MJMR, Vol. 36, No. 1, 2025, pages (137-150).

Open Access
ISSN:2682-4558

*Research Article*

# Comparison between dexmedetomidine and neostigmine as an adjuvant to bupivacaine and lidocaine in peribulbar block for cataract surgery

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**DOI: 10.21608/MJMR.2024.262020.1621**

## Abstract

**Background:** Local anesthetics are often injected into the peribulbar region. In comparison to a mix of local anesthetics, this study aimed to assess the peribulbar area's anesthetic effects of neostigmine and dexmedetomidine. approach to the research: a randomized, prospective, and double-blinded study. **Methods:** Sixty patients were a part of the present study's cohort at Minia University Hospital. A control group had just a local anaesthetic combination; the other two groups were of similar size. Patients were randomly assigned to these groups. In the group given dexmedetomidine, twenty patients were given a dosage of 25µg of the drug in addition to a mix of local anesthetics. Twenty individuals had a combination of local anesthetics and 0.4 mg of neostigmine as part of the Neostigmine group. **Results:** The neostigmine group had a significantly prolonged onset period of the block in comparison to the dexmedetomidine group. The dexmedetomidine group had an average start time of 2.70 ± 0.83 minutes for motor and sensory block, whereas the neostigmine group had a mean onset time of 3.75 ± 1.12 minutes. **Conclusion:** This research discovered that including 25 µg of dexmedetomidine or 0.4 mg of neostigmine into the local anesthetic mixture during peribulbar anesthesia for cataract procedures enhanced the rate of ocular numbness and prolonged the duration of numbness. Dexmedetomidine had higher efficacy as compared to neostigmine, as it exhibited faster onset of block, longer duration, and decreased need for post-operative analgesics.

**Keywords**: Dexmedetomidine, Neostigmine, Peribulbar, anesthesia.

## Introduction:

Particularly in older individuals with established health conditions, the administration of general anesthesia may cause several problems. But for most adult eye surgeries, regional anesthetic is a safer option that may effectively paralyze muscles and reduce discomfort [17].

A local anesthetic that blocks the eye has a long history of usage, and one such approach is the retrobulbar injection. Additionally, the peribulbar approach has been developed due to its reduced risk of optic nerve damage and globe perforation [9].

But the short d`uration of this blockage was a major challenge for vitreoretinal surgeons. It is possible to lengthen the duration of the peribulbar block by adding an adjuvant to the local anesthetics used in the block [3].

Surgeons and patients alike have benefited from the investigation of several regional anesthetic adjuvants, including as hyaluro-

nidase, adrenaline, fentanyl, magnesium sulfate, dexmedetomidine, and neostigmine. In addition to potentially producing pain relief on their own, these drugs can amplify and extend the effects of topical anesthetics. They may also lessen the need for local anesthetics, which might increase satisfaction levels while minimizing dosage-related side effects [16].

## Patients and methods

After receiving written informed consent from all patients and authorization from the university's ethics council (approval number: 60), the research was carried out at El-Minia University Hospital. Prospective, randomized, double-blind, controlled trials are the design of this investigation. An opaque, sequentially numbered envelope was utilized to contain the randomization that was generated by a computer-generated list as part of the randomization technique. Both the patient and the anesthesiologist in a double-blinded trial are kept in the dark about the specific medicine being delivered. This ensures that neither side's biases nor prior information will affect the results of the investigation. A supervisor made the solutions and gave them out in 10-milliliter syringes. Once the study was over, the code that was engraved on the syringes was revealed.
As you can see below, the patients were divided into three equal-sized cohorts, with 60 patients (n=20) in each:

Category C, the Control group: The total volume of injectable solution given to patients in this group was 9 ml. The mixture contained 4 milliliters of bupivacaine 0.5%, 2.5 milliliters of lidocaine 2%, 1.5 milliliters of lidocaine 2% with hyaluronidase (45 I.U.), and 1 milliliter of normal saline.

Injectable dexmedetomidine was administered to a total volume of 9 ml to patients in Group D. Added to 1 milliliter of normal saline, 25 micrograms of dexmedetomidine, and 2.5 milliliters of 2% lidocaine, the solution also contained 1.5 milliliters of 2% lidocaine with hyaluronidase (45 international units).

Injectable neostigmine was administered to a total volume of 9 ml to patients in Group N. The mixture contained 4 milliliters of bupivacaine 0.5%, 2.5 milliliters of lidocaine 2%, 1.5 milliliters of lidocaine 2% with hyaluronidase (45 I.U.), and 0.4 milligrams of neostigmine in 1 milliliter of normal saline.

**Inclusion criteria:**
1. Age (20:80) years old.
2. sex: male and female.
3. ASA (I, II, III).
4. Axial eye length 22:28 mm.

**Exclusion criteria:**
1. Patient's refusal
2. Localized infection.
3. Ocular injury or rupture.
4. Hypersensitivity to local anesthetics.
5. Patients who are currently on anticoagulant medications or have an extended coagulation profile.
6. Patients experiencing orthopnea and suffering from an intractable and incessant cough.
7. Patients experiencing communication challenges as a result of language hurdles or hearing impairment.
8. Individuals suffering from severe neurological diseases.

**Technique of the study:**
Patients scheduled to undergo peribulbar anesthesia (PBA) for cataract surgery were included in this research. All patients were instructed to fast for 8 hours before surgery. Prior to the surgical procedure, preliminary investigations were conducted. Following the proper fastening of the intravenous line. Heart rate monitors, non-invasive blood pressure machines, and pulse oximeters were all connected. Every participant received a standard PBA.
The patient was instructed to lie face up and maintain eye alignment by fixing their gaze on a ceiling point. For the anesthetic, we used a single droplet of tetracaine eye drops, which had a concentration of 0.5% .

A 25-gauge needle, about 25 mm in length, was used to provide two injections. The syringe with the anesthetic solution was attached to the needle.

After cleaning the lower eyelid, the initial step was to raise the eyeball using the index and middle fingers of the non-dominant hand. The exact spot where the outer 1/3 and inner 2/3 of the lower orbital rim meet is exactly 1:1.5 cm

from the outside corner of the eye, and that's where the needle was inserted.
After a negative aspiration, the patient was instructed to focus their attention in four specific directions: superior, inferior, nasal, and temporal. This was done to rule out the potential of intravascular injection. I administered 5 cc of the anesthetic solution.

Injecting the second needle at a 45-degree angle from the caruncle to the inner corner of the eye until it contacted the ethmoid bone was an additional procedure. After that, the needle was angled at a right angle to the eye, and its base was lined up with the iris. The last 4 cc of medication was given once it was confirmed that suction was not present.
The anesthetic solution was administered by placing eye pads on the eyelids and applying periodic manual pressure.

In order to measure how quickly the sensory and motor blockage took effect, ocular decompression was performed at1,3,5,7,9, and 10-minute intervals.

**Parameters assessed:**
Heart rate, average blood pressure, oxygen saturation, and other vital physiological signs are part of hemodynamic metrics. They recorded themselves 10 minutes before and 10 minutes after the blockage to ensure the process went smoothly. After injecting a cotton swab into each participant's cornea, researchers measured the amount of time it took for the cornea to become fully insensitive to touch. The sudden and coordinated paralysis of the eye-movement-controlling muscles (globe akinesia). Evaluation of the patient's postoperative status by the surgeon. The period between the administration of the local anesthetic to the patient's initial request for pain. medication is evaluated using the visual analogue scale

Patients were admitted to the postanesthesia care unit (PACU) following surgery to recuperate from the effects of the anesthetic and be evaluated before being readmitted to the regular ward.

**Data analysis and statistics:**
A statistical program developed by SPSS Inc. of Chicago, IL, USA, version 21 was used to analyze the data. The data that were presented were either numerical, with the average value and standard deviation, or categorical, with the count and percentage. The three groups' parametric quantitative data were subjected to analyses through the use of an independent t-test. Categorical data was analyzed using chi-squared tests. When the P value was less than 0.05, we knew we were at the significance threshold.

**Sample size calculation:**
G power 3.1.9.7 was used for the sample size estimation, with one-way analysis of variance set as the statistical test. A power of 0.80, an allocation ratio of 1:1, and an alpha level of 0.05 were all established[6].It is estimated that around 15 patients would be required for each group to achieve a statistical power of 80% for their respective demographics. This computation is based on the assumption of large Cohen's effect sizes (ranging from 0.8 to 0.9) for the length of reported akinesia[13]. As a minimum criterion for a considerable effect size in this particular test, an effect size of 0.4 was utilized to calculate the sample size. Fifteen people each group made up the specified sample size. We increased the sample size in each group by 5 individuals to compensate for the drop-in follow-up.
Twenty people from each group made up the final sample size, for a total of sixty patients.

**Results:**

**Patient's characteristics:**
There was no statistically significant difference between the three groups as shown in table (1).

**Table (1): Patient's characteristics in the study groups:**

| | | Group(C) N=20 | Group (D) N=20 | Group (N) N=20 | p-value |
|---|---|---|---|---|---|
| **Age (year)** | Mean | 57.40 | 55.10 | 53.10 | 0.3 |
| | SD | ±11.50 | ±9.59 | ±6.63 | |
| **Weight (kg)** | Mean | 84.45 | 82.10 | 80.70 | 0.5 |
| | SD | ±11.71 | ±12.34 | ±10.63 | |
| | Mean | 24.20 | 24.40 | 23.95 | 0.7 |
| **Axial eye length (mm)** | SD | ±2.02 | ±1.96 | ±1.90 | |
| | Mean | 32.50 | 32.90 | 33.15 | 0.7 |
| **Duration of surgery (min)** | SD | ±3.41 | ±2.65 | ±1.95 | |
| **Sex** | | | | | |
| **Male** | N (%) | 8 (40%) | 11 (55%) | 14 (70%) | 0.1 |
| **Female** | N (%) | 12 (60%) | 9 (45%) | 6 (30%) | |
| **ASA** | | | | | |
| **1** | N (%) | 8 (40%) | 9 (45%) | 9 (45%) | |
| **2** | N (%) | 10 (50%) | 9 (45%) | 9 (45%) | 0.9 |
| **3** | N (%) | 2 (10%) | 2 (10%) | 2 (10%) | |

Median values plus or minus standard deviations (SD) are used to report the data. A p-value lower than 0.05 is considered statistically significant. Using the One-way
ANOVA test, we were able to obtain the p-value for the means. Statistical analysis revealed a notable distinction between the three categories, as shown by the p-value.

**Heart rate (HR):**

Throughout the trial, there were no discernible differences in heart rate across the groups. However, after 30 minutes, there was a significant difference between group N and group C, and after 40 minutes, there was a significant difference between group D and group C. Table 2 further shows that both group D and group N had significantly lower heart rates.

**Table (2): Changes in heart rate in the study groups:**

| | | Group (C) N=20 | Group (D) N=20 | Group (N) N=20 | p-value | P* | *P*# | P` |
|---|---|---|---|---|---|---|---|---|
| **Pre-operative(beat/min)** | mean | 77.50 | 78.45 | 79.15 | 0.8 | 0.9 | 0.7 | 0.9 |
| | SD | ±11.15 | ±6.73 | ±5.07 | | | | |
| **After 10 min (beat/min)** | mean | 77.25 | 76.25 | 75.95 | 0.8 | 0.9 | 0.8 | 0.9 |
| | SD | ±11.86 | ±5.93 | ±5.62 | | | | |
| **After 20 min (beat/min)** | mean | 77.45 | 74.20 | 74.10 | 0.2 | 0.3 | 0.3 | 0.9 |
| | SD | ±11.18 | ±5.06 | ±4.72 | | | | |
| **After 30 min (beat/min)** | mean | 77.25 | 72.40 | 71.50 | 0.03* | 0.1 | 0.04* | 0.9 |
| | SD | ±11.28 | ±3.32 | ±4.86 | | | | |
| **After 40 min (beat/min)** | mean | 78.10 | 70.10 | 69.10 | <0.0001* | <0.0001* | <0.0001* | 0.8 |
| | SD | ±8.80 | ±3.73 | ±4.29 | | | | |
| **P**-value** | | 0.7 | <0.0001* | <0.0001* | | | | |

The average value and its standard deviation (± SD) are displayed alongside the data. When the pvalue is less than 0.05, it is deemed significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. There is a significant difference between groups C and D, as shown by the pvalue. A statistically significant difference exists between groups C and N, according to the p-value. Groups D and N are statistically different, as shown by the p-value. There is a statistically significant relationship between the categories, as shown by the p-value.

**MAP:**

There were no statistically significant differences seen among the three groups with regard to Mean Arterial Pressure (MAP) during the whole experiment. Nevertheless, as can be seen in table (3), there was a notable decline in groups D and N.

**Table (3): Changes in MAP in the study groups:**

| | | Group(C) N=20 | Group (D) N=20 | Group (N) N=20 | P value | P* | $P^{\#}$ | P` |
|---|---|---|---|---|---|---|---|---|
| Pre-operative(mmhg) | mean | 87.20 | 87.95 | 88.45 | 0.7 | 0.8 | 0.7 | 0.9 |
| | SD | ±5.09 | ±4.52 | ±5.51 | | | | |
| After 10 min(mmhg) | mean | 87.50 | 87.35 | 87.50 | 0.9 | 0.9 | 0.9 | 0.9 |
| | SD | ±4.94 | ±5.39 | ±5.61 | | | | |
| After 20 min (mmhg) | mean | 87.15 | 86.80 | 86.30 | 0.8 | 0.9 | 0.8 | 0.9 |
| | SD | ±4.58 | ±4.73 | ±5.29 | | | | |
| After 30 min(mmhg) | mean | 86.65 | 85.70 | 85.45 | 0.7 | 0.8 | 0.7 | 0.9 |
| | SD | ±4.70 | ±4.77 | ±5.37 | | | | |
| After 40 min(mmhg) | mean | 86.05 | 84.85 | 84.45 | 0.6 | 0.7 | 0.6 | 0.9 |
| | SD | ±4.62 | ±5.01 | ±6.38 | | | | |
| P**-value | | 0.2 | 0.008* | <0.0001* | | | | |

In addition to the standard deviation (± SD), the data are shown as the mean value. If the p-value is less than 0.05, then it is statistically significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. Groups C and D are statistically different, as shown by the P-value. A statistically significant difference exists between groups C and N, according to the p-value. Groups D and N are statistically different, as shown by the p-value. There is a statistically significant relationship between the categories, as shown by the p-value.

**Table (4): Changes in oxygen saturation in the study groups:**

| | | Group (C) N=20 | Group (D) N=20 | Group (N) N=20 | P value | P* | $P^{\#}$ | P` |
|---|---|---|---|---|---|---|---|---|
| Preoperative (%) | mean | 98.20 | 97.65 | 97.90 | 0.2 | 0.2 | 0.6 | 0.7 |
| | SD | ±1.15 | ±1.04 | ±.97 | | | | |
| After 10 min (%) | mean | 97.95 | 97.60 | 97.70 | 0.1 | 0.1 | 0.4 | 0.8 |
| | SD | ±.76 | ±.60 | ±.47 | | | | |
| After 20 min (%) | mean | 97.75 | 97.65 | 97.70 | 0.8 | 0.8 | 0.9 | 0.9 |
| | SD | ±.79 | ±.59 | ±.47 | | | | |
| After 30 min (%) | mean | 97.85 | 97.65 | 97.85 | 0.5 | 0.5 | 0.9 | 0.5 |
| | SD | ±.75 | ±.59 | ±.59 | | | | |
| After 40 min (%) | mean | 97.75 | 97.75 | 97.90 | 0.6 | 0.9 | 0.6 | 0.6 |
| | SD | ±.72 | ±.44 | ±.55 | | | | |

In addition to the standard deviation (± SD), the data are shown as the mean value. If the p-value is less than 0.05, then it is statistically significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. Groups C and D are statistically different, as shown by the P-value. A statistically significant difference exists between groups C and N, according to the p-value. Groups D and N are statistically different, as shown by the p-value.

**Beginning of ocular akinesia:**
When ocular akinesia first appeared varied significantly across the three groups, according to the research. Specifically, when comparing groups N and C, group D got off to a far faster start. Table 5 shows that there was no statistically significant difference in the start between groups C and N.

**Table (5): Ocular akinesia onset in the study groups:**

| | **Group (C) N=20** | **Group (D) N=20** | **Group (N) N=20** | **P-value** | **P*** | ***P*#** | **P`** |
|---|---|---|---|---|---|---|---|
| **Akinesia onset (min)** | 4.65 ± 1.76 | 2.70 ± 0.83 | 3.75 ± 1.12 | <0.0001* | <0.0001* | 0.08 | 0.03* |

Mean values and standard deviations (SDs), denoted by the ± sign, are included in the data report. If the p-value is less than 0.05, then it is statistically significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. There was a statistically significant difference between groups C and D, as shown by the p-value. A statistically significant difference exists between groups C and N, according to the p-value. Groups D and N are statistically different, as shown by the p-value.

In terms of how long the ocular akinesia lasted, there were statistically significant variations between the three groups. Akinetic episodes lasted much longer in groups D and N than in group C. As can be seen from table (6), however, group D and group N were not significantly different.

**Table (6): Ocular akinesia duration of the study groups:**

| | **Group (C) N=20** | **Group (D) N=20** | **Group (N) N=20** | **P-value** | **P*** | ***P*#** | **P`** |
|---|---|---|---|---|---|---|---|
| **Akinesia duration (h)** | 1.40 ± 0.45 | 2.80 ± 0.98 | 2.40 ± 0.60 | <0.0001* | <0.0001* | <0.0001* | 0.1 |

The average value and its standard deviation (± SD) are displayed alongside the data. If the p-value is less than 0.05, then it is statistically significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. There is a significant difference between groups C and D, as shown by the pvalue. A statistically significant difference exists between groups C and N, according to the p-value.
Groups D and N are statistically different, as shown by the p-value.

**Table (7): Ocular akinesia score in the study groups:**

| | **Group (C) N=20** | **Group (D) N=20** | **Group (N) N=20** | **p-value** | **P*** | ***P*#** | **P`** |
|---|---|---|---|---|---|---|---|
| **at 2 min** | | | | | | | |
| **0** | 1 (5%) | 11 (55%) | 7 (35%) | 0.002* | <0.0001* | 0.01* | 0.2 |
| **1** | 3 (15%) | 5 (25%) | 5 (25%) | | | | |
| **2** | 16 (80%) | 4 (20%) | 8 (40%) | | | | |
| **at 4 min** | | | | | | | |
| **0** | 3 (15%) | 13 (65%) | 10 (50%) | 0.01* | 0.001* | 0.02* | 0.5 |
| **1** | 7 (35%) | 5 (25%) | 6 (30%) | | | | |
| **2** | 10 (50%) | 2 (10%) | 4 (20%) | | | | |
| **at 6 min** | | | | | | | |
| **0** | 9 (45%) | 16 (80%) | 12 (60%) | 0.1 | 0.03* | 0.6 | 0.2 |
| **1** | 7 (35%) | 4 (20%) | 5 (25%) | | | | |
| **2** | 20 (4%) | 0 | 3 (15%) | | | | |
| **at 8 min** | | | | | | | |
| **0** | 14 (70%) | 20 (100%) | 15 (75%) | 0.1 | 0.04* | 0.8 | 0.1 |
| **1** | 4 (20%) | 0 | 4 (20%) | | | | |
| **2** | 2 (10%) | 0 | 1 (5%) | | | | |
| **at 10 min** | | | | | | | |
| **0** | 16 (80%) | 20 (100%) | 19 (95%) | 0.05 | 0.05 | 0.1 | 0.8 |
| **1** | 4 (20%) | 0 | 1 (5%) | | | | |
| **2** | 0 | 0 | 0 | | | | |

Numbers and percentages are used to display the data. If the p-value is less than 0.05, then it is statistically significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. There is a statistically significant difference between groups C and D, as shown by the P-value. A statistically significant difference exists between groups C and N, according to the p-value. Group D differs significantly from the other group, as shown by the p-value.

**Lid akinesia:**

**Table (8): Lid akinesia score of the study groups:**

| | Group (C) N=20 | Group (D) N=20 | Group (N) N=20 | p-value | P* | *P*# | *P*` |
|---|---|---|---|---|---|---|---|
| **at 2 min** | | | | | | | |
| **0** | 1 (5%) | 10 (50%) | 5 (25%) | <0.0001* | <0.0001* | 0.03* | 0.05 |
| **1** | 1 (5%) | 6 (30%) | 5 (25%) | | | | |
| **2** | 18 (90%) | 4 (20%) | 10 (50%) | | | | |
| **at 4 min** | | | | | | | |
| **0** | 2 (10%) | 14 (70%) | 10 (50%) | 0.001* | <0.0001* | 0.01* | 0.2 |
| **1** | 6 (30%) | 4 (20%) | 4 (20%) | | | | |
| **2** | 12 (60%) | 2 (10%) | 6 (30%) | | | | |
| **at 6 min** | | | . | | | | |
| **0** | 8 (40%) | 16 (80%) | 12 (60%) | 0.04* | 0.002* | 0.1 | 0.2 |
| **1** | 3 (15%) | 4 (20%% | 4 (20%) | | | | |
| **2** | 9 (45%) | 0 | 4 (20%) | | | | |
| **at 8 min** | | | | | | | |
| **0** | 12 (60%) | 20 (100%) | 15 (75%) | 0.04* | 0.01* | 0.5 | 0.1 |
| **1** | 5 (25%) | 0 | 3 (15%) | | | | |
| **2** | 3 (15%) | 0 | 2 (10%) | | | | |
| **at 10 min** | | | | | | | |
| **0** | 12 (60%) | 20 (100%) | 18 (90%) | 0.05 | 0.004* | 0.04* | 0.6 |
| **1** | 5 (25%) | 0 | 1 (5%) | | | | |
| **2** | 3 (15%) | 0 | 1 (5%) | | | | |

Numbers and percentages are used to display the data. When the p-value is less than 0.05, it is deemed significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. There was a statistically significant difference between groups C and D, as shown by the p-value. A statistically significant difference exists between groups C and N, according to the p-value. A statistically significant difference exists between groups D and N, as shown by the p-value.

Statistical analysis revealed a notable disparity in patient satisfaction ratings between groups D and N. Every single patient in both groups expressed utter contentment. To the contrary, just fifteen patients (or 75% of the total) in group C reported feeling as much joy. Table 9 displays this distinction between Group C and the other groups.

**Table (9): Patient satisfaction score in the study groups:**

| Satisfaction | Group (C) N=20 | Group (D) N=20 | Group (N) N=20 | p-value |
|---|---|---|---|---|
| **Patient satisfaction** | | | | |
| **Some dissatisfaction** | 5 (25%) | 0 | 0 | 0.004* |
| **Complete satisfaction** | 15 (75%) | 20 (100%) | 20 (100%) | |

Both number and percentage formats are used to display the data. To be deemed statistically significant, the p-value had to fall below 0.05. In order to find the p-value for the means, a chi-square test was employed. A statistically significant difference is indicated by the p-value among the three groups.

**Table (10): surgeon satisfaction in the study groups:**

| Satisfaction | Group (C) N=20 | Group (D) N=20 | Group (N) N=20 | p-value |
|---|---|---|---|---|
| **Surgeon satisfaction** | | | | |
| **Acceptable** | 10 (50%) | 2 (10%) | 3 (15%) | 0.006* |
| **Perfect** | 10 (50%) | 18 (90%) | 17 (85%) | |

Numbers and percentages are used to display the data. To be deemed statistically significant, the pvalue had to fall below 0.05. In order to find the p-value for the means, a chi-square test was employed. A statistically significant difference is indicated by the p-value among the three groups.

**From the very beginning of the initial request for pain relief:**
In group D, compared to group C, the time it took to request pain treatment for the first time was much longer. According to table (11) however, neither group D nor group N nor group C differed from one another statistically.

**Table (11): Time of first analgesic request of the study groups:**

| | Group (C) N=20 | Group (D) N=20 | Group (N) N=20 | P value | P* | *P*# | *P*` |
|---|---|---|---|---|---|---|---|
| **Time of first analgesic request** | 2.00 ± 1.12 | 3.30 ± 1.95 | 2.90 ± 1.17 | 0.02* | 0.01* | 0.1 | 0.6 |

A data set is represented by its mean plus or minus its standard deviation. To be deemed statistically significant, the p-value had to fall below 0.05. By utilising a One-way ANOVA test, the p-value for the means was calculated. A statistically significant difference is indicated by the p-value among the three groups. Groups C and D are statistically different, as shown by the P-value. A statistically significant difference exists between groups C and N, according to the p-value. A statistically significant difference exists between groups D and N, as shown by the p-value.

**After surgery, patients are evaluated using the Visual Analogue Scale (VAS):**
There were statistically significant differences in VAS between groups D and N as compared to group C. Table (12) shows that, save from at 3 and 6 hours postoperatively, there was no statistically significant difference between groups D and N.

**Table (12): Post-operative VAS of the study groups:**

| | Group(C) N=20 | Group(D) N=20 | Group(N) N=20 | p-value | P* | $P^{\#}$ | P` |
|---|---|---|---|---|---|---|---|
| **1 hour postoperative** | 2.30 ± 0.80 | 0.20 ± 0.41 | 0.50 ±0.76 | <0.0001* | <0.0001* | <0.0001* | 0.3 |
| **2 hours postoperative** | 4.50 ± 1.00 | 1.50 ±0.83 | 2.30 ± 1.40 | <0.0001* | <0.0001* | <0.0001* | 0.06 |
| **3 hours postoperative** | 1.85 ± .88 | 3.00 ± 0.97 | 4.95 ±1.19 | <0.0001* | 0.002* | <0.0001* | <0.0001* |
| **4 hours postoperative** | 1.20 ±0.70 | 2.50 ± 1.32 | 2.10 ± 0.64 | <0.0001* | <0.0001* | 0.01* | 0.3 |
| **5 hours postoperative** | 2.40 ±1.31 | 1.35 ± 1.09 | 1.75 ± 1.33 | 0.03* | 0.02* | 0.2 | 0.5 |
| **6 hours postoperative** | 4.35 ±1.50 | 1.00 ±1.41 | 2.85 ±1.50 | <0.0001* | <0.0001* | 0.006* | 0.001* |

Standard deviations (SDs) are included in the data reports together with the means. If the p-value is less than 0.05, then it is statistically significant. Using the One-way ANOVA test, we were able to obtain the p-value for the means. A statistically significant difference is indicated by the p-value among the three groups. There is a significant difference between groups C and D, as shown by the p value. A statistically significant difference exists between groups C and N, according to the p-value.
A statistically significant difference exists between groups D and N, as shown by the p-value.

## Discussion

Many elderly patients who are eligible for ocular treatment also suffer from many systemic diseases, making them more likely to experience difficulties during anaesthesia. Therefore, regional anaesthesia is the way to go for eye surgeries because of all the benefits it offers. By blocking the metabolic and endocrine reaction to the operation, regional anaesthesia reduces the incidence of postoperative vomiting and nausea[12]. The peribulbar block has several advantages over the retrobulbar block, including better convenience, safety, and reduced issue likelihood. However, there may be limitations to this method's utilisation owing to the lengthy surgical process and short block duration[15].

The purpose of this research was to determine if neostigmine and dexmedetomidine administered in conjunction with peri-bulbar anaesthesia improved the effectiveness of the local anaesthetic. The average age of the patients in the control group was 57.40 ±11.50. The dexmedetomidine group had patients with an average age of 55.10 ±9.59. The patients in the neostigmine group had an average age of 53.10±6.63 years. In terms of age and sex distribution, there were no discernible disparities between the groups.

Reduced heart rate and average blood pressure were the results of taking dexmedetomidine and neostigmine as additional drugs at the same time. Hemodynamics did not differ significantly between the three groups. There was no significant difference in oxygen saturation that may be used for therapeutic purposes.

Researchers found that when local anaesthetic was administered in a peribulbar block with two different doses of dexmedetomidine during cataract surgery, the outcomes were similar. Initial hemodynamic markers and peripheral SpO2 were similar across all three groups. Average heart rates and arterial pressures in Group D50 remained lower until the 30th and 60th minutes of the operation, respectively, for the course of the procedure[4].

By combining fentanyl and dexmedetomidine into a local anaesthetic mixture for peribulbar block during cataract surgery, Fayed et al., (2018) aimed to compare the effects of the two substances. Those given dexmedetomidine exhibited bradycardia on a regular basis while under anaesthesia, whilst those given fentanyl had a steady heart rate the whole time[7].

Dexmedetomidine had no effect on the cardiovascular system in patients having vitreoretinal surgery with a peribulbar block. The patients' hemodynamic profiles were consistent and stable throughout the whole surgical procedure, from preoperative preparation to postoperative recovery[3].

Ahmed et al., (2023) investigated the effects of peribulbar anaesthesia for cataract procedures with a mix of dexmedetomidine and neostigmine, two local anaesthetics. Neither the neostigmine group nor the dexmedetomidine group showed statistically significant changes in mean arterial blood pressure, cardiac output, or sulfite concentrations[2].

Aboul Fetouh et al., (2021) examined the effects of peribulbar anaesthesia for cataract surgery with lidocaine and neostigmine at two distinct dosages (0.5 mg and 0.25 mg, N50 and N25, respectively). After the block, the researchers found that neither group's average arterial pressure changed much. In contrast to the control and N50 groups, the N25 group's average heart rate following the blockage was substantially lower[1].

In comparison to the control and neostigmine groups, the dexmedetomidine group had a quicker start of ocular akinesia. But the incidence of ocular akinesia was not significantly different between the neostigmine group and the control group. However, when contrasted with the control group, the dexmedetomidine and neostigmine groups had much longer mean block durations.

Consistent with previous research, this study's results support the use of neostigmine and dexmedetomidine as supplementary drugs to a local anaesthetic combination in peribulbar anaesthesia for cataract procedures[8]. The study found that ocular akinesia started more quickly in the dexmedetomidine group than in the neostigmine group, and this difference was statistically significant. Concerning the length of the blocks, nevertheless, neither group differed much from the other.

For the traditional peribulbar block in posterior chamber operations, Hafez et al., (2016) tested three different doses of dexmedetomidine (15μg, 20μg, and 25μg) in combination with lidocaine 2%, bupivacaine 0.5%, and 120 IU of hyaluronidase. Dexmedetomidine inhibits sensory and motor activity for a longer period of time and has a faster start, according to studies. It was determined that
25 μg is the optimal dose[8].

The effects of adding two different doses of dexmedetomidine (25 μg and 50 μg) to a combination of levobupivacaine and hyaluronidase in peribulbar anaesthesia were examined in the study. Dexmedetomidine accelerated the start of sensory and motor blockage, according to their research[5].

No patient in the dexmedetomidine plus neostigmine group expressed dissatisfaction with the blocks' quality; in contrast, fifteen patients (or seventy-five percent) in the placebo group did so. This proves that the control group is significantly different from the other groups. In addition, the block provided the experts with an ideal site for the surgeries.

Their study examined the effects of neostigmine and ketorolac combined with local anaesthesia during peribulbar block for patients having vitrectomy procedures. Patients and surgeons in the neostigmine + ketorolac (NK) group were far more satisfied with the results than those in the C group, who just had local anaesthesia, according to the research[11].

By comparing the use of neostigmine and dexmedetomidine as adjuncts to local anaesthetic in peribulbar anaesthesia for cataract procedures, all patients in both groups reported full satisfaction[2].

The most up-to-date study contrasted groups C and D and showed that group D had a substantially longer period before the first request for pain medication. In terms of pain

management efficacy, however, neither group D nor group N, nor group C, showed any statistically significant differences.

Channabasappa et al., (2013) found similar results when they studied the impact of two

doses of dexmedetomidine on the efficacy of the local anaesthetic in the peribulbar block during cataract surgery. The duration of postoperative pain alleviation was significantly longer in Groups D50 and D25 compared to Group C. On top of that, these people only require a fraction of the usual amount of additional analgesics in a day[4].

In addition, a study assessed the effects of peribulbar anaesthesia with 0.5 mg of neostigmine in patients having trabeculectomy. In addition to postponing the first requirement for pain medication and speeding up the onset and duration of sensory and motor blocks, neostigmine improved the surgical conditions[11].

Another research that looked at the effects of peribulbar anaesthesia with lidocaine and two different doses of neostigmine (0.5 mg, N50 and 0.25 mg, N25)) for cataract surgery. After surgery, the N50 and N25 groups reported significantly longer periods of pain alleviation than the control group[1].

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