Original Article

Detection of Microalbuminurea

Role of Micral Test For the Detection of Microalbuminurea

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ABSTRACT

Objective: The object of this study is to assess the sensitivity of micral test for detection of microalbuminurea.
Study Design: Cross sectional study.
Place and duration of study: This study was conducted at the Department of Medicine, Mardan Medical Complex Mardan from 01 June to 31st May 2017.
Materials and Methods: A total of 100 adult type 2 diabetic patients were selected. Stable adult diabetic patients with no sign of complications on clinical examination were selected randomly in medical outdoor patient department irrespective of duration or control of diabetes. Spot urine samples were tested for albumin with Micral strip and then albuminuria was confirmed by 24 hour urinary albumin quantification.
Results: In this study 40% patients were in age range 40-50 years, were in age range 50-60 years and 28% were in age group 60-70 years. Fifty six percent patient were males and 44% patients were females. Eighty one patients showed proteinurea on micral strip method 81% that was confirmed by 24 hour urinary albumin quantification. Eleven patients were showing no proteinuria both on micral strip method and 24 hour urinary quantification 14%. False negative and false positive results were obtained in 4.3% and 13% patients respectively. Sensitivity and specificity was calculated 93% and 89% percent with 94% positive predictive value and 79% negative predictive value.
Conclusion: Micral spot test is a very sensitive and reliable test for detection of microalbuminurea.
Key Words: Sensitivity, Micral Test, Microalbuminurea, Diabetes Mellitus

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INTRODUCTION

Microalbuminuria is one of serious complication of Type 2 diabetes that ends up with end stage renal disease (ESRD). Medical interventions at early diagnosis of microalbuminurea reduces the adverse outcome in diabetic patients. Diabetes mellitus accounts for majority of patients of end state renal disease (ESRD)[1]. Those receiving renal replacement therapy were diabetics in (40%) United states Canada (24%), Australia (14%), Europe (17%) and Japan (28%)[2,3]. Nephropathy passes through well defined stages of microalbuminurea, microalbuminurea, impaired eGFR and ESRD in insulin dependent diabetes mellitus (IDDM) but this is less well defined in Non Insulin Dependent Diabetes Mellitus NIDDM[4-6]. NIDDM also has non diabetic kidney disease in 30% in proteinuric patients[7,8]. However for all patients detection of microalbuminurea warns us to take measures to prevent ESRD[7 -9]. It should be done at diagnosis and yearly in NIDDM[10].

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In IDDM, at an average it takes 3 years for earliest change of glomerulous basment membrane thickening and it takes 15 years after onset of diabetes to develop microalbuminurea. Tests for microalbuminurea have inconvenience in standardization of urine samples. Gold standard is 24 hours sample of urine. Others are albumin excretion rate per second or minute. Spot urine sample that may be early morning or collection at time of visit[11,12]. All specimens can be standardized by adjusting for urine creatinin. By ease of convenience spot specimens are ideal[13]. In this study spot specimen was tested for albumin with micral strip followed by 24 hour urinary quantification of albumin. Value from 20mg/dl to 300mg/dl was defined as microal-buminurea[14]. Value greater than this is considered as overt albumiminurea and lower than this is normal.

MATERIALS AND METHODS

This study was conducted at Mardan Medical Complex, Mardan in which a total of 100 stable adult NIDDM patents were selected randomly. All the patients are similar (Asians) or closely related by race and religion. During routine consultation, micral test was performed and patient received written instructions for collection of 24 hour urine. When patients returned with 24 hour urine sample, urine albumin was quantified. Urine creatinine was also measured. History was taken and examination was performed for selection of patients in

study. Data was analyzed with SPSS version 22.0.0.0 and is presented in tables and charts.

RESULTS

This was a cross sectional study conducted at Mardan Medical Complex, Mardan in which a total of 100 stable adult NIDDM patents were included. Age distribution among these patients was analyzed as 40 patients were in age range 40-50 years, 32 were in age range 50-60 years and 28 were in age group 60-70 years (Table No:1). Fifty six percent patients were males and 44% patients were females. Eighty one patients showed proteinurea on micral strip method 81% that was confirmed by 24 hour urinary albumin quantification. Eleven patients were showing no proteinuria both on micral strip method and 24 hour urinary quantification 14%. False negative and false positive results were obtained in 05(4.3%) and 03(03%) patients respectively**.** Sensitivity and specificity was calculated 93% and 89% percent with 94% positive predictive value and 79% negative predictive value (Table No:2).

Table No 1: Age Distribution (n:100)

Age	Number of patients	Percentage
40-50	40	40 %
50-60	32	32%
60-70	28	28%

Table No 2: Validity of Micral Strip Test to 24 hour Urinary Protiens Quantification

24 Hour Urinary Protiens(mg/dl) (n:100)		Micral Strip Test(n:100	
≥20	86	81	05
≤20	14	11	03
Sensitivity: 93%		Specificity: 89%	

Table No 3: Proteinurea in age distribution (n=86)

Proteinurea	2-5 years	8-10 years
< 1.5 gm	24	0
>1.5 gm	0	62

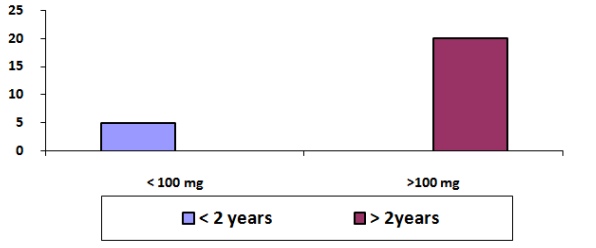

Figure No 1. Proteinurea in history of disease (n=86)

Proteinurea is amount directly related to duration of diabetes in 86%, (figure 1). In disease of less than two years history it is present in lesser amount less than 100mg.In 3-5 years it was less than 1.5 gm while in 8-10 years it is present in proteinuric range greater than 1.5 gm.(Table No: 3) In only one case it is still in micro albuminuric stage at 12th years. In two cases it was below microalbuminuric range at 3rd and 5th years (Normal).

DISCUSSION

Etiology of diabetic nephropathy includes (a) Genetic factors), (b) Sustained hyperglycemia, (c)Sustained hypertention, (d)glomerular hyperfiltration, (e)smoking, (f)dyslipidemia. It is more common in African, americans and Asians than Caucasians[15]. Pima Indians a native American tribe is the best study model as they develop NIDDM at much earlier age[3,8,13]. All stages can be observed without non diabetic proteinuric effect related to old age it is less in those with good glycemic control (Hb A1c 7%) (In the DCCT trial intensive treatment of hyperglycemia reduced the incidence of microalbuminurea by 39% and in UKPDS trial 30% reduction[16]. Kumamoto study also support this fact. Microalbuminurea is observed after 5-15 yrs of IDDM[3]. In Type 1 Diabetic patients 80% of microalbuminuric patients have progressed to albuminurea in 6-10 years[17].There are different methods to quantitatively measure urine. Difficulties include sample variation, standardization, inconvenience and effect of posture, Various methods include 24 hr urine for protein rate per minute, Spot specimen,early morning and sample at time of visit[14]. Further refining is to divide this by creatinine excretion rate. In this study spot sample at visit time was tested via micral test and urinary creatinine meared. Just in one case it changed group of one patient from microalbuminurea to normal range. In most cases just albumin essay is sufficient and without additional time and cost. This method is sensitive, accurate and convenient in respect of time and sample collection and much easy for repetition as follow up will also be required. However this is relatively expensive.ACE inhibition by rennin angiotensin system and selective blockade of angiotensin 1 receptor by ARB's lowers microaluminurea[18]. A target BP below 130|80mmhg and statin drugs are recommended in all NIDDM.

CONCLUSION

Spot urine sample just for albumin at clinic/OPD visit time by Micral test is a useful test for early detection of Microalbumiurea to prevent ESRD.

Author's Contribution:

Concept & Design of Study:	Amjad Ali, Usman Ali
Drafting:	Amjad Ali
Data Analysis:	Muhammad Siyar
Revisiting Critically:	Muhammad Khalid
Final Approval of version:	Amjad Ali

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. US Renal data system USRD 2003 Annual Data Report Atlas of End Stage Renal Disease in the United States Bathesda MD National institute of Health. National Institute of Diabetes and Digestive and Kidney Diseases 2003.
2. Young BA, Mayynard C Byko EJ. Racial differences in diabetic nephrophathy cardiovascular disease and mortality in a national population of veterans Diabetes Care 2003; 26:2392-99.
3. Ismail N. Renal disease and hypertension in non insulin dependent diabetes mellitus, Kidney Int 1999;55:1-28.
4. Adler al Steven RJ, Manley SE Bilous RW, Cull CA, Holman RR. Development and progression of nephropathy in type 2 diabetes the United Kingdom Prospective Diabetes Study (UKPDS) Kidney Int 2003;63:225-32.
5. Costacou T. Sequence of Progression of albuminurea and decreased GFR in persons with Type 1 Diabetes. A Cohort Study. Am J Kidney Dis 2007;50(5):721-32.
6. Amanda I. Development and progresssion of nephropathy in type 2 diabetes The united Kingdom Prospective Diabetes Study (UPKDS 64). Kidney Int 63:225-32.
7. Eric C. Microalbuminuria and potential confounders Diabetes Care 2003;18(4): 572-81.
8. Parving HH. Prevalence and causes of albuminuria in non insulin dependent diabetic patients Kidney Int 1992;41:758-62.
9. Viberti GC. Microalbuminurea as a predictor of clinical nephropathy in insulin dependent diabetes mellitus. Lancet 1982;1430-32.
10. Consenses Development Conference on the Diagnosis and management of Nephropathy in patients with Diabetes Mellitus DIABETES care. 1994;17(11):1357-61.
11. Steve J, Schwab, Fredrick L, Dunn, Mark N Feinglos. Screening for microalbuminurea, Diabetes Care 1992;15(11):1581-84.
12. Nathan DM. Single Void Urine Samples can be used to estimate Quantitative Microalbuminurea Diabetes Care 1987:10(4):414-18.
13. Eknoyan G. Proteinuria and other Markers of Chronic Kidney Disease. Am J Kidney Dis 2003;42(4):617-22.
14. Jorge L. Gross. Diabetic Nephrophathy Diagnosis, Prevention and treatment Diabetes Care 2005; 28:176-88.
15. Parving HH. Prevalence and risk factors for microalbuminuria in a referred cohort of type 2 diabetic patients A global perspective Kidney Int. 2006;69:205-63.
16. Chaturvedi N, Bandinelli S Mangilli R Penno G Rotella RF, Fuller JH. Microalbuminuria in type 1 diabetes rates risk factors and glycemic threshold Kidney Int 2001;60:219-227.
17. Jogenson CE, Christensen CK. Predicting diabetic nephropathy in insulin dependent patients. N Eng J Med 1984;89-93.
18. Viberti G. Microalbuminurea Reduction With Valsartan in patients with Type 2 Diabetes Mellitus Circulation. Circulation 2002;106,672-78.