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Microalbuminuria in Type 1 Diabetes Mellitus.

Abdeyazdan Z*, Hashemipour M**, Hasanzadeh A±, Pour Naghshban Z¶, Kabirzadeh Mn.

* Assistant Professor, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, ** Professor, Department of Pediatrics, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran, ± Lecturer, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran, ¶ Laboratory Assistant, Endocrine and Metabolism Research Center, Isfahan, Iran, n Research Assistant, Endocrine and Metabolism Research Center, Isfahan, Iran.

Correspondence: Dr. Zahra Abdeyazdan, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran, Tel: +98 (311) 662-8662, E.mail: abdeyazdan@nm.mui.ac.ir.

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Abstract:

Introduction: Nephropathy is one of the risky complications of Type I diabetes mellitus that could lead to end stage renal disease. Persistent microalbuminuria i.e. small amounts of urinary albumin excretion (UAE), is the best predictor of high risk of developing diabetic nephropathy. Early diagnosis of microalbuminuria and evaluation of patients with this, regarding the presence of comorbid associations are effective strategies for reduction of diabetic mortality and morbidity. The present study carried out because the great variability in prevalence of nephropathy depends on geographic area and different population and little is known about the prevalence of nephropathy and its preceding morbidity in our community.

Aims: To determine the frequency of microalbuminuria in children and adolescents with insulin dependent diabetes mellitus.

Subjects and Methods: In a cross sectional study frequency of microalbuminuria was investigated in 39 children and adolescents with IDDM which were selected by simple convenient sampling. Data were analyzed by descriptive inferential method (distribution, frequency rate, mean, standard deviation, t test and χ^2 test) using SPSS. P value < 0.05 was considered significant.

Results: from a total 39 patients with 5 years duration of diabetes 9(23.1%) patients were microalbuminuric and 30 (76.9%) of them normoalbuminuric. The mean duration of diabetes was 7.88 ± 2.7 year in microalbuminuric patients and in normoalbuminuric patients was 7 ± 2.5 year, The age of patients was 16.06 ± 2.3 year in microalbuminuric group and in normoalbuminuric patients it was 13.87 ± 3.41 year ($p=0.01$). In microalbuminuric patients systolic blood pressure and diastolic blood pressure were 10.51 ± 0.98 mm Hg and 6.9 ± 1.8 mm Hg respectively. In normoalbuminuric patients systolic blood pressure was 10.26 ± 1.31 mmHg and diastolic pressure 7.1 ± 0.75 mmHg. In patients with microalbuminuria the mean of HbA1c value was 8.44 ± 2.08 and in normoalbuminuric patients it was 8.62 ± 1.88 . Findings also, showed no association between microalbuminuria with total cholesterol, HDL LDL and triglyceride.

Discussion: In our study the mean age of patients in microalbuminuric and normoalbuminuric groups was significantly different, so this could be related to ethnic difference in different populations. Based on data obtained, absence of relationship between microalbuminuria and variables may be due to low numbers of samples, also the frequency rate of microalbuminuria in our patients was higher than many other studies. So, we can say this study can be perceived as a pilot study and we suggest doing study on more numbers of patients who are attending in different clinics of diabetes and as a national study.

Key Words: Diabetes Mellitus, Type 1, Proteinuria.

Introduction:

Type I diabetes mellitus is one of the most common metabolic disease in children and adolescents(1). Nephropathy is one of the risky complications of this disease that could lead to end stage renal disease(2). Microalbuminuria i.e., small amounts of urinary albumin excretion (UAE), is the best mean to predict risk of developing diabetic nephropathy. Microalbuminuria is defined as the appearance of abnormal levels of albumin in urine (30 – 300 mg / 24 hours), 20 – 200 mcg / min, 30-300 mg/gr creatinine(3). At least two of three collections done over a 3-6 months period should show elevated levels of albumin before designing a patient as having persistent microalbuminuria. Persistent microalbuminuria is a marker for not only nephropathy, but is a very high risk factor for cardiovascular disease in patients with this complication(3).

Early diagnosis of microalbuminuria and evaluation of patients with this complication regarding the presence of comorbid associations such poor metabolic control, hypertension and dislipidemia are effective strategies for reducing diabetic mortality and morbidity (4)

Prevalence of microalbuminuria in childhood is estimated to be between 7%-20% (5). Marchal and et al's study showed significant relationship between duration of diabetes, hormonal changes during puberty, blood pressure value, HbA1c value and microalbuminuria (6).

The association of increasing UAE in type I diabetes mellitus in childhood with the

duration of disease and poor metabolic control in the first five years of diabetes has been demonstrated in a study in Liverpool University(5).

Because of the great variability in prevalence of nephropathy based on geographic area and different population(4) the present study has been carried out to evaluate the microalbuminuria in our community. Therefore, the aim of the present study was to determine the frequency of microalbuminuria in children and adolescents with IDDM.

Materials and Methods:

The frequency of microalbuminuria was investigated in 39 children and adolescents with IDDM in a cross sectional study. Patients were selected by simple convenient method. Patients inclusion criteria were age <21 years and duration of IDDM of more than 5 years at the time of sampling. Patients with uremia, urinary tract infection, hypertension, acute febrile disease, severe exercise during last day, heart failure, hematuria, pyuria, acute hyperglycemia, intake of nephrotoxic drugs and overt microalbuminuria were excluded.

Data collection tool was a questionnaire including age, gender, duration of diabetes mellitus, 24 hr urine albumin value, existence of retinopathy, serum total cholesterol, HDL, LDL, triglyceride level, systolic and diastolic blood pressure and mean of Glycosylated hemoglobin values during last year.

Arterial blood pressure was measured manually by mercury

sphygmomanometer with an appropriate cuff twice at 20 minute interval seated after 30 minutes rest. Hypertension was defined as systolic and/ or diastolic blood pressure >90% for age and sex. Retinopathy was determined according to an examination done by an ophthalmologist.

Each patient was asked to collect a 24-hour urine sample. Girls were asked not to collect urine during menses and to wait for three days after the last day of bleeding before commencing collection. The concentration of albumin in the urine was determined by using analyzer system model of Liasys related to Italian company of AMS. Data were analyzed by analytic descriptive method (distribution, frequency rate, mean, standard deviation, t test and χ^2 test) using SPSS 11 Software. P value < 0.05 was considered significant.

Results:

From a total 39 patients with 5 years duration of diabetes, 12 patients were boy and 27 were girl. 9 (23.1%) of patients were microalbuminuric and 30 (76.9%) of them normoalbuminuric. From a total 9 patients with microalbuminuria 3(33.3%) patients were boy and 6(66.7%) of them were girl .

There was no significant association between gender of patients and microalbuminuria (χ^2 test). The mean duration of diabetes was 7.88 ± 2.7 year in microalbuminuric patients and 7 ± 2.5 year in normoalbuminuric patients, but this difference was not statistically significant (t test, $p=0.29$). The age of patients was 16.06 ± 2.3 in microalbuminuric group and 13.87 ± 3.41 year in normoalbuminuric patients. The difference was significant ($p=0.01$). Systolic blood pressure and diastolic blood pressure were 10.51 ± 0.98 mm Hg and 6.9 ± 1.8 mm Hg respectively in microalbuminuric patients.

In normoalbuminuric patients systolic blood pressure was 10.26 ± 1.31 mmHg and diastolic pressure 7.1 ± 0.75 mmHg. No significant difference was found.

In patients with microalbuminuria the mean HbA1c value was 8.44 ± 2.08 and in normoalbuminuric patients it was 8.62 ± 1.88 , this difference was not significant (table 1).

Findings also, showed no association between microalbuminuria with total cholesterol, HDL LDL and triglyceride (table 2). From a total 39 patients which were referred to ophthalmologist for fundoscopic examination, 33 patients were examined and none of them had retinopathy.

Table 1: Data in microalbuminuric and normoalbuminuric patients.

Group	Microalbuminuric			Normoalbuminuric			p.value
	Min	Max	mean \pm SD	Min	Max	mean \pm SD	
Age (year)	12	19	16.06 \pm 2.3	8	18	13.28 \pm 3.86	0.01*
Duration of diabetes (year)	5	15	7.88 \pm 2.7	5	14	7 \pm 2.5	0.29
Systolic BP (mm Hg)	9	12	10.51 \pm 0.98	8.7	13.5	10.26 \pm 1.31	0.51
Dyastolic BP (mm Hg)	5.5	8.2	6.9 \pm 1.8	6	8.2	7.1 \pm 0.75	0.6
Hb A1c	5.9	14	8.44 \pm 2.08	6.4	13.2	8.62 \pm 1.68	0.76

Table 2: lipid profile level in patients.

Group	Microalbuminuric	Normoalbuminuric	p.value
Variable	Mean± SD	Mean±SD	
Cholestrol	148± 29	151.45±30.92	0.73
HDL	50.6± 20.22	45.5±7.7	0.42
LDL	80± 24.47	82.66±30.8	0.84
Triglyceride	102.25± 48.76	93.85±39.3	0.56

Discussion:

In Smatjes et. al.'s study on 152 patients with IDDM, the duration of diabetes was 14.1±9.1 year and the frequency of microalbuminuria 14.2 %⁽⁷⁾. In AL- Hermi and et. al.'s study, the frequency of miroalbuminuru was 8%⁽⁸⁾. In the present study the mean duration of diabetes was 7.41± 2.63 years and the frequency rate of microalbuminuria was 23.1% which is higher than the two others.

In the present study the mean duration of diabetes mellitus, the mean value of systolic and diastolic blood pressures, the mean value of HbA1c were not significantly different between the two groups. There was no significant relationship between microalbuminuria and duration of diabetes in Donaghue et. al.'s study performed on 193 adolescents with IDDM⁽⁹⁾, while Esmatjes's survey showed significant relationship between duration of diabetes, HbA1c and microalbuminuria⁽⁷⁾.

Olsen and etal in their study showed none of diabetic children younger than 5 years old had microalbuminuria while the frequency rate of microalbuminuria in

patients aged more than 15 years was 14%. In This study which has been done on 339 diabetic children and adolescents, (304 patients had prepubertal onset of diabetes) micro albuminuria had significant association with HbA1c⁽¹⁰⁾.

In our study the mean age of patients in microalbuminuric and normoalbuminuric groups was significantly different, so this could be related to ethnic difference in different populations. Based on data obtained, absence of relationship between microalbuminuria and variables may be due to low numbers of samples, also the frequency rate of microalbuminuria in our patients was higher than many other studies. So, we can say this study can be perceived as a pilot study and we suggest doing study on more numbers of patients who are recruited in different clinics of diabetes and as a national study.

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