



Tropicamide 0.5% VS Cyclopentolate 0.5% for Cycloplegic Refraction in Children

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Abstract

This study compares the efficacy of tropicamide 0.5% and cyclopentolate 0.5% for cycloplegic refraction in children aged 4 to 12 years. We used several tests to verify the validity of the results and to delve deeper into the measurement results. Each participant received both agents with a one-week.

Our results revealed that participants with tropicamide 0.5% they showed a different results than those who took cyclopentolate 0.5%. In conclusion, our findings demonstrated that tropicamide may be a practical alternative in clinical settings requiring rapid recovery and more accurate results.

Introduction

Cycloplegic refraction is a critical procedure in pediatric eye care, ensuring accurate measurement of refractive errors by temporarily paralyzing the ciliary muscle to eliminate the influence of accommodation. This is particularly important in children, who often have strong accommodative abilities that can mask hyperopia or lead to inaccurate prescriptions.

Tropicamide and cyclopentolate are among the most commonly used cycloplegic agents in clinical practice. While both are antimuscarinic drugs that act on the ciliary body, they differ in their pharmacological properties, onset time, duration of action, and side-effect profiles. Cyclopentolate is traditionally considered more effective in achieving full cycloplegia, but it is also associated with longer recovery time and more frequent side effects. Tropicamide, on the other hand, is known for its rapid onset and shorter duration, making it a more convenient option in certain clinical contexts.

Most studies in this area have focused on comparing these agents at their commonly used 1% concentration. However, less attention has been given to their performance at lower concentrations, such as 0.5%, which may be preferred for improving patient comfort and minimizing side effects—especially in young children.

In this study, we aimed to compare the efficacy of tropicamide 0.5% and cyclopentolate 0.5% in a pediatric population, using a range of clinical tests to evaluate cycloplegic response, accuracy of refraction, and recovery time. By doing so, we sought to provide evidence on whether tropicamide 0.5% could serve as a practical alternative to cyclopentolate 0.5% in everyday pediatric refraction.

Materials and Methods

-Design :

An analytical, observational, clinical study was conducted at the military hospital Oued Eddahab in morocco, And the E.P.H Sisters hospital in algeria

The equipment :

The equipment that we used included a phoropter , an auto refractometer , retinoscopy , and a digital screen for far vision.

Subjects :

A total of 33 children (17 males and 16 females) aged between 4 and 12 years participated in this study. Participants were recruited from the pediatric ophthalmology departments at both the Military Hospital Oued Eddahab in Morocco and the E.P.H. Sisters Hospital in Algeria. Inclusion criteria required that all children be healthy, cooperative, and free from any systemic or ocular pathology that could affect accommodation or refraction.

Children with a history of ocular surgery, neurological disorders, or allergy to cycloplegic agents were excluded. Informed consent was obtained from the parents or guardians of all participants, and the study protocol was approved by the institutional ethical review boards of both hospitals.

Each participant underwent two cycloplegic refraction sessions, one using tropicamide 0.5% and the other using cyclopentolate 0.5% with a washout period of one week between administrations. The sequence of drug administration was randomized to reduce bias.

To confirm the accuracy of the cycloplegic effect and the refractive measurements, retinoscopy was performed in addition to objective and subjective refraction tests. These included autorefraction, followed by subjective refinement using a phoropter and visual acuity testing with a digital screen. The consistency between retinoscopy and subjective refraction results was used as a benchmark for assessing the completeness of cycloplegia.

Results

During the first session, all participants underwent cycloplegic refraction using tropicamide 0.5%, followed one week later by the same procedure using cyclopentolate 0.5%.

When comparing the results of cycloplegic correction with subjective correction, we found a consistent difference ranging from 0.25 D to 0.50 D in both hyperopic and high myopic patients. This indicated a tendency for overcorrection during cycloplegia, especially after cyclopentolate 0.5%.

Notably, 82% of participants who received tropicamide showed cycloplegic refraction results equal to their subjective refraction, whereas only 18% of those who received cyclopentolate achieved this level of agreement.

Tropicamide 0.5% showed more accurate and clinically acceptable results. In most cases, the correction obtained with tropicamide was closer to the patient's subjective correction and better tolerated.

Retinoscopy confirmed these observations, aligning more closely with subjective findings in the tropicamide session. When asked which correction felt clearer and more comfortable, the majority of participants preferred the prescription obtained after using tropicamide 0.5%, citing better clarity and visual comfort.

Conclusions

This study demonstrated that tropicamide 0.5% can be a reliable and effective alternative to cyclopentolate 0.5% for cycloplegic refraction in pediatric patients, particularly in cases of hyperopia and high myopia.

Although cyclopentolate is traditionally considered the gold standard for inducing cycloplegia, our findings showed that tropicamide provided more accurate results, with 82% of patients achieving a cycloplegic correction equal to their subjective refraction, compared to only 18% with cyclopentolate. Additionally, tropicamide was better tolerated and preferred by the majority of participants.

Given its faster action, fewer side effects, and greater alignment with subjective refraction, tropicamide 0.5% may be considered a practical first choice for routine pediatric cycloplegic refraction, especially when patient cooperation and comfort are priorities.



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