glucose tolerance or both are the components of Prediabetes. Studies have shown that diabetes specific microvascular complications like nephropathy, retinopathy, neuropathy can begin during prediabetes phase itself. Present study is intended to know the relative prevalence of albuminuria and dyslipidemia among patients with prediabetes. The study was carried out to assess albuminuria and dyslipidemiain prediabetes subjects. 100 patients with prediabetes were taken as cases and 100 normal subjects as control in this study.Albuminuria was present in 14 patients out of 100 patients with Prediabetes and 7 subjects in control group .Dyslipidemia was observed in 37 patients of prediabetes and 16 patients in control group. Microvascular complications such as microalbuminuria and dyslipidemia can be present during Prediabetes, though their prevalence is less. People with both IFG and IGT are at risk for microalbuminuria and dyslipidemia compared to normal individuals. [*J Indian Med Assoc* 2017; 115: 13-5]

Key words **: Microalbuminuria, dyslipidemia, prediabetes.**

Diabetes mellitus has been recognized as an important public health problem with major complications.The progression from prediabetes to type 2 diabetes occurs over many years before the development of overt hyperglycemia seen in diabetes. Indian patients have been identified as the ethnic group with one highest prevalence of diabetes and diagnosis is often delayed until complications occur[1,2]. Diabetes can be prevented or delayed through lifestyle interventions. There is accumulating evidence that Prediabetes is associated with nephropathyneuropathy and retinopathy including dyslipidemia. Isolated-Impaired fasting glucose, Isolated-Impaired glucose tolerance or both are the components of Prediabetes. The average annual risk of developing diabetes for someone with normoglycemia is approximately 0.7% per year. In contrast, this risk is about 5-10% per year in individuals with IFG or IGT.

Materials and Methods

The study was carried out to assess microal-buminuriaand dyslipidemia in prediabetessubjects. 100patients with prediabetes were taken as cases and 100 normal subjects (control group) as control in this study. The patients were taken from both outpatient / inpatient departments of general medicine in ESICMC & PGIMSR, Bengaluru.

It was a case control, hospital based, time bound study.

Fasting plasmaglucose and 2 hour postprandial plasma glucose with 75 gm Oral glucose load was done. After screening, a total of 100 patients with either Impaired fasting glucose or Impaired glucose tolerance or both and 100 patients with normal glucose level were included in the study after considering the inclusion and exclusion criteria. Qualifying patients underwent detailed history, clinical examination, fasting lipid profile and routine investigations and urine for microalbuminuria. Microalbuminuria defined as urine ACR of 30 -300 mcg/mg.Dyslipidemia defined as per NCEP ATP-IIIguideline.Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20.0.Descriptive and inferential statistical analysis has been carried out in the present study.

Inclusion criteria :

(a) Patients with fasting blood glucose level between 100-125 mg/dl (IFG).

(b) Patients with 2 hours post load oral glucose of 75 g with blood glucose level between 140 -199 mg /dl (IGT).

(c) Patients who are willing to give written signed consent.

Exclusion criteria :

(a) Diabetic patients.
(b) Renal failure patients.
(c) Critically ill patients.
(d) Hypertension

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Results

Out of 100 cases and 100 controls, the subjects were age and sex matched with mean SD 58.74± 13.38 and SD 59.16±13.83 for cases and controls respectively.In cases and control studied there were 55% of male and 45% of females in both groups. 63 patients with prediabetes had a Positivefamily history of type 2 DM as compared to 52 patients in control group.In prediabetes group 28 patients had both IFG/IGT and 30 patients had IFGand 42 patients had IGT (Table 1).

Microalbuminuria was present in 14 patientswith Prediabetes, among which in patients were male and 6 were female. Microalbuminuria was present in 7 patient in control group,among which 5 were male and 2 female subjects.However the difference was not statistically significant (P-0.37). Microalbuminuria was present in 9 out of 28 patients (32%) among Impaired Fasting Glucose with Impaired Glucose Tolerance (IFG with IGT), 2 out of 30 patients (6.67%) among Isolated-Impaired Fasting Glucose (I-IFG), 3 out of 42 patients (7.1%) among Isolated-Impaired Glucose Tolerance (I-IGT).

Table 1 — *Comparison of Microalbuminuria in two groups studied*

Urine albumin	Cases		Controls	
	No	%	No	%
Absent	86	86.0	93	93.0
Present	14	14.0	7	7.0
Total	100	100.0	100	100.0

In our study dyslipidemia was observed in 37 patients of prediabetes and 16 patients in controlgroup.Out of 100 patients with Prediabetes, mean total cholesterol was 177.06±27.16mg/dl and mean triglyceride was 145.25±19.72 mg/dl, mean HDL-cholesterol was 46.88± 8.36mg/dl, and mean LDL-cholesterol was 120.14± 15.85 mg/dl. Out of 100 controls subjects ,mean total cholesterol was 161.99±22.58 and mean triglyceride was 137.09±11.35, mean HDL-cholesterol was 48.58±7.14 mg/dl, and mean LDL cholesterol was 116.28±10.55 mg/dl. Total cholesterol, trigycerides and LDL cholesterol value were significantwith p value <0.05 and HDL cholesterol were statistically insiginificant (Table 2).

In our study in patients with prediabetes, the total cholesterol was >200 in 11 patients and 89 patients had total cholesterol of <200. In normal control subjects total cholesterol was >200 in only 6 patients and < 200 in 94 patients with p value of < 0.001.

Triglyceride level in 24 prediabetic patients was >150 , were as only 7 normal subjects had Triglyceride level >150 with significant p value of <0.001. Similarly patients with prediabetes had HDL <40 in 19 subjects as compared to 9 subjects in control group , with p value of 0.12 LDL cholesterol of >150 was seen in 7 patients of prediabetes as compared to 1 patient in control group with significant p value (0.03).

Table 2 — *Comparison of individual Lipid parameters in two groups studied*

Lipid parameters	Cases (n=100)		Controls (n=100)		P value
	No	%	No	%	
Total Cholesterol :					
• <200	89	89.0	94	94.0	<0.001
• >200	11	11.00	6	6.0	
TGL :					
• <150	76	76.0	93	93.0	<0.001
• >150	24	24.0	7	7.0	
HDL :					
• <40	19	19.0	9	9.0	0.12
• >40	81	81.0	91	91.0	
LDL :					
• <130	93	93.0	99	99.0	0.03
• >130	7	7.0	1	1.0	

Discussion

Microalbuminuria Prediabetes :

Various studies have evaluated the prevalence of microalbuminuria among newly diagnosed diabetic patients. Metcalf *et al*[3], Wang XL *et al*[4] and Tapp RJ *et* found the prevalence of microalbuminuria among new diagnosed diabetic patients to be 24.1%, 20.7% and 17.8 respectively.

We studied the prevalence of urinary albumin amon 100 patients (Prediabetes). Urinary albumin was presen in 14% of patients with IFG and/or IGT (Prediabetes) in our study.

Tapp RJ5 *et al* in the Aus Diab study studied 11,247 adults aged 25 years and older from 42 randomly selected areas of Australia. Microalbuminuria was present in 9.3% of subjects with Impaired fasting glucose and 11.0% of subjects with Impaired glucose tolerance respectively, overall prevalence among prediabetics was 9.4%.Prevalence of urinary albumin among IFG and/or IGT (Prediabetes) in our study was comparable to studies done by Metcalf *et al*, Nelson RG et al, Suzuki H *et al* and Wang XL *et al*. In our study Prevalence of microalbuminuria was high in impaired IGT compared to impaired IFG. It is suggested that in early stages of abnormal glucose tolerance, postprandial hyperglycemia might be a more important risk factor for microalbuminuria than isolated fasting hyperglycemia. Prevalence of microalbuminuria was also high among both IFG with IGT compared to IFG/IGT alone, most likely due to the higher insulin resistance. Since only patients with normal blood pressure were included, presence of microalbuminuria can be attributed to chronic mild hyperglycemia among IFG and/or IGT (Prediabetes) in our study.

Dyslipidemia in prediabetes :

Various studies have shown presence of dyslipidemia in prediabetes ,with prevalence ranging from 20 % to 55%

in various studies conducted around the world ,in various ethnic group and population.

The study by Diabetes Prevention Program Research Group, Lalitha P *et al*[6], M Das et al, found prevalence of dyslipidemia among prediabetes to be 20.43%, 28.6%, 40.82% respectively.

We studied prevalance of dyslipidemia in100 prediabetes patients and 100 control subjects dyslipidemia was present in 37% of prediabetic patients and 16% of control subjects.

Dyslipidemia is considered the condition most closely associated with and of diabetes mellitus. However, many studies which evaluated the presence of dyslipidemia in Impaired fasting glucose and Impaired glucose tolerance have found dyslipidemia even in 25-50% of prediabetic patients.

The Diabetes Prevention Programme recruited 3819 volunteers with impaired fasting glucose and impaired glucose tolerance who are at high risk of developing diabetes. Dyslipidemia was detected in 14-21% of participants with IFG and IGT[7]. They concluded,the finding that approximately 16-18% of the pre-diabetic population also has dyslipidemia.

Conclusion

- Microalbuminuriais seen even in prediabetes state with a prevalence of 14%. Family history of diabetes are risk factors for microalbuminuria.
- Occurance of Microalbuminuria is relatively high in patients with impaired glucose tolerance as compared with impaired fasting glucose
- Dyslipidemia is commonly present in patients with prediabetes, henceall patients with prediabetes should be screened for dyslipidemia.

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Basal bolus regimes comprise of short-acting insulins before each meal, along with one or two basal injections per day. These are used in persons with type 1 diabetes, or in type 2 diabetes patients with very high insulin requirements, or severe insulinopenia.

Basal insulins can be used with all oral hypoglycemic agents, including metformin, sulfonylureas, alpha glucosidase inhibitors and gliptins. They can also be co-prescribed with injectable GLP1RA.

Conclusion

Basal insulin represents a useful tool for the treatment of diabetes. Its ease of administration, flexibility in timing and relative lack of hypoglycemia allows it to be used in primary care practices as an option for initiation of injectable therapy in diabetes. The safety, tolerability and efficacy of basal insulin is evident with insulin analogues, especially ultra-long acting insulins such as degludec. Earlier, timely initiation of insulin will help utilize the benefits of basal insulin

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