Quality of Vision in children wearing Diffusion Optics Technology™ compared with standard spectacle lenses

Dechen Wang[1], David Webley[1], Jennifer Hill[1], Martin Rickert[2]

1. SightGlass Vision 2. Indiana University, Bloomington, IN

Purpose

Quality of vision (QoV) is an influencing factor in compliance of wear with myopia management solutions. Diffusion Optics Technology™ spectacle lenses (DOT) use contrast modulation to control myopia. This study investigated QoV with DOT after two years of wear compared to standard single vision control (SV) spectacle lenses.

Methods

171 Chinese myopic children, aged 6–13 who completed 2-year follow up data were analyzed from a randomized controlled clinical trial in China (NCT05562622). Participants wore DOT (n=123) or SV (n=48) in a 2:1 ratio. There was no significant difference between SV and DOT with respect to demographics, baseline refraction or axial length. Compliance was high, with mean wearing time >12 hours per day.

QoV was evaluated by visual disturbances questionnaires with pictures, for glare, halos and hazy vision in terms of symptom frequency (never, occasionally, quite often, very often), severity (not at all, mild, moderate, severe) and if bothersome (not at all, a little, quite, very). Responses were scored on a 4-level ordinal scale (0–3, with 0 indicating no symptom). Mean scores were compared between arms by Welch's t-test with 95% confidence intervals (CI) and response distributions by Fisher's exact test.

Results

After 2 years of wearing the allocated spectacle lenses, most children did not experience glare (DOT 70.7%; SV 66.7%), halo (DOT 68.3%; SV 54.2%) or hazy vision (DOT 67.5%, SV 50.0%). When symptoms did occur, they were mostly mild in severity (glare DOT 24.4%, SV 25.0%; halo DOT 22.0%, SV 33.3%; hazy vision DOT 23.6%, SV 29.2%) and only mildly bothersome (glare DOT 13.8%, SV 29.2%; halo DOT 18.7%, SV 31.3%; hazy vision DOT 20.3%, SV 35.4%).

Mean scores for frequency were similar between DOT and SV for glare (0.33 vs. 0.35, p=0.75) and halo (0.37 vs. 0.48, p=0.23), and lower for DOT than SV for hazy vision (0.33 vs. 0.56, mean difference −0.23, 95% CI −0.44 to −0.02, p=0.03). Severity and bothersome scores were modestly lower in DOT than SV across all three symptoms; glare bothersome reached statistical significance (−0.15, 95% CI −0.30 to −0.01, p=0.04). No other differences reached significance of p=0.05.

After adjusting for age, DOT vs SV differences were similar in direction and magnitude, with two findings remaining significant (hazy frequency, p=0.014) and glare bothersome (p=0.02).

Treatment-by-age interactions did not reach significance for any item (all $p \geq 0.32$), as well as in the conditional analyses (all $p \geq 0.13$) indicating that the DOT vs SV effects were consistent across the 6–13 year age range.

Conclusion

Visual disturbances were infrequent in both DOT and SV and, when present, were mostly mild and minimally bothersome. DOT spectacle lenses showed visual-disturbance profiles comparable to or more favorable than SV across the three symptoms assessed, with effects consistent across the age range. These findings support DOT as well tolerated for myopia control with a favorable quality-of-vision profile.

Reference not required for abstract.

1. Bullimore, M. et al (2024), Myopia control: Seeing beyond efficacy. Optom Vis Sci, 101: 134-142