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Original Research Article

A Study of Effects of Atropine 0.01% on Progression of Myopia

Vineet Pradhan

Assistant Professor, Department of Ophthalmology, Mahatama Gandhi Medical University, Sitapura, Jaipur, Rajasthan, India

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Corresponding author: Dr. Vineet Pradhan
Conflict of interest: Nil

Abstract

Background: Myopia, commonly referred to as short sightedness is a form of refractive error and is a very common cause of visual disability throughout the world.

Methods: it is a hospital based prospective study conducted on 200 patients of Myopia and 200 controls attending to Department of Ophthalmology, Mahatama Gandhi Medical University, Sitapura, Jaipur, Rajasthan, India from July-2021 to June-2022.

Results: There was no significant difference in the age, gender distribution, baseline myopia progression or follow-up duration between patients who use atropine and not use atropine drop. No significant difference of effectiveness was in atropine application.

Conclusion: Data from this study supports the use of atropine 0.01% eye drops in the progression of myopia. The atropine 0.01% eye drops provided non-significant reduction of increase in axial length and increase in refractive error as compared with control, with no side effects.

Keywords: Refractive error, Myopia, Atropine.

Introduction

Myopia is a common refractive error. It is also an important cause of ocular morbidity especially in younger generations like school-going children and young adults. [1] It has become a major public health problem globally, with a prediction of up to 50% of the world population will be myopic by 2050. Uncorrected myopia can have huge social, psychological, economic, and developmental implications. In addition, due to the degenerative changes in the retina and the optic disc, the irreversible vision-threatening sequel seems inevitable. [2]

India is the second most populated country in the world, with around 41% of its population (492 million) being less than 18-years of age. This young population is an important asset for the nation's development, and their challenges need to be addressed on time. While rising myopia is a cause of concern, it is not being given due importance in India due to a paucity of scientific literature in Indian set ups. Nevertheless, there is also a definitive role of genetics and environmental factors in the pathogenesis of myopia in Indian eyes; therefore, the present review aims to bridge the knowledge gap by providing a detailed report on myopia from last 40 years. [3] Atropine at low concentration has been shown to be safe and effective in slowing myopia progression in children of Chinese ethnicity, but its safety and effectiveness in European-derived populations has not been adequately assessed in a controlled trial. Therefore, the objective of the current study is to evaluate the efficacy, safety and mechanism of action of low-dose atropine (0.01%) with myopia.

Material and method

Study design: Hospital based prospective study.

Study population: 200 patients of Myopia attending to Department of Opthalmolgy, Mahatama Gandhi Medical University, Sitapura, Jaipur, Rajsthan

Inclusion Criteria:

- Age: 6 to 16 years
- Myopia ≥ 2.00 D (cycloplegic refraction; spherical equivalent
- No prior or current treatment for preventing myopia progression (bifocals / progressive addition lenses / orthokeratology)

Exclusion Criteria:

- Best corrected visual acuity < 0.5 (6/12)
- Refractive Myopia
- Astigmatism ≥ 1.5 D
- Amblyopia
- Ocular hypertension / Glaucoma

- Prior intraocular surgery
- Allergy to atropine eye drops
- Systemic diseases associated with myopia such as Marfan's syndrome, Stickler syndrome
- History of cardiac or significant respiratory diseases
- Lack of consent for participating in the study

Study Methodology

A total of 200 children of ages 6-16 years were randomized to two groups from july 2021 to june 2022. Intervention group received atropine 0.01% once daily in each eye for one year. Control group will not receive any medications. Follow up visits was scheduled every three months in Phase 1. Subsequently, medication was stopped and the study patients will be followed up every 3 months for one year. The progression of myopia (change in refractive error and axial length) was compared in the two groups by objective methods.

Data Analysis

Data were recorded on a Performa. The data analysis was computer based; SPSS-22 will be used for analysis. For categoric variables chi-square test was used. For continuous variables independent samples's *t*-test was used. *P-value*<0.05 was considered as significant.

Results

Table 1: Socio-demographic variable

Mean age	9.55 ±2.65Yrs
Male : Female	112: 88
Hindu : Muslim	186 : 14

We included 200 eyes of myopic in this study with the mean age of 9.55 ±2.65Yrs (range 5–16). The gender distribution was 112 male and 88 girls.

Table 2: Cycloplegic refraction

Follow up	0.01% atropine group	Control group
Base line	-3.07	-3.04
4 month	-3.43	-3.16
8 month	-3.62	-3.32
12 month	-3.79	-3.31
p-value	0.26	0.36

Table 3: Axial length

Follow up	0.01% atropine group	Control group
Base line	24.48	24.47
4 month	24.67	24.60
8 month	24.73	24.63
12 month	24.83	24.68
p-value	0.21	0.30

Discussion

The prevalence of myopia is increasing and has become an important issue in public health. [4-6] the goal of the study was to reduce the progression of myopia using topical atropine 0.01%. In this Randomized controlled trials (RCT), we compared the results of atropine 0.01% drug in the treatment and placebo groups. It is suggested that a nightly dose of 0.01% atropine seems to be a safe and effective regimen for slowing myopia progression in children, with minimal impact on visual function and without any photophobia. No safety concerns with atropine 0.01% were evident in our study. Despite a relatively small sample size, the impact of low-concentration treatment was statistically significant ($P < 0.0001$). Still, the exact mechanism of action for atropine to reduce myopic progression is currently not known. Meta-analysis of 19 studies that included 3137 children found atropine to be effective in slowing progression of myopia; however, no difference in efficacy was identified between different doses of atropine within this range. Higher doses of atropine were associated with more adverse effects. [7] Myopic eyes have reduced accommodative facility at distance, and accommodative responsiveness to both positive and negative defocus is slow. However, accommodative facility as a test does not have sufficient power to discriminate eyes with myopia from other refractive errors. [8]

Our study confirmed the efficacy and safety of atropine 0.01% eye drops in retarding the progression of axial length and spherical equivalent in atropine 0.01% treated eyes when compared to eyes treated with a placebo drug. Nevertheless, several limitations of the study must be admitted. Firstly, it was a single-center study with a somewhat small sample size, thereby reducing the power of statistical test. The use of atropine 0.01% is a new modality in the treatment of myopia

progression. Various studies have been conducted to establish the use of atropine in myopia progression. This study also showed that atropine 0.01% eye drops can achieve the best balance between efficacy and safety in the prevention and treatment of myopia and is an effective treatment modality to control the progression of myopia.

Conclusion

Data from this study supports the use of atropine 0.01% eye drops in the progression of myopia. The atropine 0.01% eye drops provided non-significant reduction of increase in axial length and increase in refractive error as compared with control, with no side effects.

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References

1. Wu PC, Huang HM, Yu HJ, et al. Epidemiology of myopia. Asia Pac J Ophthalmol (Phila). 2016; 5:386–93.
2. Walline JJ, Lindsley K, Vedula SS, et al. Interventions to slow progression of myopia in children. Cochrane Database Syst Rev 2011: CD004916.
3. Huang J, Wen D, Wang Q, et al. Efficacy comparison of 16 interventions for myopia control in children: a network metaanalysis. Ophthalmology. 2016; 123:697–708.
4. Liang YB, Wong TY, Sun LP, et al. Refractive errors in a rural Chinese adult population: the Handan Eye Study. Ophthalmology. 2009;116: 2119–2127.
5. Lin LL, Shih YF, Hsiao CK, et al. Epidemiologic study of the prevalence and severity of myopia among schoolchildren in Taiwan in 2000. J Formos Med Assoc. 2001; 100:684–691.
6. Vitale S, Sperduto RD, Ferris FL 3rd. Increased prevalence of myopia in the United States between 1971–1972 and 1999–2004. Arch Ophthalmol. 2009; 127:1632–1639.
7. Gong, Q. et al. Efficacy and adverse effects of atropine in childhood myopia: A meta-analysis. JAMA Ophthalmol. 2017;135: 624–630.
8. Pandian, A. et al. Accommodative facility in eyes with and without myopia. Invest. Ophthalmol. Vis. Sci. 2006; 47: 4725–4731.