Original Article

Frequency of Retinopathy and its Different Grades among Type II Diabetic Patients with Metabolic Syndrome in our population

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Purpose: To determine the frequency of retinopathy and its different grades among type II diabetic patients with metabolic syndrome

Material and Methods: This study was conducted in the department of Medicine, Lady Reading Hospital Peshawar from March 2011 to August 2011. Through a Descriptive Cross Sectional Study Design, a total of 201 patients with diabetes mellitus having metabolic syndrome were selected in a consecutive manner from the OPD and fundoscopy was performed to detect and grade diabetic retinopathy and results were recorded.

Results: The mean age of patients was 39 ± 12.2 years with 54.7% female and 45.3% male gender. On fundoscopy, diabetic retinopathy was found in 35 (17.4%) of patients with most of the patients with retinopathy lying in older age group i.e. 34.6% in the age group 60+ years and 20% in the age group 50-59 years. On grading of diabetic retinopathy, 40% were in the mild to moderate non proliferative diabetic retinopathy (NPDR) group, 37.1% in the severe non proliferative diabetic retinopathy (NPDR) group and 22.9% were in the proliferative diabetic retinopathy (PDR) group.

Conclusion: Diabetic retinopathy is a common sequalae of diabetes in patients with metabolic syndrome with non-proliferative diabetic retinopathy more common than proliferative diabetic retinopathy. It necessitates regular follow up of these patients to prevent development of proliferative disease and its complications. More studies are recommended before making recommendations for modifications in principles of its management.

Key Words: Frequency, Metabolic Syndrome, Retinopathy

Metabolic syndrome (MS) is a common condition occurring in diabetic patients and is characterized by the presence of glucose intolerance, hypertension, central obesity, low high density lipoproteins (HDL) and high triglycerides. Over-secretion of insulin with peripheral resistance to insulin action is believed to underlie this syndrome. The micro-vascular changes associated with MS include diabetic retinopathy, nephropathy and neuropathy.[1,2,3]

Metabolic syndrome (MD) is not an uncommon condition in diabetic patients and approximately 70-80% of diabetics develop metabolic syndrome (MS) in their life.[2] In Indian population the prevalence of MS is 73.3% in comparison to the Indian immigrants in USA who have 77% prevalence.[4] In Japanese and Western population the prevalence of MS is reported to be 58.5% and 77.6% respectively.[5,6] The prevalence is higher in women (83.3%), compared to men (65.3%). Diabetic retinopathy is an important feature of metabolic syndrome in patients with diabetes with a prevalence of 16.9%.[2]

The correlation between the micro-vascular complications of diabetes and metabolic syndrome

including diabetic retinopathy are well documented.[5,7] However not enough literature and data is available in Asian population.

It has been found that in metabolic syndrome (MS) the risk factors for retinopathy is elevated HBA_1C level, and duration of diabetes, while nephropathy include hypertension and increased body mass index as risk factors in addition to elevated HBA_1C level, and duration of diabetes.[2] In a study from Faisalabad, the frequency of retinopathy among patients with diabetes mellitus and metabolic syndrome was found to be 41.4%[8], while in another study from Lahore it was 25%.[9]

The rationale of our study is to find out the prevalence of Diabetic Retinopathy in our local population with type 2 diabetes mellitus having metabolic syndrome. Although local studies are available in literature but most of them are either comparative in nature or having controversial results as mentioned above (studies from Lahore and Faisalabad).

We also tried to generate local statistics about the magnitude of the retinopathy among diabetic people living with metabolic syndrome. The results of this study will be compared with already available local and international literature and if found to be significantly high, will be shared with local health professionals to device future recommendations for the prevention and control of the problem. Also this study will provide us frequency of different grades of retinopathy which has not been studied locally and will provide us with current statistics about the most common grade of retinopathy among patients with type II diabetes and metabolic syndrome.

MATERIAL AND METHODS

The study was conducted in Medical Department, Post Graduate Medical Institute, Lady Reading Hospital Peshawar from March 2011-August 2011. It was a Descriptive Cross Sectional Study, and sampling technique used was Consecutive Non-probability sampling. A written permission from the hospital ethical committee was obtained. All patients presenting to the Medical outpatient department (OPD) of LRH with diabetes of minimum five years duration were worked up thoroughly for metabolic syndrome by clinical examination & investigations. Those patients found to have metabolic syndrome were included in the study and were dealt with on OPD basis or admitted to the Medical ward where routine investigations as full blood count, urea, blood sugar, electrolytes, ECG and Echocardiography were done. Already diagnosed cases of retinopathy like; vasculitis, rheumatoid, systemic lupus erythematosis, radiation retinopathy, and systemic disease that will affect visual acuity evaluation (for example: CVA), Opaque cornea and vitreous were excluded from the study.

A written informed consent was obtained from all the patients. Fundoscopy of all patients was performed either on OPD basis or after the admission to detect retinopathy and its different grades. All the fundoscopies were performed by senior ophthalmologist having got minimum of 5 years experience in ophthalmology. All the information is recorded on preformed proforma. An exclusion criterion was followed strictly to control confounding variables and bias in the study result.

The data was analyzed in SPSS for windows version 10.0. Continuous variables like age and duration of diabetes were presented as Mean $\pm$ Standard deviation. Qualitative variables like gender, retinopathy and its grades are presented as frequency and percentages. Retinopathy was stratified among age, gender and duration of diabetes to see the effect modifications. All the results are presented as tables and graphs.

RESULTS

The study comprised a total of 201 patients of type II diabetes mellitus, having minimum 5 years duration of diabetes.

The mean age of diabetic patients were 39 ± 12.2 years. The minimum age in our study was 30 years and maximum age was 70 years. Distributing the sample in different age groups, we found that 35 (17.4%) were in the age group 30-39 years, 70 (34.8%) were in the age group 40-49 years, 70 (34.8%) were in the age group 50-59 years while 26 (12.9%) were in the age group 60+ years.

Considering the duration of diabetes condition among subjects recruited, in this study, participants were grouped into: > 5–10 years with 61 (30.3%) of the sample, 11-15 years with 75 (37.3%) of the sample while in the group with duration of diabetes of 15+ years we had 65 (32.3%) of the overall sample of 201.

While distributing the sample with regards to gender, we found that male gender contributed 91 (45.3%) of the sample and female gender contributed

110 (54.7%) of the overall sample.

On fundoscopic examination of all the diabetic individuals included in the study, Diabetic Retinopathy (DR) was observed in 35 (17.4%) of the patients (Table 1). While looking into the gender wise stratification of the DR, we found that out of total 91 males, 13 (14.3%) had DR and out of total 110 females, 22 (20%) had DR. Stratifying the DR with regards to age groups, we found that most of the DR were observed in older age groups, out of 35 in the age group 30-39 years 4 (11.4%) had DR, out of 70 in the age group 40-49 years 8 (11.4%) had DR, out of 70 in the age group 50-59 years 14 (20%) had DR and out of 26 in the age group 60+ years 9 (34.6%) had DR (Table 2).

While stratifying the diabetic retinopathy with regards to duration of diabetes, we found that most patients of diabetes were in the prolonged duration of diabetes suggesting that as the diseases progresses, the chances of developing diabetic retinopathy becomes higher. Out of 61 patients in the group >5–10 years with 7 (11.5%) had DR, in the group with duration of diabetes 11-15 years out of 75, 13 (17.3%) had DR while in the group with duration of diabetes of 15+ years out of 65 patients, 15 (23%) had DR (Table 3).

The grades of retinopathy are also studied in this research project and it was seen that out of total 35 patients with diabetic retinopathy, 14 (40%) were in the mild to moderate non proliferative diabetic retinopathy (NPDR) group, 13 (37.1%) were in the severe non proliferative diabetic retinopathy (NPDR) group and remaining 8 (22.9) were in the proliferative diabetic retinopathy (PDR) group (Table 4).

Table 1: Diabetic retinopathy on fundoscopy (n = 201)

Diabetic Retinopathy	No. of Patients n (%)
Yes	35 (17.4)
No	166 (82.6)
Total	201 (100)

Table 1: Diabetic retinopathy on fundoscopy (n = 201)

Age Ranges (Years)	No. of Patients	Diabetic Retinopathy n (%)
30 - 39	35	4 (11.4)
40 - 49	70	8 (11.4)
50 - 59	70	14 (20)
60+	26	9 (34.6)
Total	201	35 (100)

Table 3: Stratification of diabetic retinopathy with regards to duration of type 2 diabetes (n = 35)

Duration of Diabetes	No. of Patients	Diabetic Retinopathy n (%)
> - 10 years	61	7 (11.5)
10 - 15 years	75	13 (17.3)
> 15 years	65	15 (23)
Total	201	35 (17.4)

Table 4: Grades of diabetic retinopathy (n = 35)

Grades of Diabetic Retinopathy	No. of Patients n (%)
Mild to moderate NPDR	14 (40)
Severe NPDR	13 (37.1)
Proliferative diabetic Retinopathy (PDR)	8 (22.9)
Total	35 (100)

DISCUSSION

Metabolic syndrome (MS) is a specific disease entity as reported by National Cholesterol Education Program's ATP III report. Patients with this syndrome shows increased incidence of micro-vascular diseases.[10] Many studies showed association between hypertension, diabetes, cardiovascular diseases and micro-vascular retinal disease.[11-16] In our study we addressed the frequency of diabetic retinopathy in diabetic patients with metabolic syndrome.

The study conducted by Fisbee JC showed experimentally in rats having obesity, diabetes and metabolic syndrome that they have narrow skeletal muscle arterioles and impaired arteriolar reactivity to vaso-active stimuli.[17] While study conducted by Irnving RJ and Serne EH et al[14-16] showed changes in the structure and function of microcirculation in skin

and skeletal muscles in patients with metabolic syndrome.

After 20 years, nearly 60% people with type-1 diabetes and around 40% with type-2 diabetes have proliferative diabetic retinopathy. In diabetic patients there is venular dilatation resulting in hyperperfusion which inturn causes hypoxia and lactic acidosis.[18, 19] This venular dilatation is related to the duration of diabetes, raised HbA_1C level and high body mass index as shown by Winconsin Epidediologic Study.[20, 21] On the basis of all these facts, diabetic retinopathy can be explained in metabolic syndrome (MS) as a consequence of micro-vascular changes associated with inflammation and endothelial dysfunction resulting in decrease perfusion and hypoxia.

Our study showed relationship between metabolic syndrome (MS) and diabetic retinopathy. In our study, the prevalence of diabetic retinopathy among diabetics with metabolic syndrome was 17.4% which is lower than that (21-60 %) reported in other studies conducted in Karachi and other cities in Pakistan.[22] The reason behind these differences could be that most of those studies were done on inadequate sample size while our study took 201 patients. It may have caused an overrepresentation of diabetics in the sample because several eye diseases are more prevalent among diabetics than their non-diabetic counterparts. Second, a third of diabetics did not participate in the screening for diabetic retinopathy which may have either overestimated or underestimated the prevalence of diabetic retinopathy, depending on the rates of diabetic retinopathy among non-respondents.

In our study, women had a slightingly greater prevalence of diabetic retinopathy than men (20% vs. 14.3%). The most prevalent type of diabetic retinopathy is our study was mild to moderate non proliferative diabetic retinopathy (NPDR) which accounted for 40% of the cases. In a study by Khan in Karachi,[22] background diabetic retinopathy accounted for 79.1% of the cases compared with 92%, 89.3-94.0% and 69.8% in studies conducted in Australia, India and Oman, respectively. Severe proliferative diabetic retinopathy (NPDR) was not so far in the race and the reported frequency in our study was 37.1%. This is lower than those reported in hospital based studies in Pakistan and elsewhere. The severity of retinopathy is primarily related to the duration of diabetes, and exposure to various internal and external ocular factors. This lower prevalence of proliferative DR can be explained by the fact that majority of our participants were young. Many studies have found duration of diabetes to be an important predictor of diabetic retinopathy.[23, 24]

The strength of our study includes large sample size (201) and the objective documentation of signs by both ophthalmologists and physicians. However considering the limitations of our study it is important to mention that our study was cross-sectional and prospective data are needed to document the relationship between the micro-vascular changes including diabetic retinopathy and metabolic syndrome.

To conclude our study, we documented cross-sectional association between diabetic retinopathy and metabolic syndrome (MS) in diabetic patients. We recommend further prospective studies to clearly establish association between metabolic syndrome (MS) and micro-vascular abnormalities in diabetic patients.

CONCLUSION

Diabetic retinopathy is the commonest cause of visual impairment in diabetic patients with metabolic syndrome with non-proliferative diabetic retinopathy more common than proliferative diabetic retinopathy. It necessitates regular follow up of these patients to prevent development of proliferative disease and its complications. More studies are recommended before making recommendations for modifications in principles of its management.

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