INTRODUCTION

Before studies were very different about the relation between the pupil size and the refractive error. Whynón (1) showed that the pupil size was independent of refractive errors, sex and iris colour. However, Jones & Chadwanon (3) established a relation between the refractive error and the pupil size.

In mesopic and scotopic luminance conditions, the miosis maximizes the photons incidence in the retina, what also supplements the slow adaptation mechanism to the darkness that implies the retinal control of the photoreceptors and the bipolar cells (4).

In mesopic and scotopic conditions, the correct measurement of binocular pupil size should be very useful to the refractive surgery.

METHOD

A prospective evaluation was performed of the binocular pupil size and refractive state of 68 subjects aged 16 to 56 years (34.27±5.2 years) free without no ocular pathologies or pharmacological treatments. Measurements were obtained using the infrared, binocular pupillometer P2000 (Procyon Instruments Ltd) (5) after a 5 min period of adaptation to mesopic conditions (3cd/m²).

The study was made at three luminance levels: 0.04 lux (scotopic), 0.4 lux (low mesopic) and 4 lux (high mesopic). For each measurement, 10 photographs of both pupils were automatically taken.

Refractive errors were performed using the NidekTM autocorrection. Subjects were classified according to their refractive state as: emmetropes (+0.50 D to −0.50 D), myopes (from −0.75 D) and hypermetropes (from +0.75 D).

RESULTS

The sample pupil diameters were: RE 6.81±0.7 mm, LE 6.74±0.7 mm in scotopic conditions; RE 5.56±0.9 mm, LE 5.48±0.8 mm in low mesopic conditions; and RE 4.04±0.6 mm, LE 4.03±0.5 mm in high mesopic conditions. Table 1 shows the pupil diameters and the degree of anisocoria obtained at the three luminance conditions for the three groups of refractive error. For each luminance change, we obtained a similar about 20%.

Between the right and left eye were not significant differences. The pupil diameter varied significantly with the environmental luminance level.

The means values of refractive error were (in spherical equivalent refraction): RE = 1.35±2.3 D and LE = 1.34±2.3 D. Corneal radii of curvature were: RE 7.73±0.4 mm (43.91±0.61 mm) and LE 7.69±0.3 mm (43.85±1.80 mm).

No significant differences were detected at any luminance level among the pupil diameters and anisocoria of the myopes, emmetropes and hypermetropes. Neither were significant differences observed according to sex.

CONCLUSIONS

The refractive state of a subject bears no significant relationship with pupil size or anisocoria measured under mesopic/scotopic luminance conditions.

REFERENCES


Figure 1: Pupil diameter for three luminance conditions for each refractive group

Figure 2: Anisocoria

Table 1: Pupil diameters and anisocoria for three luminance conditions in the three refractive groups.

<table>
<thead>
<tr>
<th>Luminance level</th>
<th>Pupil diameter</th>
<th>Anisocoria</th>
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<tbody>
<tr>
<td>scotopic</td>
<td>RE: 6.81±0.7 mm</td>
<td>LE: 6.74±0.7 mm</td>
</tr>
<tr>
<td>low mesopic</td>
<td>RE: 5.56±0.9 mm</td>
<td>LE: 5.48±0.8 mm</td>
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<tr>
<td>high mesopic</td>
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