ORIGINAL ARTICLE

Association of Age Groups, Gender, Smoking, and Hypertension with Pan-Retinal Photocoagulation Sessions in Diabetic Retinopathy Patients in the Population of D.I. Khan

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Abstract:

Objectives: To evaluates age groups, gender, smoking, and hypertension as risk factors for requiring more than one session of pan-retinal photocoagulation (PRP) and the severity of DR in the population of D.I. Khan.

Methods: This cross-sectional study was conducted at the Eye Unit of Gomal Medical College, Dera Ismail Khan, from January to December 2023. Patients undergoing single or multiple PRP sessions during this period were included. Consecutive, non-probability sampling was used, and data were analyzed using SPSS version 23.

Results: Of the 84 patients included, 52 (61.90%) were male, and 32 (38.10%) were female. Age above 50 and hypertension were significant risk factors for requiring more than one PRP session ($p = 0.006$ and $p = 0.031$, respectively). Gender and smoking were not statistically significant risk factors.

Conclusion: Hypertension and older age are significant risk factors for multiple PRP sessions and the severity of DR in the population of D.I. Khan. Managing these modifiable risk factors may reduce the need for repeated treatments. *Al-Shifa Journal of Ophthalmology 2025; 21(2): 108-112. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

Diabetic retinopathy (DR) is one of the most prevalent ocular complications in the diabetic population worldwide [1,2]. It is a leading cause of preventable blindness, particularly in middle-aged and elderly individuals [3]. Fortunately, vision loss due to DR is preventable, and the incidence of such loss has decreased over the past two decades [4]. This improvement is attributed to better control of systemic risk factors, advancements in disease evaluation, screening programs, and newer management strategies, such as the widespread adoption of the Early Treatment of Diabetic Retinopathy Study (ETDRS) classification system [5].

Pan-retinal laser photocoagulation (PRP) is the standard treatment for proliferative DR (PDR) and advanced disease, effectively preventing sight-threatening complications [6]. The introduction of pattern scan laser (PASCAL) technology has made PRP faster, easier to perform, and more comfortable for patients [7]. Additionally, advancements in diagnostic tools like

optical coherence tomography (OCT) and intravitreal anti-vascular endothelial growth factor (anti-VEGF) therapies have significantly improved the management of diabetic macular edema (DME) [8]. In current eras, there are different anti-VEGF agents available for managing different DR complications e.g. bevacizumab, ranibizumab, and aflibercept[9]. While for PDR, Scatter, or pan-retinal photocoagulation is preferred. Both management's plans have a good outcome in halting the advancement in DR[10].

The D.I. Khan region has a high prevalence of diabetes and limited access to specialized ophthalmic care, making it an important area for studying DR management and risk factors. This study aims to address the lack of data on the association of age groups, gender, smoking, and hypertension with the number of PRP sessions required in DR patients in this region.

Methodology:

This descriptive cross-sectional study was conducted at the Eye Department of Gomal Medical College, D.I. Khan, from January to December 2023. Ethical approval was obtained from the institutional review board of Gomal Medical College.

All diabetic retinopathy patients undergoing PRP during the study period were included, except those with concurrent retinal diseases (e.g., retinal vein occlusion) or prior vitreoretinal surgery. Consecutive, non-probability sampling was used.

PRP was performed using a mono-spot slit-lamp delivery system (Nidek GYC-1000, Japan) under topical anaesthesia. Laser power ranged from 200–400 mW, spot size was 200–500 µm, and duration was 0.1–0.2 seconds. All procedures were performed by experienced ophthalmologists with over 5 years of practice.

The sample size was calculated assuming a diabetic retinopathy population of 20,000, with a 30% proportion of patients requiring more than one PRP session, a 95% confidence interval, and a 9.8% margin of error, yielding a sample size of 84. A 9.8% margin of error was chosen to balance precision and feasibility, given the limited resources and patient population in the region.

Data were analysed using SPSS 23. Chi-square tests were used to compare categorical variables, and logistic regression was performed to calculate odds ratios for significant risk factors. P-values < 0.05 were considered statistically significant.

Results:

Of the 84 patients included, 52 (61.90%) were male, and 32 (38.10%) were female. The majority (67.86%) were above 50 years of age. Hypertension was present in 31 patients (36.90%), with 22 (26.19%) having controlled hypertension and 9 (10.71%) having uncontrolled hypertension.

Patients above 50 years were significantly more likely to require multiple PRP sessions (p = 0.006). No significant association was found between gender and the number of PRP sessions (p = 0.732). Smoking was not a significant risk factor for multiple PRP sessions (p = 0.568). Hypertension was significantly associated with multiple PRP sessions (p = 0.031).

Table 1: Comparison of age and gender with PRP sessions

PRP sessions	Gender		Chi-Square	P-value
	Male	Female	0.117	0.732
First session	28	16		
Multiple sessions	24	16		
	Age of patients			
	age 50 or below	age 50 or below	7.507	0.006
First session	20	24		
Multiple sessions	7	33		

Table 2: Comparison of smoking history with PRP sessions

PRP sessions	Smoking history		Chi-Square	P-value
	Yes	No	0.327	0.568
First session	2	42		
Multiple sessions	3	37		

Tab 3. Comparison of HTN status with the PRP session

PRP sessions	HTN status			Chi-Square	P-value
	Controlled HTN	Uncontrolled HTN	No HTN	6.921	0.031
First session	13	08	23		
Multiple sessions	09	01	30		

Discussion:

This study evaluated the association of age groups, gender, smoking, and hypertension with the number of pan-retinal photocoagulation (PRP) sessions required in diabetic retinopathy (DR) patients in the D.I. Khan region. Our findings indicate that age above 50 and hypertension are significant risk factors for requiring multiple PRP sessions, while gender and smoking did not show a statistically significant association.

The significant association between older age (above 50 years) and multiple PRP sessions aligns with previous studies. Satoshi Kato et al. (2002) demonstrated that the prevalence of DR increases with age, even in patients with a shorter duration of diabetes, suggesting that aging itself may exacerbate retinal vascular changes [11]. This is further supported by the natural progression of DR, which tends to be more aggressive in older patients due to cumulative exposure to hyperglycemia and other systemic risk factors. Our findings underscore the importance of early screening and intervention in older diabetic patients to prevent the progression of DR and reduce the need for repeated laser treatments.

Hypertension emerged as a significant risk factor for multiple PRP sessions in our study, consistent with findings from Yu-Ting Li et al. (2021) and Tahir Masaud Arbab et al. (2008) [15.16]. Hypertension exacerbates retinal vascular damage by increasing shear stress and endothelial dysfunction, leading to more severe DR and a higher likelihood of requiring additional PRP sessions. These findings highlight the need for integrated management of diabetes and hypertension to mitigate the progression of DR and reduce the burden of treatment.

Contrary to some studies, we found no significant association between gender and the need for multiple PRP sessions. For instance, Rajiv Raman et al. (2009) reported a higher prevalence of DR in males, which they attributed to differences in healthcare-seeking behaviour and systemic risk factors [12]. Similarly, Sara Cherchi et al. (2020) found that DR was more prevalent in men, possibly due to hormonal and lifestyle differences [13]. The lack of association in our study may reflect regional variations in gender-related risk factors or differences in sample characteristics.

Similarly, smoking did not show a significant association with multiple PRP sessions in our study. This contrasts with findings by Xiaoling Cai et al. (2018), who reported that smoking increased the risk of DR in type 1 diabetes but decreased it in type 2 diabetes [14]. The discrepancy may be due to the relatively low prevalence of smoking in our study population or differences in the distribution of diabetes types. Further studies with larger sample sizes are needed to explore these associations in greater depth.

Our findings have important clinical implications for the management of DR in resource-limited settings like D.I. Khan. Early identification and management of modifiable risk factors, such as hypertension, can help reduce the need for multiple PRP sessions and improve patient outcomes. Additionally, targeted screening programs for older diabetic patients may facilitate early detection and treatment of DR, preventing vision-threatening complications.

This study provides valuable insights into the risk factors influencing PRP sessions in a region with limited access to specialized ophthalmic care. However, several limitations should be acknowledged. First, the study did not account for potential confounding factors such as duration of diabetes, HbA1c levels, or socioeconomic status, which may influence the severity of DR and the need for multiple PRP sessions. Second, the use of consecutive, non-probability sampling may introduce selection bias, limiting the generalizability of the findings. Future studies with larger, more diverse samples and longitudinal designs are needed to validate these results and explore additional risk factors.

This study found that age above 50 and hypertension are significant risk factors for requiring multiple PRP sessions, consistent with previous research [11.15]. Gender and smoking did not show a significant association, contrasting with some studies that reported higher DR prevalence in males and smokers [12,14]. These discrepancies may be due to regional variations in risk factor prevalence or study design differences.

Improved blood pressure control and early intervention strategies may reduce the need for multiple PRP sessions, highlighting the importance of integrated diabetes and hypertension management. This study did not account for potential confounding factors such as duration of diabetes, HbA1c levels, or socioeconomic status, which may influence the need for multiple PRP sessions.

Conclusion:

Age above 50 and hypertension are significant risk factors for multiple PRP sessions in DR patients. Managing these factors may reduce the need for repeated treatments and improve DR outcomes.

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