

Evaluation of Efficacy of Supplementary Intracameral Lignocaine in Phacoemulsification under Topical Anaesthesia in Tertiary Care Hospital at Anand District

Tanviben G Chaudhari¹, Nirzarini N. Shah², Samir G. Bhavsar³

¹ A. R. College of Pharmacy & G.H.Patel Institute of Pharmacy, B/h Charutar Vidyamandal Office, Mota Bazaar, Vallabh Vidyanagar, Di. Anand, Gujarat- 388120, INDIA.

²Coordinator, Clinical Pharmacy Programme A. R. College of Pharmacy and G. H. Patel Institute of Pharmacy, Anand, Gujarat- 388120, INDIA.

³Department of Ophthalmology Shree Krishna Hospital and Pramukh Swami Medical College, Karamsad, Anand, Gujarat- 388120, INDIA.

ABSTRACT

Objectives: To study analgesic effect of intracameral Lignocaine in Phacoemulsification under topical anaesthesia, and to report the effect of intracameral Lignocaine on maintenance of pupillary dilatation. **Method:** An observational study was conducted on 75 patients undergoing Phacoemulsification in cataract surgery; out of which 37 patients were enrolled in control group (treated with topical anaesthesia Only) and 38 patients in test group (treated with topical anaesthesia supplemented with Intracameral Lignocaine). Pupillary diameter was measured before surgery and at the completion of surgery. When the patients returned to recovery room after Phacoemulsification, the patients were asked to fill a pain assessment scale (VAS with numerical rating scale) and data were collected; side effects like ocular itching, burning sensation, as well as effect on maintenance of Pupil Diameter, Haemodynamic Parameters such as systolic and diastolic blood pressure and heart rate were recorded. **Results:** Patients' pain experience in control and test group was 62% and 21% respectively. There was no report of any side effect like ocular itching, burning sensation, and also on Haemodynamic parameter such as SBP, DBP, and HR. Pupil diameter before treatment was 8.03mm \pm 0.15 and 8.16mm \pm 0.17 in control and test group respectively. Pupil diameter after treatment was 5.92 mm \pm 0.20 and 6.80 mm \pm 0.22 in control and test group respectively, indicating better maintenance of dilatation in test group. **Discussion:** Patients' experience of pain was less and Pupil diameter at the completion of surgery was more in test group as compared to control group. **Conclusion:** Topical anaesthesia along with intracameral Lignocaine helps to reduce pain to more degree and avoid discomforts during Phacoemulsification in cataract surgery as compared to Lignocaine alone.

Key words: Intracameral lignocaine, Topical anaesthesia, Phacoemulsification, Analgesic, Cataract surgery, Pupil diameter.

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Address for correspondence:

Tanviben G. Chaudhari, M.Pharm
A. R. College of Pharmacy & G.H.Patel
Institute of Pharmacy, B/h Charutar
Vidyamandal Office, Mota Bazaar,
Vallabh Vidyanagar, Di. Anand, Gujarat-
388120, INDIA.

Mobile No : +91 9537365480

Email: tanvichaudhari910@gmail.com

INTRODUCTION

The lens is the optically clear structure, located behind the iris and in front of the vitreous body and retina. Shape, clarity, and refractive index of the lens enable to focus light on to the retina. The lens is formed from ectodermal tissue and contains epithelial cells that give rise to lens fibres throughout life, so with increasing age the lens becomes more compact and thicker. If

lens loses its transparency for any reason, it is called a cataract.¹

Cataract is a clouding of the crystalline lens inside the eye, which leads to a decrease in vision.²

Cataract that develops in older people without a known cause is called senile



cataract, whereas diabetes is considered as major risk factor for the rapid progression of senile type cataract.³

It is estimated that 180 million people are visually disabled worldwide, and of these, 37 million people are blind and these number increases by one to two million every year with 28,000 new cases reported daily.⁴ Its prevalence rises with age, from 4.5% to 10.0% before 65 years of age to 60% to 67% in those older than 85 years. With increasing life expectancy, the prevalence of cataract is rising, so as the demand for surgery. Cataract leads to impairment of activities of daily living and may even cause blindness.⁵ Cataract contribute 50% of blindness worldwide.⁴ It is the most prevalent, but treatable cause of visual impairment and blindness in the world.

Cataract surgery with an intraocular lens implant is one of the most common and effective surgical procedure in field of medicine.²

Removal of cataracts lens is performed by two types of surgery: (1) Intra capsular cataract extraction (2) Extra capsular cataract extraction of which, phacoemulsification and intraocular lens (IOL) implantation, being the most common technique.⁶

Phacoemulsification refers to modern technique of cataract surgery, in which internal lens of the eye is emulsified with an ultrasonic hand piece and aspirated from the eye. The smaller wound size required for phacoemulsification surgery led to safer surgery and more rapid visual recovery for patients.⁷ The methods of anaesthesia available for cataract extraction include general anaesthesia, local injection anaesthesia, topical anaesthesia and intracameral anaesthesia.^{6,8} The reduced surgical time needed for small incision cataract surgery has led to an increased use of topical forms of anaesthesia.⁹

Topical anaesthesia with or without intracameral Lignocaine has been used to avoid complications and achieve the same efficacy as previous anaesthesia used throughout Phacoemulsification.¹⁰ Topical anaesthesia has several advantages compared to injection (retrobulbar and peribulbar) anaesthesia. It allows rapid visual recovery avoiding rare but potentially serious complications such as globe perforation and retrobulbar haemorrhage.¹¹ It has been reported that the use of supplemental intracameral Lignocaine as an adjunct to topical anaesthetic drops may further reduce pain during cataract surgery.¹¹

OBJECTIVES

1. To study analgesic effect of Intracameral Lignocaine

in Phacoemulsification under Topical Anesthesia in Cataract Surgery

2. To report the effect of Intracameral Lignocaine on Pupil Diameter

METHODS

Study Design

This was an observational, questionnaire based study conducted at Shree Krishna hospital, Karamsad after getting approval of the research project from Human Research Ethics Committee (HREC).

Study Population

Inclusion Criteria

- Patients visiting ophthalmology department of Sri Krishna Hospital, diagnosed as having cataract and advised to undergo phacoemulsification under topical anaesthesia.

Exclusion Criteria

- Patients with history of adverse reaction to Lignocaine
- Patients undergoing any other surgery combined with cataract surgery.

Procedure of the study

The study was initiated after written informed consent was obtained from each patient before his/her enrolment in the study.

Total 75 patients undergoing Phacoemulsification surgery participated in this observational study; out of which 37 patients were enrolled in control group (treated with topical anaesthesia only) and 38 patients in test group (treated with topical anaesthesia along with Intracameral Lignocaine). The diameter of pupil was measured at the beginning and at the end of the surgery. When the patients returned recovery room after Phacoemulsification, the patients were asked to fill a Pain assessment scale (VAS with numerical rating scale) and data were collected; side effects like ocular itching, burning sensation, and effect on Pupil Diameter (Before surgery and After surgery). Pre-operative and post-operative haemodynamic Parameters such as SBP, DBP and HR were recorded.

The pain score was assessed using a Visual analogue scale with Numerical rating scale, where 0 represents no pain

and 10 represents unbearable pain. If patient was unable to give visual response of questions verbal answer was considered.

STATISTICAL ANALYSIS

The patient’s demographics were summarized by graphical methods. The pain score of both the control groups were assessed using graphical method. Effects on Pupil Diameter, Haemodynamic Parameters such as SBP, DBP and HR were compared in both the groups before and after treatments using Paired t-test. For comparison between control and test group, all data assessed using unpaired t-test.

RESULTS

Data were obtained from randomly selected patients undergoing Phacoemulsification.

Baseline demographic characteristics of patients undergoing Phacoemulsification in cataract surgery:

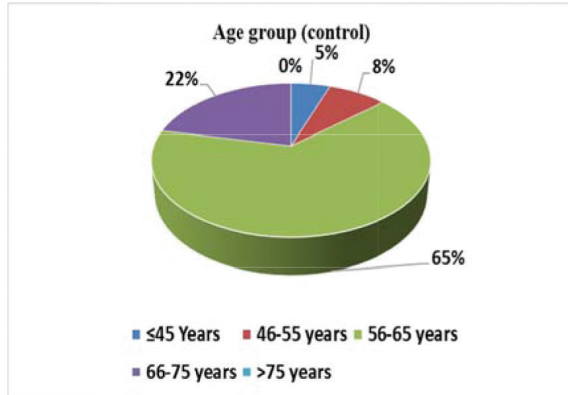


Figure: 5.1 (a) Age distribution of control group.

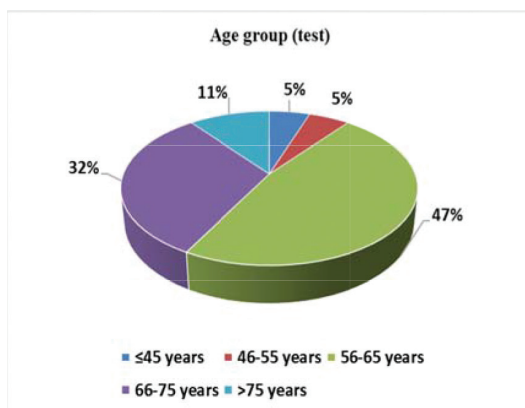


Figure: 5.1 (b) Age distribution of control group.

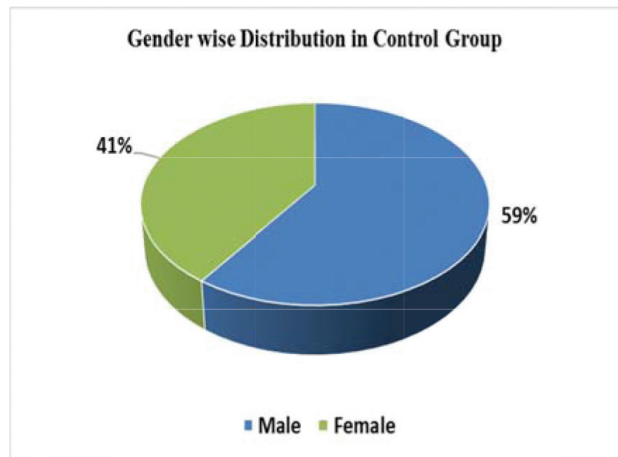


Figure: 5.2 (a) Gender wise distribution of control group.

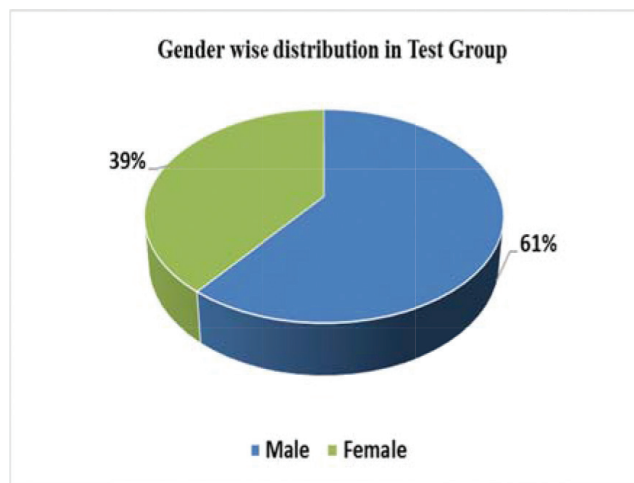


Figure: 5.2 (b) Gender wise distribution of test group.

Questions for VAS

- Did you experience any pain during the Surgery?
 - Yes/No

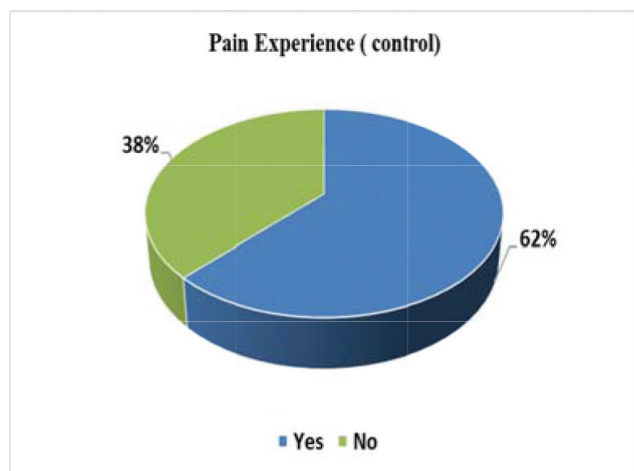


Figure: 5.3 (a) Patients’ Pain Experience.

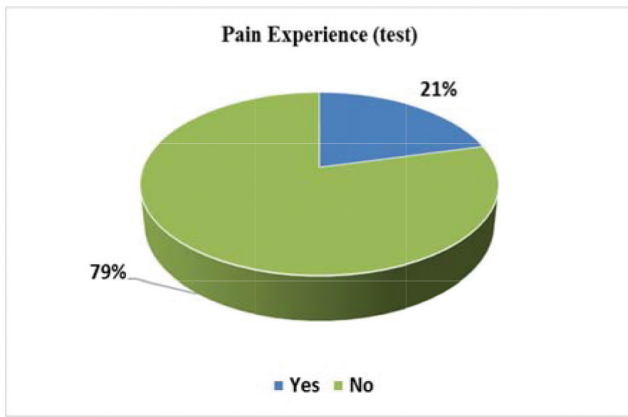


Figure: 5.3 (b) Patients' Pain Experience.

In control group 62% patients experienced pain were as in test group only 21% patients experienced pain Figure 5.3 (a) & (b).

2. How much pain did you experience?

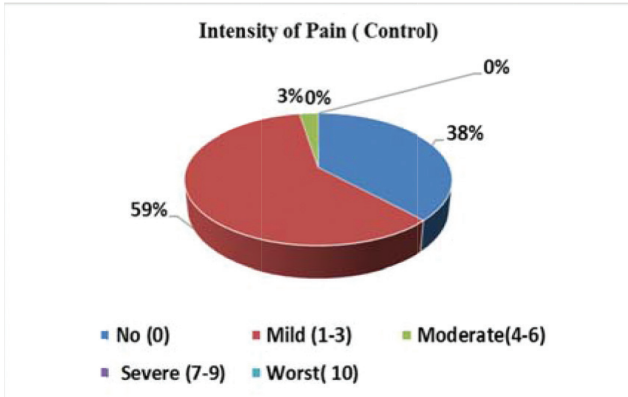
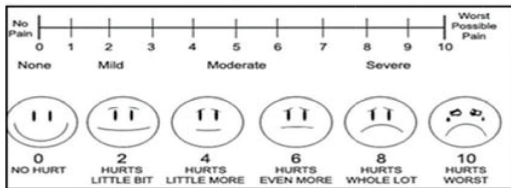


Figure: 5.4 (a) Intensity of pain.

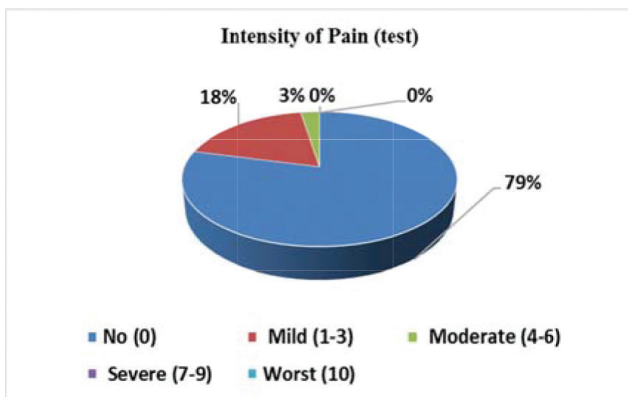


Figure: 5.4 (b) Intensity of pain.

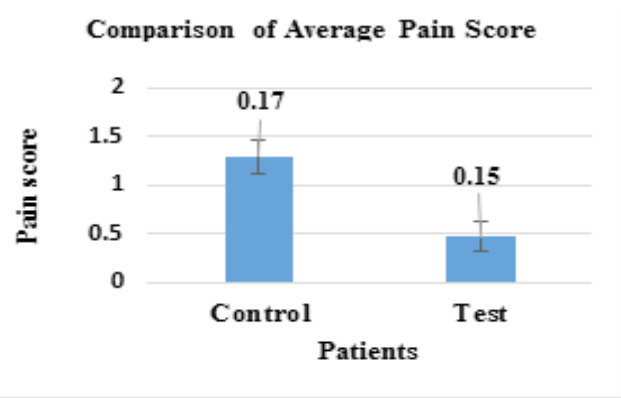


Figure: 5.5 Comparison between average pain score of both the groups.

VAS with numerical rating scale for assessment of pain Pain intensity in test group is significantly lower as compared to control group Figure 5.5.

Questions for ADR

- Did you experience itching in to the eye?
 - Yes /No
- Did you experience burning like sensation in to the eye?
 - Yes /No

There are no reports of ocular ADR in any patient.

Respiration Rate

No change in Respiration Rate was observed in any patient.

Effects on Haemodynamic parameters

There was no significant difference in Systolic Blood Pressure between the two groups before receiving the treatment or among the patients of after receiving the treatment. Figure 5.6.

There was difference in Diastolic Blood Pressure was significantly higher among the patients of control group before receiving the treatment or decreased among the patients of test group after receiving the treatment. Figure5.7.

There was no significant difference in HR among the patients of both groups. Figure5.8.

Pupil Diameter has decreased significantly among the patients in control group as well as test group. Figure 5.9.

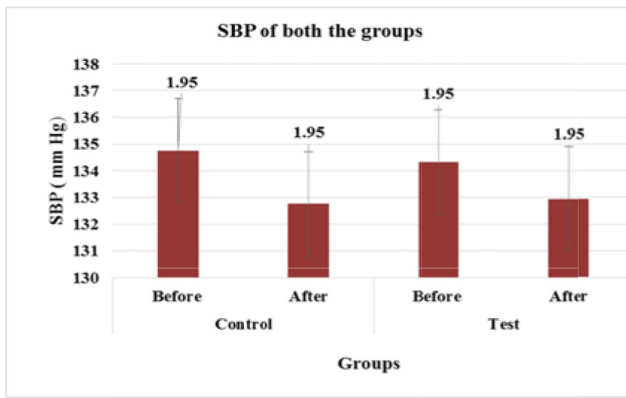


Figure: 5.6 SBP of both groups.

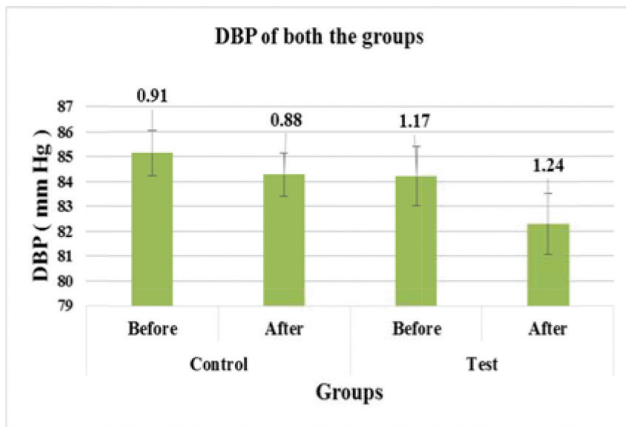


Figure: 5.7 DBP of both the groups.

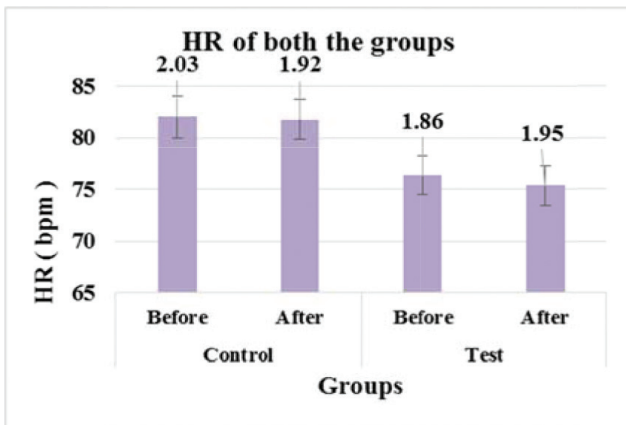


Figure: 5.8 HR of both the groups.

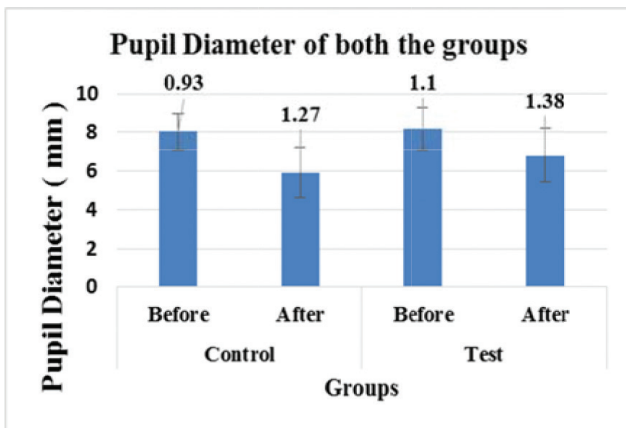


Figure: 5.9 Pupil Diameter of both the groups.

Effects on Haemodynamic Parameter

There was no significant difference in Systolic Blood Pressure between the two groups before and after receiving the treatment. Figure 5.10.

There is no significant difference in Diastolic Blood Pressure between the two groups before and after receiving the treatment. Figure 5.11.

Heart Rate was moderately high among the patients of control group before receiving the treatment as compared to test group or Heart Rate has decreased moderately among the patients of test group after receiving the treatment as compared to control group. Figure 5.12.

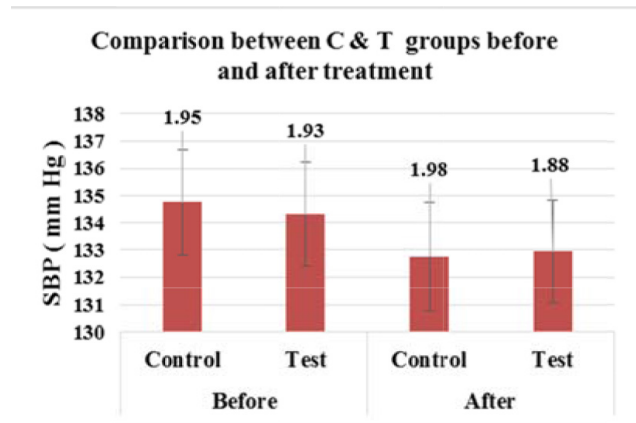


Figure: 5.10 Comparison of SBP between two groups before and after treatment.

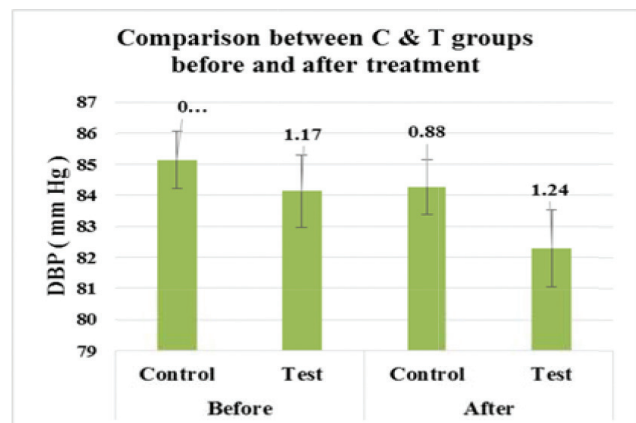


Figure: 5.11 Comparison of DBP between two groups before and after treatment.

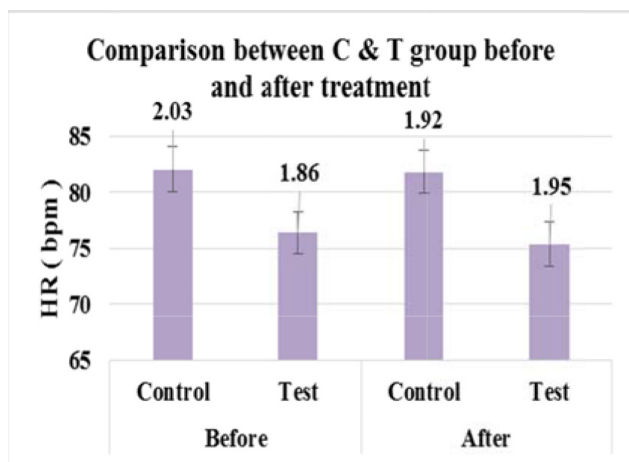


Figure: 5.12 Comparison of HR between two groups before and after treatment.

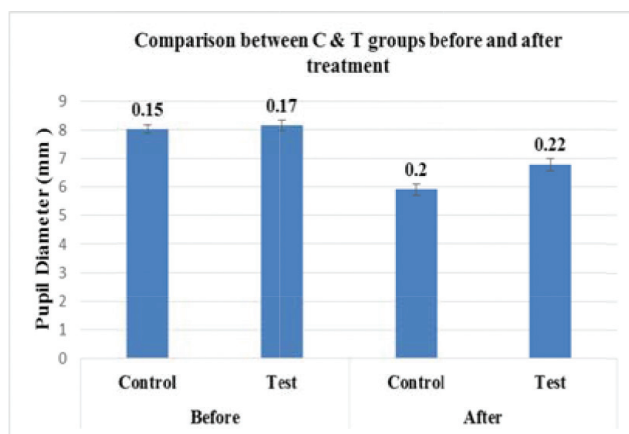


Figure: 5.13 Comparison of Pupil Diameter between two groups before and after treatment.

There was difference between the two groups before treatment not significant but after treatment, which is highly significant. Reduction of Pupil Diameter in test group is less as compared to control group. Figure 5.13.

DISCUSSION

Cataract refers to the decrease visual function due to clouding of the crystalline lens inside the eye. It is the most prevalent disease, treatable cause of visual alteration and blindness in the world. Most common Cause of cataract is aging, while other factors include diseases like diabetes mellitus, trauma, medications and genetic predisposition. In cataract, most effective treatment in any field of medicine is Cataract Surgery With an intraocular lens implantation.

Cataract surgery includes removal of opacified lens and implantation of synthetic lens inside the eye.¹

Cataract extraction is done by two techniques; Intracapsular

Master Table

Parameter	Group	Value
Male/ Female distribution	Total	60%/40%
Male/ Female distribution	Control	59%/41%
Male/ Female distribution	Test	61%/39%
Patients' Pain Experience (yes)	Control	62%
Patients' Pain Experience (yes)	Test	21%
Patients' Pain Experience (no)	Control	38%
Patients' Pain Experience (no)	Test	79%
Intensity of pain	Control	No 38%
Intensity of pain	Control	Mild 59%
Intensity of pain	Control	Moderate 3%
Intensity of pain	Test	No 79%
Intensity of pain	Test	Mild 18%
Intensity of pain	Test	Moderate 3%
Pain score (mean)	Control	1.30±0.17
Pain score (mean)	Test	0.47±0.15
SBP (mm Hg)	Control	Before 134.76±1.95
SBP (mm Hg)	Control	After 132.76±1.95
SBP (mm Hg)	Test	Before 134.32±1.93
SBP (mm Hg)	Test	After 132.95±1.88
DBP (mm Hg)	Control	Before 85.14±0.91
DBP (mm Hg)	Control	After 84.27±0.88
DBP (mm Hg)	Test	Before 84.21±1.17
DBP (mm Hg)	Test	After 82.29±1.24
HR (/min)	Control	Before 82.05±2.03
HR (/min)	Control	After 81.81±1.90
HR (/min)	Test	Before 76.37±1.86
HR (/min)	Test	After 75.37±1.95
Pupil Diameter (mm)	Control	Before 8.03±0.15
Pupil Diameter (mm)	Control	After 5.92±0.20
Pupil Diameter (mm)	Test	Before 8.16±0.17
Pupil Diameter (mm)	Test	After 6.80±0.22
SBP (mm Hg)	Before treatment	Control 134.76±1.95
SBP (mm Hg)	After treatment	Control 132.76±1.98
SBP (mm Hg)	Before treatment	Test 134.32±1.95
SBP (mm Hg)	After treatment	Test 132.95±1.88
DBP (mm Hg)	Before treatment	Control 85.14±0.91
DBP (mm Hg)	After treatment	Control 84.27±0.88
DBP (mm Hg)	Before treatment	Test 84.21±1.17
DBP (mm Hg)	After treatment	Test 82.29±1.24
HR (/min)	Before treatment	Control 82.05±2.03
HR (/min)	After treatment	Control 81.81±1.92
HR (/min)	Before treatment	Test 76.37±1.86
HR (/min)	After treatment	Test 75.37±1.95
Pupil Diameter (mm)	Before treatment	Control 8.03±0.15
Pupil Diameter (mm)	After treatment	Control 5.92±0.20
Pupil Diameter (mm)	Before treatment	Test 8.16±0.17
Pupil Diameter (mm)	After treatment	Test 6.80±0.22

extraction and Extracapsular extraction (ECCE).

Currently Phacoemulsification is the most common ECCE procedure used in extraction of the cataract because of smaller incision size, lower the Intraoperative complications, reduced surgery time, and faster visual recovery time.^{1,12}

Various anaesthetic techniques are used in surgical procedure: General anaesthesia, Local anaesthesia include Retrobulbar anaesthesia, Peribulbar Anaesthesia, Sub-Tenon Anaesthesia.

Topical anaesthesia and Intracameral anaesthesia. Where it has proven advantages such as efficacy, safety and preservation of eye ball movements. General anaesthesia is used for the patients who are unsuitable for local anaesthesia like confused patients, who are unable to comply, with tremors or jerky movements, and/or with history of allergic reactions.¹³

In cataract surgery, use of local anaesthesia is reported safe. Local anaesthesia includes Retrobulbar, Peribulbar, Sub-Tenon, Topical and Intracameral; but in Retrobulbar and Peribulbar techniques some complications occurs such as haemorrhage, globe perforation, strabismus, confusions, respiratory arrest and ptosis. In topical anaesthesia there is no need of anaesthesiologist in the operating room. But this agent blocks trigeminal nerve ending in the cornea and the conjunctiva only, leaving intraocular structure in the anterior chamber anaesthetised. Thus, the iris and stretching of the ciliary and zonular tissues during surgery can irritate the ciliary nerves, resulting discomfort to the patients. Intracameral Lignocaine as a supplement with the topical anaesthesia induced significant reduction in pain occurs during surgery when compared with Topical anaesthesia alone. In addition, intracameral Lignocaine keep pupil well dilated during surgery.^{14,15}

The present study is an observational, questionnaire based study, conducted on 75 patients undergoing Phacoemulsification with topical anaesthesia. This study was asses the efficacy of intracameral Lignocaine during Phacoemulsification.

Age

- Incidence of cataract increases with Age. (Asbell *p. et al.*, 2005)
- Results of our study are also in correlation with literature.

Gender

- Women have a higher incidence and risk for most type of cataract than men, probably due to lack of estrogen in post-menopausal years. (Gupta V.B. *et al.*, 2014)
- In our study, patients are randomly selected, so incidence of cataract is reported higher in male as compared to female gender.

Patients' Pain Experience

- In the Colin S. H. Tan *et al.* (2011) study, result indicates that 45% and 53.7% of patients experience pain in control and BSS group respectively. The proportion of patients who experience pain was significantly lower in the intracameral lidocaine.
- In one similar study by Lofoco G. *et al.* (2008) results indicates that 20.05% and 3.3% patients experience pain in control group as compared to test group.
- Our study revealed that 62% and 21% patients experience pain in control group compared with test group respectively. The difference between both the groups is found significant.

Haemodynamic Parameters

- A study by Robert T. *et al.* (2002) indicate that there is no significant difference between two groups in haemodynamic parameters such as SBP, DBP and HR.
- Results of our study are in accordance to this research.

Pupil Diameter

- Aminollah N. *et al.* (2007) reported that mean pupil dilatation was 4.52mm \pm 0.08 in the intracameral group compare to 4.06 mm \pm 0.09 in the topical group; difference between both the group was found to be significant.
- In our study, results exhibit Pupil dilatation before treatment were 8.03mm \pm 0.15 and 8.16mm \pm 0.17 in control and test group respectively. Pupil dilatation after treatment 5.92 mm \pm 0.20 and 6.80 mm \pm 0.22 in control and test group respectively.

CONCLUSION

Aim of our study is to evaluate the analgesic effect of intracameral Lignocaine in Phacoemulsification

under topical anaesthesia. Analgesic effect of topical anaesthesia with intracameral Lignocaine has more impact as compared to topical anaesthesia alone. By comparing topical anaesthesia alone and topical anaesthesia with intracameral Lignocaine, there were no reports of any side effect like ocular itching, burning sensation in the later treatment. Intracameral Lignocaine did not change Respiration Rate and Haemodynamic Parameters such as SBP, DBP and HR.

Based on results of our study, it can be concluded that intracameral Lignocaine, added to topical anaesthesia helps to reduce pain to more degree and avoid discomfort during Phacoemulsification in cataract surgery. Exhibited pain relief as well as dilatation to more extent; making the surgery more convenient and easier. There was significant difference in pain intensity and Pupil Diameter between control and test group.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

ABBREVIATION USED

VAS: Visual Analogue Scale; **BP:** Blood Pressure; **SBP:** Systolic Blood Pressure; **DBP:** Diastolic Blood Pressure;

HR: Heart Rate; **ADR:** Adverse Drug Reaction; **SD:** Standard Deviation.

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