

Distribution of Side Effects of Cyclopentolate in Cycloplegic Patients (Age Group 1-8 Years) at Mardan Medical Complex

Muhammad Tariq, Haleema Zafar, Hira Ali and Bilal

ABSTRACT

Objective: To determine the possible side effects of cyclopentolate.

Study Design: Observational study.

Place and Duration of Study: This study was conducted at the Department of Ophthalmology, Mardan Medical Complex Mardan from May 2017- July 2017.

Materials and Methods: 96 patients of age group from 1-8 years were examined with instillation of one drop of 1% cyclopentolate three times at the interval of 10-15 minutes. The possible side effects were then observed.

Results: Most of the children were observed with more than one side effect like Blurred vision, Watery eyes, Fever, Swelling of eye lids and Allergy etc to the drug. Bilateral swelling and laziness were also observed in few patients, not reported in previous literatures.

Conclusion: Patients compliance was very poor due to side effects of these cycloplegic drug. So to improve the patient compliance, so to minimize the side effects of cycloplegic drugs we need to use drugs with fewer side effects.

Key Words: Cyclopentolate, Side effects, Cycloplegic Patients

Citation of articles: Tariq M, Zafar H, Ali H, Bilal. **Distribution of Side Effects of Cyclopentolate in Cycloplegic Patients (Age Group 1-8 Years) at Mardan Medical Complex. Med Forum 2018;29(2):16-19.**

INTRODUCTION

Cycloplegia is also refers to the pharmacological paralysis of the ciliary muscles, and is primarily results in inhibition of accommodation¹. The time in which maximum cycloplegia can be achieved, may range from 10 to 60 minutes after instillation of cyclopentolate². Difference in iris colors has also been reported to affect the timing in the adult people. Cycloplegic agents act on muscarinic receptor sites and block the action of acetylcholine. Due to their mechanism of action, cycloplegics are called anti-cholinergics, anti-muscarinics or parasympatholytic agents. Muscarinic receptors are extensively distributed in the human body, especially in the iris and ciliary body³. Instillation of a cycloplegic agent results in inhibition of accommodation and also mydriasis (due to paralysis of the pupillae sphincter muscle). However, many cycloplegics have been shown to cause mydriasis but very little accommodative suppression⁴. Mydriasis also occurs without accompanying cycloplegia when a sympathomimetic agent is used. This shows that mydriasis is not always evidence of accompanying cycloplegia.

Because of the different time courses of mydriasis and cycloplegia, pupil size is a poor indicator of the cycloplegic effect⁵. Cycloplegic agents are indispensable in the diagnosis of latent hyperopia, pain relief from ciliary spasm, breaking or preventing irido-lenticular or irido-corneal adhesion, as well as penalization (or occlusion therapy) in eye care⁶. Hyperopic children generally have greater accommodative efforts in comparison to myopic children with relatively lower accommodation requirements⁷. Cycloplegic refraction is invaluable in the evaluation of patients with decreased vision or ocular deviation. The rationale for cycloplegic refraction is that patients have different levels of accommodation at different times⁸. Cycloplegic refraction helps determine full hyperopia in patients with accommodative esotropia and prevents overcorrection in myopic patients. It is also useful in prescribing correction in patients with limited cooperation during subjective refraction and amblyopic patients who have chaotic accommodation⁸. Cycloplegic refraction is considered as the gold standard for measuring refractive errors in epidemiologic studies in children and adolescents^{9,10}. Recently, it was even proposed that cycloplegic refraction be performed not only in children and adolescents but also in adults aged less than 50 years¹¹. However, several issues regarding cycloplegic refraction have not been completely addressed. First, although cycloplegic refraction in population-based studies could be done, under many circumstances, cycloplegic refraction is a great challenge in

Department of Ophthalmology, MMC Mardan.

Correspondence: Dr .Muhammad Tariq; FCPS Associate Professor of Ophthalmology, BKMC/MMC Mardan.
Contact No: 0333-9878809
Email: drmtariq73@gamil.com

Received: September, 2017; Accepted: December, 2017

population-based or school-based studies, especially in the studies of young children. Many parents and children do not agree to undertake cycloplegic refraction because of the blurred vision after cycloplegia.¹² In addition, feasibility and side effects of cycloplegia were also challenges. It has been well-established that generally myopia could be overestimated and hyperopia be underestimated if refraction was performed without cycloplegia, but to which extent the prevalence of refractive errors are overestimated or underestimated in different populations is different as the prevalence of refractive errors seems to be a major determinant for the difference between cycloplegic and non-cycloplegic refractive error. Cyclopentolate provides cycloplegia for 12 to 24 hours.

Side effects of cyclopentolate may be Ocular as well as systemic. Ocular side effects may include irritation, lacrimation, allergic blepharoconjunctivitis, conjunctival hyperemia, and increase in intraocular pressure. Systemic side effects include drowsiness, ataxia, disorientation, incoherent speech, restlessness, and visual hallucinations¹³. This study was focused on the side effects of cyclopentolate in cycloplegic patients.

MATERIALS AND METHODS

This study was carried out in Mardan Medical Complex Mardan. The duration of this study was three months from May 2017 to July 2017. A total of 96 patients were examined. Criteria for inclusion were children aged between 1 and 8 years. Children outside this range, those with other eye diseases and history of cardiovascular disease were excluded from the study. Subjects with a history suggestive of hypersensitivity to cyclopentolate were also excluded from the study. 96 patients were examined with instillation of one drop of 1% cyclopentolate at the interval of 10-15 minutes and three times before refraction was performed. After 10-15 min of instilling drop of cyclopentolate the patients was observed for any possible side effect and continue till and after few hours of refraction. Refraction was done 45 min after instillation of the last drop of cyclopentolate. Side effects were observed till 3-4 hours after the last drop of cyclopentolate was instilled. Parents of the subjects were informed about possible post instillation side effects of the drugs and were told to present to the hospital immediately should any of these be observed.

RESULTS

A total of 96 patients, 58 male and 38 female were examined to determine the side effects of cyclopentolate.. Among 96 patients this was studied that blurred vision was found among 93 patients, out of which 57 were male while 36 were female, similarly redness was also found higher in number and was 72

out of 96 patients in which 39 were male and 33 were female patients. Cyclopentolate cause watering from the eyes among 69 patients out of 96, in these 69 patients 36 were male and 33 were female. Fever was noted in 48 patients (27 male and 21 female) while asking from patients 45 have burning sensation to eyes in which 24 were male and 21 were female.

Table No.1: Frequencies of side effects in both genders for cyclopentolate

Side effects	No of patients n=96	Male N=58	Female N=38
Fever	48	27	21
Redness	72	39	33
Watering	69	36	33
Itching	33	21	12
Allergy	36	18	18
Blurred vision	93	57	36
Tachycardia	3	1	2
Hallucination	9	4	5
Headache	30	15	15
Difficulty in breathing	3	1	2
Burning sensation to eye	45	24	21
Dryness of mouth	24	15	9
Laziness	24	13	11
Bilateral swelling of lower lid	18	10	8
Others	12	6	6

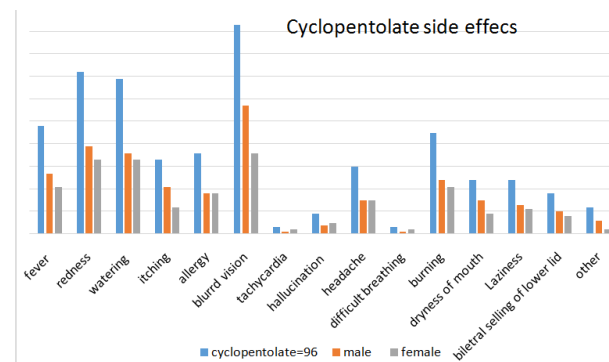


Figure No. 1: Side effects of cyclopentolate

36 patients have allergy in which 18 were male and 18 were female, similarly 33,30,24,18,12,9 and 3 patients presented with itching, Headache, tachycardia, dryness of mouth, bilateral swelling of lower lids, laziness and difficulty in breathing respectively, as shown in the given Table.1.

Among the 96 patients 12 patients presented with Nausea and Drowsiness, which was listed as others in the Table 1.

The data were also analyzed through statistical graphs and the number of patients (both sexes) presented with the side effects. As shown from the given Figure 1, the number of patients were at Y axis while side effects were given at X axis.

DISCUSSION

Anticholinergic drugs (atropine, cyclopentolate, tropicamide, homatropine, scopolamine, etc) produce mydriasis and cycloplegia by relaxing the ciliary body and iris¹⁴. However, they also manifest cardiovascular, respiratory, cerebral and gastrointestinal effects when absorbed in the systemic circulation such as tachycardia, atrial dysrhythmias, fever and flush, bronchodilatation, prolonged gastric emptying time and alterations in mental status ranging from sedation or excitation and restlessness to acute psychotic reaction¹⁵. Myasthenia gravis-like syndrome has also been reported after topical administration of these drugs.¹⁶

This study was focused over the side effects of two mostly used cycloplegic drug, cyclopentolate. 96 patients were examined with instillation of one drop of 1% cyclopentolate at the interval of 10-15 minutes and three times. All the 96 patients of the group age from 1-8 years for both male and female were carefully studied to examine the side effects of the drug. It was observed that Blurred vision was most commonly found among the patients. Many of the patients suffers from mild to moderate allergy to the eye drop which may be due to the active ingredients or may be due to the preservatives in the eye drop. The symptoms of allergy were redness of the eye lids and itching. Along with allergy some children were observed with watering from the eyes due to action of the drugs on the lacrimal glands.

Some of the systemic side effects like increase heart rate, flushing of the face, fever which was noted from mild to moderate in both male and female patients. As this drug is parasympatholytics, so it acts on blood vessels and causes an increase in blood pressure and also cardiac rhythm.

Drowsiness was noted in a single patient for cyclopentolate. Bilateral swelling and laziness which were not reported in previous literatures have also been observed.

CONCLUSION

In this study 96 pediatric patients from 1-8 years age group were examined for the side effects of the drug. Multiple side effects like Blurred vision, Allergy, Fever, redness, etc are commonly were observed among the patients and because of these side effects patients compliance was very poor specially with the installation of second and third drops. Bilateral swelling and laziness which were not reported in previous literatures have also been observed.

So to improve the patient compliance and to minimize the side effects of cycloplegic drugs we need to have drugs with fewer side effects and also the half-life of the drug may be reduced so that its effects will last for shorter amount of time after its instillation.

Author's Contribution:

Concept & Design of Study: Muhammad Tariq
 Drafting: Haleema Zafar, Muhammad Tariq
 Data Analysis: Hira Ali and Bilal
 Revisiting Critically: Muhammad Tariq, Haleema Zafar
 Final Approval of version: Muhammad Tariq

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Bin Wang and Kenneth J Ciuffreda, Depth-of-focus of the human eye: theory and clinical implications. *Survey Ophthalmol* 2006;51:75-85.
2. LUKE L-K LIN, et al., The cycloplegic effects of cyclopentolate and tropicamide on myopic children. *J Ocular Pharmacol Therap* 1998;14: 331-335.
3. Paul Abrams, et al. Muscarinic receptors: their distribution and function in body systems, and the implications for treating overactive bladder. *Br J Pharmacol* 2006;148: 565-578.
4. Gettes BC, Leopold IH. Evaluation of five new cycloplegic drugs. *AMA Archives Ophthalmol* 1953;49:24-27.
5. Amos DM. Cycloplegics for refraction. *Optometry and Vision Sc* 1978; 55:223-226.
6. Dorothy SP Fan, et al. Comparative study on the safety and efficacy of different cycloplegic agents in children with darkly pigmented irides. *Clin Exp Ophthalmol* 2004; 32:462-467.
7. Rosenfield M, Cohen AS. Repeatability of clinical measurements of the amplitude of accommodation. *Ophthalmic and Physiological Optics* 1996; 16: 247-249.
8. Farhood QK. Cycloplegic refraction in children with cyclopentolate versus atropine. *J Clin Exp Ophthalmol* 2012; 3p. 1-6.
9. Jie Chen, et al. Cycloplegic and noncycloplegic refractions of Chinese neonatal infants. *Investigative Ophthalmol Visual Sci* 2011; 52: 2456-2461.
10. Fotouhi A, et al. Validity of noncycloplegic refraction in the assessment of refractive errors: the Tehran Eye Study. *Acta Ophthalmol* 2012;90: 380-386.

11. Morgan IG, et al. Cycloplegic refraction is the gold standard for epidemiological studies. *Acta Ophthalmol* 2015; 93:581-585.
12. Pokharel GP, et al. Refractive error study in children: results from Mechi Zone, Nepal. *Am J Ophthalmol* 2000; 129:436-444.
13. Ihekaire D. The comparative efficacy of cycloplegic drugs-tropicamide and cyclopentolate on school children. *Int J Sci Res Educ* 2012;5: 223-46.
14. Benatar-Haserfaty J, Tercero-López J. Hypertensive crisis and coma after administration of scopolamine, atropine, and phenylephrine ophthalmic solutions during 2 vitreoretinal operations. *Revista española de anestesiología y Reanimación* 2002;49:440.
15. Mirshahi A, Kohnen T. Acute psychotic reaction caused by topical cyclopentolate use for cycloplegic refraction before refractive surgery: case report and review of the literature. *J Cataract Refractive Surg* 2003; 29:1026-1030.
16. Meyer D, Hamilton RC, Gimbel HV. Myasthenia Gravis-like Syndrome Induced by Topical Ophthalmic Preparations: A Case Report. *J Neuro-Ophthalmol* 1992;12: 210-212.