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# Comparative Study between Intramuscular Ephedrine Versus Intravenous Ondansetron Versus Intravenous Dexamethasone for Prevention of Spinal Anaesthesia-Induced Hypotension in Parturients Undergoing Caesarean Section

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## Abstract

*Background:* Hypotension is one of the most common intra-operative complications associated with spinal anaesthesia. Its incidence in caesarean section has been estimated to be as high as 50-60%. The cardinal symptoms of hypotension include light headedness or dizziness. If the blood pressure is markedly low, loss of consciousness and seizures may occur. Several studies suggest that hypotension during spinal anaesthesia may causes everal adverseevents such as delirium and coronary ischemia. In spite of using a lot of prophylactic measures as left displacement of the pregnant uterus, Administration of pre-load or co-load of crystalloid and colloid solutions and use of vasopressors, none of them can totally avoid maternal hypotension post-spinal anaesthesia.

*Aim of Study:* The aim of the study was to compare efficacy and safety of Ephedrine versus Ondansetron versus Dexamethasone inpreventing spinal anaesthesia-induced hypotension in parturients undergoing caesarean section.

*Patients and Methods:* This study was a comparative randomized double-blind trial applied on 153 patients divided into three Groups, Group I (n=52): Received 25mg ephedrine (1ml) IM and 5ml saline (IV), 25 minutes before spinal anaesethia; Group II (n=50): Received 4mg ondansetron in 5ml normal saline (IV), and 1ml saline IM, 25 minutes before spinal anesthesia, and Group III (n=51): Received 4mg dexamethasone in 5ml normal saline (IV) and 1ml saline IM, 25 minutes before spinal anesthesia. All cases were collected from anesthesia Department at Bab El Shearia university Hospital, Al-Azhar University during the period from April 2019 to April 2021.

*Results:* There is statistically significant difference in degree of hypotension between the studied groups, hypotension in Ephedrine group was in 20 cases (38.5%), followed by Dexamethasone group 14 cases (27.5%), while the Ondansetron group was in 8 cases (16%). By looking at the dose of vasoconstrictors, vomiting, nausea and shivering, the results showed no statistically significant differences.

*Conclusion:* The preemptive use of Ephedrine, Ondansetron and Dexamethasone in reducingpost-spinal hypotension (PSH) in obstetric patients undergoing cesarian sectionshowed thatthe Ondansetron drug was more effective in reducing post-spinal hypotension than Dexamethasone followed by Ephedrine.

***Key Words:*** *Spinal anesthesia – Hypotension – Dexamethasone – Ondansetron – Caesarean Section – Vasopressors – Bradycardia.*

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## Introduction

**HYPOTENSION** is one of the most common intra-operative complications associated with spinal anaesthesia. Its incidence in caesarean section has been estimated to be as high as 50-60% **[1]**.

This incidence is present despite fluid preloading, lateral uterine displacement and the use of vasopressor agents. It occurs due to sympathetic block which leads to autonomic nervous system disturbances and a decrease in systemic vascular resistance. This can occur because the level of block must be at least at T4 to ensure adequate analgesia **[1]**. Hypertension, advancedage, obesity, higher neonatal weight, and a block at higher spinal levels are considered potential risk factors. Severe hypotension following spinal anaesthesia in caesarean section is a dangerous complication. If it is unnoticed or inadequately treated, it can lead to serious maternal or fetal compromise **[2]**.

The cardinal symptoms of hypotension include light headedness or dizziness.If the blood pressure is markedly low, loss of consciousness and seizures may occur. Other symptoms associated with low blood pressure include chest pain, shortness of breath, arrhythmia. It also includes headache,

nausea, vomiting and fatigue [3]. Several other studies suggest that hypotension during spinal anaesthesia may cause several adverse events such as delirium and coronary is chemia [4].

Several measures were adopted to prevent or at least reduce the incidence of hypotension induced by spinal anaesthesia. They include patient position as displacement of the pregnant uterus to prevent aortocaval compression. Administration of preload and/orco-loadof crystalloid and colloid solutions helps to increase the intravascular volume, using small sized spinal needle. We can use alsovasopressors boluses as ephedrine, phenylephrine and finally reduce the local anaesthetic dose. In spite of using all the prophylactic measures described, none of them can totally avoid maternal hypotension post-spinal anaesthesia [5].

Therefore, there should be an interventional study to preventor at least reduce the incidence of hypotension following spinal anesthesia in caesarean section [5].

Ephedrine, an indirectly acting sympathomimetic amine, is probably the vasopressor of choice in obstetric anesthesia. Although ephedrine has mixed a- and 0-adrenoreceptor activity, it maintains arterial pressure mainly by increases in cardiac output (CO) and heart rate as a result of its predominant activity on β 1-adrenoreceptors [6].

Ondansetron is a highly specific and selective serotonin 5-HT3 receptor antagonist with low affinity for dopamine receptors. Several studies have shown that it can prevent hypotension after spinal anaesthesia in pregnant and non-pregnant women [7]. A recent meta- analysis concluded that ondansetron may reduce the incidence of hypotension induced by spinal anesthesia [8]. The mechanism of action is believed to be inhibition of the Bezold-Jarisch reflex (BJR). This reflex is mediated through vagalafferents.When activated,it causes hypotension and bradycardia [9].

Triggering of chemoreceptors sensitive to serotonin in the intra cardiac wall can occur by a reduction in blood volume. It may lead to increased vagal nerve activity, followed by bradycardia and vasodilatation. Effect of prophylactic Ondansetron on blood pressure has not been compared in a clinical trial with that of another agent of the antiemetic drugs. In this study Ondansetron will be compared with dexamethasone as a prophylactic measure to prevent or at least reduce post-spinal hypotension in caesarean section [10].

Dexamethasone is a synthetic glucocorticoid 40-50 times more potent than hydrocortisone and even longer acting. It can elevate the blood pressure [11]. The exact mechanism by which glucocorticoids elevate blood pressure is not completely understood. It appears to increase responsiveness to vasoconstrictors and decrease vasodilator production as nitricoxide [12].

The aim of the study was to compare efficacy and safety of Ephedrine, Ondansetron versus dexamethasone in preventing or reducing the incidence of hypotension following spinal anaesthesia in caesarean section.

## Patients and Methods

This study is a randomized double-blind trial applied on 153 patients divided into three Groups, Group I (n=52): Received 25mg ephedrine (1ml) IM and 5ml saline (IV), 25 minutes before spinal anaesethia; Group II (n=50): Received 4mg ondansetron in 5ml normal saline (IV), and 1ml saline IM, 25 minutes before spinal anesthesia, and Group III (n=51): Received 4mg dexamethasone in 5ml normal saline (IV) and 1ml saline IM, 25 minutes before spinal anesthesia. All cases were collected from anesthesia Department at Bab El Shearia University Hospital, Al-Azhar University during the period from April 2019 to April 2021.

*Inclusion criteria:*

All participants are be full term, singleton, ASA I and II pregnant patients between the age of 18 and 35 years scheduled for caesarean section under spinal anaesthesia wereincluded in the study.

*Exclusion criteria:*

Patients with cardiac, pulmonary, renal, hepatic, neuromuscular disorders and diabetes mellitus were excluded from the study. Contraindication to spinal anaesthesia e.g. coagulopathy, Hypersensitivity to the used drugs and patients who take antidepressants in the form of serotonin antagonists or corticosteroids were also excluded.

In the preparation room, history was taken from all patients with documentation of the age, American Society of Anesthesiologists' score and gestational age. Then Preoperative preparations were done to all patients in the form of recording the laboratory investigations complete blood picture, coagulation profile, albumin, urine analysis, liver and renal functions and after that an intravenous access was obtained.

Then, the patient baseline vital signs were recorded 5 minutes before receiving the drugs of study including non-invasive measurement of systo-

lic, mean, diastolic arterial pressures, heart rate, ECG, oxygen saturation.

The patient received preload in the form of 250 ml Ringers solution and another 250ml as a co-load while receiving spinal anesthesia.

The patient was placed in the sitting position, sterilization of the back and local anaesthetic infiltration was done. After that, spinal anesthesia was performed at the level L3-L4 with a 25 G Quincke needle (B.Braun) using a hyperbaric bupivacaine solution (Sunnypivacaine) 5mg/mL in a dose of 0.09mg/cm patient's height.

The patient was placed in a supine position immediately after regional blockade with a left lateral tilt. The sensory and motor block were assessed bilaterally by cold discrimination using a frozen sachet of normal saline or ice cube and by modified bromage scale (0: no motor block, 1: inability to raise extended legs, 2: inability to flex knees, 3: inability to flex ankle joints) respectively to ensure adequate anaesthetic block.

*Ethical considerations:*

The study was performed after ethical committee approval of faculty of medicine Al-Azhar University and informed consent from the patients. The study protocol was explained to the patients after taking their consent to the type of anaesthesia and surgical procedure.

*Study tools and study procedures:*

Hemodynamic parameters; blood pressure using non-invasive measurement, heart rate, oxygen saturation were immediately recorded after resuming the supine position then every 5 minutes in the first 20 minutes then every 10 minute until skin closure and in recovery room.

Other complications as dizziness, nausea, vomiting, post anaesthetic shivering as well as side effects of the used drugs were monitored and recorded.

Hypotension is defined as a decrease of mean arterial pressure 20% below the baseline.

In case of hypotension, 10mg of ephedrine with 100ml fluid was administrated intravenously and repeated until restoration of baseline values.

The primary investigated outcome was the incidence of post spinal hypotension in caesarean section.

Secondary outcomes included safety and the least side effects of the used drugs as nausea, vomiting, dizziness, blurring of vision, shivering and total dose of vasopressors used.

*Statistical analysis:*

Recorded data were analyzed using the statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were expressed as mean ± standard deviation (SD). Qualitative data were expressed as frequency and percentage. A one-way analysis of variance (ANOVA) when comparing between more than two means. Post Hoc test: Least Significant Difference (LSD) was used for multiple comparisons between different variables.Chi-square ($x^2$) test of significance was used in order to compare proportions between qualitative parameters. The confidence interval was set to 95% and the margin of error accepted was set to 5%. $p$-value <0.05 was considered significant.

## Results

There was no statistically significant difference between groups in those parameters.

As regards The Nausea and vomiting there were 13 cases (25%) in Ephedrine Group, also were 5 cases (10%) in Ondansetron Group, as for the N&V in Dexamethasone group there were 10 cases (19.6%); there is no statistically significant difference with ($p$-value=0.141 non-significant) (Table 1).

As regards thesystolic blood pressure “mmHg” differences between the studied groups, there was statistically significant reduction in systolic blood pressureover the periods compared with the base line in all groups. Moreover, patients in the Ephedrine group had significantly lower systolic blood pressure compared to Ondansetron Group, while Dexamethasone group was non significantlylower than the Ondansetron group. Fig. (1).

As regards thediastolic blood pressure “mmHg” differences between the studied groups, there was statistically significant reduction in diastolic blood pressureover the periods compared with base line in all groups. Moreover, patients in the Ephedrine group had significantly lower diastolic blood pressure compared to Ondansetron group, while Dexamethasone group wasnon significantly lower than the Ondansetron group. Fig. (2).

As regards the mean arterial blood pressure “mmHg” differences between the studied groups, there was statistically significant reduction in mean arterial blood pressureover the periods compared with the base line in all groups. Moreover, patients

in the Ephedrine group had significantly lower mean arterial blood pressure compared to Ondansetrongroup, while Dexamethasone group was non significantly lower than the Ondansetron group (Table 2).

This table shows statistically significant difference between groups according to intraoperative MBP (mmHg) at 0min., At 10min., At 15min., At 20min., At 30min., At 40min.

As regards the heart rate "beat/min" differences between the studied groups. there was statistically significant reduction in heart rateover the periods compared with the base line heart rate in all groups. Moreover, patients in the Ephedrine group had significantly lower heart rate compared to Ondansetron group, while Dexamethasone group wasnon significantly lower than the Ondansetron group (Table 3).

This table shows statistically significant difference between groups according to intraoperative heart rate at 0min., At 5min., At 15min., At 20min., At 30min., At 40min.

As regards the blood pressure changes between the studied groups, there was statistically significant higher hypotension incidence in Ephedrine group 20 cases (38.5%), followed by Dexamethasone 14 cases (27.5%), while the lowest incidence was Ondansetron 8 cases (16%).

As regards the heart rate changes between the studied groups, there was statistically significant higher bradycardia incidence in Ephedrine group 19 cases (36.5%), followed by Dexamethasone 13 cases (25.5%), while the lowest incidence wasondansetron 7 cases (14%) (Table 3).

As regards the intraoperative O2 saturation. There is no statistically significant differences between the studied groups($p$>0.05) (Table 5).

Table (1): Comparison between Group I: Ephedrine, Group II: Ondansetron and Group III: Dexamethasone according to their demographic data regarding age, BMI, ASA, duration of surgery, intraoperative nausea and vomiting.

| Demographic data | Group I: Ephedrine (N=52) | Group II: Ondansetron (N=50) | Group III: Dexamethasone (N=51) | $p$-value |
|---|---|---|---|---|
| Age (years) | 27.03±4.60 | 26.01±4.42 | 28.05±4.77 | 0.087 |
| BMI [wt/(ht)^2] | 29.10±4.95 | 28.13±4.78 | 30.07±5.11 | 0.147 |
| *ASA* | | | | |
| I | 8 (15.4%) | 9 (18.0%) | 6 (11.8%) | 0.678 |
| II | 44 (84.6%) | 41 (82.0%) | 45 (88.2%) | |
| Duration of surgery (min) | 48.75± 14.89 | 47.75± 13.72 | 49.75± 15.06 | F=0.238 |
| *Intraoperative Nausea & Vomiting* | | | | |
| Yes | 13 (25.0%) | 5 (10.0%) | 10 (19.6%) | 0.141 |
| No | 39 (75.0%) | 45 (90.0%) | 41 (80.4%) | |

Using: F- One Way Analysis of Variance; $x^2$: Chi-square test $p$-value>0.05 NS

Table (2): Comparison between Group I: Ephedrine, Group II: Ondansetron and Group III: Dexamethasone according to their intraoperative mean arterial blood pressure (mmHg).

| Intraoperative mean arterial blood pressure (mmHg) | Group I: Ephedrine (N=52) | Group II: Ondansetron (N=50) | Group III: Dexamethasone (N=51) | ANOVA | $p$-value |
|---|---|---|---|---|---|
| Pre Spinal | 93.10±8.99 | 92.20± 12.41 | 92.66± 10.04 | 0.093 | 0.912 |
| At 0min. | 75.37±9.68B | 80.29±9.98A | 77.03± 10.24AB | 3.202 | 0.043 * |
| At 5min. | 71.18± 13.31 | 75.47± 12.85 | 73.30±8.72 | 1.681 | 0.190 |
| At 10min. | 74.79±8.98B | 79.65±9.65A | 76.84±8.21 AB | 3.772 | 0.025* |
| At 15min. | 72.55± 12.62B | 78.75±9.40A | 76.16± 13.94AB | 3.352 | 0.038* |
| At 20min. | 70.69± 11.25B | 77.37± 10.97A | 74.50±8.19AB | 5.478 | 0.005* |
| At 30min. | 71.47±9.77B | 78.03± 11.31A | 73.69±8.82AB | 5.644 | 0.004* |
| At 40min. | 70.82± 11.33B | 78.47± 11.30A | 74.35± 11.74AB | 5.687 | 0.004* |
| At 50min. | 87.66± 13.49 | 90.04± 10.30 | 88.25± 13.32 | 0.500 | 0.607 |

Using: F- One Way Analysis of Variance. $p$-value>0.05 NS *$p$-value <0.05 S $p$-value <0.001 HS.
- Different small letters indicate significant difference at ($p$<0.05) among means in the same row.

Table (3): Comparison between Group I: Ephedrine, Group II: Ondansetron and Group III: Dexamethasone according to their intraoperative heart rate (beat/min).

| Intraoperative mean Heart Rate (beat/min) | Group I: Ephedrine (N=52) | Group II: Ondansetron (N=50) | Group III: Dexamethasone (N=51) | ANOVA | *p*-value |
|---|---|---|---|---|---|
| Pre Spinal | 102.87±13.35 | 101.97±12.76 | 102.43±9.34 | 0.072 | 0.930 |
| At 0min. | 78.04±12.05B | 84.72±13.33A | 81.69±13.08AB | 3.473 | 0.034* |
| At 5min. | 72.84±11.66B | 78.69±9.87A | 76.72±10.64AB | 3.918 | 0.022* |
| At 10min. | 74.24±11.89 | 78.73±9.27 | 77.14±9.28 | 2.530 | 0.083 |
| At 15min. | 70.94±12.46B | 77.27±12.00A | 75.05±9.18AB | 9.978 | <0.001 ** |
| At 20min. | 66.92±9.06B | 73.33±13.25A | 70.98±11.60AB | 4.135 | 0.018* |
| At 30min. | 70.42±10.35B | 77.07±11.95A | 73.33±12.15AB | 4.277 | 0.016* |
| At 40min. | 68.15±10.88B | 75.49±12.11A | 72.05±12.02AB | 5.049 | 0.008 * |
| AT 50min | 91.55±9.03 | 94.10±10.88 | 92.80±12.70 | 0.690 | 0.503 |

Using: F- One Way Analysis of Variance. *p*-value>0.05 NS. **p*-value <0.05 S. ***p*-value <0.001 HS.
- Different small letters indicate significant difference at ( *p*<0.05) among means in the same row.

Table (4): Comparison between Group I: Ephedrine, Group II: Ondansetron and Group III: Dexamethasone according to their intraoperative O2 saturation.

| Intraoperative O2 saturation | Group I: Ephedrine (N=52) | Group II: Ondansetron (N=50) | Group III: Dexamethasone (N=51) | *p*-value |
|---|---|---|---|---|
| Pre Spinal | 98.44±0.93 | 98.61±0.83 | 98.35±0.87 | 0.323 |
| Post Spinal | 98.89±0.94 | 98.91±0.76 | 98.57±0.74 | 0.066 |
| At 5min. | 97.86±0.82 | 97.81±0.78 | 97.98±0.94 | 0.586 |
| At 10min. | 98.15±0.72 | 98.11±0.71 | 98.39±0.91 | 0.155 |
| At 15min. | 98.83±0.80 | 98.61±0.82 | 98.53±0.65 | 0.120 |
| At 20min. | 97.63±0.65 | 97.46±0.92 | 97.66±0.70 | 0.368 |
| At 30min. | 98.15±0.73 | 98.04±0.95 | 98.14±0.98 | 0.791 |
| At 40min. | 97.90±0.83 | 97.94±0.79 | 97.61±0.68 | 0.065 |
| At 50min. | 98.95±0.75 | 98.80±0.89 | 98.98±0.82 | 0.500 |

Using: F- One Way Analysis of Variance. *p*-value>0.05 NS.

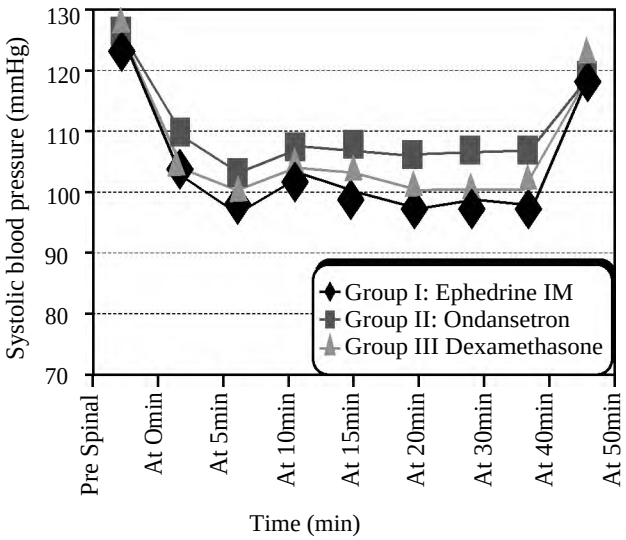


Fig. (1): Comparison between Group I: Ephedrine, Group II: Ondansetron and Group III: Dexamethasone according to systolic blood pressure (mmHg).

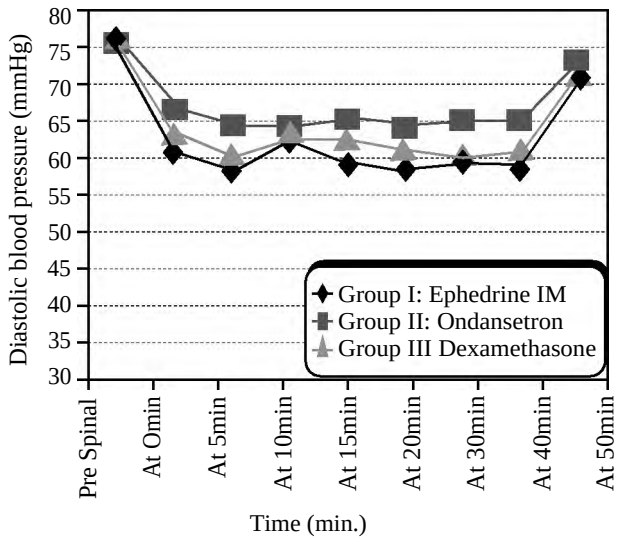


Fig. (2): Comparison between Group I: Ephedrine, Group II: Ondansetron and Group III: Dexamethasone according to diastolic blood pressure (mmHg).

## Discussion

Hypotension is one of the most common intra-operative complications associated with spinal anaesthesia. Its incidence in caesarean section has been estimated to be as high as 50-60% [13].

This incidence is present despite fluid preloading, lateral uterine displacement and the use of vasopressor agents. It occurs due to sympathetic block which leads to autonomic nervous system disturbances and a decrease in systemic vascular resistance [13]. Severe hypotension following spinal anaesthesia in caesarean section is a dangerous complication. If it is unnoticed or inadequately treated, it can lead to serious maternal or fetal compromise [14,15].

Several measures were adopted to prevent or at least reduce the incidence of hypotension induced by spinal anaesthesia. They include patient position as displacement of the pregnant uterus to prevent aortocaval compression. Administration of preload and/or co-load of crystalloid and colloid solutions helps to increase the intravascular volume, using small sized spinal needle and finally reduce the local anaesthetic dose [4].

In spite of using all the prophylactic measures described, none of them can totally avoid maternal hypotension post-spinal anaesthesia. Therefore, there should be an interventional study to preventorat least reduce the incidence of hypotension following spinal anesthesia in caesarean section.

This study demonstrated that the preemptive use of Dexamethasone, Ondansetron and Ephedrine significantly reduced the incidence of Post spinal hypotensionin obstetric patients. There was significant difference was shown between the three drugs. Furthermore, they also reduced vasopressor consumption as well as incidence of bradycardia, nausea, vomiting and shivering.

Dexamethasone reduced the incidence of post spinal hypotension through “dexamethasone induced hypertension” mechanism. This is mainly due to sympathetic stimulation, increased secretion of catecholamines probably due to stimulation of tyrosinehydroxylase. Tyrosinehydroxylase is the first and rate limiting enzyme in catecholamines biosynthesis [16].

However, the mechanism of ondansetron in preventing post spinal hypotension was mediated by inhibition of Bezold-Jarisch reflex (BJR). This reflex is mediatedthroughvagalafferents. Whenactivated,itcauseshypotension and bradycardia. Triggering of chemoreceptors sensitive to serotonin in the intra cardiac wall can occur by a reduction in blood volume. It may leadto increased vagal nerve activity, followed by bradycardia and vasodilatation [8,9].

Ephedrine, an indirectly acting sympathomimetic amine, is probably the vasopressor of choice in obstetric anesthesia. Although ephedrine has mixed a- and 0-adrenoreceptor activity, it maintains arterial pressure mainly by increases in cardiac output (CO) and heart rate as a result of its predominant activity on β 1-adrenoreceptors.

Compared to Abbas et al., [17] who stated that incidence of Post spinal hypotensionin obstetric patients was 72%, the current study demonstrated that prophylactic dexamethasone, ondansetron and Ephedrine reduced this incidence to 27.5%,16% and 38.5% respectively.

In the Ephedrine group, the current study results were similar to those of Lee et al., [18] who studied the safety and efficacy of 37.5mg ephedrine IM in preventing hypotension associated with spinal anaesthesia for Caesarean section. They concluded that using IM ephedrine lowers incidence of Post spinal hypotension by 30% andprovided more sustained cardiovascular support.

Similar to the current study, Lee et al., [18] found no increase in either the incidence or the severity of hypertension in patients given 37.5mg ephedrine imprior to spinal anaesthesia for Caesarean section. No persistent postoperative hypertension was detected. There was also no evidence of increased heart rates in the ephedrine group.

With regard to efficiency in preventing hypotension, a previous study using 50mg ephedrine IM noted an incidence of 25% hypotension. The higher incidence of hypotension (38.5%) in the current study may be related to the lower dose of ephedrine, and to the modest fluid preload used (500ml Ringer's lactate).

These results were consistent with those of Shahraki et al., [19] who concluded that intravenous Dexamethasone reduced post-cesarean section pain and stabilized the vital signs.

The study also matched that of Wahdan et al., [20] who stated that the addition of dexamethasone to levobupivacaine in parturient receiving combined spinal-epidural analgesia prolonged the duration of spinal analgesia and maintained haemodynamic stability.

In the ondansetron group, several studies have tested its use for prophylaxis against post spinal

hypotension. The current study results were consistent with those of Sahoo et al., [6] who studied the effect of ondansetron in patients undergoing LSCS. Similar to the current study, they used 4 mg of ondansetron. They concluded that prophylaxis with I.V 4mg ondansetron was effective in reducing the incidence of post spinal hypotension.

Also the study results were similar to Wang et al., [9] who compared different doses of ondansetron for the sake of prophylaxis against post spinal hypotension. They compared placebo with 2,4,6 and 8mg of ondansetron. They found that 4mg of ondansetron was the optimal dose.

Similar to this study, Trabelsi et al., [21] who used a dose of 4mg of ondansetron with10ml/kg of crystalloid versus placebo. Theyfoundthat the incidence of hypotension, bradycardia and vasopressor consumption were less in those received prophylactic ondansetron.

The study results were also consistent with those of Gaoetal. [7] who compared the effects of prophylactic ondansetron on PSH in 10 randomized controlled trials and found that it reduced its incidence as well as vasopressor consumption in both obstetric and non-obstetric patients. In addition, it also reduced related adverse outcomes such as bradycardia, nausea and vomiting.

This study also matched that of He et al., [22] who tested the efficiency and safety of ondansetron versus placebo and pethidine in the prevention of post anaesthesia shivering (PAS) and found that compared with placebo, ondansetron was associated with a significant reduction of PAS and hypotension and that ondansetron was as effective and safe as pethidne in prevention of PAS. However there was no significant difference between ondansetron and placebo in terms of risk of bradycardia.

However, Ortiz-Gómez et al., [8] showed that prophylactic ondansetron had little effect on the incidence of hypotension in healthy parturient undergoing spinal anaesthesia with bupivacaine and fentanyl for elective caesarean delivery.

The incidence of bradycardia indexamethasone, ondansetron and Ephedrine group was 25.5%, 14% and 36.5% respectively. These results were in consistence with those of Shahraki et al., [19] and Wahdan et al., [20] who concluded that addition of Dexamethasone reduced post-cesarean section pain and stabilized the vital signs including blood pressure and heart rate.

Sahoo et al., [6] Wang et al., [9] and Trabelsi et al., [21] also concluded that prophylactic ondansetron significantly reduced the incidence of bradycardia caused by spinal anesthesia.

In Ephedrine group 13 cases (25%) ondansetron group 5 cases (10%) and Dexamethasone group 10 cases (19.6) developed nausea and vomiting. There is no statistically significant difference between them. These results go in line with those of Shahraki et al., [19] and Wahdan et al., [20] who concluded that addition of Dexamethasone significantly reduced incidence of nausea and vomiting. Ortiz-Gómez et al., [8] and Wang et al., [9] also concluded that prophylactic ondansetron significantly reduced incidence of nausea and vomiting.

Regarding post anaesthesia shivering, 2 patients developed shivering in the dexamethasone group. However, shivering was not experienced in the Ephedrine or ondansetron group.

He et al., [22] showed results not far from ours; the yconcluded that ondansetron was associated with a significant reduction of post anaesthesia shivering. Also, Shahraki et al., [19] and Wahdan et al., [20] concluded that addition of Dexamethasone significantly reduced postanaesthesia shivering.

In this study, no side effects were reported in the ondansetron group. However, 3 patients experienced perineal itching in the dexamethasone group. However, the pathophysiology of this rare side-effect remains unknown. Most reports suggest that a slow rate of administration and dilution of dexamethasone can minimize or even abolish this side-effect [23].

Ontheotherhand, Shahraki et al., [19] and Wahdan et al., [20] concluded that no adverse effects were experienced with dexamethasone when used as a single preoperative dose while Ortiz-Gómez et al., [8] on the other side, concluded that several adverse effects were experienced with ondansetron as pruritus with incidence 2.5%, diarrhea (16%) and fever (8%).

*Conclusion:*

The preemptive use of Ephedrine, Ondansetron and Dexamethasone in reducing post-spinal hypotension (PSH) in obstetric patients undergoing cesarian section showed that the Ondansetron drug was more effective in reducing post-spinal hypotension than Dexamethasone followed by Ephedrine.

Furthermore, they also reduced vasopressor consumption as well as incidence of bradycardia, nausea, vomiting and shivering.

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# دراسة مقارنة لحق الإفيدرين عضلى، والاوندانسيترون وريدى والديكساميثازون وريدى لمنع انخفاض ضغط الدم بعد التخدير النصفى للأمهات الخاضعين للولادة القيصرية

خلفية البحث: إن إنخفاض ضغط الدم هو أحد المضاعفات الأكثر شيوعاً المرتبطة بالتخدير النصفى. ويقدر حدوثه فى العملية القيصرية بنسبة تصل إلى٥٠-٦٠٪. وتشمل الأعراض الرئيسية لانخفاض ضغط الدم الدوار. وإذا إنخفض ضغط الدم بشكل ملحوظ، فقد يحدث فقدان فى الوعى وتشنجات. وتشير العديد من الدراسات إلى أن انخفاض ضغط الدم أثناء التخدير النصفى قد يسبب العديد من الأحداث السلبية مثل الهذيان والآقفار التاجى. وعلى الرغم من استخدام العديد من الوسائل الوقائية كانزياح الرحم، اعطاء محاليل واستخدام قابض للاوعية الدموية، لم يتمكن احد منهم ان يتجنب انخفاض ضغط الدم بعد التخدير النصفى تماما.

الهدف من البحث: مقارنة فعالية وسلامة الافدرين مقابل الأوندانسيترون مقابل الديكساميثازون فى منع أو الحد من حدوث إنخفاض ضغط الدم بعد التخدير النصفى فى العملية القيصرية..

المريضات وطرق البحث: كانت هذه الدراسة عبارة عن تجربة عشوائية مزدوجة التعمية تم تطبيقها على ١٥٣ مريضاً مقسماً إلى ثلاث المجموعة الاولى:(n=٥٢) تلقت ٢٥ مجم من الايفيدرين فى العضل و٥ مل من محلول: ملحى (IV)، قبل ٢٥دقيقة من التخدير النخاعى، والمجموعة الثانية:(n=٥٠) تلقت ٤ مجم أوندانسيترون فى ٥مل من محلول ملحى عادى (IV)، و١مل من محلول ملحى فى العضل، ٢٥ دقيقة قبل التخدير النخاعى. والمجموعة الثالثة (n=٥١) تلقت ٤ مجم ديكساميثازون فى ٥مل من محلول ملحى عادى (IV) و١ مل من محلول ملحى فى العضل، ٢٥ دقيقة قبل التخدير تم إختيار جميع الحالات من قسم التخدير بمستشفى باب الشعرية الجامعى خلال الفترة من أبريل ٢٠١٩ إلى أبريل٢٠٢٠

نتائج البحث: فروق ضغط الدم بين المجموعات المدروسة عند ($p<٠.٠٥$) ، بينما كان هناك أنخفاض ذو دالالة إحصائية أعلى فى أنخفاض ضغط الدم فى الايفيدرين ٣٨.٥٪، يلية ديكساميثازون٢٧.٥٪، وأقل قيمة لهبوط ضغط الدم كانت ١٦٪، وهذا يشير الى أن هناك أولوية فى إستخدام الأدوية، لذلك كانت مجموعة الاوندانسيترون هى الأفضل، تليها مجموعة الديكساميثازون، بينما كانت مجموعة الإيفيدرين هى الأقل فى النتائج. ولكن بالنسبة لجرعة قابضات الأوعية الدموية، القىء، الغثيان والارتجاف فإن النتائج كانت متشابهة.

الاستنتاج: الإستخدام الوقائى لكل من الافدرين والأوندانسيترون والديكساميثازون خفض من حدوث انخفاض ضغط الدم فى الولادة القيصرية الخاضعة للتخدير النصفى. وكان هناك فرق ملحوظ بين الثلاثه أدوية. فالافضل هو الاوندانسيترون يلية الديكساميثازون ثم الافدرين.