



RESEARCH ARTICLE

PHARMACY PRACTICE

MYDRIATIC EFFECT OF TROPICAMIDE, PROPARACAINE AND LIGNOCAINE: A MONO AND COMBINATION THERAPY**M.G.RAJANANDH*., MATTA SAI PAVAN KUMAR., VARUN CHAPARLA., RAVI TEJA., N.N.KALYAN CHAKRAVARTHI., JOEL JOHNY MOLEKUNNEL AND C.RAMASAMY**

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ABSTRACT

The present study was undertaken to assess the mydriatic effect of mono and combination therapy of tropicamide with lignocaine in outpatients of Ophthalmology department. The proposed study was of prospective type. Ninety patients were included in the study. The study population was further subdivided into three individual groups of thirty each, in which all were assigned to receive the fixed regimens of tropicamide and combinations of tropicamide with lignocaine and proparacaine. The pupil dilatation with respect to tropicamide was found to be maximum at 6mm. The tropicamide and lignocaine regime produced more significant mydriatic effect at a maximum of 7mm in the outpatients, whereas the combination of tropicamide with proparacaine produced mydriasis as same as tropicamide alone. A new combination of tropicamide (muscarinic receptor antagonist) and lignocaine (local anesthetic) is found to be more effective in bringing about maximal dilatation of the pupil in ophthalmic patients who require routine screening.



KEYWORDS

Mydriasis, tropicamide, lignocaine, proparacaine, ophthalmic

INTRODUCTION

Pupil dilatation or mydriasis is of great significance in screening of various ophthalmological conditions. The factors that contribute to this phenomenon are disease, drugs etc. The ability of the agent that is used for producing dilatation has variable impact on each individual¹. Moreover the physiology of the eye is another factor that gains prime attention in subjects with eye disorders. Innervations by parasympatholytic system can contract the radial muscles². Sympathomimetics and parasympatholytics are the common and main categories of mydriatic agents that have been used so far routinely³. An ideally used mydriatic will possess sudden onset of action with less side effects thereby allowing a quick recovery⁴. Additionally for an economic ophthalmic surgery, an adequately and sufficiently dilated pupil is mandatory⁵. The present study assessed the efficacy of combining a local anesthetic with a mydriatic to attain appreciable mydriasis for the screening.

MATERIALS AND METHOD

The study was of a randomized prospective type, carried out in the Department of Ophthalmology in SRM Medical College hospital and Research centre. The study was approved by the Institutional Ethical Committee. A total of ninety patients between 18 to 75 years were selected for the study based on the inclusion criteria set up. Moreover, Patients with or without any primary or secondary illnesses were included for the study. Pregnant and lactating women were also included in the population. Instead, Patients who had undergone any surgical procedures in eye or with any ocular infections were excluded from the study.

METHOD

After obtaining the informed consent from each patient, their primary demographic data was noted. Pupil dilatation was the main outcome of the study. The subjects were divided into three groups: I, II and III consisting of thirty each. The drug regimens assigned consists of tropicamide 1%, tropicamide 1% with lignocaine 4% and tropicamide 1% with proparacaine 0.5%. One drop of the assigned drug was instilled into the left eye and the right eye was used as standard. The pupil diameter was measured using a transparent scale after the acuity test, before the instillation of the first drop. A ten-minute interval was followed between the administrations of the next drop up to one hour. The same methodology was followed for the other groups as well. In the combination therapy, a five-minute interval was given before the instillation of the first drop of the second drug which followed up to one hour. **Statistical Analysis** Data is expressed as mean \pm standard deviation. Paired student's t-test was used to analyze the data using PSPP 17.0 version software. Significant results were produced within the statistical range of $P < 0.05$.

RESULTS

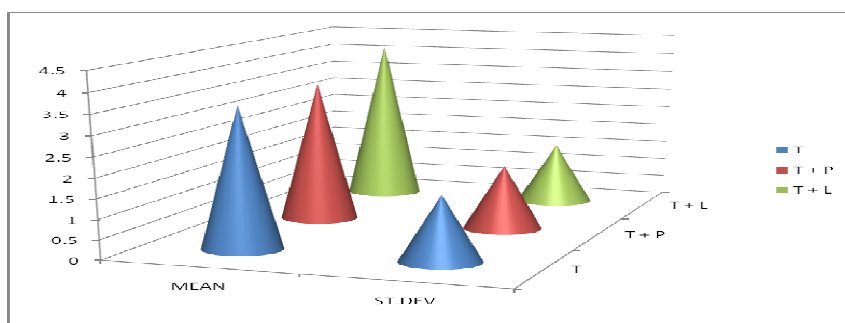
The table depicted below demonstrates that the mydriasis produced when combining tropicamide with lignocaine was more significant at P-values of 0.01, whereas, the dilatation produced with respect to tropicamide alone was significant at 0.02 levels of P-values. The pupil dilatation of tropicamide with respect to proparacaine and tropicamide combination was less significant than the monotherapy.

Table 1
Mydriatic Effect of Lignocaine and Proparacaine with respect to Tropicamide

Group	Drug Treatment	Left Eye	Right Eye
I	Tropicamide	3.56 ± 1.64	1.54 ± 0.01
II	Tropicamide and Lignocaine	4.17 ± 1.57	2.04 ± 0.04
III	Tropicamide and Proparacaine	3.57 ± 1.66	1.65 ± 0.03

Data expressed as mean ± standard deviation

FIG 1 MYDRIATIC EFFECT OF LIGNOCAINE AND PROPARACAINE WITH RESPECT TO TROPICAMIDE



DISCUSSION

The effectiveness of successful ophthalmic screening can prevent blindness which depends on the mode used, screening interval, as well as the capability of the screening investigator. Two broad methods have been adopted viz; ophthalmoscopy, with or without mydriasis using eye drops and retinal photography. Routine dilated examination or mydriasis is a screening test performed in patients, presented without any symptoms or risk factors of any diseases, which can be done by using mydriatic agents^{6,7}. The strength of the agent that is used for dilatation implies the effect produced in the patient. The routinely viewed process is that of combining a parasympatholytic with sympathomimetics, as, the regulation of the latter is being dominated by the former system. As a result, the combination therapy is preferred rather than mono therapy for producing the same effect⁸.

The current study was undertaken on the basis to show where, lignocaine (which is having a different mode of action than tropicamide) can produce significant mydriatic effect as an alternative eye drop. Tropicamide blocks the acetylcholine action leading to the paralysis of sphincter iris muscles. This effect is followed by the unopposition of the adrenergic innervations to the radial muscle ultimately leading to dilatation.

Lignocaine, in spite of its anesthetic effect, is able to potentiate the mydriasis produced by tropicamide⁹. Lignocaine acts by potentiating the mydriasis induced by tropicamide and it has been proved from earlier studies that the latter is a better potentiator, but the mode how it exerts action is still unclear. Proparacaine, a topical anesthetic is recommended in order to enhance both the rate and magnitude of pupillary dilation and therefore a concentration of 0.5% proparacaine was used to investigate the study¹. An exact mechanism of how proparacaine can exert any ophthalmological action is yet to be confirmed. Earlier studies



have shown that the instillation of proparacaine prior or after tropicamide reduces the speed of dilatation¹⁰.

Another important factor that requires prime attention is the proper time interval between the instillation of the eye drops. An immediate or late administration is not preferable as it may lead to the dilution of the mydriatic allowing it to remain intact in the conjunctival sac. Taking this into consideration a time interval of three minutes was given for the present study based on literature surveys.

The present study reveals that a better and quicker ophthalmological screening for mydriasis can be achieved with a combination of tropicamide and lignocaine. The combination therapy of the above can also be beneficial to other medical practitioners in surgical as well as screening purposes on a practical point of view. An extensive study on the above combination has not been done elsewhere. The present study does confirm that proparacaine does not produce or potentiate any significant mydriasis as compared to tropicamide. Despite its local anesthetic effect it has no significant role in mydriasis. Treatments for various ophthalmological conditions require adequate pupillary dilatation. The investigation performed by combining tropicamide with proparacaine confers that tropicamide is superior in action.

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Our next target in the field is to combine higher concentrations of lignocaine and other anesthetics with tropicamide to bring it in the right proportion for an effective mydriasis that would enable the ophthalmologists as well as other paramedical professionals for routine screening tests.

CONCLUSION

The current study concludes that the combination of lignocaine with tropicamide potentiates the mydriatic effect produced by the latter and can be practiced widely for quicker dilatation in ophthalmological screening as well as in surgical purposes.

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