

Preliminary results and adaptability to the Defocus Incorporated Multiple Segments spectacle lenses among pre-myopic children of preschool age

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Purpose This pilot study aims to investigate the adaptability of the photochromic Defocus Incorporated Multiple Segments (DIMS) spectacle lenses in pre-myopic children and to evaluate preliminary results of parameters associated with myopia in this patient group.

Methods This pilot study enrolled children aged 5-6y, diagnosed with pre-myopia (cycloplegic refraction ranging from $\leq +0.75$ to > -0.50 diopters) between November 2023 to February 2024. Following the baseline visit, eligible participants were prescribed photochromic DIMS spectacle lenses. Participants and their caregivers were instructed to ensure the children wear DIMS spectacle lenses full-time (≥ 10 hours). At the one-week follow-up visit, participants completed a questionnaire about any visual complaints, acceptability, and adaptability to the DIMS spectacle lenses. Subsequently, compliance of DIMS spectacle lens wear and information on myopia-related lifestyle habits were gathered through follow-up questionnaires. Cycloplegic refraction (Spherical Equivalent Refraction, SER), axial length (AL), and central choroidal thickness (CCT) were evaluated at three-month follow-up intervals.

Results Twenty-four pre-myopic children were enrolled. The mean age was 5.4 ± 0.59 years, with a male-to-female ratio of 11:13. The ratio of parental myopia was

16:7:1 for none, one parent, and both parents, respectively. All children had a visual acuity of 20/20 on the Snellen visual acuity chart at the baseline visit. The near visual acuity when wearing DIMS spectacles lenses was 20/20 on the near chart for all children.

After one week of DIMS spectacle lens wear, 16.7% of participants reported an inconvenience to daily activities at home though the frequency and severity of complaints reported were mild. Other visual complaints reported included visual strain and discomfort reported by the same 8.3% of participants. 8.3% of participants reported the need for a lens position adjustment. All parents agreed to continue having their children wear DIMS lenses. After three months, the mean SER changed from $+0.38 \pm 0.32$ to $+0.42 \pm 0.37$ diopters. Mean AL increased from 22.48 ± 0.61 to 22.54 ± 0.63 millimeters. Mean CCT increased from 351.3 ± 55.9 to 359.8 ± 51.7 μm .

Conclusions This pilot study indicates that preschool-aged pre-myopic children report good adaptability to DIMS spectacle lenses. Visual complaints were minimal and of mild severity. The preliminary results for change in SER, AL and CCT are promising. Further research is underway to explore the efficacy of DIMS lenses in managing myopic progression in pre-myopic pre-school children.