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# Role of Atropine to Control Myopia in Indian Childrens: A Review

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**Keywords: Myopia, Atropine, Refractive error, blindness.**

**Abstract:** Uncorrected refractive error is the second major cause of avoidable blindness in India. There is an increased amount of refractive error among the Indian population, myopia is considered an important public health program in the urban population as its prevalence is much higher in the younger population than any other refractive error. Atropine has been used by many clinicians to arrest the growth of progressive myopia. A review of the studies published in India does not provide compelling evidence regarding its safeguard in controlling myopia in Indian children.

**Keywords:** Myopia, Atropine, Refractive error, blindness.

## INTRODUCTION

Uncorrected refractive error is the second major cause of avoidable blindness in India. Due to the increased amount of refractive error among the Indian population, myopia is considered an important public health program in the urban population as its prevalence is much higher in the younger population than any other refractive error.

In the cross-sectional study conducted in Delhi in 2015, 10.8% of children had a presenting vision ≤ 6/12 in the better eye with nearly 80% was due to myopia [1]. In the current surveys, it has been found that there is a considerable increase in myopia among adolescents, and it is now thought to be approaching from 10 to 25% in the west and 60 to 80% in the east 2. Various surveys conducted in India shows us that its prevalence is ranging from 6.9% to 19.7 % [3, 4].

The incidence of myopia is increased by 8-9 years of age and remained high till around 12 years, one possible reason for this finding in our study could be the early introduction of reading and writing in urban schools in India 4. Even in 1611, Kepler proposed the hypothesis of near work as a cause of myopia, suggesting that reading and performing near tasks at shorter distances in childhood accustomed the eye to near objects [5-7]. This in turn linked accommodation to myopia. However other findings have not supported a significant effect of near work on myopia [8-11]

Result obtained from the well-documented studies conducted in the 20$^{th}$ century which includes the use of bilateral atropine treatment confirmed that convergence likely does not affect myopia, its onset or progression, as children receiving bilateral atropine continued to perform near-vision work and therefore converge, but the severity of myopia did not increase [11-15]. Donders (1864) was the first man to recommend the use of atropine in correcting myopia when he suspected spasm of accommodation in myopic patients [16]. A century ago Pollock was the first to employ prolonged use of atropine for the treatment of myopia (for a duration of several months to years), the therapy also required affected children to avoid reading and writing [17].

## ATROPINE STUDIES IN INDIA

ATOM (Atropine For the Treatment of Myopia ) clearly shown that the atropine eye drops have dosage-dependent on efficacy for retarding myopia, 1% is most effective (78%) followed by 0.5%, 0.1%, and 0.01% (50% effective). Followed by ATOM 1, ATOM 2 study which was conducted to check the effectiveness of the lower doses of atropine showed that the efficacy of 0.01% was similar to 0.1 %, 0.5%, and 1.0 % but the 0.01 % was found to be more effective in slowing myopic progress with a 24% of the children continued to have progressive myopia after a washout period of 1 yr as compared to 0.5 %(68 % progressed) and 0.1%(59% progressed) [18]. The rebound phenomenon occurs more with the higher doses of atropine in both the ATOM1 & ATOM2. In the study conducted and compared with ATOM, topical 1% atropine sulfate eye drops were well tolerated and effective in reducing the myopia progression

by 67% in 60 eyes of 30 Indian children when used for more than a year [19]. Although the retardation of myopia progression with 1% Atropine was found to be lesser as compared to findings reported in the ATOM 1 study [18 20]. Studies conducted in India showed that 0.01 % of atropine is more effective than 0.1 %. In a Study conducted checking the efficacy of 0.01 % atropine there were 0.32 ± 0.29 increases in spherical equivalent over the year with a minimum baseline refractive error of -2.00 D, increase in axial length was found to be 0.2 ±0.29 [21]. When the results of this study were compared to ATOM 2 there was less variation probably due to the difference in sample size being taken. One of a study conducted at Mumbai, responses of 17 members from The Group of Pediatric Ophthalmologists and Strabismologists (GPOS) were taken into account, in which they stated that 0.01% atropine sulfate is a safe intervention with minimal side-effects and should be offered to children showing the progression of simple myopia but the possibility of long term side effects of this drug cannot yet be commented upon [22]. Atropine had been adopted into clinical practice for preventing the progression of childhood myopia by all the members of the panelist in a clinical session, and all of them use 0.01% atropine in children with the documented progression of myopia, even though no definite data is available on the side effect of long term use of atropine, unstructured evidence shows no significant side effects [23].

## CONCLUSION

After going through available literature there was not sufficient study conducted in India recommending the use of atropine as a myopia control drug. Its correct dosage, duration & side effects are still unpredictable. Moreover, long-term follow-up of the children undergoing atropine treatment is necessary to track down the side effects that can prevail in later days of their life. Long term practice of atropine for the treatment of myopia is not yet a standard practice in India.

## FURTHER STUDIES

We need more studies in order to decide the correct intervention program for the use of atropine in the treatment of childhood myopia. A set of protocols need to be made for practitioners to use atropine as a mode of correction for myopia.

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