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A SILICONE HYDROGEL CONTACT LENS PRODUCED LESS MYOPIA PROGRESSION THAN SINGLE VISION SPECTACLES IN CHINESE CHILDREN OVER A 6 (AND 12) MONTH PERIOD

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INTRODUCTION

- Several myopia treatment options have been investigated to determine the effect of single vision spectacle lenses, progressive addition spectacle lenses, rigid gas permeable lenses and conventional soft contact lenses on myopia progression[1-5].
- No significant difference in myopia progression between single vision spectacle and single vision hydrogel contact lens wearers have been reported[4-5].
- However, a recent study reported less myopia progression with a silicone hydrogel contact lens when compared to low Dk/t hydrogel contact lenses[6]

PURPOSE

- To compare myopia progression in Chinese children after 12 months wear of single vision spectacles (SPL) and single-vision silicone hydrogel contact lens (SHCL).

MATERIALS AND METHODS

- Rates of progress of myopia over 12 months in myopic Chinese children aged 7 to 14 years (with baseline myopia between -0.75 to -3.50D of sphere and cylinder ≤1.00D) were measured at Zhongshan Ophthalmic Centre, Guangzhou, China for a group wearing single vision silicone hydrogel contact lenses (SHCL Group, n=53, Lotrafilcon B, CIBA Vision, USA) and a group wearing normal sphero-cylindrical spectacles (SPL Group, n=41) from two myopia control studies.
- Cycloplegia was achieved with instillation of topical proparacaine hydrochloride 0.5% and Tropicamide1%, 2 drops 5 minutes apart, with measurements 30 minutes after the second drop.
- Cycloplegic central refraction was measured with an open field autorefractor (Shin Nippon NVision K-5001, Japan) at baseline, 6 and 12 months.
- Axial length (AL) and corneal curvature were measured with an IOLMaster (Meditec Carl Zeiss, Germany) at baseline, 6 and 12 months.
- Peripheral refraction along the horizontal meridian (20°, 30° and 40° nasal and temporal fields) was measured with an open field autorefractor (Shin Nippon NVision K-5001, Japan) with and without correction at baseline.
- The relative peripheral refractive error (RPRE) was defined as the amount of peripheral refractive power with respect to central refraction at each field angle.
- The investigation was conducted in accordance with the tenets of the Declaration of Helsinki. Approval by local Human Research Ethics Committee was obtained and all subjects and/or guardians were required to sign a declaration of Informed Consent.

STATISTICAL ANALYSIS

- Data from both eyes of participants that satisfied the baseline sphere and cylinder criteria and completed the 12 month visit were included in the analysis.
- The change in spherical equivalent (SE) and AL from baseline computed for each subject-eye and change in corneal curvature (right eyes only) was compared between the two study groups at 6 and 12 months using a linear mixed model.
- The linear mixed models used in the analysis were adjusted for age, gender, parental myopia and baseline refractive error; were accounted for the within–subject correlated data.
- The difference in RPRE (dRPRE) with and without optical intervention was calculated and represents the amount of peripheral refraction change induced by the optical device. dRPRE (at each field angle, and across all field angles) was compared between groups using an Independent t-test.
- The level of statistical significance was set at 5% and data analysis was performed in SPSS (v17) and STATA (v10).

RESULTS

DEMOGRAPHICS

- No significant difference in age, gender and parental myopia distribution was found between the SPL Group and the SHCL Group (p>0.05).
- No significant differences in refractive error and AL were found between the SPL and the SHCL Groups (SE -1.97±0.63D vs -2.24±0.74D, p=0.087 and AL 24.55±0.77mm vs 24.64±0.83mm, p=0.678 respectively).

MYOPIA PROGRESSION AT 6 AND 12 MONTHS

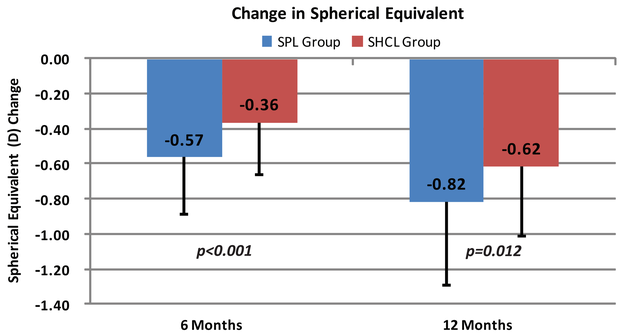


Figure 1. After adjusting for parental myopia, gender, age and refractive error at baseline, myopia progression was significantly less for the SHCL group than the SPL group at 6 months (p<0.001) and 12 months (p=0.012).

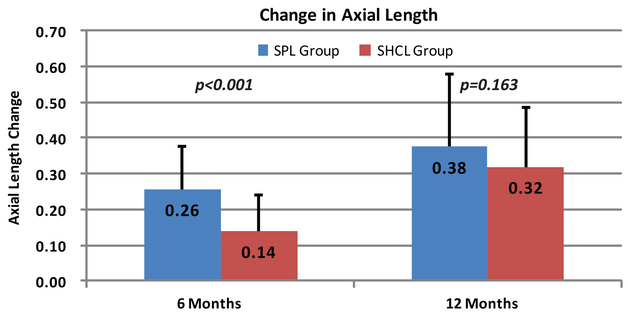
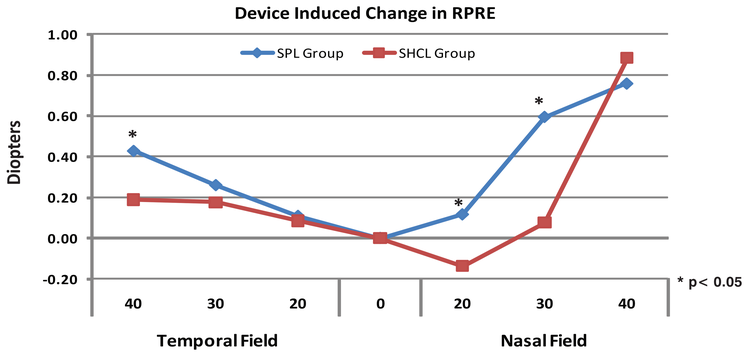


Figure 2. AL increase was statistically significant less with the SHCL Group at the 6 month (p<0.001), however no difference was found at the 12 month visit (p=0.163).

- No change in corneal curvature was found at 6 and 12 month visits between groups (p> 0.05).

PERIPHERAL REFRACTION WITH AND WITHOUT CORRECTION

- Analysis of peripheral refraction results showed that SPL introduced greater amounts of peripheral hyperopic defocus than SHCL for 40° temporal, 20° and 30° nasal fields (p=0.015, p<0.001 and p<0.001, respectively) and averaged across all field angles (SPL Group=0.33±0.46D, SHCL Group=0.18±0.74D, =0.002).



CONCLUSION

- Myopia progression (as SE) was lower for the SHCL Group than for SPL Group after 6 and 12 months and was significant. A similar change was observed with axial legnth and was significant at 6 months, but not at 12 months.
- The slower myopia progression rates observed with the SHCL cannot be explained by corneal curvature changes.
- The faster myopia progression observed for SPL may have been due to higher amounts of induced relative peripheral hyperopia with SPL than SHCL, suggesting that variations in lens design may impact peripheral refractive errors and possibly progression of myopia.

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