The Influence of pupil size on myopia control effects using Defocus Incorporated Multiple Segments (DIMS) spectacle lens

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Abstract:

Purpose: To investigate if the baseline pupil size influences the myopia control effects using Defocus Incorporated Multiple Segments (DIMS) spectacle lenses in Hong Kong Chinese children over 6 years.

Method: Data from a 6-year clinical trial that tested the myopia control efficacy was reviewed. In the first 2 years, children were allocated randomly to wear either the DIMS lens (n=79) or SV (n=81) spectacle lens. Participants who completed the 2-year RCT were followed for a total of 6 years. Group 1 (n = 36) wore DIMS spectacles for 6 years; Group 2 (n = 14) wore DIMS lens for the first 3.5 years and SV spectacles afterward; Group 3 (n = 22) wore SV spectacles in the first 2 years and switched to DIMS; Group 4 (n = 18) wore SV spectacles in the first 2 years, switched to DIMS for 1.5 years and then SV spectacles again. Their pupil size, cycloplegic refractions and axial length were monitored.

Result: In the first 2 years of study, no statistically significant difference in baseline pupil size was observed in the DIMS (5.68±0.84mm) and SV group (5.64±0.80mm) ($p>0.05$). There was no statistically significant correlation between baseline pupil size and refraction changes and axial elongation at 6-month, 12-month,-18-month, and 24-month in the DIMS and SV group ($p>0.05$). For children who completed all the 6-year study, there was no statistically significant difference in baseline pupil size among the four groups (Group 1, 5.59±0.71mm; Group 2, 5.87±0.86mm; Group 3, 5.68±0.78mm, Group 4, 5.72±6.70mm, $p>0.05$). And there was no statistically significant correlation between baseline pupil size with either refraction changes and axial elongation per 6 months over 6 years in all four groups($p>0.05$).

Conclusions: Myopic children using DIMS lenses showed similar myopia control effects irrespective of the pupil sizes. It could be due to the design of the DIMS spectacle lens, that the area of distance correction and myopic defocus have a ratio of close to 50:50, so in all directions of gaze, there will be the same amount of myopic defocus regardless of pupil size.

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Patent: Patents titled ‘Spectacle Lens’ in China (CN104678572 B) and USA (US10268050 B2) were issued on 27 April 2018 and 23 April 2019 respectively.

Keywords: Myopia control, myopic defocus, pupil size