



RESEARCH ARTICLE

EFFECT OF ONDANSETRON IN MITIGATION OF POST-OPERATIVE SHIVERING IN COMPARISON TO FORCED AIR WARMER AND DEXAMETHASONE IN PATIENTS UNDERGOING INFRA UMBILICAL SURGERIES UNDER SUBARACHNOID BLOCK - A PROSPECTIVE RANDOMISED STUDY

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Abstract

Background: Subarachnoid block is a ubiquitous technique used in the field of anaesthesia to facilitate any number of surgeries below the level of the umbilicus. However, this technique is frequently associated with post anaesthesia shivering caused by the sympathetic blockade and peripheral vasodilatation.

Materials and Methods: We compared the efficacy of Ondansetron against dexamethasone and isolated forced air warming in the mitigation of sub arachnoid blockade induced shivering. We enrolled a total of 120 individuals scheduled to undergo elective infra umbilical surgeries and randomly allocated them into three groups designating each other to receive Dexamethasone (Group D), Ondansetron (Group O) and Forced air warming (Group W). We compared the three groups with respect to pre operative and post operative temperature and onset of shivering. Shivering was graded according to the Crossley Mahajan Scale.

Results: We found that the statistical analysis yielded comparable results in terms of demographic parameters and no statistical significance among the three groups with respect to mitigation of Shivering (Chi square value = 8.5, P = 0.075).

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Introduction:-

Post operative shivering is a common complication of anaesthesia and associated with increased oxygen demand, increased risk of Hypoxemia, and may increase the risk of post operative complications. Postoperative shivering (PS) is an involuntary, oscillatory muscular activity during early recovery after anaesthesia. Shivering also occasionally impedes monitoring techniques, increases intraocular and intracranial pressures [1]. Besides the obvious discomfort, shivering increases oxygen consumption by 300%-400% and increases the risk of hypoxemia, induces lactic acidosis, carbon dioxide production, and catechol- amine release, resulting in increased cardiac output, heart rate, and arterial pressure [2,3].

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The combination of anaesthetic-induced thermoregulatory impairment and exposure to a cool environment makes most unwarmed surgical patients hypothermic. However, it occurs even in normothermic patients undergoing neuraxial procedures. Active warming measures such as forced air warming of the patient is shown to be beneficial. The preoptic area of the hypothalamus releases 5-HT₃ to activate heat production pathways, and thus increase body temperature. 5-HT₃ antagonists may prevent postoperative shivering by inhibiting reuptake of 5-HT in the preoptic area[4]. Ondansetron, a 5-HT₃ (serotonin) antagonist, is generally used as an antiemetic but its efficiency and safety in the prevention of PS remains controversial.

Aims and Objectives:-

To assess the efficacy of Ondansetron in mitigating the occurrence of post-operative shivering in comparison to that of a forced air warming and dexamethasone; in patients undergoing infra-umbilical surgeries under spinal anaesthesia

Primary Outcome :

Incidence of post anaesthetic shivering

Secondary Outcome :

Evaluation of pre-operative and post-operative temperature changes

Material and Methods:-

This study was conducted in Saveetha Medical College From November 2022 to June 2023, after obtaining the Necessary approval and ethical clearance from the institutional review board. We enrolled a total of 120 patients undergoing elective surgical procedures below the level of umbilicus under sub-arachnoid blockade. The patients were selected using simple random sampling. The selected patients were based on Inclusion criteria : Patients undergoing infra-umbilical surgeries under spinal anaesthesia aged between 18 and 35. Exclusion criteria were defined as Patients having contraindication to spinal anaesthesia – Severe Shock, deranged coagulation profile, Bleeding diathesis, active bleeding PV, etc., Patients who have allergy to local anaesthetics, Ondansetron, dexamethasone, those who have heat intolerance, Those who are unwilling to participate in the study. After obtaining due consent, the patients were randomly allocated into three Groups. Group D – designated to receive 0.1mg/Kg of Dexamethasone IV + Intra-operative warming @ 38°C; Group O designated to receive 0.1mg/Kg of Ondansetron IV + Intra-operative warming @ 38°C. Group W designated to receive Pre-operative forced air warming at 38°C and Intra-operative warming @ 42°C along with a saline filled syringe for IV injection. All three Groups used the same kind of forced air warmer (Covidien WarmTouch™ WT 6000 Warming Unit). The drugs were loaded and administered by an anaesthesiologist independent from the one conducting the case. All the patients underwent subarachnoid blockade using the same gauge of Quincke - Babcock needle and were administered the same dose of Local anaesthetic drug (15mg of 0.5% Hyperbaric Bupivacaine at the level of L3-L4 Space) to ensure uniformity. Hypotension if any was treated by fluid loading @ 5mL/Kg and Ephedrine 6mg Boluses. The Age, sex, BMI, Pre-operative, and Post -operative temperature were recorded by the anaesthesiologist in charge of the case. Post operatively the patients were followed up by an independent observer and the incidence and Grade of Shivering was documented. All patients were administered Nasal oxygen post-operatively irrespective of the incidence of shivering. Patients developing a Shivering Grade of More than 3 were administered Inj. Fentanyl 25mcg IV irrespective of the group allocation by the post-operative observer. The resultant variables were statistically Compared.

Statistical Analysis

Parametric data were analysed using one-way ANOVA and Student's paired t-test where ever appropriate. Nonparametric data were analysed using the Kruskal–Wallis and the Chi-square test. Values of P < 0.05 were considered statistically significant.

Results:-

Of the 120 study participants, 57.5% were males and the rest 42.5% were females. The mean age of the study population was 33.6% ±9.19.

The mean weight was 65.62 ± 8.7. The mean BMI was 24.32 ± 2.6.

The mean pre op temperature was 97.66 ± 0.92 . The mean post Operative temperature was 97.41 ± 0.77 .

57.5 % had shivering grade 1, 40.8% had shivering grade 2 and 1.7% had shivering grade 3.

The 120 study participants, were randomly allotted into three groups(O - ondansetron, D- dexamethasone, W- Warmer) of 40 each.

Males were more or less equally distributed in each group - 55% in group A, 52.5% in group B and 45% in group C. (Chisquarevalue : 1.404. $P=0.49$).(Fig 1)

Shivering was grade 1 in 72.5% of the ondansetron group while it was 45% in dexamethasone group and 55% in warmer group. (Chi square value = 8.5, $P = 0.075$)(Fig 2)

Fig 1:- Distribution of study population according to sex.

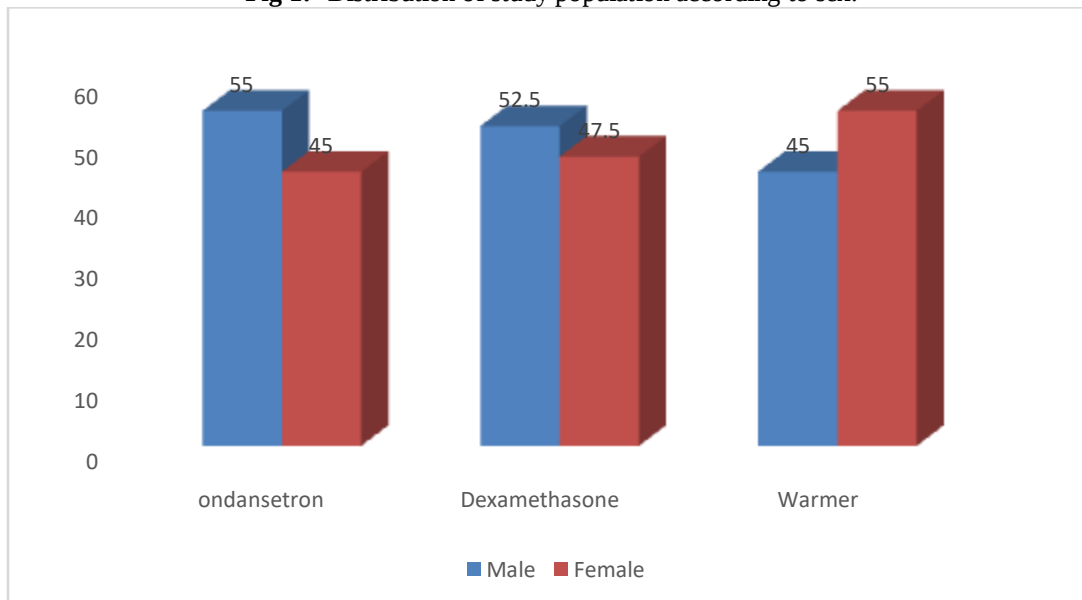


Fig 2:- Distribution of study population according to Shivering grade.

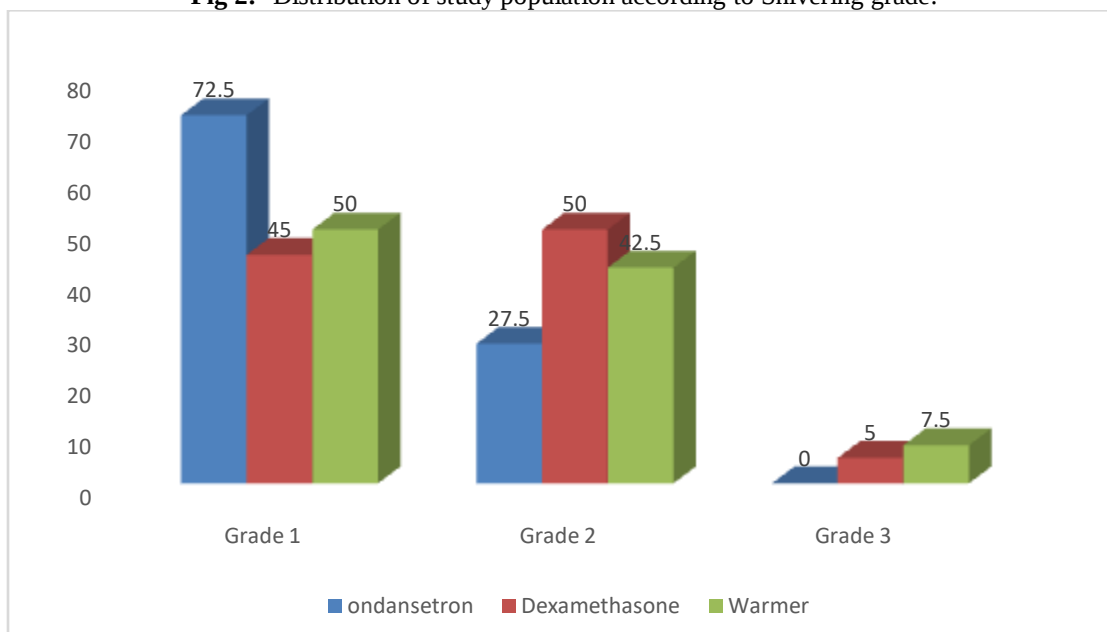


Table 1:- Comparison of mean parameters between the three groups.

Parameter	Ondansetron		Dexamethasone		Warmer		F Value	P value
	Mean	SD	Mean	SD	Mean	SD		
Age	31.25	9.06	31.98	8.95	31.55	8.62	0.068	0.934
Weight	64.95	8.73	66.35	9.72	65.55	7.69	0.258	0.773
BMI	24.18	2.12	24.92	2.53	24.87	2.76	1.109	0.331
Preop	97.59	0.98	97.67	.99	97.73	0.81	0.214	0.808
Post op	97.38	0.72	97.39	.87	97.44	0.74	0.05	0.951

There is no significant difference between the three groups with respect to age, weight, BMI and pre op temperature signifying that all the three groups were comparable.

Discussion:-

Approximately 85% of patients undergoing LSCS under neuraxial anesthesia experience post operative shivering[5]. In general, postoperative shivering occurs due to fall in core temperature caused by intraoperative heat loss[6]. The 5-HT₃-receptor antagonists ondansetron, granisetron, and dolasetron are all the same. They have been utilized to reduce postspinal shivering extremely well recently. It is believed that 5-HT₃-receptor antagonists work by inhibiting serotonin reuptake on the preoptic anterior hypothalamus area, albeit the precise mechanism by which they reduce postspinal shivering remains unclear.

In this study we have maintained the core temperature by combining the forced air warmer in all three groups. In a study conducted by K.S. Ram et al., forced air warmer combined with ondansetron was used. But warmer was used only preoperatively, core temperature was not maintained throughout the surgery[7].

In a study Sajedi et al., four groups were compared, tramadol vs granisetron vs meperidine vs placebo. They have used granisetron 40 mcg/kg as prophylactic dose in preventing postspinal shivering and concluded to be effective one for the same[8].

Verma et al. 2016 study compared the efficacy of butorphanol and ondansetron in 180 participants. Here postoperative shivering in both general and regional anesthesia were included. They have concluded that both butorphanol and ondansetron were effective in preventing postoperative shivering[9]. In another study Kim et al. 2010 conducted in patients undergoing knee arthroscopy under regional anesthesia also proved 5HT₃ antagonist were effective in preventing postspinal shivering[10].

Distinctive feature in our study is that we have maintained core temperature throughout the procedure by combining forced air warmer with dexamethasone or ondansetron. So there was no significant change in temperature pre and post operatively.

Conclusion:-

Combined use of ondansetron and forced-air warmer resulted in reduced intensity of shivering when compared to Dexamethasone and Forced air warmer or Forced air warming alone. However, there was no statistical significance in prevention of shivering across all three groups. It was also observed that there were no significant changes between the pre-operative and post-operative temperature among all three groups.

Limitation:

This was a single center study done in a finite population which might have contributed to the unequivocal results. The type of surgery were not taken into account thus confounding the contributory factors to the incidence of shivering. A much more larger and more uniform population might be needed to better shed light on the effects of both pharmacological and non-pharmacological methods that mitigate post anesthetic shivering.

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