

THE INFLUENCE OF MEDIUM AND HIGH ADDITION SOFT MULTIFOCAL CONTACT LENSES ON ACCOMMODATION AND PHORIA AT NEAR

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PURPOSE

Possible optical method for myopia control (MC) is to create myopic defocus on the peripheral retina while correcting foveal refractive error in the same time. One of the optical devices that can create this effect is multifocal soft multifocal contact lens (MFSCl) with center distance design.

Currently there is no consensus to what addition (ADD) power should be used to maximize MC effectiveness without negative impact on the visual performance.

The purpose of the study was to measure how medium (+2.00D) and high (+4.00D) ADDs in MFSCl designed for myopia control can influence accommodative response and phoria at near.

METHODS

Subjects

Subjects (N=12) were 20 to 30 years old, with mean refractive error RE -1.23 D and astigmatism up to 0.75 D. Ocular diseases were excluded and participants with no accommodation or binocular vision dysfunctions, were enrolled to this study.

Apparatus and stimuli

Consensual response of accommodation was measured with photorefraction method (PlusOptix A09 Emily) on the left eye. Stimuli (two lines of letters, size 0.36 deg. presented on the LCD screen) were observed with the right eye at distance: 5 m, 1 m and 0.40 m. The measurements were performed in scotopic conditions and eyes were separated by divider mask. Phoria at near with Prismatic Cover Test at 0.40m distance was performed. The stimuli was a letter on the fixation stick.

Experiment procedure

This was prospective, double-masked study. Each subject was fitted with 3 different designs of CLs in random order:

1. Distance power plano with ADD +2.00 D (Relax, SwissLens)- ADD2
2. Distance power plano with ADD +4.00 D (Relax, SwissLens)- ADD4
3. Single Vision Spherical (SVS) plano lens (Orbis, SwissLens)- ADD0

In each pair of lenses accommodative response and phoria at near were measured with spectacles if needed. All lenses had total diameter of 14.2 mm, BC 8.6 mm and central distance zone diameter of 3.0 mm. Contact lenses were made from hydrogel material Contaflex GM3 58% (Acofilcon A; Contamac Ltd. UK).

RESULTS

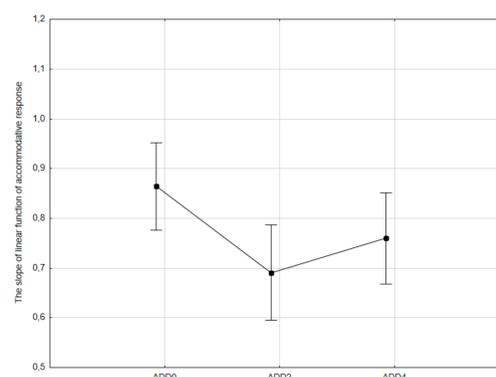


Figure 1. Mean slope of linear function of accommodative response for ADD0, ADD2 and ADD4.

The slope of linear function of accommodative response (Figure 1) were 0.86, 0.69 and 0.76 respectively for ADD0, ADD2 and ADD4, the difference was statistically insignificant ($p>0.05$).

The increase of lag of accommodation with additional power (Figure 2) was noticed, however this effect was statistically insignificant ($p>0.05$)

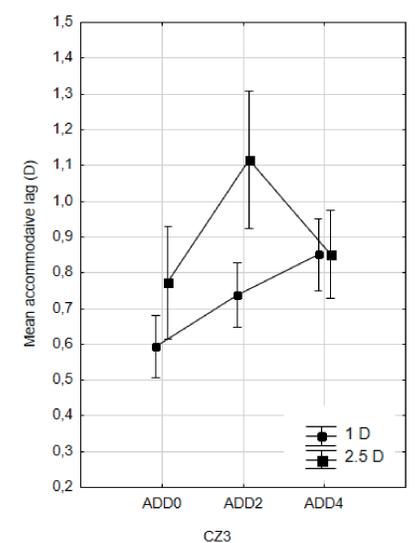


Figure 2. Mean accommodative lag in ADD0, ADD2 and ADD4 for stimulus of accommodation 1D and 2.5D.

With increasing ADD subjects were more exophoric at near (Figure 3), but this was statistically insignificant ($p>0.05$).

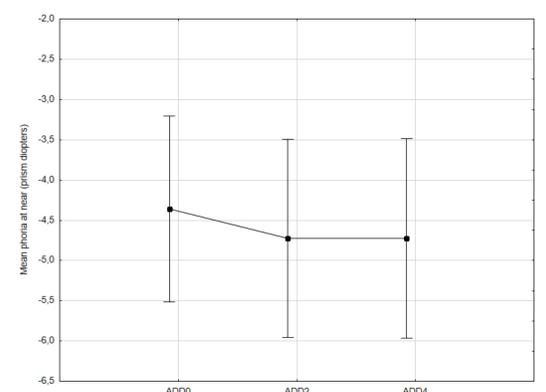


Figure 3. Mean phoria at near in 3 different ADDs.

CONCLUSIONS

Tested MFSClS designed for myopia control (center distance design) had no significant influence on accommodative response and accommodative lag.

Tested MFSClS with medium and high addition powers had no significant impact on phoria at near.

This study shows that tested MFCLs even in high addition powers (+4 D) slightly influence accommodative and convergence capacities.

Conflict of interest and Source of Funding:

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