Contact Lens & Anterior Eye 37 (2014) 153–156

Contents lists available at ScienceDirect

Contact Lens & Anterior Eye

journal homepage: www.elsevier.com/locate/clae

Effect of orbital protrusion and vertical interpalpebral distance on pterygium formation

Hasan Altinkaynak[a,e,*], Ali Demircan[b,e], Can Kocasaraç[c,e], Necip Kara[d,e], Hüseyin Dundar[e], Çiğdem Altan[b,e], Ahmet Demirok[b,e]

[a] Erzurum Regional Training and Research Hospital, Department of Ophthalmology, Erzurum, Turkey
[b] Beyoglu Eye Research and Education Hospital, Istanbul, Turkey
[c] Kelkit State Hospital, Department of Ophthalmology, Gümüşhane, Turkey
[d] Şehit Kamil State Hospital, Department of Ophthalmology, Gaziantep, Turkey
[e] Ergani State Hospital, Department of Ophthalmology, Diyarbakır, Turkey

ARTICLE INFO

Article history:
Received 12 July 2013
Received in revised form
13 September 2013
Accepted 22 September 2013

Keywords:
Pterygium
Protrusion value
Vertical interpalpebral distance

ABSTRACT

Purpose: To evaluate the risk factors in the development of pterygium in the Marmara region of Turkey as well as the efficacy of vertical interpalpebral distance, protrusion level and tear function in the development of pterygium.
Materials and methods: The cases were grouped in two as the research group consisted of patients with pterygium and the control group consisted of healthy people. A total of 294 patients with pterygium (108 bilateral, 186 unilateral) and 200 controls were included in the study. All patients and control group underwent a thorough ophthalmic examination, including tear function analysis using tear film breakup time measurement, protrusion level and vertical interpalpebral distance.
Results: No statistically significant difference was found between the bilateral pterygium subgroup and control group in terms of vertical interpalpebral distance and protrusion value ($p = 0.733$, $p = 0.625$). When the pterygium eyes and the control group were compared in the unilateral pterygium subgroup, no significant difference was found in terms of vertical interpalpebral distance and protrusion value ($p = 0.533$, $p = 0.209$).
Conclusions: While UV efficiency in pterygium was obvious, protrusion value and vertical interpalpebral distance were not found to be a risk factor in the formation of pterygium.

1. Introduction

Pterygium is a wing-like fibrovascular form that advances from conjunctiva to cornea between the upper and lower palpebra [1]. It commonly has a nasal growth. Sometimes pterygium can develop simultaneously both in the nasal and in the temporal area. It rarely develops only in the temporal area.

Pterygium etiology is still debated. Its geographical distribution and its presence in the interpalpebral area bring environmental factors to mind. Heat, dry atmospheric conditions, wind, dust and similar factors have been found to be responsible in many research studies [2–4]. As well as environmental factors, hereditary factors, tear dysfunction, immunological mechanisms, viral infections such as human papillomavirus (HPV) and herpes simplex virus (HSV), chronic inflammation, various occupations and p53 tumor suppressor gene abnormalities have been shown to be related in pterygium etiology [2,5–7]. There are a many studies showing that ultraviolet B (UV-B) light in particular has a distinctive role in the pterygium pathogenesis [8–12]. Hilgers stated that corneal proteins that are exposed to long-term sunlight in the palpebral fissure are denatured and they become antigenic; antibodies are then developed and the recurrent inflammatory process stimulates fibrovascular proliferation [13]. Demirok et al. argued that pterygium eyes had a high level of protrusion and thus UV exposure might be a risk factor in the development of pterygium [14].

This study aims to assess the risk factors in the development of pterygium in the Marmara region of Turkey as well as the efficacy of vertical interpalpebral distance, protrusion level and tear function in the development of pterygium.

2. Materials and methods

Our cross-sectional clinical study was conducted in Beyoğlu Eye Training and Research Hospital in July and August 2012. The patients included in the study gave written consent form and were

* Corresponding author at: Erzurum Regional Training and Research Hospital, Department of Ophthalmology, Erzurum, Turkey. Tel.: +90 05063509748.
E-mail address: altinkaynak167@yahoo.com (H. Altinkaynak).

1367-0484/$ – see front matter © 2013 British Contact Lens Association. Published by Elsevier Ltd. All rights reserved.
http://dx.doi.org/10.1016/j.clae.2013.09.010

informed about the purposes of the study. The ethical review board of the hospital reported that our study was conducted in accordance with the principles of the Declaration of Helsinki.

The cases were grouped in two as the research group consisted of patients with pterygium and the control group consisted of healthy people. The research group consisted of 294 patients with pterygium (108 bilateral, 186 unilateral) while the control group consisted of 200 age- and gender-matched healthy individuals. Both groups were chosen from people living in Marmara region. Excluded from the study were people who lived outside the Marmara region or who had ocular surgery, eyes with a trauma history and relapse pterygium, corneal pathology, or ocular inflammatory disease. Also excluded were those who had used topical medication or who had systemic diseases such as diabetics and hypertension.

The patient and the control groups' ages, gender, average sunlight exposure (hours/day), and years of exposure to sunlight were recorded.

All the patients underwent a detailed ophthalmologic examination. All the examinations and measurements were made by a single doctor (HA). Measurements of pterygium were made by measuring the distance between pterygium apex and nasal limbus using a slit lamp biomicroscope.

All the participants in the study took the Schirmer and tear film breakup time (TFBUT) test following the ophthalmologic examination. The Schirmer test was applied without topical anesthesia and by inserting the standard Schirmer paper on the 1/3 outer fornix of the lower palpebra and measuring the amount of moisture 5 min later. TFBUT was measured 15 min later than the Schirmer test. For the measurement of TFBUT, a drop of physiological saline was dropped on fluorescein strip, which was then lightly applied to the lower fornix. The patient was asked to blink three times and then to look straight ahead without blinking. The tear layer in front of the cornea was examined with a biomicroscope and the first breakup time of this layer was recorded. The test was repeated three times, with average time recorded. Vertical interpalpebral distance examination of the cases was made by measuring the distance between upper and lower palpebra free edges using a millimetric ruler with eyes in the primary gaze position. The proptosis measurements of the patients and the control group were made with the Hertel Exophthalmometer (Inami & Co. Ltd. K-0161, Tokyo, Japan).

2.1. Statistical analysis

The data input and the statistical measurements of the group members were made by using the SPSS 16.0 (Statistical Social Sciences Package) program. One sample Kolmogorov–Smirnov test determined whether the data had normal distribution. Since the distribution was normal, parametric tests were preferred. The relationship between pterygium and parameters was assessed by Pearson correlation test. The measurement results of the research and control groups were compared by using independent samples *t*-test. ANOVA test was used for parametric comparisons between groups of more than two and the significance between groups was determined by Bonferroni test. A p value less than 0.05 was considered statistically significant.

3. Results

Of the pterygium patients, 155 were women (53%) and 139 were men (47%) while 110 members of the control group were women and 90 were men. The bilateral pterygium subgroup consisted of 55 women and 53 men while the unilateral pterygium subgroup consisted of 100 women and 86 men. The average age of the patients was (mean ± standard deviation, SD) 56.8 ± 9.1 years for the pterygium group and 57.8 ± 8.7 years for the control group ($p = 0.89$). When the average sunlight exposure times of the groups were compared, the pterygium group had an average of 4.06 ± 2.54 (hours/day) while the control group had an average of 2.96 ± 2.26 (hours/day). There was a statistically significant difference between the two groups ($p = 0.008$). When the years of exposure to sunlight were questioned, the results were 30.82 ± 12.85 years for the pterygium group and 24.68 ± 8.83 years for the control group. This difference was found to be statistically significant ($p = 0.002$).

Average pterygium size was measured as 2.66 ± 1.11 mm. When the correlation between pterygium size and vertical interpalpebral distance ($p = 0.565$, $r = 0.072$), protrusion value ($p = 0.758$, $r = -0.039$), Schirmer ($p = 0.757$, $r = 0.039$) and TFBUT ($p = 0.274$, $r = -0.137$) was examined, no significant relationship was found (Table 1).

Table 2 presents the comparison of the bilateral pterygium subgroup with the control group in terms of vertical interpalpebral distance, protrusion value, Schirmer and TFBUT. While no statistically significant difference was found between the bilateral pterygium subgroup and control group in terms of vertical interpalpebral distance and protrusion value, significant differences were found between the two groups in terms of Schirmer and TFBUT parameters.

When the eyes on the side with big pterygium size and the eyes on the side with small pterygium size were compared within the bilateral pterygium subgroup, no significant differences were found between vertical interpalpebral distance, protrusion value, Schirmer and TFBUT ($p = 0.843$, $p = 0.916$, $p = 0.665$, $p = 0.593$).

Tables 3 and 4 present the comparison between the unilateral pterygium subgroup and the control group. While there was no significant difference between the pterygium eyes and non-pterygium eyes in terms of vertical interpalpebral distance and protrusion value ($p = 0.77$, $p = 0.755$), Schirmer and TFBUT were significantly lower for the pterygium eyes ($p = 0.004$, $p = 0.003$).

When the pterygium eyes and the control group were compared in the unilateral pterygium subgroup, no significant difference was found in terms of vertical interpalpebral distance and protrusion value ($p = 0.533$, $p = 0.209$) while Schirmer and TFBUT parameters were found to be significantly lower for the pterygium eye within the unilateral subgroup ($p = 0.006$, $p = 0.002$).

No statistically significant differences were seen between the non-pterygium eyes and control group in the unilateral pterygium subgroup in terms of vertical interpalpebral distance, Hertel, Schirmer and TFBUT ($p = 0.944$, $p = 0.426$, $p = 0.67$, $p = 0.854$).

4. Discussion

Although pterygium incidence varies throughout the world in terms of climactic and environmental conditions, it is an important ocular illness which is commonly seen in eye clinics. Because its prevalence is high in warm climates and because of its geographic distribution and its location in the interpalpebral area, the most accepted etiologic factor is UV radiation [9,13,15]. Several studies show a relationship between pterygium and UV rays [16].

Based on the UV theory, Demirok et al. proposed that pterygium eyes might have high protrusion levels and thus conducted research on 102 patients with pterygium. In this study, they found out that the protrusion levels of patients with bilateral pterygium were significantly higher than those of the control group. Also, the protrusion level of pterygium was higher than that of the healthy eyes in the unilateral pterygium sub-group. Furthermore, when the pterygium eyes and non-pterygium eyes were compared with the eyes of the healthy control group in the unilateral sub group, it was found that the protrusion values of the pterygium and non-pterygium eyes were significantly higher than those of the healthy control group [14].