ORIGINAL ARTICLE

COMPARISON OF URINARY ALBUMIN EXCRETION RATE IN TYPE 1 AND TYPE 2 DIABETICS OF DISTRICT LAHORE

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ABSTRACT

Background: The main cause of end-stage renal disease is diabetic nephropathy throughout the world. Renal disease in diabetics is characterized by increasing rates of urinary albumin excretion, starting from normoalbuminuria, which progresses to microalbuminuria, macroalbuminuria and ultimately to end-stage renal disease. This study was conducted to compare the urinary albumin excretion rate in type 1 and type 2 diabetics of district Lahore.

Material & Methods: This comparative cross-sectional study was conducted in the department of Physiology Sheikh Zayed Medical Complex, Lahore from September 2008 to April 2009. Total 70 subjects were selected for this study and divided into two groups i.e. known Type 1 and Type 2 diabetics having albuminuria, each having 35 subjects. The urinary albumin excretion in 24 hours urine was measured by Micro-Albumin Quantitative Test which is a solid phase enzyme-linked immunosorbant assay. The data were analyzed using student t test.

Results: There were a total of 70 subjects, 54 males and 16 females. Out of these, 27 males and 8 females were type 1 diabetics and 27 males and 8 females were type 2 diabetics. The urinary albumin excretion rate measured was 181.06±16.98 mg/24 hours in type 1 diabetics and 182.67±27.35 mg/24 hours in Type 2 diabetics. There was no significant difference between the urinary albumin excretion rate of the two groups (p-value = 1.00).

Conclusion: This study concludes that there is no significant difference between urinary albumin excretion rate of type 1 and type 2 diabetics.

KEY WORDS: Albuminuria; Microalbuminuria; Type 1 diabetes mellitus; Type 2 diabetes mellitus.

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INTRODUCTION

Diabetes mellitus (DM) is a clinical syndrome characterized by hyperglycemia due to impaired insulin secretion, impaired insulin action or both. Chronic hyperglycemia in DM is associated with long-term damage, dysfunction or failure of several organs, especially eyes, kidneys, nerves, heart and blood vessels.[1] Diabetes requires ongoing patient self-management, education, and medical care to prevent acute complications and to reduce the risk of chronic complications.[2]

According to World Health Organization (WHO) there are 194 million diabetics world-wide (4% of the population) and the figure may reach 300 million by the year 2025. Pakistan ranks among top five countries with the highest ratio of diabetics. There are now 8.8 million diabetics (7 to 8 percent of the population) who are likely to touch 14.3 million in the year, 2025 in Pakistan.[3] Diabetes is a national as well as global epidemic in terms of incidents, health care costs, and overall complications and it is the sixth leading cause of death in the United States.[4]

Complications of DM, such as coronary artery disease, diabetic nephropathy (DN), diabetic neuropathy, and retinopathy, result in increasing disability, reduced life expectancy. The main cause of end-stage renal disease (ESRD) is diabetic nephropathy throughout the world. Almost 30% of chronic renal failures in India are due to DN. Renal disease in diabetics is characterized by increasing rates of urinary albumin excretion (UAE), starting from normoalbuminuria (NAU), which progresses to microalbuminuria (MAU), macroalbuminuria and ultimately to ESRD. The earliest evidence of nephropathy is the appearance of low levels of albumin in the urine, known as MAU. Without treatment, 20–40% of diabetics with MAU progress to overt nephropathy.[5]

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With proper treatment, MAU can be retarded and reverse the progress of the disease.[6] Normoalbuminuria was defined by UAE values<20 microgram / min, or <30mg in 24-hrs.[7] Microalbuminuria is defined as level of albumin ranging from 30 to 300 mg/ 24-hrs urine collection. Overt albuminuria or macroalbuminuria is defined as UAE of ≥ 300 mg/ 24-hrs. [8] Microalbuminuria is a major risk factor for ESRD and cardiovascular disease (CVD).[9] Urinary Albumin Excretion is a sensitive early marker of diabetic nephropathy and other forms of renal dysfunction. Minimally elevated levels of UAE, commonly termed "MAU," predict progression of renal disease, development of CVD, and total mortality. [10] Microalbuminuria is usually absent at diagnosis of type 1 DM but may be present at diagnosis of type 2 DM, partly because diagnosis is often delayed.[11]

Ischemic heart disease (IHD) is the major cause of morbidity and mortality in patients with type 2 diabetes, especially in those with elevated levels of UAE. It is known that there are gender differences in the progression of MAU and cardiovascular mortality in patients having type 2 diabetes. In patients with type 1 diabetes, male gender, independent of age, is a significant predictor of albuminuria progression, metabolic control, duration of diabetes, and baseline albumin excretion rate.[12] Accumulative evidence suggests that the pathological changes causing MAU and the pathological changes leading to premature atherosclerosis are the same.[13] An increased UAER, even in the microalbuminuria range, has been found to be an independent risk factor for CVD and mortality in the general population.[14]

This study was conducted to find out and compare the urinary albumin excretion rate in type 1 and type 2 diabetics of district Lahore.

MATERIAL AND METHODS

This was a comparative cross-sectional study comprising 70 subjects, divided into two groups i.e. known type 1 and type 2 diabetics having albuminuria, each having 35 subjects. The diabetic subjects were selected from medical OPD, diabetic clinic of Sheikh Zayed Hospital, Lahore. Subjects were both males and females of 20-60 years of age.

The urinary albumin excretion in 24 hours urine was measured by Microalbumin Quantitative Test which is a solid phase enzyme-linked immunosorbant (ELISA). Type 1 and type 2 diabetics having albuminuria (≥30mg of urinary albumin excretion/24 hours urine or ≥20 microgram/min) were included in the study. Diabetic subjects having other acute illnesses (dehydration, hemorrhage, and acute renal failure) or chronic illnesses (tuberculosis, chronic lymphadenitis) and with any metabolic disorder e.g., Cushing syndrome, Hyperthyroidism, or Hyperpituitarism were excluded from the study.

Proper history, general physical and systemic examination was done after obtaining the informed consent, and the relevant necessary informations were recorded on the predesigned proforma. Pulse and blood pressure were measured. Twenty four hours' urine samples were collected from all the subjects for UAER. The blood sample was taken for estimation of random blood sugar. The data were entered into computer using SPSS version 16.0 for analysis. The data were described in terms of mean ±standard deviation (SD). Statistical significance was calculated using student t test. A 5% significance level ($p<0.05$) was used as per convention.

RESULTS

There were a total of 70 subjects, 54 males and 16 females. Out of these, 27 males and 8 females were type 1 diabetics and 27 males and 8 females were type 2 diabetics.

Table-1 shows the comparison of UAER/24hours in type 1 diabetic with type 2 diabetic subjects. The mean ±SD concentration of UAER/24hours was 181.06 ±16.98 mg and 182.67 ±27.35 mg in type 1 diabetic and type 2 subjects respectively, showing p value (1.00) which is non-significant.

Table 1: Comparison of urinary albumin excretion rate / 24 hours between type-1 and type- 2 diabetic groups.

Parameter	Diabetic type 1 (n=35)	Diabetic type 2 (n=35)	p-value
Urinary Albumin Excretion Rate (UAER/24hrs)	mean ±SD	mean ±SD	1.00
	181.06 ± 16.98 (mg/24hrs)	182.67 ± 27.35 (mg/24hrs)	

DISCUSSION

Diabetes mellitus is a chronic disorder of carbohydrate, fat, and protein metabolism, characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both.[4] There are two types of DM: Type-1 diabetes which results from β-cell destruction, usually leading to absolute insulin deficiency and type-2 diabetes which results from a progressive insulin secretory defect on the background of insulin resistance. Microalbuminuria is a marker for DN and CVD in patients with type 1 & type 2 diabetics. Microalbuminuria is the earliest sign of DN and the simplest index for early detection of DM-related renal complications. [15]

Diabetic nephropathy is one of the serious chronic microvascular complications of diabetes mellitus.[16] A study conducted by Greive KA *et al.* shows significant increase in proteinuria in experimental diabetes appears to be associated with an albu-

min-specific mechanism responsible for the increase in albumin peptides in urine.[17] Another study shows that MAU was significantly positive (>20mg/24 h) in 12 of 15 evaluated patients.[18] Microalbuminuria in diabetic patients has been recognized not only as a predictor of progression of diabetic nephropathy but also as a powerful independent risk factor for CVD.[19] All these results are in agreement with the results of our study.

As far as the comparison of UAER/ 24 hours of both type 1 diabetic and type 2 diabetic subjects is concerned, the available research in this regard is very much meager and at best, inconclusive. Therefore, we compared the UAER/ 24 hours of type 1 diabetics with that of type 2 diabetics, so as to see which type of diabetes has more renal consequences. In this study the comparison of UAER/ 24 hrs between the two groups i.e. type 1 and type 2 diabetics was not significant (p-value=1.00). It suggests that both types of diabetes have more or less the same renal consequences. Although one study is available which was done by Lutale *et al* in Tanzania, Africa, showing prevalence of MAU among type 1 and type 2 diabetic patients of different racial groups. Prevalence of MAU in type 1 patients was 12% and in type 2 patients was 9.8% with $p < 0.001$.[20] Lutale et al has not studied the magnitude of the severity of MAU in both types of diabetic patients. Therefore their study does not give any clue about the magnitude of MAU in type 1 and type 2 diabetic patients.

CONCLUSSION

This study concludes that there is no significant difference between urinary albumin excretion rate of type 1 and type 2 diabetics.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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None declared.