



Tear production in adults with and without pterygium in Onitsha, Nigeria

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Abstract

Objectives: To assess and compare the volume of tear production in adult Nigerians, with and without pterygium.

Materials and Methods: This was a case-control study. Consecutive adults with pterygium and their age and gender-matched controls were examined. A pre-tested interviewer-administered questionnaire on socio-demographic characteristics and ocular health was completed by each participant. Schirmer's test 1 assessed the volume of tear production.

Results: Three hundred and twelve patients comprising 156 pterygium patients and 156 controls were studied. The age range was 30-65 years with a mean age of 43.9 ± 8.4 years. The mean Schirmer's value was 22.2 ± 9.3 mm in pterygium patients and 23.7 ± 9.0 mm in the controls ($p=0.03$). The mean Schirmer's value was reduced in cases with bilateral pterygia compared to their age and gender-matched controls although the difference was not significant ($t=-1.36$, $p=0.365$).

Conclusions: Tear production is reduced in pterygium eyes compared to eyes without pterygium. This may eventually lead to symptomatic dry eye disease. Prophylactic use of ocular lubricants is recommended for pterygium patients to enhance ocular hygiene and comfort.

Keywords: tear film, ocular dryness, pterygium, schirmer test

1. Introduction

Pterygium is a triangular subconjunctival growth characterized by the growth of fibro-vascular tissue from the bulbar conjunctiva across the limbus onto the cornea^[1]. It is a common degenerative disease affecting the ocular surface^[2] and indeed a common indication for ophthalmic surgery^[2, 3]. It is also a common external ocular surgical problem presenting to the eye clinic. Nwosu^[4] reported that pterygium accounted for 24.1% of ophthalmic surgical diseases at the Nnamdi Azikiwe University Teaching Hospital in Nnewi, Nigeria. Similarly, Ashaye^[5] found it to account for 20% of all planned surgeries at the University College Hospital in Ibadan, Nigeria.

A meta-analysis of 20 population-based studies showed that the pooled prevalence rate of pterygium was 10.2% (95% CI: 6.3-16.1%) in the general population. In Nigeria, the prevalence rates of pterygium in the general population varied from 4% - 9%^[5, 6].

The pre-corneal tear film is the key element for the quality of optical image and ocular surface health^[7]. The pre-corneal film consists of 3 layers namely the lipid, aqueous and mucoid layers, which together ensure optically smooth surface for the cornea. The middle layer which is the aqueous layer constitutes over 90% of the tear film and plays a role in bacteriostasis, debris flushing and the maintenance of epithelial hydration^[9]. Corneal drying and epithelial irregularities from reduced production of tears expose the ocular surface to the damaging effects of ultraviolet rays which in turn predispose to pterygium growth. On the other hand, it has also been postulated that the presence of pterygium can lead to malfunction of any of the three layers of the pre-corneal tear film including the aqueous layer thereby resulting in ocular dryness and the associated symptoms^[4].

Schirmer's test is still the simplest, fastest and least

expensive diagnostic test available for assessing aqueous tear production i.e. the quantitative function of the tear film. It measures the volume of tears produced during a fixed time. Various authors have stated the normal range of Schirmer's test to be between 10-25mm and 5-10mm as borderline. Although Schirmer himself considered <15 mm as abnormal^[13], the Dry Eye Workshop (DEWS) report in 2007 suggested a cut off value of ≤ 5 mm in 5mins for a dry eye diagnosis.

Information on tear production in pterygium patients in our environment is lacking though it is suspected that tear volume may differ between adults with pterygium and non-terygium adults. In an effort to fill this knowledge gap, the present study which assessed tear production in pterygium patients and those without pterygium was conducted.

Materials and Methods

This study subjects comprised adult patients aged 30 years and above presenting with primary pterygium and their age and sex-matched controls at the Guinness Eye Centre Onitsha, Nigeria, between August and October 2014. All pterygium patients should not have had previous ocular surgery and should not have been using topical medication in the 4 weeks preceding the study. Inclusion criteria for the controls were absence of pterygium, kerato-conjunctiva sicca and other surface ocular diseases.

The sample size calculation was based on 95% confidence interval using a case control study formula. Ethical approval was obtained from Nnamdi Azikiwe University Teaching Hospital Ethical Committee and written informed consent was obtained from each patient. This study followed the tenets of the Declaration of Helsinki on human subjects^[6].

A pre-tested, interviewer-administered, structured questionnaire on socio-demographics, ocular and general health was completed by each patient. Anterior segment

examination was with pen torch and slit lamp bio microscope while posterior segment examination was by direct ophthalmoscopy. The Schirmer's test I (without topical anesthesia) was performed on both eyes simultaneously using a 5mm by 35mm What mann's filter paper. The filter paper was folded 5mm from the marked end and placed at the junction between the middle and the lateral third of the lower lids to minimize irritation to the cornea during the test. The subject was allowed to blink normally.

The filter papers were removed after 5 minutes and the amount of wetting measured in millimeters from the folds. Wetting of less than 5mm was considered abnormal.

Data was analyzed using both the descriptive and inferential statistics including chi square and t-tests, with alpha level at 0.05.

Results

Six hundred and twenty-four eyes of 312 patients were examined: 156 cases and 156 controls matched for age and gender. Table 1 shows the socio demographic characteristics of the participants. There were 127 males (40.7%) and 185 (59.3%) females. There was no gender difference between cases and controls (p>0.05). The age range was 30-65 years; the mean age for cases was 43.9±8.3 years and for controls, 43.8±8.5 years; there was no difference in age between the cases and the controls (p>0.05). Pterygium cases were more likely to be outdoor workers (p=0.001; Odds ratio - 6.2). Traders constituted nearly half of the participants. Nasal pterygium was recorded in 143(91.6%) patients; 83(53.2%) patients had bilateral pterygia. For unilateral pterygium, the right eye was involved in 38 (24.4%) patients and the left in 35 (22.4%).

Table 1: Socio-demographic characteristics

| Characteristic | Case (n=156) | Control (n=156) | test | p value |
|--------------------|--------------|-----------------|-----------------------|-----------------------|
| Age distribution | | | | |
| 30-39 | 52 (33.3%) | 53 (34%) | | |
| 40-49 | 57 (36.5%) | 57 (36.5%) | | |
| 50-59 | 43 (27.6%) | 42 (26.9%) | | |
| ≥60 | 4 (2.6%) | 4 (2.6%) | | |
| Mean Age in years | 43.94 | 43.79 | t= 0.16 | 0.875 |
| Standard deviation | 8.392 | 8.459 | | |
| Sex | | | | |
| Female | 0.908 | 92(59.0%) | 93(59.6%) | χ ² =0.013 |
| Male | 64(41.0%) | 63(40.4%) | | |
| Occupation | | | | |
| Trader | 78(50%) | 73(46.8%) | χ ² =35.51 | 0.000 |
| Civil Servant | 31(19.9%) | 62(39.7%) | | |
| Farmer | 24(15.4%) | 3(1.9%) | | |
| Student | 3(1.9%) | 1(0.6%) | | |
| Artisans | 20(11.8%) | 17(10.9%) | | |
| Work place | | | | |
| Indoor | 63(40.4%) | 126(80.8%) | 0.000 | χ ² =53.27 |
| Outdoor | 93(59.6%) | 30(19.2%) | | |

The mean Schirmer's value was 22.2 ± 9.3mm in the cases and 23.7 ± 9.0mm in the control group. This difference was statistically significant (t – 2.09; p = 0.037). Six (1.9%) eyes of the pterygium cases and 4 (1.3%) eyes of the controls had Schirmer's value <5mm. Table 2

Table 2: Mean of Schirmer's test values by gender

| Group | Gender | |
|---------|----------|----------|
| | Male | Female |
| Cases | 22.6±8.1 | 21.9±8.2 |
| Control | 24.5±8.3 | 23.1±8.0 |

(cases: t= -1.35, df =1, p = 0.182; controls: t= -0.66, df =1, p = 0.516)

Shows the mean Schirmer's test values segregated by gender. For both sexes, the Schirmer's values were lower in cases than controls. But there were no significant differences in the Schirmer's value in between the males and females (p= 0.2 in cases; p= 0.5 in controls).

Discussion

Low tear production can lead to changes on the ocular surface presenting with ocular discomfort that are disturbing to the individual [14]. While some researchers found lower tear production in pterygium patients compared to controls, others reported no difference. Although Ashaye [5] reported normal Schirmer's value in the majority of pterygium patients, other studies by Bekibebe *et al* [17], Rahman *et al* [12] and Roka *et al* [18] noted a significant reduction in Schirmer's value in patients with pterygium. In the present study, Schirmer's values were significantly reduced in pterygium patients compared to controls when their two eyes were analysed together. Similarly, there was reduction in the Schirmer's value when the cases with bilateral pterygia were compared with their age and gender-matched controls though no significant difference was found. It could be due to the inclusion of the normal eyes in patients with unilateral pterygium.

Pterygium formation in outdoor workers may occur as a result of dusty polluted environment and UV light, which in turn can lead to chronic irritation and inflammatory changes. This cascade could affect the quantitative or qualitative function of the tear film with resultant symptoms of ocular dryness such as burning, irritation, lacrimation, and foreign body sensation. Ekpe in the same hospital found that patients with symptoms suggestive of dry eye had Schirmer's value of 4.2mm/5mins as against 16.6mm/5mins for those without symptoms suggestive of dry eye. (t = 10.72, df= 1, p>0.05). Similarly, the study by Beikibebe [17] *et al* observed lower Schirmer's test values among patients with ocular irritation symptoms suggestive of dry eye than their healthy controls. The present study showed that 68.6% of the pterygium patients examined had symptoms associated with ocular dryness.

In conclusion, this present study suggests that there is reduction in the Schirmers value of patients with pterygium compared to those without pterygium. Low tear production could eventually result to symptomatic dry eye disease. Thus, there is need to incorporate Schirmer's test as a routine test for pterygium patients. This would assist in early detection of tear dysfunction and prompt institution of treatment to relieve patients of accompanying symptoms.

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