

Myopia control efficacy through Emmetropic Progression Ratio: 1-year of spectacle wear with cylindrical annular refractive elements (CARE)

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Purpose

To evaluate the performance of spectacle lenses (SPL) with cylindrical annular refractive elements (CARE) after 1-year of SPL wear with metrics based on age-related physiological eye growth.

Methods

Published data on annual axial length (AL) elongation for myopic and emmetropic eyes (>1000 eyes each, respectively, age 7-12 years, both Asian and Caucasian) were used to establish age-wise AL growth curves. Emmetropes had cycloplegic spherical equivalent refractive error (SE) of > -0.50D. The 1-year AL growth data for 144 Chinese children with myopia, SE -0.75D to -5.00D, aged 7-12 wearing SPL with CARE (n=72 eyes each with MyoCare (ZEISS) and MyoCare S (ZEISS) respectively, NCT05288335) was determined. The first method involved computing "Emmetropic Progression Ratio" (EPR) as $(1 - ((\text{progression with intervention} - \text{emmetropic progression}) / (\text{myopic progression} - \text{emmetropic progression}))) * 100\%$ on a scale of 0-100% where 0% = AL growth equivalent to a myopic eye and 100% = AL growth equivalent to an emmetropic eye. In addition, EPR thresholds were used to categorize myopic eye growth under intervention into 'similar to emmetropic' (EPR $\geq 50\%$) or 'equivalent to emmetropic' AL growth (EPR $\geq 75\%$).

Results

In myopic eyes, AL growth decreased from $0.60 \pm 0.25 \text{ mm/yr}$ at 7yrs to $0.30 \pm 0.15 \text{ mm/yr}$ at 12yrs, whereas in emmetropes, AL growth was lower at $0.18 \pm 0.13 \text{ mm/yr}$ at 7yrs and $0.07 \pm 0.10 \text{ mm/yr}$ at 12yrs. For all ages, using method 1, 1-year AL growth with MyoCare and MyoCare S was lower than in myopes and closer to emmetropes with an overall EPR of 70% for MyoCare and 68% for MyoCare S (MyoCare 7yrs: 61% and 12yrs: 82%; MyoCare S 7yrs: 62% and 12yrs: 74%). Using method 2, 17% of eyes had AL growth similar to emmetropic eyes, while 53% of eyes showed AL growth equivalent to emmetropes with MyoCare, whereas 21% and 44% of eyes showed AL growth similar to or equivalent to emmetropic eyes using MyoCare S, respectively.

Conclusions

Both methods utilizing emmetropic AL growth demonstrate myopia control efficacy. EPR demonstrates that MyoCare and MyoCare S reduced myopic AL growth by an average of 70% and 68% compared to emmetropic eye growth. Seven of ten eyes wearing MyoCare or MyoCare S had eye growth similar to or equivalent to emmetropic eyes.

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