Original Article

Coexistence of Diabetic Retinopathy and Diabetic Foot in Patients Admitted at Indoor Facility of a Tertiary Care Center

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ABSTRACT

Purpose: To determine frequency of "diabetic retinopathy (DR)" in patients admitted at a tertiary care hospital with diabetic foot.

Study Design: Cross sectional study.

Place and Duration of Study: HBS medical and dental college, Islamabad from November 2022 to November 2023.

Methods: Sixty two patients admitted with "diabetic foot ulcer" (DFU) were included in this study. Severity of DFU was assessed using . Patients were assessed for presence of "diabetic retinopathy (DR)" as well as its severity. Data was analyzed using SPSS 22.

Results: Mean age was 49.37 ± 11.02 years. There were 34 (54.84%) males and 28 (45.16%) females. Mean HbA1C% was 9.46 ± 1.11%. Mean duration of diabetes was 10.06 ± 5.53 years. Forty five percent patients had diabetic retinopathy (DR). Amongst these patients diagnosed with DR (n = 45), 6 (13.33%) had mild non-proliferative DR, 20 (44.44%) had moderate non-proliferative DR, 14 (31.11%) had severe non-proliferative DR and 5 (11.11%) had proliferative DR. According to Wagner Grade there were 32 (51.61%), patients with grade 2 DFU, 19 (30.65%) had grade 1 and 11 (17.74%) had grade 3. Coexistence of diabetic retinopathy and diabetic foot in patients admitted at indoor facility was 72.58%.

Conclusion: Prevalence of "diabetic retinopathy (DR)" in patients admitted with diabetic foot was 72.58%. Presence of diabetic foot can be considered as strong predictor of presence of concomitant "diabetic retinopathy".

Key Words: Diabetes, Diabetic foot, Diabetic retinopathy.

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INTRODUCTION

Diabetes mellitus (DM) has become a prevalent disease worldwide, affecting individuals of all races, ethnicities, and age groups indiscriminately. Recent estimates indicate that over five hundred million people globally are afflicted by this endocrine disorder, equating to an estimated global prevalence of 10.5%.[1] In Pakistan, the estimated prevalence of diabetes mellitus ranges from 10.6% to 19.1%, with a relatively higher prevalence among women (15.8%) compared to men (14.8%).[2] Although this disease appears benign but it has the tendency to adversely affect almost all the organ systems of the body resulting in a wide variety of complications including diabetic retinopathy (DR), diabetic neuropathy (DN)", diabetic nephropathy, diabetic arthropathy, diabetic

gastropathy and diabetic foot syndrome.[3,4] DR is one of the most potentially debilitating condition that can lead to permanent blindness.[5]

DR is a micro-angiopathy which can range from non-proliferative DR to proliferative DR and diabetic macular edema (DME).[6] It has been reported that presence of DR significantly increases the chances of other complications of diabetes.[7] These complications include both macrovascular complications (including stroke, cardiac event and disease of peripheral arteries) as well as microvascular complications (including neuropathy and nephropathy).

In Pakistan, diabetic foot ulcers (DFU) have a prevalence of 16.83%, with a significantly higher prevalence in urban populations compared to rural populations. DFU ranks among the most frequent reasons for hospital admissions among patients with diabetes.[8,9]

In Pakistan, lack of awareness among patients often leads to a failure to undergo regular check-ups for diabetes-related complications, particularly for conditions like DR. Consequently, a significant number of patients go undiagnosed and typically seek medical attention only when the disease has advanced.[10] To address this issue, it is crucial to ensure that high-risk diabetic patients undergo regular screening for DR. With this objective in mind, this study was undertaken to assess the prevalence of DR among patients admitted to a tertiary care hospital for diabetic foot conditions. Diabetic foot patients were selected for this study due to the condition being the leading cause of hospital admissions among diabetic individuals.

METHODS

This cross-sectional study was conducted at HBS medical and dental college, Islamabad – from November 2022 to November 2023 after taking ethical approval from the institutional review board. WHO sample size calculator was used by taking confidence interval of 95%, absolute precision of 8% and anticipated prevalence of diabetic retinopathy in patients admitted with diabetic foot of 88.46%.[11,12] Patients between 35-75 years of age, either gender and admitted with diabetic foot were recruited using non-probability consecutive sampling technique. Patients treated for retinopathy, history of ocular trauma, having foot ulcer other than diabetic foot and those who were not cooperative for retinal examination were excluded from the study. Baseline characteristics of the patients including age (in years), gender, duration of diabetes (in years), HbA1Cand severity of DFU was documented based on Wagner grading as follows:[13]

Grade 0 Skin intact but bony deformities lead to foot at risk

Grade 1 Superficial ulcer

Grade 2 Deeper, full thickness extension

Grade 3 Deep abscess formation or osteomyelitis

Grade 4 Partial gangrene of forefoot

Grade 5 Extensive gangrene

Dilated fundus examination was performed using indirect ophthalmoscopy. Severity of DR was categorized by Early Treatment Diabetic Retinopathy Study ETDRS.[14] Data were analyzed using Statistical Package for Social Sciences (SPSS) 22.00. Quantitative data (age, HbA1C and duration of diabetes) was represented in mean ± standard deviation. Qualitative data (gender, Wagner grade of DFU, presence of DR and severity of DR) were represented by using percentage and frequency. Chi square test was used for qualitative variables, Student t-test for quantitative variables and p-value of ≤ 0.05 was considered as statistically significant.

RESULTS

Mean age of the participants was 49.37 ± 11.02 years. Thirty four (54.84%) patients were males. Mean HbA1C% was 9.46 ± 1.11%. Mean duration of diabetes was 10.06 ± 5.53 years. Wagner grading is represented in Figure 1.

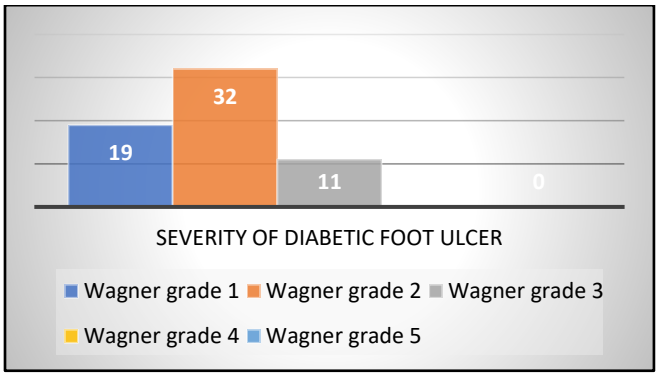

Figure 1: Severity of Diabetic Foot using Wagner grading (n = 62).

Frequency of DR in patients with diabetic foot was 72.58%. Details of severity of DR is shown in table 1.

Table 1: *Diabetic retinopathy and its severity distribution.*

	Yes	No
Diabetic retinopathy (n = 62)	45 (72.58%)	17 (27.42%)
Severity of diabetic retinopathy (n = 45)		
Mild non-proliferative	6 (13.33%)	
Moderate non-proliferative	20 (44.44%)	
Severe non-proliferative	14 (31.11%)	
Proliferative	5 (11.11%)	

DISCUSSION

Our results showed that 72% of patients with DFU had DR. Micro-angiopathy and macro-angiopathy are regarded as interconnected components.[15] Studies have shown that DR which is a microangiopathy is recognized as a contributory condition that substantially elevates the risk of foot ulcers in diabetic individuals.[16,17]

In the present study, it was found that average age of the patients who were admitted with diabetic foot was 49 years. Mariam et al.[18] observed similar findings when they reported highest prevalence of DF in patients having age ranging from 48 to 57 years. It was also observed in present study that most patients who were admitted with DF were males which is congruent with the findings of Vanherwegen et al,[19] who reported that male patients had higher propensity to develop this complication of diabetes.

Average duration of diabetes after which patients developed DFU was 10 years and had poor glycemic control (based on average value of HbA1C%). This corresponds to the fact that long standing, poorly controlled diabetes significantly enhances the chances of developing DFU.[20]In this particular study, 72.58% patients of DFU had DR. according to Serban et al,[21] frequency of DR in patients with DFU ranged between 22.5% and 95.6%. In another study conducted by Malik et al.[11] This percentage was 88.46%. Results closer to our study were described by Karam et al,[22] which were 67.58%.

Strengths of the study is that it demonstrates the importance of regular and rigorous screening of diabetic patients for presence of DR. Limitation of the study is small sample size and cross sectional design. It is suggested that population wide awareness programs should be arranged along with television campaigns to educate and encourage diabetic patients to have regular ophthalmological checkups to avoid blinding DR.

CONCLUSION

Prevalence of DR in patients admitted with diabetic foot was 72.58%. Presence of diabetic foot can be considered as a predictor of presence of concomitant DR.

Conflict of Interest: Authors declared no conflict of interest.

Ethical Approval: The study was approved by the Institutional review board/Ethical review board. **(Appl #EC/16/171)**

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Author's Designation and Contribution

Afia Matloob Rana; Associate Professor: *Concepts, Design, Literature search, Data acquisition.*

Erum Yousafzai; Assistant Professor: *Manuscript preparation.*

Humara Gul; Associate Professor: *Literature search, Manuscript review.*

Waseem Akhtar; Professor: *Data analysis, Statistical analysis, Manuscript editing.*