

Short Time Effect of 2% Pilocarpine Eye Drops on Intra Ocular PressureKVV Satyanarayana¹, A Chitra², K Ravi Naini³, Ch Ramya⁴, VVL Narasimha Rao⁵, T Jaya Chandra⁶¹Associate Professor, Department of Ophthalmology, GITAM Institute of Medical Sciences & Research, Visakhapatnam – 530 045 Andhra Pradesh.²Department of Ophthalmology, GITAM Institute of Medical Sciences & Research, Visakhapatnam – 530 045 Andhra Pradesh.³Asst. Professor, Department of Ophthalmology, GITAM Institute of Medical Sciences & Research, Visakhapatnam – 530 045 Andhra Pradesh.⁴Department of Ophthalmology, GITAM Institute of Medical Sciences & Research, Visakhapatnam – 530 045 Andhra Pradesh.⁵Professor & HOD, Department of Ophthalmology, GITAM Institute of Medical Sciences & Research, Visakhapatnam – 530 045 Andhra Pradesh.⁶Department of Microbiology, GSL Medical College, Rajahmundry – 533 296.

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Abstract:**Introduction:** Pilocarpine is direct acting parasympathomimetic agent, acts on autonomic nervous system. Intra ocular pressure (IOP) is the major risk factor for the development of glaucoma. A study was conducted to find the short time effect of 2% Pilocarpine eye drops on IOP.**Methods:** This was a hospital based, prospective study, conducted in the department of Ophthalmology, GITAM Institute of Medical sciences & Research, Visakhapatnam. Study was conducted between January to June 2023. Individuals aged ≥ 20 years, both gender diagnosed to be angle closure glaucoma and different subtypes were included in this research. The preprocedural IOP was recorded with goldman applanation tonometer, recorded in milli meters of mercury (mm Hg). Pilocarpine eye drops at 2% concentration was instilled to both eyes for every 30 minutes for 2 hours and IOP was measured. The data were represented in mean \pm SD. ANOVA test was used for the statistical analysis. $P < 0.05$ was considered to be statistically significant.**Results:** Total 50 members were included, female male ratio was 2.3. Maximum (24%) study members were in 40 – 50 years group and minimum (8%) in ≤ 20 years group. The mean \pm SD IOP was 17.3 ± 6.2498 and 14.52 ± 5.1217 , respectively in pre and post administration of 2% pilocarpine eye drops; statistically there was significant difference ($P = 0.001$).**Conclusions:** Pilocarpine can bring significant IOP reduction among the glaucoma individuals. But small sample size, short duration of study and not reporting the diurnal and nocturnal data are the limitations of the study. Studies on large sample size for long time is recommended.**Keywords:** Intra Ocular Pressure, Primary, Pilocarpine, Study, Member.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Pilocarpine is direct acting parasympathomimetic agent, acts on autonomic nervous system. It modifies the effect of acetylcholine (ACh), the primary neurotransmitter of the parasympathetic nervous system. It was introduced in the treatment of glaucoma 140 age years. [1, 2] it was the first suggested treatment for glaucoma. In low concentrations, it reduces the blood supply to ciliary processes and causes shrinkage as well as reduce the secretion of aqueous humor. [3] Animal studies have shown that Pilocarpine can stimulate eye receptors, alters the flow. [4]

Intra ocular pressure (IOP) is the major risk factor for the development of glaucoma. [5] IOP is the only modifiable factor in the treatment and also prevention of glaucoma. Hence there is an increased importance to reduce IOP in the treatment of glaucoma. [5] Pilocarpine can also be used as a simulant for organophosphate exposure as demonstrated by its ability to reliably induce both miosis and accommodative spasm in aged population. [6] With this back a study was conducted to find the short time effect of 2% Pilocarpine eye drops on IOP.

Methods

This was a hospital based, prospective study. It was conducted in the department of Ophthalmology, GITAM Institute of Medical sciences & Research, Visakhapatnam. Study was conducted between January to June 2023. Study protocol was approved by the Institutional Ethics committee. An informed consent was taken from the study participants.

Individuals aged ≥ 20 years, both gender diagnosed to be angle closure glaucoma and different subtypes were included in this research. Non cooperative individuals were not considered in this research.

The preprocedural IOP was recorded with goldman applanation tonometer and the results were recorded in milli meters of mercury (mm Hg). The anterior chamber angle is examined with 4 mirror sussman gonio lens and anterior chamber angle

width is classified with Shaffer grading. [7] Pilocarpine eye drops at 2% concentration was instilled to both eyes for every 30 minutes for 2 hours and IOP was measured. In addition AC angle was also measured with gonioscope to note the changes within the angle configuration.

Statistical analysis: The data were analysed using SPSS 21.0. The data were represented in mean \pm SD. ANOVA test was used for the statistical analysis. $P < 0.05$ was considered to be statistically significant.

Results

Total 50 members were included, 35 (70%) were male and 15 (30%) were female. The male female ratio was 2.3. The age was ranged between 18 to 83 years. Maximum (24%) study members were in 40 – 50 years group and minimum (8%) in ≤ 20 years group (Table 1).

Table 1: Age wise distribution of the study members.

Age	Number	%
≤ 20	4	8
21 – 30	7	14
31 – 40	5	10
41 – 50	12	24
51 – 60	7	14
61 – 70	8	16
71 – 80	7	14
Total	50	100

The mean \pm SD IOP was 17.3 ± 6.2498 and 14.52 ± 5.1217 , respectively in pre and post administration of 2% pilocarpine eye drops; statistically there was significant difference ($P = 0.001$). Statistically there was significant difference in the mean IOP of left eye (LE) and right eye (RE), respectively (Table 2).

Table 2: Statistical analysis of IOP before and after administration of 2% pilocarpine among the study members.

Area	Mean \pm SD IOP in mm Hg		Statistical analysis
Right eye	Before administration	17.16 ± 5.953	Statistically significant ($P = 0.001$)
	After administration	14.44 ± 4.986	
Left eye	Before administration	17.44 ± 6.591	Statistically significant ($P = 0.001$)
	After administration	14.6 ± 5.303	

Discussion

Glaucoma is one of the major health issues, responsible for visual impairment. [8] Next to cataract, this is the leading cause of bilateral blindness. Moreover in most of the individuals it is the silent killer by the time of presentation to the specialist, irrecoverable visual loss. In one of the previous reports [9], the incidence of glaucoma is common among the male; the incidence was 51.4%, 48.6%, respectively among the male and female. In this research also male predominance was detected; the male female ratio was 2.3. Palimkar A et al. [10] conducted an epidemiological study, nearly 8600 members were included; the age of the study members was ranged between 35 – 84 and 51.4 years was the mean age and most of the study members were in 35 – 49

years. Whereas almost similar finding were reported in this research also but the current study was not epidemiological research, the sample size is also limited; maximum number of study participants were in 41 – 50 years group (Table 1).

Lowering the IOP treatment is widely used now a days. Most of the glaucoma individuals require additional treatment to maintain normal or healthy IOP. [11] Pilocarpine at 2% concentration is frequently used as an additional therapeutic agent to in IOP reduction among the individuals with glaucoma. Pilocarpine was reported to decrease IOP when applied three times in a day among the open angle glaucoma. [12]

In this research, there was statistically significant decline in the mean IOP after administration of 2% Pilocarpine. The mean \pm SD IOP was $17.3 \pm$

6.2498 and 14.52 ± 5.1217 , respectively in pre and post administration of 2% pilocarpine eye drops; statistically there was significant difference and the mean IOP decline is statistically significant, respectively in the LE and RE (Table 2). Seibold LK et al. reported significant reduction in IOP among the glaucoma individuals statistically also there was significant difference¹² Combination of two drugs or more is common in the treatment of glaucoma; but if multipharmacy is not convenient, monotherapy is recommended. Moreover, if the IOP levels are not coming down, change from one monotherapy to another is recommended. [13]

Pilocarpine can bring significant IOP reduction among the glaucoma individuals. But small sample size, short duration of study and not reporting the diurnal and nocturnal data are the limitations of the study. Studies on large sample size for long time is recommended.

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