ORIGINAL ARTICLE

Obesity, Physical Inactivity, and Duration of Diabetes Mellitus as Risk Factors for Multiple Sessions of Retinal Photocoagulation

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Abstract:

Objectives: Diabetic retinopathy (DR) is evolving as one of the leading causes of legal blindness worldwide. There is an immense need for the prevention of this potentially blinding disorder. Research has been going on to determine modifiable risk factors to decrease the progression of DR. More advanced cases of DR need pan-retinal photocoagulation (PRP) for the prevention of potentially blinding complications of DR.

Our study aimed to evaluate obesity, physical inactivity, and duration of DM as risk factors for multiple PRP sessions and the severity of DR.

Methods: This was a cross-sectional comparative study conducted at the Department of Ophthalmology, Gomal Medical College, Dera Ismail Khan, Pakistan from January 2021 to June 2021. The sample consisted of consecutive patients of pan-retinal photocoagulation (PRP) laser procedures during this period at the Eye Unit, DHQ Teaching Hospital, Dera Ismail Khan, Pakistan.

Results: A total of 168 patients undergoing laser procedures were included in the study. Out of these 104 (61.9%) were male and 64 (38.1%) were female. Obesity and duration of DM >5 years were found to be statistically significant ($p<0.05$) risk factors for multiple PRP sessions and severity of DR, whereas physical inactivity was not a statistically significant risk factor for multiple PRP sessions.

Conclusion: Obesity and duration of DM >5 years are significant risk factors for multiple PRP sessions in our setup. Efforts should be made to control all modifiable risk factors for the prevention of the sight-threatening complications of DR. *Al-Shifa Journal of Ophthalmology 2024; 20(3): 101-105. © Al-Shifa Trust Eye Hospital, Rawalpindi, Pakistan.*

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Introduction:

Diabetic retinopathy (DR) is the leading cause of blindness in the working-age group globally[1]. International Diabetes Federation has recently released an estimated figure of 537 million diabetics worldwide and 33 million people are affected in Pakistan.

A review study on diabetic retinopathy has estimated that globally 35% of people with diabetes mellitus (DM) had some form of DR, 7% had proliferative diabetic retinopathy (PDR), 7% had diabetic macular edema (DME), and 10% were affected by the vision-threatening stages of diabetic retinopathy[2].

Among other measures, intra-vitreal injections of anti-vascular endothelial growth factors (VEGFs) and Pan-retinal photocoagulation (PRP) procedures have been widely used for the treatment of these vision-threatening complications. These treatment strategies aim to halt further vascular proliferation and exudation on the retina. These modalities cannot revert the tissue damage already caused by the effects of metabolic disturbances of DM. So there is a significant need to prevent tissue damage by controlling the risk factors responsible.

Apart from good metabolic control[3], the duration of DM, associated hypertension[4], smoking, nephropathy, pregnancy, smoking, obesity[5,] and anemia have been associated with the progression of DR and its complications. However, relatively recent studies such as the Action in Diabetes and Vascular Disease (ADVANCE)[3] and the Action to Control Cardiovascular Risk in Diabetes (ACCORD-Eye)[4] have shown a limit to the risk reduction for DR that can be achieved with better glucose and BP management alone, respectively. Also, the evidence supporting the relationship between other modifiable risk factors and the severity of DR is inconclusive[6-9]. There remains a need for retinal photocoagulation for the prevention of vision-threatening complications of DR.

It can easily be understood that the more severe the DR, the more frequent the need for PRP sessions. So, the need for multiple PRP sessions is an indirect indicator of the severity of DR. As our study was conducted on patients being treated with laser PRP for severe DR, it is presumed that patients receiving multiple PRP sessions have more severe DR. Our objective was to determine whether Obesity, Physical Inactivity, and Duration of DM are risk factors for Multiple PRP Sessions in our location.

Materials and Methods:

This was a cross-sectional comparative study conducted at the Department of Ophthalmology, Gomal Medical College, Dera Ismail Khan, Pakistan from January 2021 to June 2021. The sample consisted of consecutive patients receiving Green laser photocoagulation during this period at the Eye Unit, DHQ Teaching Hospital Dera Ismail Khan, Pakistan. Approval from the ethical committee of Gomal Medical College, Dera Ismail Khan was taken before starting the study.

A total of 168 patients receiving Green laser procedures were included in the study using consecutive sampling during this period. Green laser procedures were performed with a mono-spot slit-lamp delivery system, Nidek GYC-1000, Japan in all patients under topical anesthesia using a wide-field Mainster PRP contact lens.

The patients were divided into those who received only one session of PRP (Single PRP Session) and those who received more than one (Multiple PRP Session). Obesity was defined as Body Mass Index (BMI) >30 kg/m^2 and less than 30 were taken as non-obese. Physical inactivity was defined as the absence of exercise with dedicated time and place. Based on the duration of DM, the subjects were divided into those having <5 years and those having ≥5 years duration from the onset of DM.

Patients with other ocular (including dense cataract, glaucoma, uveitis) or systemic (joint disease, end-stage kidney disease) co-morbidities were excluded.

The sample was described by frequency and percentages using SPSS version 20 software. Gender and Age of the patient were the demographic variables and Obesity, Physical inactivity, and Duration of Diabetes were our clinical/research variables. The clinical variables were compared with the number of PRP sessions using the Chi-square test and a p-value <0.05 was taken to be statistically significant.

Results:

A total of 168 patients were included in the study. Out of these 104 (61.9%) were male and 64 (38.1%) were female. Mean age of

the patients was 56.83 ± 12.5 years. The frequency distribution of Obesity, Physical Inactivity, Duration of DM, and PRP Sessions are shown in Tables 1.

Table 1: Frequency distribution

Obesity	Frequency	Percent
Obese	26	15.5%
Non-Obese	142	84.5%
Total	160	100%
Physical Inactivity	Frequency	Percent
Absent	26	15.5%
Present	142	84.5%
Total	160	100%
Duration of DM	Frequency	Percent
<5 years	36	21.4%
>5 years	132	78.6%
Total	160	100%
PRP Sessions	Frequency	Percent
Single PRP Session	88	52.4%
Multiple PRP Sessions	80	47.6%
Total	160	100%

A comparison between the research variables (Obesity, Physical Activity, and Duration of DM) and PRP sessions is shown in Tables 2 to 4 respectively.

Table 2: Comparison of Obesity: PRP Sessions

PRP Sessions	Obesity		Chi-Square	p-value
Single Session	Obese	Non-Obese	10.590	0.001
	6	82		
Multiple Session	20	60		

Table 3: Comparison of Physical Inactivity: PRP Sessions

PRP Sessions	Physical Inactivity		Chi-Square	p-value
Single Session	Absent	Present	1.034	0.309
	16	72		
Multiple Session	10	70		

Table 4: Comparison of Duration of DM: PRP Sessions

PRP Sessions	Duration of DM		Chi-Square	p-value
Single Session	<5 years	>5 years	17.598	0.000
	30	58		
Multiple Session	6	74		

This is evident from the above tables that Obesity (p=0.001) and Duration of DM >5 years (p=0.000) are statistically significant (p<0.05) risk factors for multiple PRP Sessions, whereas Physical Inactivity (p=0.309) is not statistically significant (p>0.05) risk factor for multiple PRP Sessions.

Discussion:

It is evident from Table 2 that Obesity is a statistically significant risk factor for multiple PRP sessions and so for the severity of DR. Dirani et al had concluded that obese people were 6.5 times more likely to have PDR as compared to normal weight[10]. Also, they have shown that higher Body-mass index (BMI) was significantly associated with any DR (p=0.02). Moreover, they have also shown that neck circumference (p=0.03) and waist circumference (p=0.01) were also significantly associated with any DR. In contrast Hwang et al had shown that higher BMI (p=0.001), larger waist circumference (p=0.047) and higher total body fat (p<0.001) were significantly associated with lower risk of vision-threatening DR.

In our study, physical inactivity is not a statistically significant risk factor for multiple PRP sessions (p=0.309) and so, neither for the severity of DR. AlQabandi et al had published an extensive review on this subject in which they have linked decreased sedentary times and more physical activity to the delayed onset and progression of DR and its severity[11]. They also added that physical activity provides both protective and anti-inflammatory effects on the retina.

In our study duration of DM >5 years is a statistically significant risk factor for multiple PRP sessions and so for severity of DR (Table:7). Similar results have been shown by Jenchitr W et al in their study at 10 and 20 years of DM. They have shown that for subjects having less than 10 years of DM, the prevalence of NPDR varied from 13.11% to 22.91% and PDR varied from 2.15% to 2.42%. Whereas subjects having up to 20 years of DM, the prevalence of NPDR was up to 42.86% and PDR was up to 10.20%[12]. Niazi et al have shown the duration of DM as an independent risk factor for both severity and progression of DR (OR 5.7 for 5 to 10 years and 32.3 for more than 10 years in cases of NPDR and OR $2x10^6$ for 5 to 10 years and $2x10^8$ for more than 10 years in cases of PDR.

Conclusions:

Obesity and duration of DM > 5 years are significant risk factors for multiple sessions of PRP and so for severity of DR in our location. Control of modifiable risk factors as much as possible can decrease the risk of progression of DR and so for the need of multiple PRP sessions.

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