



Effect of optical zone diameter of orthokeratology lenses over the keratometric profile



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INTRODUCTION

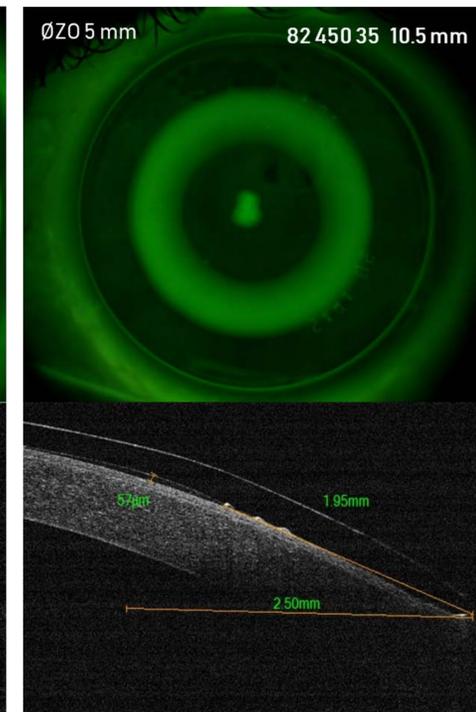
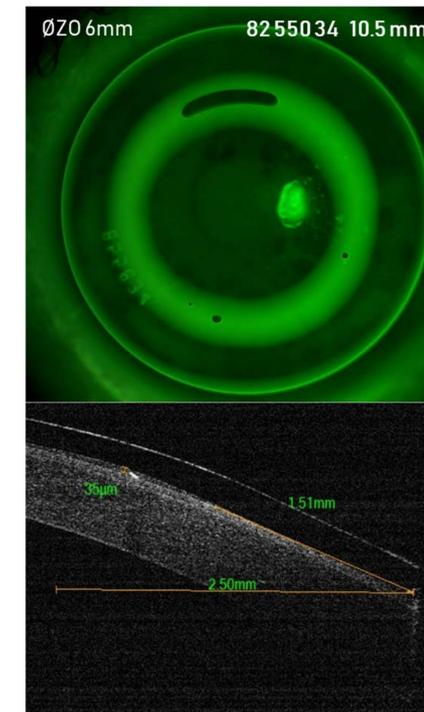
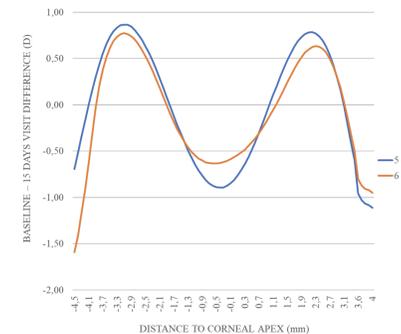
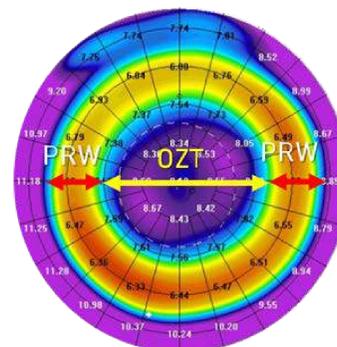
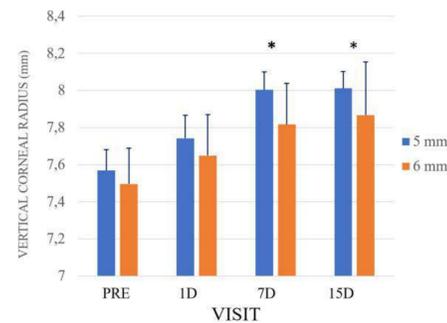
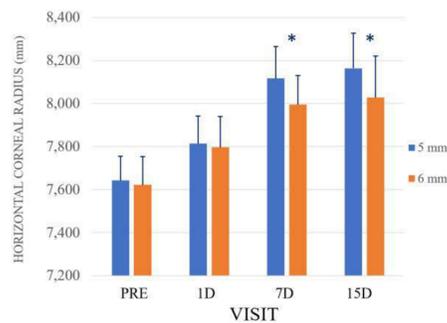
Newer OrthoK lens designs are trying to increase the peripheral myopic defocus and take into account pupil size dependence in higher-order aberrations. These lenses are being developed with a smaller optical zone (OZ) in attempts to achieve a smaller treatment zones and a steeper, more power mid-peripheral ring closer to the pupil. The main objective of this study is To evaluate the effect of the optical zone (OZ) diameter of orthokeratology (OrthoK) contact lenses (CL) on the keratometric profile in high myopia (-4.00 D to -7.00D) subjects and to study its effect over the visual quality.

METHODS

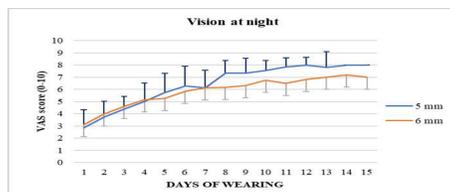
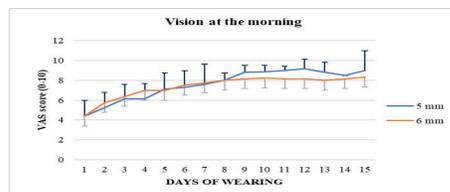
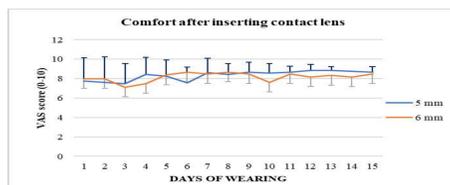
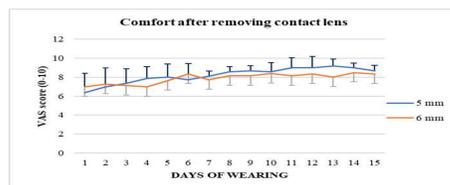
A prospective, longitudinal, experimental and double-blind study were performed. Twelve healthy subjects (18 eyes, 8 women and 4 men) were recruited in the Faculty of Optics and Optometry (Complutense University of Madrid, Spain). The mean age of patients were 25.01 ± 6.91 years (range 18-27 years old) and mean spherical refractive error -4.72 ± 0.36 diopters (D) (range -4.00 D to -7.00 D). All subjects were fit with Paragon CRT™ contact lenses (Paragon Vision Sciences, Gilbert, AZ), with 6 mm (OZD) and 5 mm, in HDS 100 material (paflufocon D, Dk = 100 barrer). They were worn overnight for 2 weeks randomly with 2 weeks of wash out period between lenses. Keratometry parameters, high order aberrations, visual acuity, contrast sensitivity and subjective comfort and vision were measured at baseline and after 14 nights of OrthoK lens wear. Student t-test for paired samples was used for statistical analysis.

RESULTS

No significant differences were found between any measurements for the same subject at both baselines (p-value>0.05). There was no difference between optical zone (OZ) lens designs found in refraction, subjective vision or comfort, and High Contrast (HC) and Low Contrast (LC) visual acuity. Contrast sensitivity was decreased in the 5 mm OZ lens design compared with 6 mm OZ design (p-value<0.05). 5 mm OZ design provoked a greater flattening, more powerful mid-peripheral ring and 4th-order corneal and total spherical aberration than the 6 mm OZ design, being statistically significant after 7 days, for corneal aberration, and 15 days, for corneal and total, of wearing the lens (p-value<0.05). The OZT obtained were 2.8±0.2 mm and 3.1±0.1 mm for 5mm and 6 mm OZ design, respectively (p-value<0.05). Regarding PRW, the 5mm OZ design had a wider ring width in the both nasal and temporal zone (p-value<0.05).



5 mm OZ design showed more landing zone and more space in the reverse zone between cornea and lens than 6 mm OZ.



| (mean ± SD) | 5 mm OZ lens | 6 mm OZ lens | p-value |
|--------------|--------------|--------------|---------|
| Nasal PRW | 2.3 ± 0.2 | 1.9 ± 0.1 | 0.037* |
| OZT | 2.8 ± 0.2 | 3.1 ± 0.1 | 0.024* |
| Temporal PRW | 2.4 ± 0.1 | 2.2 ± 0.2 | 0.047* |

| (mean ± SD) | Corneal Z12 (µm) | | |
|-------------|------------------|---------------|---------|
| VISIT | 5 mm OZ lens | 6 mm OZ lens | p-value |
| PRE | 0.144 ± 0.030 | 0.132 ± 0.029 | 0.854 |
| 1 DAY | 0.403 ± 0.083 | 0.331 ± 0.089 | 0.526 |
| 7 DAYS | 0.644 ± 0.101 | 0.477 ± 0.153 | 0.027* |
| 15 DAYS | 0.603 ± 0.116 | 0.476 ± 0.124 | 0.039* |

CONCLUSIONS

A smaller diameter of the optical zone in OrthoK lenses produces a smaller treatment area and a larger and more powerful peripheral ring. This produces an increase in high-order aberrations; the corneal and total spherical aberration is greater with the 5 mm optical zone lens with 5 mm pupil diameter. Horizontal coma aberration with 5 mm lens was greater probably due to the horizontal decentering of the lens.

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ACKNOWLEDGEMENTS

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The authors would like to thank to Paragon Vision Science and Clínica Universitaria de Optometría, UCM for its material support.
Results recent published in *Journal of Ophthalmology*