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Microalbuminuria and Status of diabetic nephropathy in low socioeconomic sect of Karachi

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Abstract

Microalbuminuria, an established biomarker of nephropathy in diabetes, is often ignored in the lower socioeconomic sect of our society. The aim of this study was to investigate the status of nephropathy with reference to microalbuminuria in diabetics and understanding of these complications in this sect of Karachi. 90 Patients (aged 30–76 years) with type 2 diabetes were selected from diabetic clinic. Albumin/creatinine ratio was determined. Urine samples were divided into three groups according to albumin-to-creatinine ratio; normoalbuminuria, microalbuminuria and macroalbuminuria with UACR <30mg/g, >30mg/g and >300mg/g respectively. The subjects had no Urinary Tract Infection. Details regarding diabetes and hypertension were recorded through a structured questionnaire after informed consent. Glucose was estimated in blood and Microalbuminuria, Proteinuria and glycosuria were analyzed using dipstick (Roche) in urine samples. Out of 90 Diabetic patients 8.9% had hypertension, 53.1% glycosuria and 38.7% Proteinuria. The frequency of normoalbuminuria was 58.89%, microalbuminuria 35.55% and macroalbuminuria 5.55%. None of the patients (100%) knew about or had any symptoms or problems related to kidney. The complication of microalbuminuria was present in 42% of Diabetic patients from low socioeconomic sect who was totally unaware of this complication. Low education level is the highest risk factor for Diabetic complications in the low economic strata because early detection of albuminuria can stop its progression to final End Stage Renal Disease.

Keywords: Microalbuminuria, Diabetes, Nephropathy

Introduction

Diabetes mellitus is a chronic disease that has affected 382 million of the population worldwide [1], in 2014 the global prevalence of diabetes was estimated 9% among adults [2]. Its most severe long-term complication is Diabetic nephropathy. In all diabetes complications diabetic nephropathy is specific complication with the greatest mortality [3]. Renal dysfunction developed in 20-40% of patients with diabetes [4], Increased microalbuminuria is the first signal to predict the nephropathy or renal dysfunction [5], protein level produced by microalbuminuria, when levels of albumin is high, can be detected by special urine dipstick. An albumin level above the upper limit mean >300 mg/g of creatinine is called macroalbuminuria [6], albumin/creatinine ratio is helpful to compare the amount of albumin with concentration of creatinine in urine in spot-check samples [7]. In a study high frequency of microalbuminuric patients in Albanian diabetes patients is to emphasize that microalbuminuria levels must be used for routine screening and better control of risk factors [8]. Microalbuminuria >20 mg/day can be an important diagnostic biomarker of renal disease in hyperuricosuria also in asymptomatic condition, when the Microalbuminuria levels above 160 mg/day the morphological changes is made prior to proteinuria [9], it was also reported in a study that microalbuminuric subjects can progress to overt proteinuria in renal diseases, and develop end stage renal disease (ESRD) after some time [10], The prevalence of microalbuminuria aged 10 to 19 years in adolescents is high specially higher in female subjects [11]. High prevalence of microalbuminuria in diabetic patients and its progression to overt proteinuria and difficult to stop end stage renal disease and cardiovascular disease [12]. The aim of this study was to evaluate the status of microalbuminuria in type 2 diabetic patient in low socio economic area. Microalbuminuria is an important diagnostic biomarker for renal damage if patients do not check their albumin levels then microalbuminuria can be increased to macroalbuminuria and End Stage Renal Disease later.

Materials and methods

It is a cross-sectional study in low socioeconomic area of Karachi in diabetic clinics. Data were obtained for 90 patients with type 2 diabetes attending diabetes centers in four different area of Karachi, aged between 30 to 76 years. Subjects who had urinary tract infection were

excluded. Information regarding gender, age, height and weight to calculate body mass index, duration of diabetes, and history of hypertension was obtained through structured questionnaire from patients. Microalbuminuria was assessed using auto analyzer 902, Hitachi. To determine microalbuminuria urine samples were collected. Urine samples were divided into three groups according to albumin-to-creatinine ratio (UACR); normo-albuminuria, microalbuminuria and macroalbuminuria with UACR <30mg/g, >30mg/g and >300mg/g respectively. Data analyzed using the Statistical Package for Social Sciences SPSS 20. The chi-square test and ANOVA were used to determine correlations between microalbuminuria and other risk factors.

Results

Ninety patients with type 2 diabetes included 46 males and 44 females. Their mean age was 51.01 ± 9.8 years, all base line characteristics regarding age, hypertension, family history BMI was calculated, and 56.67 % were at high risk showing family history of diabetes. Of the 90 subjects, 78 (86.6 %) earned less than 25000 Rs per month. Their education level was intermediate or less (Table 1). The subjects included 53(58.89%) with normoalbuminuria, 32 (35.55%) microalbuminuria and 5 (5.55%) macroalbuminuria which showed a progressive pattern with duration of diabetes and glucose levels. This was also observed associated with poor glycemic control (Table 2). Analysis of urine by dipstick method revealed 59 (65.50 %) Patient had glycosuria and 43 (47.80%) had proteinuria.

Discussion

Although Diabetes and its complication is a major health problem worldwide, yet the awareness of its complications is not known in the lower socioeconomic sect of Pakistan. In this study 42% diabetics had microalbuminuria and macroalbuminuria and 58% normoalbuminuria, whereas, none of them were aware about this complication. This result is almost equal to previous study conducted in Omani population which also showed a prevalence of 42.5% of microalbuminuria and macroalbuminuria in diabetic

nephropathy [13]. In another study frequency of microalbuminuria was 37 % which is also nearly in accordance with our study (36 %) [14]. A mega study conducted on 10 different Asian populations revealed Pakistan having the lowest prevalence of microalbuminuria (24.2%) and Korea the highest (56.5%) [15]. In this study Blood glucose levels were higher in the macroalbuminuria group of compared to normoalbuminuria and microalbuminuria. A study in uncontrolled Diabetes blood glucose is strongly associated with increased urinary albumin excretion [16]. Whereas, in Controlled diabetic patients blood glucose shows normal microalbuminuria levels [17].

Looking at the education and socioeconomic status in this study 86.6 % subjects earned less than Rs. 25000 per month (\$250) and their education levels were intermediate or less. Microalbuminuria levels were found higher in low socioeconomic areas because of unawareness and low educational status. Association with high microalbuminuria in lower socioeconomic status compared to the higher socioeconomic status, education and income has also been observed by other studies [18]. Hence, low education can be declared as one of the risk factors. Deaths due to Diabetes occur in low- and middle-income countries and the percentage is more than 80% [19].

In this study 47.80% had positive proteinuria method while 65.50% had positive glycosuria by dipstick when compared with Microalbuminuria levels were compared on the bases of albumin/creatinine ratio with dipstick method only 32 % with proteinuria and 44% with glycosuria. In another study a 14.1% patients with positive proteinuria dipstick method in microalbuminuric patients [20], The proteinuria estimation through dipstick Compared to microalbuminuria had specificity of 61% and a sensitivity of 60% the positive predictive value was 15.4% [21].

For diagnosis of urinary tract infection and diabetes mellitus dipstick urinalysis can be a reliable testing method for detection of glucose but not for proteinuria [22], which confirms that dipstick is not an accurate method for detection of these parameters but an approximate can be calculated or just for screening.

Table 1: Socioeconomic Status and education levels

Education			Income		
Education Level	Patients	Percentages	Income in Rs.	Patients	Percentages
Middle	36	40 %	10000	4	4.4 %
Matric	28	31 %	11,000 to 15000	28	31.1 %
Inter	15	17 %	16000 to 20000	31	34.4 %
Graduation	4	4.4 %	21,000 to 25,000	15	16.7 %
Master	4	4.4 %	26,000 to 30,000	7	7.8 %
No Formal Education	3	3.3 %	>31000	4	4.4 %

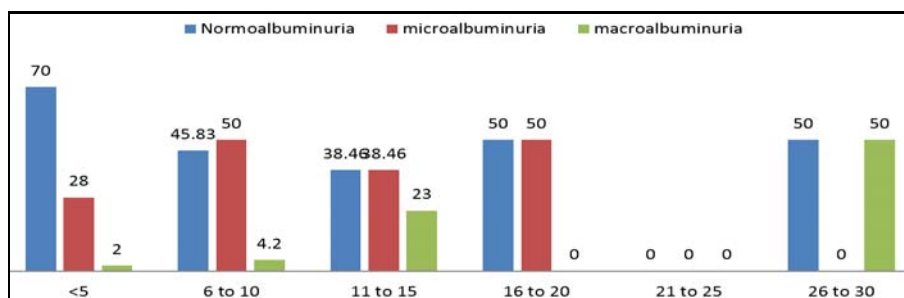


Fig 1: Percentages of albuminuria with duration of DM

Table 2: Relationship of glucose levels with albuminuria

Variables	Normo-albuminuria	Micro-albuminuria	Macro-albuminuria
Subjects	53 (58.89%)	32(35.55 %)	5(5.55 %)
Glucose Levels	165.1 ± 45.51	320.9 ± 40.38	435.6 ± 30.9
Duration of Diabetes	5.6 ± 5.49	7.1 ± 4.3	9.8 ± 3.5

Table 3: Proteinuria and Glycosuria by Dipstick method

	Protein (Dipstick)		Glycosuria (Dipstick)	
	Positive (47.80%)	Negative	Positive (65.50%)	Negative
Normoalbuminuria	24	29	28	23
Microalbuminuria	14	18	26	8
Macroalbuminuria	5	0	5	0
Total (90)	43	47	59	31

Conclusion

The complication of microalbuminuria was present in 42% of Diabetic patients from low socioeconomic sect who was totally unaware of this complication. Low education level is the highest risk factor for Diabetic complications in the low socioeconomic strata because early detection of albuminuria can stop its progression to final End Stage Renal Disease. The quality of life of Diabetes patients of this sect can be improved by education and awareness.

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