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Evaluation of Albumin Creatinine Ratio as a Screening Test in Diabetic Patients.

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ABSTRACT

Microalbuminuria is an early sign of renal disease in individuals with Diabetes.It is established as a marker of diabetic nephropathy. In this study we compared spot urine albumin in the form of Albumin Creatinine ratio (A:Cratio) with 24 hours urine albumin excretion method.Random urine samples and 24 hr collection were obtained from 100 Diabetic patients. Albumin creatinine ratio was calculated from the spot urine specimens.From 24 hour urine samples albumin excretion rate was calculated. Results of albumin / creatinine ratio were then compared to the 24 hr urine albumin excretion rate. Measurements of Urine albumin and UACR in a spot urine specimen presented almost perfect accuracy for the screening of micro and macro albuminuria and RUS is simpler and less expensive. It is suggested as a valid screening test for diabetic nephropathy

Keywords: Diabetes mellitus, Albumin Creatinine Ratio, screening test.

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INTRODUCTION

Micro albuminuria is a well-known predictor of diabetic nephropathy and has also been considered as the first indication of renal injury in patients with diabetes. Thus screening for micro albuminuria is currently recommended for all patients with diabetes. Screening for micro albuminuria in the urine sample can be done by two proven method: spot method, 24 hr collection method.Aim of our study is to compare spot urine albumin estimation in the form of Albumin Creatinine ratio (A:C ratio) with 24 hours urine albumin excretion method.

MATERIALS AND METHODS

This study was done in 100 diabetic patients (male – 66, Female - 34) [Fig.1] who attended the diabetic clinic at SBMCH from May 2014 to June 2015.Patients with history of Renal disease, Urinary infection (positive urine culture) were excluded from the study. They were asked to collect 24 hours urine samples. The albumin concentration was analysed and the UAER in mg/24hr calculated. The patients were asked to void a new, random urine specimen the next day and the spot urine was analysed immediately with Biosystem BTS 350 (Immuno turbidimetric method). It calculates the Albumin creatinine ratio. Both the results were tabulated and analysed.

EXPERIMENTAL RESULTS

From the random urine samples collected from the participants urine albumin creatinine ratio was calculated, among 100 people 72 were found to have diabetic nephropathy and 28 were found to be normal [Fig.2] In 24 hours urine sample collected from our participants, the urine albumin excretion rate was calculated in which among 100 participants 46 were found to be normal, 54 were found to have increased albumin excretion [Fig.3] and both the values were tabulated. Our study showed sensitivity as 96.5 % whereas specificity was 56.5% with spot urine ACR in comparison to sensitivity of 64.3% and specificity of 96.1% with 24 hours UAER (Urine Albumin Excretion Rate) [Table.1].The ROC Curve plotted for the microalbuminuria also shows higher sensitivity for albumin creatinine ratio in comparison to Urine albumin excretion rate [Fig.4].

Table 1.Accuracy of ACR and UAER as screening tests for microalbuminuria in diabetic patients based on ROC curve analysis.

S.no	DETAIL	ACR	24Hr UAER
1	Sensitivity	96.3%	84.9%
2	Specificity	56.5%	95.8%

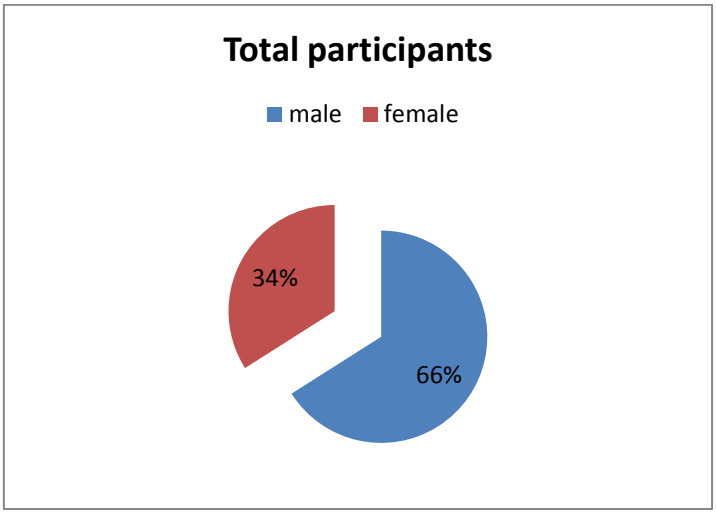

Figure 1: Study Population

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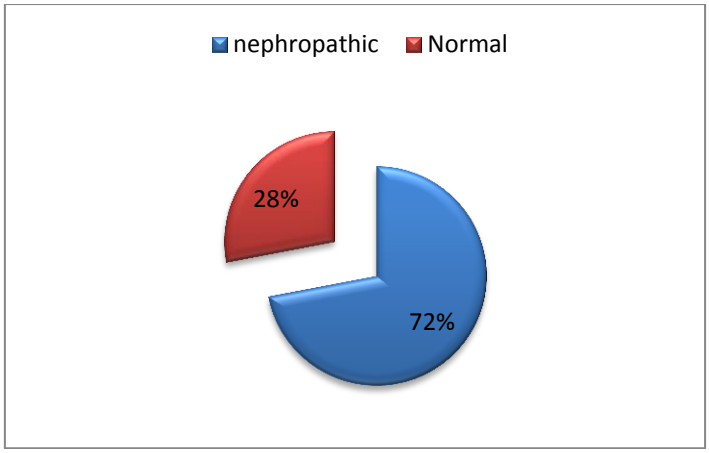

Figure 2: Urine albumin creatinine ratio in random urine sample

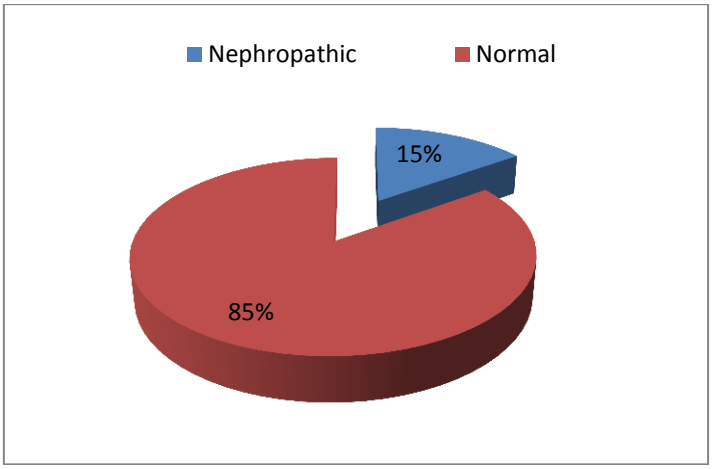

Figure 3: Urine albumin excretion rate in 24 hrs urine sample.

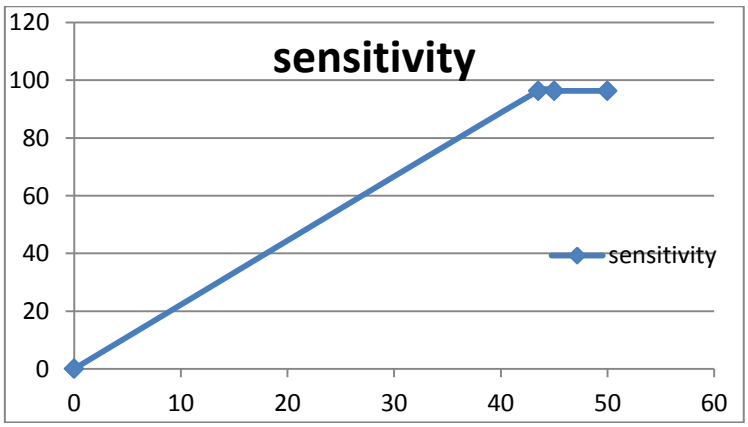

Figure 4: ROC curve for ACR

DISCUSSION

In India, about 50 million people are known cases of Diabetes [1]. By 2030, the Type 2 Diabetes Mellitus is expected to be 79.4 million [3] and many studies say that India will become the global diabetes capital by 2050 [2,4]. With increasing incidence all over the world, Diabetes Mellitus will be the leading cause of mortality and morbidity [6]. Diabetes is found to be the most important cause of End stage renal disease [ESRD] [5].The pathogenesis of Diabetic nephropathy is related to chronic hyperglycaemia.

Microalbuminuria is defined as 30 – 300 mg/dl in 24 hours urine albumin excretion method or 30 – 300 µgm/mg creatinine in spot urine ACR. This is reversible process if detected in the early stage. Once overt nephropathy develops, the changes are likely irreversible [6].

The best treatment option for Diabetic nephropathy is prevention which is attained by doing proper screening tests for diabetic nephropathy. It is advised to do urinalysis for protein annually, preferably spot method, recommended by National Kidney Federation [7]. Even though 24 hour urine analysis is the gold standard test, it is very difficult to collect the sample in the outpatient department and it is not feasible for all the patients [8].

So our study is aimed to compare the spot urine albumin creatinine ratio with 24 hour urine albumin excretion rate, to evaluate the accuracy of the test and to find a valid screening test for Diabetic nephropathy.

In this study it was observed that ACR measured in a RUS is the accurate screening test for microalbuminuria because of its high sensitivity. ROC curve plotted for microalbuminuria shows higher sensitivity in comparison to UAER [Fig.4]. This shows that ACR is the valid screening test for diabetic nephropathy.

CONCLUSION

From the present study it was clear that urine albumin creatinine ratio from the random urine sample was the valid screening test for microalbuminuria. The ROC curve along with high sensitivity and specificity for random urine albumin creatinine ratio clearly suggests this test as the screening test for diabetic nephropathy.

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