CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.3819642

Available online at: http://www.iajps.com Research Article

LEVELS OF ANTIOXIDANTS IN THE BLOOD WITH THE USE OF ROPIVACAINE FOR ANESTHESIA

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Article Received: March 2020 **Accepted:** April 2020 **Published:** May 2020

Abstract:

Objectives: *The main objective of this study was to determine the levels of antioxidants after the use of Ropivacaine for anesthesia.* ***Material and method:*** *This cross-sectional study was conducted in Nishtar Hospital, Multan during March 2019 to December 2020. To measure the levels of lipid peroxidation, glutathione (GSH), superoxide dismutase (SOD) and the levels of catalases (CAT), samples were taken from the vein before anesthesia (0 min) and at 5, 15, and 60 min. after anesthesia.* ***Results:*** *The levels of MDA , SOD and GSH slightly increased at 5 min after spinal injection of ropivacaine and this increase continued throughout anesthesia (P<0.001). Catalases levels were decreased at 5 min after anesthesia (P<0.001) and this level not recovered after 60 min of anaesthesia.* ***Conclusion:*** *In conclusion, we found that spinal injection of ropivacaine increased free radical levels in spinal fluid which may be supported antioxidant environment of spinal fluid during anesthesia.*

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Please cite this article in press Madeeha Afaq et al, ***Levels Of Antioxidants In The Blood With The Use Of Ropivacaine For Anesthesia.,*** *Indo Am. J. P. Sci, 2020; 07(05).*

INTRODUCTION:

General anesthetics agents' effect on the ion channels and neurotransmitter receptor subtypes[1]. They even affect actin-based motility in dendritic spines. Anesthesiologists frequently discuss the actions of many drugs counting opioids, muscle relaxants and anticoagulants. However, emergence of general anesthesia is still treated as a passive process, dictated by the pharmacokinetics of anesthetic drug clearance[2].

Even though there has been active research onto the mechanisms of general anesthesia for over a century but still there is no commonly accepted or fully suitable definition of general anesthesia itself[3]. The critical effectors sites that cause general anesthesia may be moderately different from those primary target sites where anesthetic molecules actually bind. For example, it is generally thought that changes in the properties of neuronal ion channels cause general anaesthesia, but this could result when anaesthetic molecules interact with any of the following primary sites: a) the channel proteins, b) channel regulatory proteins (e.g., by phosphorylating them), or c) the surrounding lipid bilayer[4]. Anaesthetic agents are mostly hydrophobic in nature and usually behave like polar ions. Intravenous anaesthetic agents used for induction and for short surgical procedure and they can produce apnoea and hypotension. They are contraindicated if the anaesthetist is not confident of being able to maintain an airway. Any muscle relaxant must be given before intubation and the requirement for Individual varies considerably[5].

There are many agents used as a local anaesthetic for the treatment and surgery. Ropivacaine is a commonly used anaesthetic drug which belongs to the amino amide group[6]. Ropivacaine is the (S)-enantiomer of 1-propyl-2', 6'- pipecoloxylidide, an amide local anesthetic with a structure similar to that of mepivacaine and bupivacaine. Animal studies have indicated that ropivacaine is less toxic than bupivacaine. Both drugs have a comparatively long duration of action, but their relative potency has still to be determined in humans. As Ropivacaine used as a long acting local anesthetic drug and it has a same clinical profile as bupivacaine[7].

Objectives of the study

The main objective of this study was to determine the levels of antioxidants after the use of Ropivacaine for anesthesia.

MATERIALS AND METHODS:

This cross-sectional study was conducted in Nishtar Hospital, Multan during March 2019 to December 2020. This study was conducted according to the rules and regulations of authority of services Institute of medical sciences Lahore. 50 patients were selected to study the effect of ropivacaine. 5.0 ml blood sample was taken from vein to measure the levels of lipid peroxidation (MDA), glutathione (GSH), SOD and Catalases before anaesthesia (0 min), and at 5, 30 and 60 minute after anaesthesia. Commercially available enzymatic kits of Randox were used

Statistical Analysis

Statistical analysis (Anova Test and Post Hoc) was performed using the SPSS software program (17.0). All results were expressed as the mean ± standard deviation (SD). As P value <0.05 was considered to be statistically significant.

RESULTS:

Mean values of investigated parameters and differences in the values between, before and after anaesthesia are represented in the table 01. The values are expressed in terms of mean± SD. According to the analysis, the level of SOD, MDA and GSH increase as compared to normal level. But the level of catalases decreased with the value of 0.43±0.39 (after 5 minutes of anaesthesia). All the data are explained in table 01.

Table 01: Analysis of parameters

No.of Observation	Analysis of blood	Normal µg/mL	After treatment(5min) µg/mL	After treatment(15min) µg/mL	After treatment(60min) µg/mL
01	**SOD**	0.32±0.00	0.39±0.00	0.45±0.19	0.51±0.21
02	**CAT**	4.16 ±0.00	0.43±0.39	0.30±0.24	0.19±0.18
03	**GSH**	1.89 ±0.00	3.23±0.03	4.92±0.57	5.64±0.55
04	**MDA**	2.35±0.00	4.95±0.97	5.13±1.06	6.58±0.00

Effects of spinal injection of Ropivacaine on the levels of MDA in spinal fluid indicated in Fig. 1. The levels of MDA slightly increased at 5 min after spinal injection of ropivacaine and this increase continued throughout anesthesia (P<0.001).

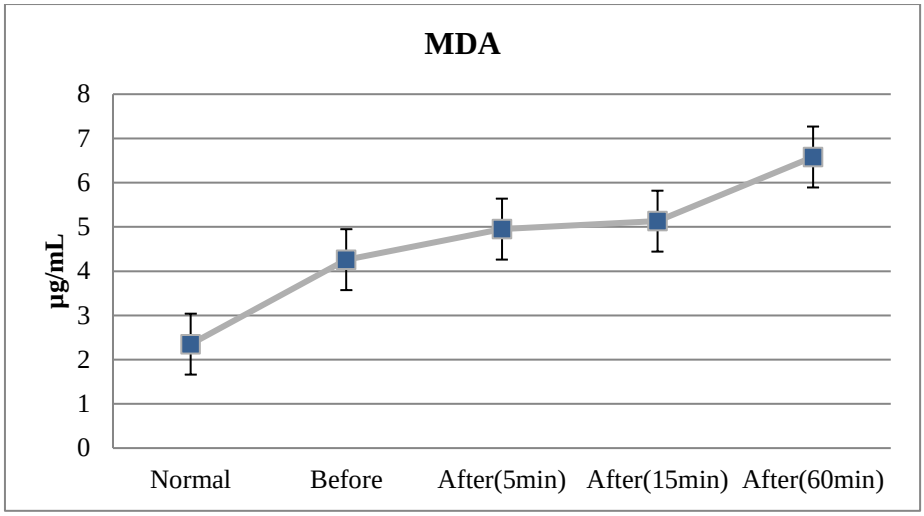

Fig 01: Effects of spinal injection of ropivacaine on the levels of MDA in blood. P<0.001 in comparison to the 0th point of the time. Values are expressed as mean ±SD.

DISCUSSION:

The results of this study show that spinally injected ropivacaine has an effect on change the lipid peroxidation and antioxidant enzymes in the blood. Lipid peroxidation is one of the prominent revealed of oxidative stress. Reactive oxygen species are induced oxidation and peroxidation of membrane phospholipids, thereby causing damage to the phospholipid molecule as well as to other molecules in the cells[8]. Polyunsaturated fatty acids are found in abundance in mammalian membrane lipids and are the most likely targets of Reactive Oxygen Species (ROS). Activities of enzymatic antioxidants like catalase, superoxide dismutase and glutathione peroxidase significantly decrease in prostate cancer patients compared to normal subjects[9]. Oxidative stress plays an important role for the initiation of DNA damage. In the present study, we observed an increase in MDA levels and increase in SOD and GSH levels and decrease in catalases level. Increased levels of lipid hydroxyl peroxides and hydroxyl phospholipids have been associated with oxidative stress and membrane injury that occur in pathological conditions such as spinal cord injury[10].

CONCLUSION:

In conclusion, we found that while spinally injection of ropivacaine increased free radical levels in the blood. According to our study levels of free radicals will increase in the blood and it may be supported antioxidant environment of spinal fluid during anesthesia.

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