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Original Article

Correlation of Risk Factors with the Severity of Diabetic Retinopathy at a Rural Health Facility in Sindh Pakistan

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ABSTRACT

Diabetes Mellitus (DM) and the resulting Diabetic Retinopathy (DR) is a significant health problem around the World. In 2019, the total number of diabetics worldwide was 463 million, and 35% had some DR. **Objectives:** To determine the correlation between the severity of Diabetic Retinopathy (DR) and the known risk factors. **Methods:** Analytical cross-sectional study design was used with convenience sampling in a primary, multispecialty day care health facility under the Baqai Foundation (Khushal Nagar) in a rural area of Sindh from 2020 - 2022. A total of 133 patients had some DR according to the International Classification of Diabetic Retinopathy Severity Scale (ICDRSS), which correlated with the different risk factors. Spearman rank correlation was used, and the result was considered significant when the P value was <.05. **Results:** The results showed a significant positive correlation between the severity of DR with Age, Random Blood Sugar, Hypertension, and Smoking. Glycated hemoglobin and hyperlipidemia were not significantly correlated, mainly because of the small sample size. (23 and 14 respectively). The patients who tried to have Lipid Profile and Glycated Hemoglobin done had stage four or five of ICDRSS. **Conclusions:** Most risk factors studied were positively correlated with the severity of DR. Besides the intended study, the findings highlighted the non-awareness of patients about DR and its consequences. Awareness campaigns and screening programs for DR and its risk factors are urgently required and tailored to our circumstances.

INTRODUCTION

Diabetes Mellitus (DM) and the resulting Diabetic Retinopathy (DR) is a significant health problem around the World. In 2019, the total number of diabetics worldwide was 463 million, and 35% had some DR [1]. Pathogenesis of DR remains unclear, although various factors are known to be operative, such as a high glucose environment [2], accumulation of leukocytes [3], and Aldosterone [4]. These can all lead to loss of pericytes, increased permeability of retinal blood vessels, and ischemia-induced vascular proliferative changes, leading to macular edema and proliferative retinopathy. Although the true prevalence of DR among diabetic patients in Pakistan is unclear [5], it has variously been reported as 11.77% [6], 24.2% [7], 28.78% [5], 55.3% [8], and 56.9% [9]. The treatment of DR has become much more effective in the last few decades. However, it is still the leading cause of blindness worldwide [10], although the burden of diabetic blindness is shifting from rich to poorer countries [11]. Prevention or delaying the development of DR remains the ideal management, and the reduction of controllable risk factors is crucial to accomplish this. Several risk factors promoting the development of DR have been identified,

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such as hyperglycemia [12], Increasing age, duration of DM, hypertension, hyperlipidemia, and family history of DM [13]. The frequency of risk factors among the Pakistani rural population has not been extensively reported [7]. Hence, even modest information in this regard may help further research. Therefore, this study has been conducted to determine the correlation between risk factors of DR and the severity of DR in Gharo, district Thata, Sindh.

METHODS

Analytical cross-sectional study design was used with a non-probability, convenient sampling technique. The study was conducted in a primary, multispecialty daycare health facility under the Baqai Foundation (Khushal Nagar) in a rural area near Gharo, Thata District of Sindh. The selection criteria of the patients were those patients who attended the Eye OPD from 1st April,2020 to 30th June,2022 at Khushal Nagar, a primary, multispecialty daycare health facility under the Baqai Foundation in a rural area near the town of Gharo, district Thata. The patients referred from other departments for evaluation of DR, and the non-referred Eye OPD patients whose loss of vision was not explained fully by any anterior segment findings, underwent ophthalmoscopy at the slit lamp with a 90 D lens. If we discovered DR, we graded it according to the International Clinical Diabetic Retinopathy Severity Scale (ICDRSS) [14]. In patients with DR, the history included determination of age, sex, smoking, and any other medical conditions known to the patient. The blood pressure (BP) and the random blood glucose (RBS) levels were determined at the Clinic. At the same time, for lipid profile and glycated hemoglobin (HbA1C), the patients were asked to get it done, at a subsidized cost, from the laboratory of the Tertiary Center (Baqai Medical University). We excluded from the study any patient whose opaque media did not allow proper DR classification or was missing from the record for any reason. After the exclusion according to the set criteria, some degree of DR was found in 133 Patients (male and female included) with ages ranging from 32 to 78 years. The correlation of different risk factors was determined among these DR patients. Hence Stage 1 of the ICDRSS was not considered. The relevant institutional review board (IRB) obtained ethical approval for the study. This approval ensures that while conducting the study, ethical principles and protection of the rights and well-being of the participants are considered. The study ensured ethical considerations by obtaining a signed consent from the willing participants and assuring the confidentiality of their information. After data compilation, SPSS version 20.0 was used for the data analysis. Frequency and percentage were used for the demographic variables. Moreover, Spearman rank correlation was used to determine the correlation between DR severity and different risk factors, and the result was considered significant when the P value was <.05. Each risk factor was correlated separately and independently.

RESULTS

Table 1 shows that there are a total of 133 patients. Of these, 94 patients (70.7%) are male, and 39 (29.3%) are female. Regarding their ages in the 32-42 age groups, there were 4.5% participants. Moreover, the 43-52 age group comprises 9.3%. 53-62 age group, which is 60%. In the 63-72 age group, 21.2% of the participants are. Last, the 73+ age group there is 5% of the participants.

Table 1: Sociodemographic characteristics n=133

Gender	Number of Patients (%)
Male	94 (70.7%)
Female	39 (29.3%)
Age	
32-42	6 (4.5%)
43-52	12 (9.3%)
53-62	80 (60%)
63-72	28 (21.2%)
73+	7 (5%)

Table 2 displays, the sverity of DR among participants of stage I, II, III, IV and V which is 0 (0%), 60 (45.11%), 40 (30.07%), 25(18.8%)and 8(6.01%) respectively.

Table 2: Severity of DR through International Classification of Diabetic Retinopathy Severity Scale

Stage	Dilated pupil ophthalmoscopy findings	Severity	N=133
I	No diabetic Retinopathy (DR)	No DR	0 (0%)
II	Only Micro-aneurysms	Mild None Proliferative NPDR	60 (45.11%)
III	Presence of - micro-aneurysms, - intra-retinal hemorrhages - and/or venous beading BUT NO FEATURES OF SEVERE NPDR	Moderate NPDR	40 (30.07%)
IV	4-2-1 Rule (Any or more of the following) - hemorrhages in all four quadrants -2 quadrants or more have venous beading -1 quadrant or more of Intra retinal Micro -angiopathy. (IRMA)	Severe NPDR	25 (18.8%)
V	- Neo-vascularization of the disc (NVD), or elsewhere (NVE) - Vitreous hemorrhage - Pre-retinal hemorrhage	Proliferative diabetic retinopathy" (PDR)	8 (6.01%)

Table 3 shows correlation between the severity of Diabetic Retinopathy with Age, Random Blood Sugar, Hypertension, and Smoking. Glycated hemoglobin and hyperlipidemia were not significantly correlated, mainly because of the small sample size. (23,14). The patients who tried to have Lipid Profile and Glycated Hemoglobin had stage four or five of ICDRSS.

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Table 3: Correlation and Diabetic Retinopathy and Risk factors

Risk Factors	Spearman Correlation	p-value
Age	0.7	0.00001**
Random blood sugar	0.6	0.00001**
Blood pressure (systolic)	0.5	0.02099**
Blood lipids	0.2	0.29736
Glycated Hemoglobin (HbA1C)	0.4	0.05860
Smoking	0.5	0.00040**

**Significant

DISCUSSION

The main assessment of this study, although a simple correlation, is to bring into record whatever data was available from a health center in rural Sindh. In this study, males were 70.7% and females 23.3%; this may be due to males being more in number than females attending the OPD. Furthermore, the majority (60%) of the patients were 53-62. Similarly, a study conducted showed 57% male and 43% female, with the majority (25.4%) age group (50-54%) [8]. This study indicated a correlation of DR with age, random blood sugar, blood lipids, and smoking. On the other side, the association of risk factors with DR is consistent with other studies [12, 13, 15, 16]. Furthermore, a systematic review study stated that risk factors such as dyslipidemia and hyperglycemia are the main target of all clinicians to be controlled to prevent DR [2]. The current study showed a correlation of DR with smoking. Some other studies' results revealed that DR and smoking were positively correlated, while it is often reported otherwise [17-20]. The study's chief limitation was a lack of data about the patient's medical history, investigations, and follow-up. Hence, considering the scanty data available for this study, a simple cross-sectional correlation study design was chosen instead of a more elaborate study. Despite being educated and warned, this oblivion and neglecting attitude of the patients seems mainly due to non-awareness about the consequences of neglecting DR in the early stages. It was an un-intended observation that the only patients who traveled for lipid profile belonged to stages 4 & 5 of ICDRSS, indicating that willingness to make some effort was increased once patients lost sight significantly. This highlights the problem of non-awareness in patients about their health problems, which has often been discussed [21-24]. However, financial and domestic factors and time for travel must also have been operative. The role of risk factors in the prognosis of DR is established [25]. However, to reduce the blindness burden, timely intervention is mandatory. To achieve this, awareness campaigns [26] and screening can make the task easier. Furthermore, the screening strategies employed by financially advanced countries may not be feasible for low-income countries [27]. Strategies for screening for DR have to be tailored according to our geo-political needs and resources, as some other regional countries are planning [27].

CONCLUSIONS

Most risk factors studied were positively correlated with the severity of DR. Besides the intended study, the findings highlighted the non-awareness of patients about DR and its consequences. Awareness campaigns and screening programs for DR and its risk factors are urgently required, and tailored to our circumstances.

Authors Contribution

Conceptualization: AK
Methodology: MQK, MA
Formal Analysis: AK, MA
Writing-review and editing: AHR, MSF, AN, RAK, ABB

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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