

## Studying the Type of Astigmatism in Patients with Corneal Pterygium Referring to Ophthalmology Clinics of Northwestern Iran

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**Abstract:** Pterygium is a prevalent ocular disease which is often asymptomatic but can cause photophobia and tearing and decrease vision through progression towards the visual axis or create astigmatism. Our aim in this study is to determine the type of astigmatism in patients suffering from corneal pterygium referring to Imam Hospital during the second six months of the year 2010. **Methods:** All patients referring to the ophthalmology clinics of the education-treatment center of Imam in Urmia were non-randomly entered into the plan and the rate and type of their astigmatism were studied. The patients' informations such as demographics, urban and rural, occupation, the amount and type of astigmatism was determined by Autorefractometer set (with-the-rule or against-the-rule astigmatism) and entered into the check-lists. **Results:** Among 100 studied patients, 55 patients (55%) were men and 45 (45%) were female. For 32 cases (32 %) right eyes, 38 (38%), left eyes and 30 cases (30 %), both eyes suffered from Pterygium. In comparison of the type of astigmatism between eyes with pterygium and healthy eyes, it was observed that out of 130 eyes suffering from pterygium, 83 cases (63.8%) had with-the-rule astigmatism, 13 cases (10%) against-the-rule astigmatism and 34 cases (26.2%) had oblique astigmatism. Out of 67 healthy eyes, 30 cases (44.8%) were with-the-rule astigmatism, 12 cases (17.9%) against-the-rule astigmatism and 25 ones (37.3%) oblique astigmatism. Given the Chi-Square statistic test, there is a significant difference between the types of astigmatism of eyes with pterygium and healthy eyes ( $P=0.03$ ). The average rate of astigmatism in 130 eyes with pterygium was  $-1.52 \pm 1.32$  diopters and  $-1.04 \pm 1.41$  diopters in 67 healthy eyes. According to the t-test, there is a significant statistical difference between the rate of astigmatism in eyes suffering from pterygium and that in the healthy eyes ( $P=0.01$ ). **Conclusions:** Pterygium causes the creation of with-the-rule astigmatism and also has a great impact on the rate of astigmatism.

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### Introduction

Pterygium is a prevalent ocular disease which expands as a highlight triangular mass of thickened bulbar conjunctiva on the cornea [Ojaghi H, 2005]. Pterygium is the growth of fibrovascular tissue originated from conjunctiva and progresses towards cornea and also UV rays and environmental factors such as heat, wind, dust and dry weather. Its prevalence is directly related to the proximity to the equator. Pterygium is often asymptomatic; however, it can cause photophobia and tearing and also reduce visibility through progression towards the visual axis or create astigmatism [Mehrtash A, 2000]. Feeling a foreign body in the eye, eye irritation- and itch, blurred vision, and in case of progression, limited field of vision are the signs of pterygium [Waller S Adamis A, 2001]. The above-mentioned disease is created due to the degeneration of collagen and the appearance of subepithelial fibrovascular tissue in conjunctiva. Pterygium on cornea also causes the destruction of Bowman's layer and inflammatory changes [Fraunfelder FRoy F 2000, Liesegang T et al.

2000]. Pterygium can cause to create astigmatism, limited field of vision and aesthetic problems [Ojaghi H 2005, Fraunfelder FRoy F 2000, Liesegang T et al. 2000]. Medical treatments must be performed and sun-rays exposure should possibly be limited until frequent and severe inflammation and irritation, involvement of the optic axis and aesthetic problems is not created [Waller Adamis A, 2001]. In case of the above symptoms and problems related to beauty and sometimes the need to use contact lenses, surgery is inevitable [Mehrtash A, 2000]. This damage is mostly occurred in the nasal and is more common in hot and sunny areas in frequent contact with dry weather [Nikbin H et al., 2000]. Due to exposure to sun-light, Pterygium is a major public health problem in rural areas. Independent parameters in the incidence of pterygium such as older age, male and the history of out-door activities indicate the multi-factorial causes of pterygium [Shoja MBesharati M, 2004]. The progression of pterygium does not follow a special rule; it may persist for months or years without any progression or may suddenly develop towards the

cornea within 2-3 months. It takes years for pterygium to reach the cornea axis. In a study conducted by Amsler et al, they observed that the pterygium created against-the-rule astigmatism of about 1.5 diopters [Amsler M, 1953]. Most active and progressive lesions are seen among the youth, and the most severe lesions are seen in farmers and construction workers [Nikbin H et al. 2000, King JWad S 1981]. As it was mentioned above, one of the most common complications of pterygium is astigmatism. In the study by Sedaghat et al on 59 eyes of 44 patients in Mashhad, the axis of astigmatism was with-the-rule one in more than two thirds of the patients [Sedaghat M et al., 2002]. In the study conducted by Shoja' M.R et al, independent risk factors for pterygium was age, male gender, rural residence and exposure to ultra-violet radiation. Pterygium has often created an asymmetric with-the-rule astigmatism. Pterygium which expanded more than 45% of the corneal curvature caused more than 3 diopters astigmatism. There was a significant positive correlation between the amount of the progression of corneal pterygium and created astigmatism [Shoja MBesharati M, 2004]. In the study by Mohammed Saleh and colleagues in Malaysia, the most common type of astigmatism in patients with pterygium was with-the-rule astigmatism, 49.4%, then against-the-rule, 36.4% and finally, oblique, 14.3%. There was a stronger correlation between pterygium size and the difference in corneal astigmatism in the group with pterygium compared with that in the control group. When pterygium extension becomes more than 2.2 mm, astigmatism will increase as 2 diopters [Mohammad-Salih PASHarif AF, 2008]. As it was mentioned above and more fully in the literature review, in the vast majority of textbooks, astigmatism of the pterygium are of against-the-rule type; and in most of the papers, they are of with-the-rule ones; however, clinical experience in Imam Hospital in Urmia suggests the higher rate of against-the-rule astigmatism. Therefore, the present study has been designed for an exact and documentary investigation of the status of astigmatism in patients with pterygium in Imam Hospital in Urmia which is also the referral center for ophthalmology in the province so that in case this assumption be proved, a study be recommended and conducted in order to examine its causes and contributing factors. In new references, no references have been made for against- or with-the-rule types of astigmatism.

#### Materials and Methods

This descriptive-cross sectional study was conducted on patients with pterygium referring to the eye clinic of Imam Hospital, Urmia in 2010. All patients with pterygium who referred to Imam medical center during the year 2010 and were studied in the

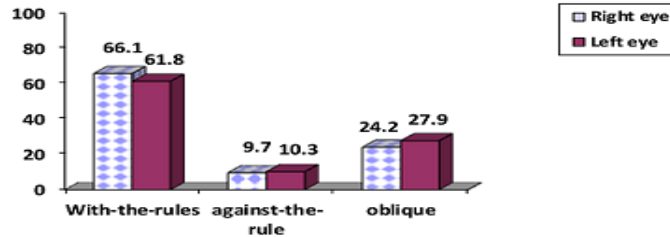
clinic, were Non-randomly entered into the plan and the type and amount of their astigmatism were examined. A list was designed by researchers beforehand that these researchers completed it before coming to the clinic. The subjects' information such as demographic data, being urban or rural, occupation, the amount of astigmatism determined by refraction, the type of astigmatism (with- or against-the-rules) were entered into the lists. The collected data were entered into the SPSS statistical software ver16 and were statistically analyzed by descriptive statistics (including frequency, mean and standard deviation). To evaluate the correlation between pterygium and the type of astigmatism, the Chi-square test and/or Fisher's exact test were used. The questionnaires were completed anonymously and the subjects' information remained with the researchers.

#### Results

The current study was conducted to determine the type of astigmatism in patients with corneal pterygium referring to the eye clinics of Imam Hospital, Urmia in 2010. Of 100 patients examined in this study, 55 patients (55%) were male and 45 (45%) were female. The mean age of the overall patients was  $55.40 \pm 16.11$  years (minimum of 22 years and maximum of 90 years). Of 100 examined patients, 9 patients (9%) were in the age group of less than or equal to 30 years, 28 patients (28%) in the 31-50 years age group, 44 patients (44%) in the 51-70 age group, and 19 patients (19%) were more than 70 years old. Out of 100 examined patients, 47 patients (47%) were urban and 53 (53%) were rural residents. Out of 100 examined patients, 38 patients (38%) were farmer, 34 patients (34%) were housewives, 10 patients (10%) employees, 9 patients (9%) self-employed, and 9 patients (9%) were workers. Of 100 studied patients, in 32 cases (32%), the right eyes, in 38 cases (38%), the left eye and in 30 cases (30%), both eyes suffered from pterygium. In this study, we collected patients who had pterygium in both eyes (30 cases in their right eyes and 30 ones in their left eyes) with patients who had only the right eye or the left eye with pterygium. This means that 130 eyes were obtained with pterygium (62 cases (47.69 %) in the right eye and 68 cases (52.31%) in the left eyes). Of 130 eyes with pterygium, the frequency of astigmatism was 83 cases (63.8%) with-the-rules, 13 cases (10%) against-the-rule and 34 cases (26.2%) oblique. Of 62 patients with right-eye pterygium, 41 cases (66.1%) had with-the-rule astigmatism, 6 ones (9.7%) had against-the-rule astigmatism and 15 cases (22.4%) had oblique astigmatism. Of 68 patients with left-eye pterygium, 42 cases (61.8%) had with-the-rule astigmatism.

**Table 1:** Distribution of relative and cumulative frequencies of the type of astigmatism in the studied population

Variable	Type of astigmatism			Total
	With-the-Rules	Against-the-Rule	Oblique	
Right eye	(%66.1)41	(%9.7)6	(%24.2)15	(%100)62
Left eye	(%81.8)42	(%10.3)7	(%27.9)19	(%100)68
Total	(%63.8)83	(%10)13	(%26.2)34	(%100)130



**Figure 1:** Relative frequency distribution of astigmatism in the studied population

The mean amount of astigmatism in 62 right eyes with pterygium was  $-1.60 \pm 1.33$  diopters and in 68 left eyes with pterygium was  $-1.45 \pm 1.32$  diopters. According to t-test, there were no significant differences between two eyes with the amount of their astigmatism (The overall mean of the amount of astigmatism in patients with pterygium was  $-1.52$  diopters).

In this study, we examined 70 healthy eyes, 37 (9.52%) right eyes and 30 (9.42%) left eyes as control eyes. Of these 70 cases, 3 cases were not measurable in the examination (1 left eye due to blindness and 1 due to corneal opacities) and 1 case of the right eye was excluded from the study due to corneal transplants that finally, 67 samples were investigated as the control eyes. Of 37 healthy right eyes, the type of astigmatism in 15 cases (40.5%) was (10.3%) had against-the-rule astigmatism, and 19 cases (27.9%) had oblique astigmatism (Table 1,

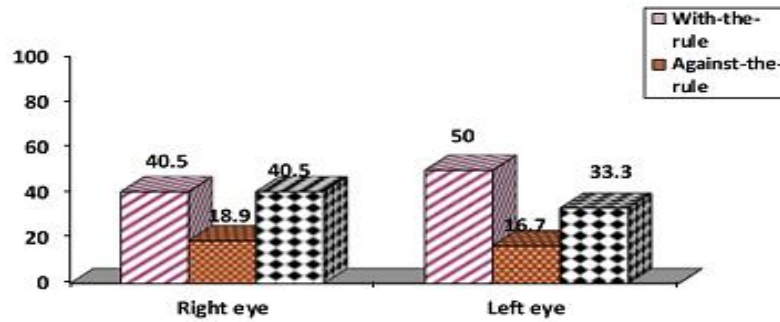
Figure 1). With-the-rule one, in 7 cases (18.9%) against-the-rule and in 15 cases (40.5%) it was oblique astigmatism. Of 30 healthy left eyes, the type of astigmatism in 15 cases (50%) was with-the-rule ones, in 5 cases (16.7%) against-the-rule and in 10 cases (33.3%) the type of astigmatism was oblique. Given the Chi-square test, there were no significant differences between the type of astigmatism with healthy eyes. ( $P=0.73$ ) (Table 2, Figure 2).

**Table 2:** Distribution of relative and cumulative frequencies of the type of astigmatism in the studied population (healthy eyes)

Variable	Type of astigmatism			Total
	With-the-Rules	Against-the-Rule	Oblique	
Right eye	(%50.5)15	(%18.9)7	(%40.5)15	(%100)37
Left eye	(%50)15	(%16.7)5	(%33.3)10	(%100)30
Total	(%44.7)30	(%17.9)12	(%37.3)25	(%100)67

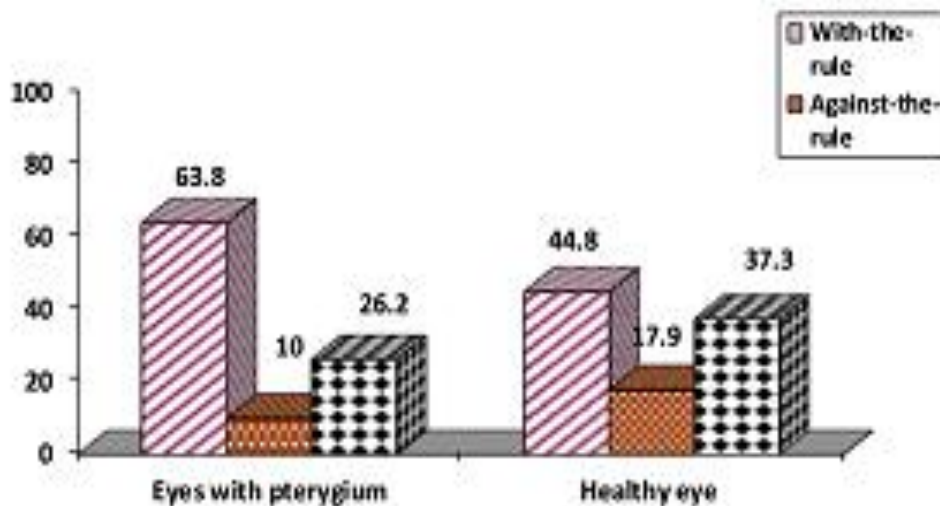
**Table 3:** Comparison of the type of astigmatism in eyes with pterygium and healthy eyes = 0.03p Chi-square

Variable	Type of astigmatism			Total
	With-the-Rules	Against-the-Rule	Oblique	
Right eye	(%63.8)83	(%10)13	(%26.2)34	(%100)130
Left eye	(%44.8)30	(%17.9)12	(%37.3)25	(%100)67
Total	(%57.4)113	(%12.7)25	(%29.9)59	(%100)197



**Figure 2:** Relative frequency distribution of astigmatism in the study population (healthy eyes)  
 The mean astigmatism in 37 healthy right eyes was  $-0.9 \pm 0.75$  diopters and in 30 healthy left eyes, it was  $-1.2 \pm 1.9$  diopters. According to the t-test, there were no significant differences between the amounts of astigmatism and healthy right and left eyes ( $p=0.37$ ). (The overall mean of the amount of astigmatism in healthy eyes is  $-1.04$  diopters).

In comparing the astigmatism of the pterygium with healthy eyes, it was observed that of 130 eyes with pterygium, the type of astigmatism in 83 cases (63.8%) was with-the-rule ones, in 13 cases (10%) against-the-rule and in 34 cases (26.2%) the type of astigmatism was oblique. Of 67 healthy eyes, 30 patients (44.8%) was with-the-rule ones, in 12 cases (17.9%) against-the-rule and in 25 cases (37.3%), the type of astigmatism was oblique. Given the Chi-square test, there were no significant differences between the types of astigmatism in eyes with pterygium and the healthy eyes. ( $P=0.03$ ) (Table 3, Figure 3).



**Figure 3:** Comparison of the type of astigmatism in eyes with pterygium and that in healthy eyes  
 Mean astigmatism in 130 eyes with pterygium was  $-1.52 \pm 1.32$  diopters and in 67 healthy eyes was  $-1.04 \pm 1.41$  diopters. According to the t-test, there were no statistical significant differences between the types of astigmatism in the healthy eye and that in the eyes with pterygium ( $P=0.01$ ).

## Disussion and Conclusion

Independent and intervening parameters involved in the incidence of pterygium are older age, male gender, the history of out-door activities to name a few (Shoja M Besharati M, 2004). Accordingly, in our study, men had the most percentage of patients with pterygium than women (55% vs. 45%). A high percentage of pterygium in men can be attributed to more out-door activities and exposure to UV sunlight. Pterygium is mostly occurred in nasal part and it is more common due to frequent contact with dry weather in warm, and sunny areas (Nikbin H et al., 2000). The high frequency of Pterygium is in the age group 70-51 years in our study (44%) that this percentage encompasses the most patients referred to the eye clinics compared to other age groups. In this study, 53% of people were living in rural areas (53%), 47% were urban residents. The amount of the incidence of pterygium in rural residents is more than that in urban ones. We consider the high rate of exposure to more sunlight and dust as the main reason for this (Shoja M Besharati M, 2004). In our study, the frequency of pterygium in the patients based on occupation, the farmers (38%) and housewives (34%) had the highest percentage of patients suffering from pterygium; and its reason could be that rural residents and farmers are more exposed to the sun's UV rays. In most previous studies, similar results have been obtained, in the way that in the study conducted by Reza Shojaei and colleagues, independent risk factors for pterygium were age, males, staying in the village and most of the lifetime exposure to ultra-violet radiation (Shoja M Besharati M, 2004). The most common signs and symptoms of Pterygium are red eye, tearing and photophobia and reduced- or blurred vision due to the development towards the visual axis and creating astigmatism, limiting the visual fields (Mehrtash A 2000, Ojaghi H 2005, Fraunfelder F Roy F 2000, Liesegang T et al., 2000). In our study, the mean astigmatism in the eyes with pterygium and in the control (healthy) is -1.52 and -1.04 diopters, respectively; and there is a significant statistical difference between the amount of astigmatism of control eyes and the eyes with pterygium. As it is evident, the amount of astigmatism in eyes with pterygium is 0.49 diopters greater than that in the control. This complication can be the effect of pterygium on the cornea.

In the study by Kamptak (Kampitak K, 2003) and Lindsay RG et al (Lindsay RG Sullivan L, 2001), the degree of corneal astigmatism was significantly correlated with the size of pterygium. In the study conducted by Inechuku (Ibechukwu BI, 1990), the degree of astigmatism in the eyes with pterygium was more compared with that in the control eyes which was averagely 0.92 diopters. The results of the studies (Kampitak K 2003, Lindsay RG Sullivan L 2001,

Ibechukwu BI 1990) are consistent with those of our study and confirm the impact of pterygium on the amount of astigmatism.

In our study which has been performed on 130 eyes with pterygium, 83% of the created astigmatism is with-the-rule ones; and in comparing the control eyes and eyes with pterygium, there was a significant statistical difference between the type of created astigmatism ( $P=0.03$ ). This suggests that pterygium is causing with-the-rule astigmatism that this theory is consistent with the study conducted by Kamptak (Kampitak K, 2003) and Lindsay (Lindsay RG Sullivan L, 2001) and also, the study by Arisar (Avisar R et al., 2000) in which Pterygium causes with-the-rule astigmatism. Also, in the study by Lin and colleagues (Lin A Stern G, 1998), and Hulady (Holladay J et al., 1985) it has been concluded that pterygium is causing with-the-rule astigmatism. In the old textbooks, it has been mentioned that pterygium is causing against-the-rule astigmatism in the way that the in American Academy of Ophthalmology Volume 8, pp. 203 in 1995, the type of created astigmatism in pterygium has often been cited as against-the-rule one. Accordingly, several studies were conducted worldwide for a closer look at this issue, and most studies proved the other way around i.e. pterygium causes with-the-rule astigmatism. Hence, in the new textbooks, the only thing pointed out is that pterygium is causing astigmatism and no reference is made to the type of astigmatism caused by the pterygium. So we hope that by further studies all over the world, the type of astigmatism caused by pterygium is also recorded in reference books. It is generally concluded that besides with-the-rule astigmatism, pterygium is effective regarding the amount of astigmatism. Although there was a direct correlation between the size of pterygium and the amount of astigmatism in the studies (Kampitak K 2003, Ashaye AO 2002, Oner FH et al. 2000, Avisar Ret al. 2000), this issue has not been examined in our study and was not the aim of our study. Therefore, it is suggested that in the future studies the size of pterygium be examined too. In the future studies, the effect of pterygium on the amount and type of astigmatism as case-control study must be investigated so that the impact of pterygium on the type and amount of astigmatism can be declared more confidently.

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