Journal of Ophthalmology Research Reviews & Reports



Research Article

Correlation of the Different Grades of Pterygium with Severity of Dry Eye Disease

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ABSTRACT

Introduction: Pterygium is an ocular surface disease which causes tear film instability leading to dry eye symptoms and irritation.

Material Method: Patients with primary pterygium having symptoms with grade 2, 3, 4 pterygia were selected. Parameters for dry eye disease like Tear film break up time, schirmer's test, tear meniscus height were evaluated and OSDI questionnaires was asked and scores were calculated in patients with different grades of pterygium. The data collected was qualitative in nature and Chi square test was used to calculate the association between these variables.

Results: In selected 75 patients with various grades of primary pterygium with high percentage of grade 2 pterygium (66.6%). There was definite association with grades of pterygium and OSDI (P<0.05). Similarly, Tear Film Breaks up Time (TBUT), Tear Meniscus Height (TMH), schirmer's 1 and 2 were significantly associated with various grades of pterygium (P<0.05).

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Received: February 04, 2023; Accepted: February 10, 2023; Published: February 16, 2023

Keywords: Pterygium, Dry Eye Disease, Tear Film Break Up Time (TBUT), Tear Meniscus Height (TMH), Schirmer's 1 and 2

Introduction

Pterygium is a frequently encountered ocular surface disorder. It's a fibrovascular subepithelial ingrowth of degenerative bulbar conjunctiva, as it crosses the limbus and grows over cornea leading to tear film instability, alteration in the limbal epithelial cells causing the ocular surface changes resulting in dry eye disease. Dry eve symptoms are common among pterygium patients and many investigators have noted a link between dry eye and pterygium, which may be an independent risk factor for dry eye. Dry eye disease is a multifactorial malady of tears and ocular surface which gives rise to ocular surface uneasiness, visual disparity and conjointly tear film instability along with potential harm to the ocular surface [1]. This damages the ocular surface especially in interpalpebral area with a variety of symptoms reflecting ocular discomfort [2]. The risk of dry eye symptoms is higher in pterygium patients due to indirect effect of mediators of inflammation in pterygium [3]. Dry eye disease caused by pterygium can be evaluated by Tear Meniscus Height (TMH), Ocular Surface Disease Index (OSDI), Tear film breakup time (TBUT), Schirmer's 1 & 2 [4, 5]. Tear film breakup time is useful in detecting mucin and lipid layer deficiency of tear film. Schirmer's test indicates instability of aqueous phase of tear film. Severity of ocular surface changes are associated with grades of pterygium. Hence; the aim of the study is to evaluate the different grades of pterygium and its correlation with severity of dry eye disease.

Materials and Methods

The present study was conducted after the approval of institutional ethical committee. Patients with primary pterygium having symptoms were taken in consideration after taking written informed consent for the study.

The study data includes the complete demographic profile of patient. In addition to presenting complaints, past medical and surgical history was noted. Detailed systemic and ocular examination was done to rule out adnexal, anterior and posterior segment diseases. Patients were included fulfilled the following criteria: Inclusion Criteria:1. Patients with primary grade 2, grade 3, grade 4 pterygium has an age group between 18-75 years (figure 1,2,3).



Figure 1: Grade 2 nasal pterygium



Figure 2: Grade 4 nasal pterygium



Figure 3: Schirmer's – 1 with Grade 3 nasal pterygium

Exclusion Criteria1

Patients below 18 years and above 75 years of age. 2. Patients not consenting for the study. 3. asymptomatic patients with grade 1 pterygium. 5. Patients having ocular comorbidities other than pterygium 6. Patients having systemic diseases\syndromes associated with dry eye (e g. Sjogren's syndrome).

Fibrovascular tissue which extends from the bulbar conjunctiva on the cornea was accepted as pterygium [3]. Grading of the pterygium was done according to Sejal and Maheshwari slitlamp grading based on relative translucency of the body of the pterygium Grade 1: fibrovascular tissue just touching the limbus, Grade 2: between the limbus and a point midway between the limbus and pupillary margin, Grade 3: head of the pterygium reaching the pupillary margin; and Grade 4: crossing the pupillary margin [6]. Presence of dry eyes was evaluated by Tear Meniscus Height (TMH), Ocular Surface Disease Index (OSDI), Tear Film Breakup Time (TBUT), Schirmer's 1 & 2 (figure 3,4,5). OSDI questionnaires was asked and scores were calculated in patients with different grades of pterygium (figure 6). The data collected was qualitative in nature and Chi square test was used to calculate the association between these variables.



Figure 4: Schirmer's-2



Figure 5: Tear meniscus height



Figure 6: OSDI Questionnare

Results

Table 1 shows that female patients have the highest percentage 31.9% for less than 50 years of age while, the lowest percentage 29.8% belongs to 50-60 years of age. Similarly, Male patients show the highest percentage 35.7% for 50-60 years of age while, an equal percentage 32.1% belongs to less than 50 years and 60-70 years of age. As shown in table 2 Patients falling under grade 2 group show the higher percentage 66.66%. Patients falling under grade 3 group show the 28% and the lower percentage 5.33 % was shown in grade 4 Pterygium. Table 3 suggests the association between Pterygium grade and Tear meniscus height of the respondents which found to be significant (P < 0.05). It implies that tear meniscus height of patients differs significantly with the pterygium grade they belong to. Patients falling under grade 2 group show the highest percentage 40% for =0.22 tear meniscus height while, the lowest percentage 24% had > 0.22 tear meniscus height. Patients falling under grade 3 group show the highest percentage 66.7% for < 0.22 tear meniscus height while, the lowest percentage 4.8% had > 0.22 tear meniscus height. On the other hand, 100% patients falling under grade 4 group had <0.22 Tear Meniscus height. Association of Pterygium Grade and OSDI Group is shown in table 4 which was found to be significant (P < 0.05). It implies that Pterygium grade of patients differs significantly with the OSDI they had. Patients falling under grade 2 group show the highest percentage 74% for mild OSDI while, show the lowest percentage 2% for severe OSDI. Patients falling

under Grade 3 group show the highest percentage 57.1% for mild OSDI while, show the lowest percentage 4.8% equally for both severe and normal OSDI. On the other hand, patients falling under grade 4 group show the highest percentage 50% for mild OSDI while, none for Severe OSDI. Table 5 signifies the association between Pterygium Grade and TBUT of the respondents which found to be significant (P < 0.05). It implies that Pterygium grade of patients differs significantly with the TBUT they had. Patients falling under grade 2 group show the highest percentage 54% for 25-21 TBUT while, show none for <=10 TBUT. Patients falling under grade 3 group show the highest percentage 42.9% for 20-16 TBUT while, show none for <=10 TBUT. On the other hand, patients falling under grade 4 group show the highest percentage 50% for <=10 TBUT while, show none for both 15-11 and 30-36 TBUT. Association between Pterygium Grade and Schirmer's 1 was seen in table 6 which found to be significant (P < 0.05). It implies that Pterygium grade of patients differs significantly with the Schirmer's 1 they had. Patients falling under grade 2 group show the highest percentage 74% for 25-21 Schirmer's 1while, show none for both 15-11 and <=10 Schirmer's 1. Patients falling under grade 3 group show the highest percentage 52.4% for 20-16 Schirmer's 1 while, show none for 30-26 and ≤ 10 Schirmer's 1. On the other hand, patients falling under grade 4 group show the highest percentage 50% for 15-11 Schirmer's 1 while, show none for 30-26 and 25-21 Schirmer's 1. Table 7 shows the association between pterygium grade and Schirmer's 2 of the respondents which found to be significant (P<0.05). It implies that Pterygium grade of patients differs significantly with the Schirmer's 2 they had. Patients falling under grade 2 group show the highest percentage 46% for 25-21 SCHIRMERS 2 while, show none for <=10 Schirmer's 2. Patients falling under grade 3 group show the highest percentage 52.4% for 15-11 Schirmer's 2 while, show none for ≤ 10 Schirmer's 2. On the other hand, patients falling under grade 4 group show the highest percentage 50% for <=10 Schirmer's 2 while, show none for 25-21 Schirmer's 2.

Table 1: Distribution	n of Sex and Age	Group in study patients
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Age Group		SEX		Total
		Female	Male	
< 50 Years	Count	18	9	27
	%	38.3%	32.1%	36.0%
50-60	Count	14	10	24
Years	%	29.8%	35.7%	32.0%
60-70	Count	15	9	24
Years	%	31.9%	32.1%	32.0%
Total	Count	47	28	75
Total	%	100.0%	100.0%	100.0%

Age Group		PTERYGIUM GRADE			
		Grade 2 Grade 3 Grade 4			
	Count	50	21	4	
Total	%	66.66%	28%	5.33%	

Table 3: Association	of Pterygium	Grade and	Tear Meniscus
HT Group			

TEAR MENISCUS HT		PTER	Total		
		Grade 2	Grade 3	Grade 4	
< 0.22	Count	18	14	4	36
	%	36.0%	66.7%	100.0%	48.0%
	Count	20	6	0	26
=0.22	%	40.0%	28.6%	0.0%	34.7%
	Count	12	1	0	13
> 0.22	%	24.0%	4.8%	0.0%	17.3%
	Count	50	21	4	75
Total	%	100.0%	100.0%	100.0%	100.0%
Chi Square	Df	P Value	P Value Result		
11.190a	4	0.025	Significant		

 Table 4: Association of Pterygium Grade and OSDI Group

OSDI		PTERYGIUM GRADE			Total		
		Grade 2	Grade 3	Grade 4			
Severe	Count	1	1	0	2		
	%	2.0%	4.8%	0.0%	2.7%		
	Count	2	7	1	10		
Moderate	%	4.0%	33.3%	25.0%	13.3%		
	Count	37	12	2	51		
Mild	%	74.0%	57.1%	50.0%	68.0%		
	Count	10	1	1	12		
Normal	%	20.0%	4.8%	25.0%	16.0%		
Total	Count	50	21	4	75		
	%	100.0%	100.0%	100.0%	100.0%		
Chi Square	Df	P Value		Result			
13.690ª	6	0.033	Significant				

Tuble et 1950etation of 1 terygium et aue and 1201 et oup						
	PTERYGIUM GRADE			Total		
	Grade 2	Grade 3	Grade 4			
Count	6	3	0	9		
%	12.0%	14.3%	0.0%	12.0%		
Count	27	6	1	34		
%	54.0%	28.6%	25.0%	45.3%		
Count	13	9	1	23		
%	26.0%	42.9%	25.0%	30.7%		
Count	4	3	0	7		
%	8.0%	14.3%	0.0%	9.3%		
Count	0	0	2	2		
%	0.0%	0.0%	50.0%	2.7%		
Count	50	21	4	75		
%	100.0%	100.0%	100.0%	100.0%		
Df	P Value		Result			
8	0.000		Significant			
	Count % Count % Count % Count % Count % Count % Count % S	PTER Grade 2 Count 6 % 12.0% Count 27 % 54.0% Count 13 % 26.0% Count 4 % 8.0% Count 0 % 0.0% Count 50 % 100.0% Df P Value 8 0.000	PTERYGIUM G Grade 2 Grade 3 Count 6 3 % 12.0% 14.3% Count 27 6 % 54.0% 28.6% Count 13 9 % 26.0% 42.9% Count 4 3 % 8.0% 14.3% Count 0 0 % 8.0% 14.3% Count 13 9 % 8.0% 14.3% Count 0 0 % 0.0% 0.0% Count 50 21 % 100.0% 100.0% Uters 8 0.000	PTERYGIUM GRADE Grade 2 Grade 3 Grade 4 Count 6 3 0 % 12.0% 14.3% 0.0% Count 27 6 1 % 54.0% 28.6% 25.0% Count 13 9 1 % 26.0% 42.9% 25.0% Count 4 3 0 % 8.0% 14.3% 0.0% Count 0 2 9 % 8.0% 14.3% 0.0% Count 0 2 9 % 0.0% 0.0% 50.0% Count 0 2 9 % 0.0% 0.0% 50.0% Count 50 21 4 % 100.0% 100.0% 100.0% W 0.000 Significant 5		

 Table 5: Association of Pterygium Grade and TBUT Group

Table 6: Association of Pterygium Grade and SCHIRMERS1 Group

SCHIRMERS 1		PTERYGIUM GRADE			Total
		Grade 2	Grade 3	Grade 4	
30-26	Count	5	0	0	5
	%	10.0%	0.0%	0.0%	6.7%
	Count	37	8	0	45
25-21	%	74.0%	38.1%	0.0%	60.0%
	Count	8	11	1	20
20-16	%	16.0%	52.4%	25.0%	26.7%
	Count	0	2	2	4
15-11	%	0.0%	9.5%	50.0%	5.3%
<=10	Count	0	0	1	1
	%	0.0%	0.0%	25.0%	1.3%
Total	Count	50	21	4	75
	%	100.0%	100.0%	100.0%	100.0%
			-		
Chi Square	Df	P Value	Result		
30.457ª	8	0.000		Significant	

Table 7: Association of Pterygium Grade and SCHIRMERS2 Group							
SCHIRMERS 2		PTERYGIUM GRADE			Total		
		Grade 2	Grade 3	Grade 4			
25-21	Count	23	4	0	27		
	%	46.0%	19.0%	0.0%	36.0%		
	Count	21	6	1	28		
20-16	%	42.0%	28.6%	25.0%	37.3%		
	Count	6	11	1	18		
15-11	%	12.0%	52.4%	25.0%	24.0%		
<=10	Count	0	0	2	2		
	0/0	0.0%	0.0%	50.0%	2 7%		

	%	100.0%	100.0%	100.0%	100.0%
Chi Square	Df	P Value		Result	
30.457 ^a	8	0.000	Significant		

21

4

75

50

Count

Discussion

Total

Patients of age range included in our study was 28-70 years with a mean age of 62 years similar to Antony et al. Female preponderance was seen in our study because majority of female patients were field worker by occupation while male preponderance was seen in Ann Tresa Antony et al and Safarzadeh et al [7]. Out of total 75 pterygium cases, maximum cases (65.8%) belongs to grade 2 pterygium. As in Zhang et al study also showed maximum number of patients with grade 2 pterygium (52.3%). TBUT has been used as an important indicator and was markedly reduced in patients with pterygium that is directly co-related with increasing grade of ptervgium similar to Moreno JC et al study [8,9]. A study conducted by Ranjana Bandvopadhvay et al revealed 30% of patients with pterygium had TBUT less than 10 as compared to our study which observed significantly low TBUT in relation to the grade of pterygium i.e., 50% of grade 4 pterygium patients have TBUT less than 10. Another study conducted by Masoud Jafarzadeh et al showed significantly lower TBUT (61.05%) in pterygium patients supporting our results. Tear meniscus height was not significant in pterygium and control patients in a study done by Ning et al while in our study,48% of study patients have tear meniscus height (<0.22) talks about significant correlation with grade of pterygium with tear meniscus height [10, 11] and the study done by Masoud Jafarzadeh et al showed significantly lower TMH in ptervgium patients 82.1 % cases and they found to have TMH 0.21 vs 0.24 in 3.16 % cases supporting our results. Many studies have not found significant difference in Schirmer's test between pterygium patients and controls, however Osama m omran et al found 40 % pterygium cases to be schirmer's positive as opposed to 0% in control after group while in our study, schirmers 1,2 with grade of pterygium was found to be significantly correlated. 10 patients (13.3%) have schirmer's 1 value less than 15 and 20 patients (26.6%) has schirmers 2 value less than 15. In a recent study conducted in 2022, Mohd Rdzi et al reported OSDI to be significantly associated with increasing grade of pterygium, as OSDI suggests that with increasing grade of pterygium there is increase in the dryness. This association was not seen in the study performed by Ning Li et al where it was negatively correlated to pterygium grade of pterygium. In our study significant correlation was found between different grades of

pterygium and the dry eye evaluation parameters namely TBUT, TMH, Schirmer's 1, Schirmer's 2. This implies dry eye disease is directly proportional to increasing grades of pterygium.

Conclusion

We can conclude that pterygium induced dry eye was associated with increasing grades of pterygium.

Disclaimer: No financial interest, no conflict of interest.

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