

A REAL-WORLD STUDY COMPARING ATROPINE MONOTHERAPY TO THE SYNERGISTIC EFFECTS OF COMBINATION TREATMENT: DEFOCUS INCORPORATED MULTIPLE SEGMENTS SPECTACLE LENSES AND LOW DOSE ATROPINE



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Background

- The increasing of global prevalence of myopia has been a cause for concern. In myopia management there are many types of interventions used as monotherapy or combination treatment.
- The effectiveness of Defocus Incorporated Multiple Segments (DIMS) spectacle lenses (as an optical intervention) has been demonstrated both as a stand-alone treatment and when combined with atropine (pharmacological treatment) in diverse populations.^{1,2}
- There is no literature on the effectiveness of combination treatment using DIMS spectacle lenses and low dose atropine (LDA) in the South American population.

Purpose

The objective of this study was to evaluate whether the combination of LDA and DIMS spectacle lenses was beneficial in South-American children undergoing myopia control treatment.

- Retrospective data for 51 patients attending a private clinic between January – September 2020.
- Inclusion criteria:
 - Age 8-13y
 - Myopia with SER between -5.00 to -1.00 D
 - Myopia progression ≥ 0.50 D/year in the previous 12 months
 - Attended for 6-month, one- and two- year follow-up visits
- Phase 1 Environmental control: Following initial myopia diagnosis, participants were advised to spend 2 hours a day in outdoors activities.
- Phase 2 Monotherapy: Participants whose axial length (AL) increased by ≥ 0.15 mm in 6 months were prescribed LDA for the next 12-month period.
- Phase 3 Combination treatment: If at the 12-month visit, the AL increased by ≥ 0.17 mm/year, combination treatment (LDA + DIMS spectacle lenses) was prescribed for the next 12 months period.
- To observe changes, only data from the right eye was accepted.
- Treatment effectiveness was calculated based on the myopia progression across time periods.
- This study was approved by ethics committee of Centro Universitário da Várzea Grande, Brazil, under number 2127639 (December, 8th, 2023).

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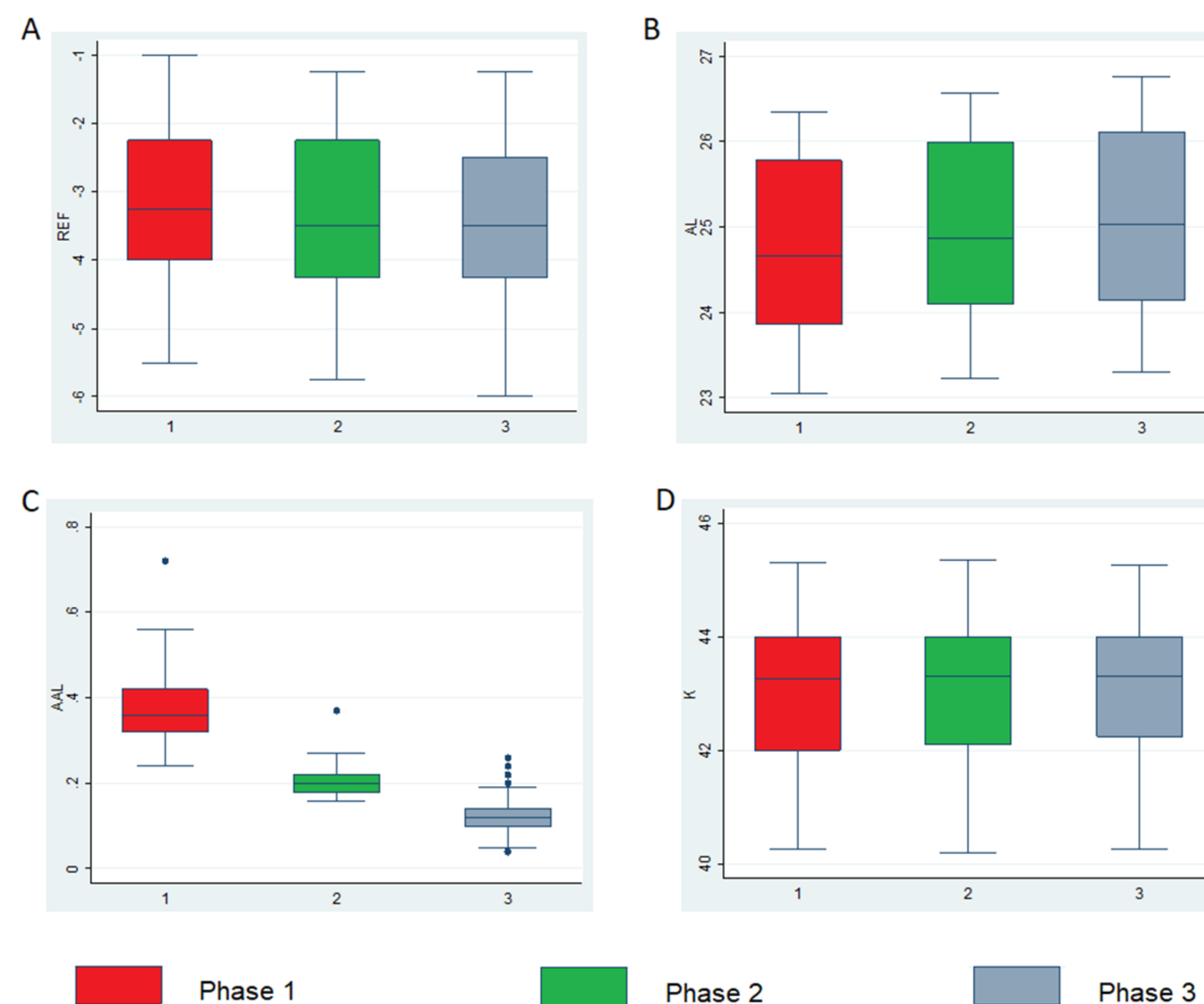
Results

Mean age: 10.16 ± 1.63 years Gender: Males 49%, Females 51%

Table 1: General data

Outcome	Phase	Mean \pm SD
Spherical Equivalent Refraction (D)	Baseline	-3.01 ± 1.22
	Phase 1	-3.33 ± 1.22
	Phase 2	-3.40 ± 1.21
	Phase 3	-3.46 ± 1.23
Axial Length (mm)	Baseline	24.60 ± 1.03
	Phase 1	24.79 ± 1.03
	Phase 2	24.99 ± 1.02
	Phase 3	25.12 ± 1.03
Keratometry (D)	Baseline	43.13 ± 1.19
	Phase 1	43.12 ± 1.21
	Phase 2	43.13 ± 1.24
	Phase 3	43.17 ± 1.22

Graph 1: Boxplot with the distribution in each phase of spherical equivalent refraction (A), axial length (B), variation axial length (C), and keratometry (D).



Discussion

- LDA is the most widely used pharmaceutical intervention in clinical settings 0.01%³.
- Several studies that showed weak effectiveness in long-term follow-up, particularly when AL elongation was the outcome of interest.^{4,5}
- Moreover, 0.05% atropine has been suggested as the most effective LDA tested in the young Asian population.⁶ In the western population, there were reports of frequent side effects when using this low-concentration.⁷
- In the present study, AL elongation was 0.13 ± 0.05 mm/year with combination treatment, compared to 0.21 ± 0.03 mm/year from LDA alone, confirming the synergistic effect between LDA and DIMS.
- Although 0.025% atropine was used in combination with DIMS spectacle lenses in the present study, the results were indifferent to combination of 0.01% atropine + DIMS spectacle lenses in a European population.²
 - Attributed to participant selection
 - European study: participants selected from progressive myopes
 - Present study: sub-group of participants selected from progressive myopes in whom monotherapy (0.025% atropine) was not effective.
- Limitations:
 - Retrospective study
 - Small sample size
 - Short follow-up duration

Conclusions

- Combination treatment (DIMS spectacle lenses and 0.025% atropine) resulted in the most significant reductions in myopia progression based on AL elongation when compared to the use of 0.025% atropine monotherapy or environmental control in a Brazilian population.
- Further randomized, double-blind clinical trials with longer follow-up may elucidate the true impact of this combination therapy on myopia progression.

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