A comparison of clinical trials investigating the efficacy of myopia control with an age matched normal axial growth analysis

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Background: Myopia control strategies such as low-dose atropine, orthokeratology, multifocal contact lenses, and specially designed spectacle lenses are well evidenced for their use myopia management. Through evidence-based practice, practitioners can offer objective and unbiased myopia management advice to their patients. Treatment efficacy of the myopia control method is commonly calculated based on a non-age matched control group. The Age Matched Myopia Control (AMMC) model, developed by the present authors, classifies axial length growth as highly excessive, moderately excessive, and physiological growth whilst controlling for age.

Aims: To give an overview of results from recent clinical trials of myopia management strategies that slow axial length growth and to categorize these results using the AMMC model. (Graff et al., 2023)

Methods: A literature review of clinical trials investigating treatment options for slowing myopia progression (with or without a placebo group) in children was performed. For each clinical trial, participants' mean annual axial length growth was calculated and plotted with respect to participants' mean age after one year of treatment using the AMMC. If data for a clinical trial were available for subsequent years, these were included.

Results: Based on AMMC, children treated with 0.01% and 0.025%atropine, spectacle lenses with slightly aspherical lenslets, and medium addition soft contact lenses had highly excessive axial growth. Atropine 0.05% led to moderately excessive axial growth. Patients treated with high addition contact lenses had moderate axial length growth in the first two years of treatment, but excessive axial length growth in the third year. Spectacle lenses with defocus incorporated multiple segments and dual-focus contact lenses showed physiological axial length growth over six years of treatment. Highly aspherical lenslet spectacles led to physiological axial length growth in the first year but changed to highly excessive growth in the second and third years. Diffusion optics technology lenses test lens 1 showed moderate growth while the second lens design showed physiological growth.

Conclusion: As children's physiological axial length growth declines with age, the evaluation of reported clinical trial results need to be interpreted with respect to the cohort's age and baseline axial length, and therefore the underlying age matched physiological axial growth. Only defocus incorporated multiple segments and dual-focus contact lenses resulted in physiological axial length growth over the treatment period. Practitioners should be aware of this finding when considering a long-term treatment for myopia.