The Egyptian Journal of Hospital Medicine (April 2018) Vol. 71 (6), Page 3314-3321

Comparative Study between Intravenous Paracetamol and Pethidine as Post-Cesarean Section Analgesia

Abd El-Moneim M Zakaria, Ashraf H Mohammed,
Mohammed E Hammour, Mohammed A Refaie
Department of Obstetrics & Gynecology, Al-Azhar University
Corresponding author: Mohammed A Refaie**,** Mobile: 01002893959, Email: rfay1616@hotmail.com

ABSTRACT

Background: Management of acute pain after cesarean section has evolved considerably over the past decade. The general approach to pain after cesarean section is changing, shifting away from traditional opioid-based therapy. Typical analgesic regimens include opioids and nono-pioid analgesics, such as paracetamol and NSAIDs, with the variable addition of local anesthetic techniques. **Aim of the Work:** The aim of this study is to compare the efficacy of intravenous infusion of paracetamol in comparison with meperidine (pethidine) as post cesarean section analgesia, as demonstrated by the degree of pain relief. **Patients and Methods:** This terventional prospective randomized study was conducted at El- Helal Hospital for Health Insurance, Damitta. It comprised (90) labouring women who seek post C.S analgesia. They were divided into two groups: 1st group (group A, 45 women): They received 100 ml intravenous perfalgan containing 1000 mg paracetamol. Second group (group B, 45 women): They received 50 mg meperidine hydrochloride Intramuscular. **Results:** There was a statistically significant lower pulse rate in the pethidine group 84.3 ± 5.18 as compared to paracetamol group 87.3 ± 6.85 (p=0.024). While systolic and diastolic Blood pressure showed non-significant difference between the two groups. The mean visual analogue scale (VAS) after 1hour of receiving analgesia in the paracetamol group was 2.19 ± 0.79 while in the pethidine group it was 2.09 ± 0.72 and this was statistically significant (p=0.039*). As regards side effects, in the pethedine group, 3 (6.7%) patients had nausea and vomiting, 2 (4.4%) patients had hypotension and 1 (2.2%) patient had a decreased respiratory rate, While, no side effects noticed in the paracetamol group. This difference was statistically highly significant (p=0.037*). **Conclusion:** Paracetamol is as effective as pethidine in relieving pain after cesarean section. Prescribing paracetamol in the form of intravenous infusion can be suggested as a suitable alternative for opioid after the operation. No side effects were noticed in patients who received paracetamol making it highly safe. **Recommendations:** Further studies on a larger scale of patients are needed to confirm the results obtained by this study.

Keywords: intravenous paracetamol, pethidine, cesarean section, analgesia.

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage. Medical and technological advances have made pain more manageable today than ever before. Pain management has been established as one of the benchmarks of health care quality [(1)].

Pain is a major problem in surgery including cesarean section. Post cesarean section pain is a common cause of acute pain in obstetrics. Pain relief and patient satisfaction are still inadequate in many cases. Today, cesarean section is one of the most frequently performed surgeries in the world. Cesarean births are more common than most surgeries, due to many factors. The first factor of course is that nearly 50% of the world populations are women, and pregnancy is still a very common condition. However, more important is the fact that a cesarean section may be life saving for the baby, or mother or both [(2)].

Pain in the postoperative period is an important impediment to recovery from surgery and anesthesia. Hence, reducing the pain after cesarean section (C/S) or any other surgery is very important [(3)].

Opioid analgesia includes morphine, pethidine, fentanyl, tramadol, butorphanol, remifentanil, and ketamine, which is currently the gold standard for obstetric analgesia [(4).]

Whilst opioids are the main stay for relief of severe pain, they are far from perfect analgesics as they have many significant adverse effects [(5).]

The common opioid side effects include respiratory depression, sedation, depression of gastrointestinal motility, nausea and vomiting [(6).]

Pethidine, like morphine exerts its analgesic effects by acting as an agonist at the mu opioid receptor. It also has a kappa opioid receptor action, which is of unknown clinical significance. It has structural similarities to atropine and other tropane alkaloidsand may have some of their effects and side effects. In addition to these opioidergic and anticholinergic effects, it has local anesthetic activity related to its interactions with sodium ion channels [(7).]

Paracetamol is another type of analgesics and is the most commonly prescribed analgesic

Received: / /2018
Accepted: / /2018
DOI**: 10.12816/0047256**

for the treatment of acute pain and the efficacy of single-dose paracetamol as apostoperative analgesic has been confirmed by various studies, the mechanism of actionremains unclear as, unlike opioids and NSAIDs respectively, paracetamol has no known endogenous binding sites and does not inhibit peripheral cyclooxygenase activity significantly. There is increasing evidence of a central antinociceptive effect, and potential mechanisms for this include inhibition of a central nervous system (COX-2), inhibition of a putative central cyclooxygenase (COX-3) that is selectively susceptible to paracetamol, and modulation of inhibitory descending serotinergic pathways [(8)].

Also, Perfalgan (IV paracetamol) provides onset of pain relief within 5 to 10 minutes after start of administration. The peak analgesic effect is obtained in 1 hour and the duration of this effect is usually 4 to 6 hours. The maximal plasma concentration of paracetamol observed at the end of 15 minutes IV infusion of 500 mg and l g of perfalgan is about 15pg/ml and 30pg/ml respectively [(9)].

Aim of the Work

The aim of this study was to compare the efficacy of intravenous infusion of paracetamol in comparison with meperidine (pethidine) as post cesarean section analgesia, as demonstrated by the degree of pain relief.

Patients and Methods:

Study site:

El-Helal Hospital for Health Insurance, Damitta.

Study Design

It is an interventional prospective randomized study assessing the use of IV paracetamol in managing the post C.S pain in comparison with meperidine hydrochloride.

Population:

The study comprised (90) labouring women who seek post C.S analgesia. They will be divided into 2 groups:

- **1st group** (group A) (45 women): They received 100 ml IV perfalgan containing 1000 mg paracetamol.
- **2nd group** (group B) (45 women): They received 50 mg meperidine hydrochloride Intramuscular.

Study treatment and dosages:

- **Test Drug** (Manufactured by Bristol-Myers Squibb Pharmaceuticals Ltd): Perflgan 100 ml vial contains 1000 mg paracetamol. Pethidine ampoule of 50 mg (Manufactered by Misr Pharmaceutical Co).

- **Supplies and accountability:**

The investigators delivered the study treatment only to patients included according to inclusion criteria described in the protocol. The treatment was provided by main investigators.

Selection of patients:

Subjects' recruitment:

The patients were approached on admission. The study was discussed with the woman attending labour ward and consents were taken by the investigator involved with the patient.

Inclusion criteria:

1. Age not less than 18 years old of age and not more than 35 years old.
2. Women who were prepared for elective caesarean sections.
3. Emergency cesarean sections.
4. Patient seeking analgesia.

Exclusion criteria:

1. Extreme of age (below 18-above 35).
2. Vaginal delivery.
3. Spinal anesthesia.
4. Any medical disorder with pregnancy e.g., rheumatic heart disease, diabetes mellitus, hypertension and anemia.
5. Use of any other kind of analgesia before recruitment in the study.
6. Hypersensitivity to paracetamol or meperidine.

Data collection and schedule:

Enrollment (recruitment data [case record form (CRF):

Following admission, all patients underwent complete clinical examination and detailed medical history was obtained. Each patient had a Case Record Form (CRF) in which the following data were recorded:

- Patient initials.
- Age, height, weight.
- Known allergies.
- Past medical and surgical history.
- Medications taken within the last 4 weeks and discontinued.

Clinical examination: general Including (pulse, blood pressure, and temperature), abdominal including (presentation and to exclude multiple pregnancy), and vaginal examination of (cervical dilatation at the beginning of intervention, state of fetal membranes, presenting part, station of fetal head, colour of liquor, and pelvic adequacy).

- Time of delivery.
- Assessment of post C.S pain by VAS at start of study and 15 minutes, 1, 2, 3 and 4 hours after drug administration.

Efficacy and safety data [CRF]:

Efficacy data

Efficacy was assessed on the basis of improved pain perception as evidenced by visual analogue score and the need of additional analgesia.

■ VAS, is one of the most commonly used pain assessment instruments, and is regarded as the gold standard in research and clinical practice

It consists of 100mm horizontal or vertical straight line with anchors indicating, for example "no pain and the worst pain imaginable". The pain experience is recorded by marking the appropriate point on the line.

No pain

Maximum pain

The analysis of VAS for pain measurement suggested that VAS of 0 mm to 4 mm was equivalent to "no pain", 5 mm to 44 mm "mild pain", 45 mm to 74 mm "moderate pain", and > 75 mm was considered "severe pain".

Safety data

Spontaneously observed and reported adverse events, either maternal or neonatal.

Special situations arising during the treatment period

Withdrawal upon patient's will:

The patient has the right to stop the treatment and to be withdrawn from the study without giving an explanation. In all cases, patients who will not fulfill the whole study observational period will not be replaced, but will be taken into account in the analysis of the intention to treat basis. Reasons for withdrawal will be recorded in the CRF and in the medical file of the patient.

***Checkup schedule*:**

Inclusion and follow-up visits will be run according to the schedule:

- **1st session:** Inclusion & exclusion criteria and examination.
- **2nd session:** Hospital admission, consent and clinical assessment.
- **3rd session:** post C.S assessment of pain and side effects.

Ethical and legal aspects:

Patient information and informed consent:-

Before being admitted to the clinical study, the patient must consent to participate after being aware by the nature, scope and possible consequences of the clinical study. An informed consent document, in Arabic language, containing all locally required elements was signed by the patient and the person conducting her. **The study was approved by the Ethics Board of Al-Azhar University.**

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.

Descriptive statistics for measured variables was expressed as range, mean and standard deviation (for metric data); range, median and interquartile range (for discrete data); and number and proportions (for categorical data). Demographic data, and primary and secondary outcomes of both groups were compared using t-test (for quantitative parametric measures), Mann-Whitney's U-test (for quantitative non- parametric measures) and chi-squared and Fischer's Exact tests (for categorical measures). Pearson's correlation coefficient (for metric variables) and Spearman's correlation coefficient (for rank variables) were used to estimate association between variables. Microsoft© Excel® (version 2007) and SPSS© for Windows® version 16.0 was used for data presentation and statistical analysis.

The following tests were done:

- Independent-samples t-test of significance was used when comparing between two means.
- Chi-square (x^2) test of significance was used in order to compare proportions between two qualitative parameters.
- The confidence interval was set to 95% and the margin of error accepted was set to 5%. So, the p-value was considered significant as the following:

Probability (P-value)

- P-value <0.05 was considered significant.
- P-value <0.001 was considered as highly significant.
- P-value >0.05 was considered insignificant.

RESULTS

Table (1): Comparison between two groups according to demographic characteristics.

	Group A: Paracetamol (N=45)	**Group B: Pethidine (N=45)**	**t-test**	**p-value**
Age (years)				
Mean ± SD	25.33 ± 3.81	24.79 ± 3.66	2.219	0.157
Range	18-35	18-35		
GA (weeks)				
Mean ± SD	35.87 ± 1.47	35.82 ± 1.40	0.147	0.656
Range	30-38	30-38		
Parity				
Mean ± SD	1.20 ± 0.98	1.29 ± 0.90	1.459	0.193
Range	0-4	0-4		
Weight (kg)				
Mean ± SD	72.38 ± 7.51	74.39 ± 4.57	0.005	0.895
Range	55-101	62-80		
Height (cm)				
Mean ± SD	156.47 ± 5.73	153.90 ± 3.76	2.126	0.342
Range	143-168	147-174		
BMI (kg/m^2)				
Mean ± SD	26.70 ± 2.58	27.65 ± 1.86	1.628	0.187
Range	21-31	25-31		

There was no statistically significant difference between two groups as regard age (p= 0.157), gestational age (p=0.656) and parity (p=0.193). As regards weight, height and BMI the difference between paracetmaol and pethidine groups was statistically non-significant p-value was 0.895, 0.342 and 0.187 respectively.

Table (2): Comparison between two groups according to vital data

Group A: Paracetamol Group B: Pethidine t-test (N=45)		**(N=45)**		**p-value**
Pulse rate				
Mean ± SD	87.3 ± 6.85	84.3 ± 5.18	5.394	0.024*
Range	70-92	70-98		
Systolic blood pressure				
Mean ± SD	117.71 ± 14.96	115.62 ± 14.51	2.011	0.084
Range	95-171	86-162		
Diastolic blood pressure				
Mean ± SD	74.29 ± 11.04	72.87 ± 10.36	1.707	0.096
Range	57-114	57-105		

This table showed statistically significant lower pulse rate in the pethidine group 84.3±5.18 as compared to paracetamol group 87.3±6.85 (p=0.024). While systolic and diastolic blood pressure showed non-significant difference between two groups.

Table (3): Comparison between two groups according to indication for CS

CS	Group A: Paracetamol (N=45)	Group B: Pethidine (N=45)	x^2	p-value
Emergency	9 (20.0%)	10 (22.2%)	0.196	0.876
Elective	36 (80.0%)	35 (77.8%)		

This table showed no statistically significant difference between groups according to indication for CS.

Table (4): Comparison between two groups according to VAS

VAS	Group A: Paracetamol (N=45)	Group B: Pethidine (N=45)	t-test	p-value
1 hr.	2.19 ± 0.79	2.09 ± 0.72	4.425	0.039*
2 hrs.	2.28 ± 0.97	2.19 ± 0.82	2.886	0.101
3 hrs.	2.29 ± 0.94	2.28 ± 0.88	0.767	0.384
4 hrs.	2.66 ± 0.98	2.57 ± 1.00	1.808	0.190

The mean VAS after 1 hour of receiving analgesia in the paracetamol group was 2.19 ±0.79 while in the pethidine group it was 2.09 ± 0.72 and this was statistically significant (p=0.039*), while the rest had insignificant differences.

Table (5): Comparison between two groups according to mean VAS

VAS	Group A: Paracetamol (N=45)	Group B: Pethidine (N=45)	t-test	p-value
mean VAS	2.38 ± 0.74	2.28 ± 0.68	2.076	0.097

The mean of mean VAS in the paracetamol group was 2.38±0.74 while in the pethidine group it was 2.28±0.68 and this was statistically non-significant (p=0.097).

Table (6): Comparison between two groups according to need for additional analgesia.

Additional analgesia	Group A: Paracetamol (N=45)	Group B: Pethidine (N=45)	x^2	p-value
Yes	4 (8.9%)	2 (4.4%)	0.179	0.673
No	41 (91.1%)	43 (95.6%)		

As regards additional analgesia, it was needed in 4 (8.9%) patients in paracetamol group, while it was needed in 2 (4.4%) patients in pethideine group, and this difference was statistically non-significant (p= 0.673).

Table (7): Comparison between groups according to side effects

Side effects	Group A: Paracetamol Group B: Pethidine x^2 (N=45)	(N=45)		p-value
No	45 (100.0%)	39 (86.7%)	6.429	0.037*
Nausea & vomiting	0 (0.0%)	3 (6.7%)		
Hypotension	0 (0.0%)	2 (4.4%)		
Decreased RR	0 (0.0%)	1 (2.2%)		

As regards side effects, in the pethedine group 3 (6.7%) patients had nausea and vomiting, 2 (4.4%) patients had hypotension and 1 (2.2%) patient had a decreased respiratory rate, while no side effects noticed in the paracetamol group and this difference was

statistically highly significant (p=0.037*).

Table (8): Correlation between mean VAS and different variables in the studied group

Side effects	Group A: Paracetamol		Group B: Pethidine	
	r	p	r	p
Age (years)	-0.016	0.957	0.187	0.274
Parity	0.037	0.772	-0.056	0.613
Gestational age	0.072	0.493	-0.175	0.073
Pulse	0.082	0.749	-0.758	0.021*
Systolic BP	-0.068	0.526	0.145	0.138
Diastolic BP	-0.030	0.831	0.088	0.389
CS type	0.131	0.185	-0.165	0.092

On correlation, in the paracetamol group mean VAS was directly proportional with parity, gestational age and pulse rate and it was indirectly proportional with age and systolic and diastolic blood pressure. These differences were statistically non-significant (p>0.05). On the other hand, in the pethideine group mean VAS was significantly indirectly proportional with pulse rate (p=0.021). Other variables showed non-significant correlation (p>0.05).

DISCUSSION

Increasing rates of caesarean sections are a continuing concern for the obstetric and public health communites. Fears of maternal and neonatal morbidity from vaginal delivery (VD) may be encouraging this trend [(10)].

Nonsteroidal anti-inflammatory drugs, ketamine, acetaminophen, and local anesthetics have all been reported to reduce postoperative opioid consumption [(11,12)].

Pain management can take many forms. Although systemic opioid analgesics and patient-controlled analgesia remain at the forefront of pain management. This class of medications is associated with multiple common adverse reactions [(13)].

Due to complications of opioids, particular attention has been paid to other strategies, and the physicians use these drugs as useful analgesics in controlling different types of pain [(14,15)].

All opioids could cause common side effects that include depression of respiratory center in the brainstem, hypotension and vomiting. Morphine often causes histamine release and may cause flashing, tachycardia, hypotension, itch, and bronchospasm. Long-term administration of opioids slows gastrointestinal transit and causes ileus and constipation in many patients [(16)].

Intravenous acetaminophen has been shown to have significant opioid-sparing effects for a multitude of surgical procedures [(17)].

In the present study both paracetamol and pethidine showed good analgesic effect in post cesarean section pain management. Although in the paracetamol group VAS was significantly higher after 1 hr, the overall analgesic effect was good with non significant difference in the mean VAS over 4 hrs. That was supported by a randomized controlled trial that was conducted in the United States, comparing oral analgesia with intravenous patient-controlled analgesia for pain management after cesarean delivery, it was declared that using paracetamol caused significant postoperative pain reduction [(18)].

In another study in Turkey, **Kilicaslan and colleagues** [(19)] studied the effects of intravenous paracetamol on postoperative analgesia and tramadol consumption in cesarean operations and concluded that paracetamol increases analgesia and reduces the need to tramadol. In a double-blind clinical trial study, 120 candidates of cesarean with spinal anesthesia were randomly divided into four groups. Acetaminophen, indomethacin, diclofenac, and placebo suppositories were used in groups, respectively, as post operative analgesia. It was reported that pain score was significantly higher in control group than other groups and that the use of indomethacin, diclofenac, and acetaminophen significantly reduced the amount of pethidine usage in 24 h after the surgery in relation to control group [(20)].

Similar result was also reported by **Siddik and colleagues** [(21)] who concluded that pethidine has good effects on pain relief after cesarean section. In a randomized controlled trial assessing the efficacy of diclofenac and paracetamol combination in comparison with pethidine on

postoperative pain after cesarean surgery where 120 patients undergoing CS was included in the study. Postoperative pain was reported after six hours of operation in 38.7% in pethidine group and 16.7% in paracetamol + diclofenac group (P = 0.010) and it was concluded that paracetamol and diclofenac combination would have a better efficacy in postoperative pain control compared to pethidine [22].

Several studies on available methods for pain relief after cesarean section indicated that combination therapy especially with using an analgesic with central effect similar to paracetamol would have a significant effect on reducing the need for narcotic drugs use [22,23].

As regards additional analgesia, it was needed in 4 (8.9%) patients in paracetamol group, while it was needed in 2 (4.4%) patients in pethidine group, and this difference was statistically non significant (p = 0.673).

Darvish *et al.* [22] in their study on 120 patients undergoing CS, they reported that additive pethidine use was seen after six hours of operation in 26.7% and 6.7% in pethidine group and diclofenac/paracetamol group respectively (P = 0.013).

This difference may be due to the synergic drug reaction of the combination therapy of diclofenac with paracetamol used in that study as compared to single agent used in the current study. As regards side effects, in the pethidine group 3 (6.7%) patients had nausea and vomiting, 2 (4.4%) patients had hypotension and 1 (2.2%) patient had a decreased respiratory rate, while no side effects noticed in the paracetamol group. This difference was statistically highly significant (p = 0.001).

In a systematic review and meta-analysis, **McNicol *et al.*** [24] concluded that iv paracetamol is an effective analgesic with a safety profile similar to placebo. In addition **Akhavanakbari *et al.*** [20] ,comparing paracetamol with placebo, reported that only 1 patient had vomiting in the paracetamol group. **Darvish and associates** [22] in their study reported nausea and vomiting in 7 (11.7%) patients and 10 (16.7%) patients in paracetamol and pethidine groups respectively, and itching in 1 (1.7%) patients in each group. They stated that the frequency of drug adverse effects was the same between the two groups. **Faiz *et al.*** [25] in their study comparing acetaminophen with ketamine reported that rates of nausea were similar between the two groups. Vomiting was reported by 6 participants in the acetaminophen group (15.0%) and by 11 participants in the ketamine group (27.5%).

In general, the number of patients with drug side effects has also been lower with paracetamol group.

CONCLUSION

Paracetamol has almost the same effect as pethidin in relieving pain after cesarean section. However, due to the complicated rules and restrictions on the use of opioids and the high rate of side effects related to opioids, prescribing paracetamol in the form of intravenous infusion could be recommended as a good alternative for relieving opioid after the operation. No side effects were noticed in patients who received paracetamol making it highly safe.

REFERENCES

1) **Kingdom RT, Kizior RJ (2002):** Handbook for Pain Management. Fourth edition, UK, Pp: 12-25p.
2) **Anna'na' H (2005):** Caesarean section Past/Recent/Future, MISC. Journal of Medical Islamic Students' Committee, 2: 18-19.
3) **Ng A, Parker J, Toogood L, Cotton BR and Smith G (2002):** Does the opioidsparing effect of rectal diclofenac following total abdominal hysterectomy benefit the patient? Br J Anaesth., 88(5): 714-716.
4) **Pandya ST (2010):** Labour analgesia: Recent advances. Indian journal of anaesthesia,54(5): 400.
5) **Stein C, Schafer M and Machelska H (2000):** Why is morphine not the ultimate analgesic and what can be done to improve it? J Pain, 1: 51-6
6) **Bodnar RJ and Hadjimarkou MM (2003):** Endogenous opiates and behavior: Peptides, 24: 1241-302.
7) **Ghelardini C, Mannelli LD, Bianchi E (2015):** The pharmacological basis of opioids. Clinical Cases in Mineral and Bone Metabolism, 12(3):219.
8) **Koppert W, Wehrfritz A, Korber N *et al.* (2004):** The cyclooxygenase isozyme inhibitors parecoxib and paracetamol reduce central hyperalgesia in humans. Pain, 108: 148-53
9) **Örün E, Polat A, Andan H, Çizmeci N, Tufan N (2013):** Incorrect prescription of intravenous paracetamol in a pediatric patient. Hippokratia, 17(1):77.
10) **Turner CE, Young JM, Solomon MJ, Ludlow J, Benness C and Phipps H (2008):** Vaginal delivery compared with elective caesarean section: the views of pregnant women and clinicians. BJOG: An International Journal of Obstetrics & Gynaecology, 115 (12):1494-502.
11) **Marret E, Kurdi O, Zufferey P and Bonnet F (2005):** Effects of nonsteroidal antiinflammatory drugs on patient- controlled analgesia morphine side effects: metaanalysis of randomized

controlled trials. Anesthesiology, 102(6): 1249-1260.

12) **Tzortzopoulou A, McNicol ED, Cepeda MS, Francia MB, Farhat T and Schumann R (2011):** Single dose intravenous propacetamol or intravenous paracetamol for postoperative pain. Cochrane Database Syst Rev., (10): CD007126.

13) **Benyamin R, Trescot AM, Datta S *et al.* (2008):** Opioid complications and side effects. Pain Physician, 11 (2): S105-S120.

14) **Elyasi H, Heidari M and Shahbeigi S (2000):** Comparative effects of indomethacin suppository and pethidine on pain after cesarean section. Pajoohandeh J., 5: 9-15.

15) **Trevor** A, **Katzung B and Masters** S **(2002):** 6th ed. New York: Lange Medical Books/McGraw-Hill. Katzung and Trevor's Pharmacology, pp 322-30.

16) **Chestnut DH (2009): Chestnut's obstetric anesthesia principles and practice.** 4th ed. Philadelphia: Mosby. pp. 576-86.

17) **Moon YE, Lee YK, Lee J and Moon DE (2011):** The effects of preoperative intravenous acetaminophen in patients undergoing abdominal hysterectomy. Arch Gynecol Obstet., 284(6): 1455-1460.

18) **Davis K, Esposito MA and Meyer BA (2006):** Oral analgesia compared with intravenous patient-controlled analgesia for pain after cesarean delivery: a randomized controlled trial. **Am** J Obstet Gynecol., 194 (4): 967-71.

19) **Kilicaslan A, Tuncer S, Yuceaktas A, Uyar M and Reisli R (2010):** The effects of intravenous paracetamol on postoperative analgesia and tramadol consumption in cesarean operations. Agri., 22 (1): 7-12.

20) **Akhavanakbari G, Entezariasl M, Isazadehfar K and Kahnamoyiagdam F (2013):** The' effects of indomethacin, diclofenac, and acetaminophen suppository on pain and opioids consumption after cesarean section. Perspect Clin Res., 4(2): 136— 141.

21) **Siddik SM, Aouad MT, Jalbout MI, Rizk LB, Kamar GH and Baraka AS (2001):** Diclofenac and/or propacetamol for postoperative pain management after cesarean delivery in patients receiving patient controlled analgesia morphine. Reg Anesth Pain Med., 26 (4): 310-5.

22) **Darvish H, Ardestani B, Shali S and Tajik A (2014):** Analgesic Efficacy of Diclofenac and Paracetamol vs. Meperidine in Cesarean Section. Anesth Pain Med., 4(1): e9997.

23) **Ong CK, Seymour RA, Lirk P and Merry AF (2010):** Combining paracetamol (acetaminophen) with nonsteroidal antiinflammatory drugs: a qualitative systematic review of analgesic efficacy for acute postoperative pain. Anesth Analg., 110 (4): 1170-9.

24) **Pakar Tadbiri SH and Rahimi E (2001):** Comparison of morphine and piroxicam in decreasing post cesarean pain. Scientif J Kurdistan Uni Med Sci., 19: 10-14.

25) **Faiz H, Rahimzadeh P, Visnjevac O, Behzadi B, Ghodraty M, and Nader N (2014):** Intravenous acetaminophen is superior to ketamine for postoperative pain after abdominal hysterectomy: results of a prospective, randomized, double-blind, multicenter clinical trial. J Pain Res., 7:65-70.