

FREQUENCY OF RETINOPATHY IN TYPE 2 DIABETIC PATIENTS WITH OR WITHOUT MICROALBUMINURIA

Asim Shehzad, Jamal Ahmad*, Rabia Sajjad*

137 Medical Battalion Peshawar Pakistan, *Combined Military Hospital Peshawar/National University of Medical Sciences (NUMS) Pakistan

ABSTRACT

Objective: To determine the association of diabetic retinopathy among type 2 diabetic patients with microalbuminuria.

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Medical wards combined Military Hospital Peshawar from 12th Jun to 12th Dec 2013.

Material and Methods: One hundred and eighty six patients (93 in each group) with type 2 diabetes fulfilling the inclusion criteria were included in study through consecutive sampling. A standard protocol was followed for testing spot urine for micro, on the basis of which patients were divided into cases and control groups depending upon presence or absence of microalbuminuria. Fundos copy was done for any evidence of diabetic retinopathy including micro aneurysms dot and blot hemorrhages, new vessel formation and maculopathy.

Results: 51.61% (n=48) in cases and 29.03% (n=27) in controls were having diabetic retinopathy while remaining 48.39% (n=45) in cases and 70.97% (n=66) in controls were not having diabetic retinopathy.

Conclusion: We concluded a significant association between diabetic retinopathy and microalbuminuria.

Keywords: Diabetic Retinopathy, Microalbuminuria, Type 2 Diabetes.

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder of diverse etiologies. It is characterized by chronic persistent hyperglycemia with altered metabolism, resulting from underlying defective insulin secretion, insulin action or both. Diabetes mellitus is associated with macro vascular and micro vascular complications¹. The vast majority of diabetic patients are classified into one of two broad categories: type 1 in which there is an absolute deficiency of insulin, and type 2 diabetes, which is characterized by the presence of insulin resistance with an inadequate compensatory increase in insulin secretion¹.

Diabetic nephropathy comprises a triad of albuminuria, hypertension and declining renal function⁷. Persistent microalbuminuria in diabetics is a risk factor for renal, cardiac and ocular complications². The most dreadful

complication among all is Diabetic retinopathy, a leading cause of blindness worldwide¹. Diabetic complications including diabetic retinopathy result from the possible interaction between genes and environmental factors¹³. Diabetic retinopathy begins with microaneurysms and progress into exudative changes, blood (blot hemorrhages), ischemic changes, collateralization, dilatation of venules and proliferative changes³. Approximately 0.7 million people will have proliferative diabetic retinopathy and 1.8 million will have clinically significant macular edema eventually leading to blindness in India, If the prevalence of diabetic complications remains unchanged³. Diabetes induced disorders e.g. oxidative stress, formation of AGE, dysregulation of NOS and activation of NF-Kb are responsible for these complications⁴. The duration of diabetes is the strongest predictor for the development and progression of retinopathy. Other important factors include glycemic control, obesity, hypertension, lipid control, pregnancy and nephropathy^{5,14}.

Correspondence: Dr Asim shehzad, MOQ, # 37/3, Family Wing, CMH Peshawar, Pakistan (Email:osmium_osmium@yahoo.com)
Received: 07 Jul 2015; revised received: 12 Oct 2015; accepted: 20 Oct 2015

Spot sample (preferably first morning void sample) are taken in order to allow for urine concentration, the albumin content is corrected for creatinine giving an albumin:creatinine ratio (ACR). A positive ACR on two or more occasions is enough to confirm the diagnosis of diabetic renal disease (ACR >2.5 in males and >3.5 in females). This is suggested as giving a sensitivity of 96% and specificity of 99.7% for the presence of diabetic nephropathy⁷. Relationship between microalbuminuria and retinopathy in type 2 diabetics has been studied in various trials⁵. Diabetic retinopathy is well established in type 1 diabetics. However, this is not clear in type 2 diabetes. A study done abroad shows that diabetic retinopathy is more common in patients with microalbuminuria⁵. A study done in Pakistan shows frequency of retinopathy was higher in patients with microalbuminuria (45.4%) whereas in patients without microalbuminuria it was 24.3%¹.

Diabetic retinopathy is more common in patients with microalbuminuria⁵. Our study will determine the association of diabetic retinopathy in patients with microalbuminuria in our setup. Based on the results of our study, patients will be offered in time diagnosis and management of diabetic retinopathy.

MATERIAL AND METHODS

This Comparative Cross-sectional study was carried out from 12 June 2013 to 12 December 2013 at Combined Military Hospital Peshawar, which is a tertiary care centre. A total of 186 patients fulfilling the inclusion criteria were selected through non probability consecutive sampling. Permission was obtained from "Hospital Ethical Committee". Written informed consent was obtained from the patients. Name, age, and hospital ID number were entered in the proforma. Complete history, clinical examination and detailed workup was done to fulfill the exclusion criteria including patients with prior laser therapy of retina, taking ACE inhibitors, with hypertension determined clinically by manometer, with positive protein on dipstick

(macroalbuminuria), casts, BUN > 20 mg/dl and creatinine > 1.20 mg/dl.

The patients presenting with Type 2 diabetes mellitus were admitted in the hospital. Their spot urine test for microalbuminuria was checked. Then patients were divided into cases and control groups depending upon presence or absence of microalbuminuria. Fundo scopy was done by retinal camera for any evidence of diabetic retinopathy including micro aneurysms, dot and blot hemorrhages, soft and hard exudates, venous looping and beading, new vessel formation and maculopathy. All the findings so obtained by the researcher were confirmed by my supervisor and ophthalmologist and strictly exclusion criteria were followed to avoid confounder and make the results unbiased.

Laboratory analysis in this study included urine albumin and creatinine. Urine albumin was analyzed by means of Albumin Tina-quant Roche/Hitachi reagent kit, which utilizes an immunoturbidimetric technology. Urine creatinine was measured by the Jaffé assay using Beckman UniCel® DxC 600 Synchron® Clinical System. Albumin to creatinine ratio was calculated by dividing the urinary albumin concentration by the urinary creatinine concentration. All data collected were entered in SPSS version 11. Mean \pm SD was calculated for continuous variables like age. Frequency and percentages were calculated for categorical variables like gender and diabetic retinopathy. Chi-square test was applied to compare the diabetic retinopathy in both the groups. Results were presented with help of tables and charts.

RESULTS

A total of 186 patients fulfilling the inclusion/exclusion criteria were enrolled in study. In our study, 36.56% (n=34) in cases and 39.78% (n=37) in controls were between 25-40 years while 63.44% (n=59) in cases and 60.22% (n=56) in controls were between 41-70 years, mean \pm SD was calculated as 44.48 \pm 10.63 in cases and 44.63 \pm 11.24 years in controls table-1, gender distribution is shown in table-2.

Comparison of diabetic retinopathy in both groups done which shows that 51.61% (n=48) in cases and 29.03% (n=27) in controls were having diabetic retinopathy while remaining 48.39% (n=45) in cases and 70.97% (n=66) in controls table-3 were not having diabetic retinopathy, which shows a significant difference in both groups.

DISCUSSION

Diabetes mellitus has become a major cause of morbidity and mortality in Pakistan. According to a WHO report Pakistan has 5.2 million diabetic population which is expected to rise to approximately 13.9 million, the 5th highest globally by 2030⁶.

We planned this study to determine the association of diabetic retinopathy in patients

decrease the morbidity and improve the quality of life of patients with diabetes mellitus¹².

Our findings are in agreement with a study revealing that that diabetic retinopathy is more common in patients with microalbuminuria⁵. Another study done in Pakistan shows frequency of retinopathy was higher in patients with microalbuminuria (45.4%) whereas in patients without microalbuminuria it was 24.3%¹.

Cruickshanks and colleagues⁸ investigated the relationship between microalbuminuria and the presence and severity of diabetic retinopathy in a large population-based cohort of individuals with diabetes they concluded that microalbuminuria is associated cross-sectionally with the presence of retinopathy in persons with diabetes and microalbuminuria may be a marker

Table-1: Age distribution among groups (n=186).

Age (in years)	Cases (n=93)		Control (n=93)	
	No of patients	%	No of patients	%
25-40	34	36.56	37	39.78
41-70	59	63.44	56	60.22
Total	93	100	93	100
Mean ± SD	44.48 ± 10.63		44.63 ± 11.2	
p-value	0.926			

Table-2: Gender distribution among groups (n=186).

Gender	Cases (n=93)		Control (n=93)	
	No. of patients	%	No. of patients	%
Male	45	48.39	51	54.84
Female	48	51.61	42	45.16
Total	93	100	93	100

Table-3: Comparison of diabetic retinopathy in both groups (n=186).

Diabetic Retinopathy	Cases (n=93)		Control (n=93)	
	No. of patients	%	No. of patients	%
Yes	48	51.61	27	29.03
No	45	48.39	66	70.97
Total	93	100	93	100

p-value: 0.002

with microalbuminuria in our setup. Based on the results of our study, patients may be offered in time diagnosis and management of diabetic retinopathy. Prophylaxis of diabetic retinopathy with strict glycemic control may reduce the incidence and progression of visual impairment,

for the risk of proliferative retinopathy developing.

Manaviat and co-authors⁹ identified risk factors for the development of retinopathy and microalbuminuria and their correlation in type II diabetic patients and recorded that the overall

prevalence of retinopathy was 39.3% (232 patients), 5.4% of which showed to be proliferative diabetic retinopathy (PDR). The diabetic retinopathy had significant inverse correlation with body mass index (BMI) ($p=0.02$). HbA1C was higher in patients with PDR (mean=10.5%) than in patients with no signs of retinopathy (mean=9.5%) and this difference was statistically significant ($p=0.001$). The prevalence of microalbuminuria was 25.9% while 14.5% of the patients revealed to have macroalbuminuria. As expected, diabetic retinopathy and renal involvement were highly positively correlated. ($p=0.001$) and concluded that microalbuminuria is associated cross sectionally with the presence of retinopathy in persons with diabetes type II. These data suggest that microalbuminuria may be a marker for the risk of proliferative retinopathy development. If longitudinal studies confirm these findings, diabetic patients who have microalbuminuria may benefit from close ophthalmologic follow up.

Rani¹⁰ revealed that subjects with microalbuminuria were around 2 times as likely to have DR as those without microalbuminuria. A similar trend was recorded for sight-threatening DR, the odds were 2.5 times for microalbuminuria¹¹ The findings are consistent with the results of the current study.

However, the association of diabetic retinopathy in patients with microalbuminuria in our setup is recorded significant as compared to without microalbuminuria. Based on the results of our study, patients may be offered in time diagnosis and management of diabetic retinopathy.

CONCLUSION

We concluded a significant association between diabetic retinopathy and microalbuminuria and all type 2 diabetic patients may be offered in time diagnosis and management of

diabetic retinopathy considering microalbuminuria as a marker.

CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

REFERENCES

1. Nisar S, Mateen F, Masud F. Frequency of retinopathy in type 2 diabetic patients with or without microalbuminuria. *Pak J Med Health Sci.* 2010; 4(4): 479-83.
2. Chen H, Zhenq Z, Huang Y, Guo K, Zhang L, Yu H, et al. A microalbuminuria threshold to predict the risk for the development of diabetic retinopathy in type 2 diabetes mellitus patient. *PLoS One.* 2012; 7(5): 1-6.
3. Antonetti DA, Klein R, Gardner TW. Diabetic Retinopathy. *N Engl J Med* 2012; 366(13): 1227-39.
4. Zhang W, Liu H, Caldwell RW, Caldwell RB. Inflammation and diabetic retinal micro vascular complications. *J Cardiovascular Dis Res.* 2011; 2: 96-103.
5. Mohan VKA, Nithyanandam S, Idiculla J. Microalbuminuria and low hemoglobin as risk factors for the occurrence and increasing severity of diabetic retinopathy. *Indian J Ophthalmol,* 2011; 59(3): 207-10.
6. Javadi MA, Katibeh M, Rafati N. Prevalence of diabetic retinopathy in Tehran province: a population-based study. *BMC Ophthalmol,* 2009; 16: 9-12.
7. Eboh C, Chowdhury TA. Management of diabetic renal disease. *Ann Transl Med.* 2015; 3(11): 154.
8. Cruickshanks KJ, Ritter LL, Klein R, Moss SE. The association of microalbuminuria with diabetic retinopathy. The wisconsin epidemiologic study of diabetic retinopathy. *Ophthalmology.* 1993; 100(6): 862-7.
9. Manaviat MR, Afkhami M, Shoja MR. Retinopathy and microalbuminuria in type II diabetic patients. *BMC Ophthalmol.* 2004; 4: 9.
10. Rani PK, Raman R, Gupta A, Pal SS, Kulothungan V, Sharma T. Albuminuria and diabetic retinopathy in type 2 diabetes mellitus Sankara Nethralaya Diabetic Retinopathy Epidemiology And Molecular Genetic Study (SN-DREAMS, report 12). *Diabetol Metab Syndr.* 2011 25; 3(1): 9. p3-9.
11. Molitch ME, Steffes MW, Cleary PA, Nathan DM. Baseline analysis of renal function in the Diabetes Control and Complications Trial. The Diabetes Control and Complications Trial Research Group [corrected]. *Kidney Int.* 1993; 43: 668-74.
12. Aiello LP, Ayala AR, Antoszyk AN, Arnold-Bush B, Baker C, Bressler NM, et al. Assessing the Effect of Personalized Diabetes Risk Assessment During Ophthalmological Visits on Glycemic control: A randomized Clinical Trial. *JAMA Ophthalmol.* 2015; 133(8): 888-96.
13. Maqbooli Z, Pasalar P, Keshtkar A, Farzadfar F, Larijani B. Predictive factors of diabetic complications: a possible link between family history of diabetes and diabetic retinopathy. *J Diabetes Metab Disord,* 2014; 13: 55.
14. Sartore G, Chillelli NC, Burlina S, Lapolla A. Association between glucose variability as assessed by continuous glucose monitoring (CGM) and diabetic retinopathy in type 1 and type 2 diabetes. *Acta Diabetol,* 2013; 50(3): 437- 42.