Al-Azhar International Medical Journal

Volume 3 | Issue 9 Article 14

9-1-2022

EVALUATION OF EFFECT OF ULTRASOUND GUIDED(USG) TRANSVERSUS ABDOMINIS PLANE BLOCK(TAP BLOCK) ON POSTOPERATIVE PAIN AFTER CAESARIAN SECTION

AbdelGelil Kamal
Department of Obstetrics and gynecology, faculty of medicine,Al-Azhar University,Cairo, Egypt., abdelgelil000@gmail.com

Abdalla Ahmed
Department of Obstetrics and Gynecology, Al-Azhar University, Faculty of Medicine for boys, Cairo, Egypt, abdallakhalil1971@gmail.com

Al-Refaai Marai
Department of Obstetrics and Gynecology, Al-Azhar University, Faculty of Medicine for boys, Cairo, Egypt, refaaimarai@gmail.com

Ahmed Ahmed El-Naggar
Department of Anaesthesiology and Intensive Care, Faculty of Medicine for boys, Al-Azhar University, Cairo, Egypt., ahmed.elnaggar@azhar.edu.eg

How to Cite This Article

Kamal, AbdelGelil; Ahmed, Abdalla; Marai, Al-Refaai; and Ahmed El-Naggar, Ahmed (2022) "EVALUATION OF EFFECT OF ULTRASOUND GUIDED(USG) TRANSVERSUS ABDOMINIS PLANE BLOCK(TAP BLOCK) ON POSTOPERATIVE PAIN AFTER CAESARIAN SECTION," *Al-Azhar International Medical Journal*: Vol. 3: Iss. 9, Article 14.
DOI: https://doi.org/10.21608/aimj.2022.130355.1887

OPEN AIMJ ORIGINAL ARTICLE

Obstetrics & Gynecology

Evaluation OF Effect OF Ultrasound Guided(USG) Transversus Abdominis Plane Block(Tap Block) ON Post Operative Pain after Caesarian Section

Abd El-Gelil Mohie El-Din Kamal El-Din Selim [1,*] M.B.B.Ch, Abd-Allah Khalil Ahmad [1] MD, Al-Refaai Abd El-Fattah Marai [1] MD and, Ahmed Mossad Ahmed El-Naggar [2]MD.

Corresponding Author:

Abd El-Gelil Mohie El-Din Kamal El-Din Selim
abdelgelil000@gmail.com

Received *for publication April 01, 2022;* ***Accepted*** *September 24, 2022;* ***Published online*** *September 24, 2022.*

doi: *10.21608/aimj.2022.130355.1887*

Citation: *Abd El-Gelil M. , Abd-Allah K. and Al-Refaai A.et al. Evaluation OF Effect OF Ultrasound Guided(USG) Transversus Abdominis Plane Block(Tap Block) ON Post Operative Pain after Caesarian Section. AIMJ. 2022; Vol.3-Issue9 : 76-81.*

[1]Obstetrics and Gynecology Department, Faculty of Medicine, Al-Azhar University Cairo, Egypt.

[2]Anaesthesiology and Intensive Care Department, Faculty of Medicine, Al-Azhar University Cairo, Egypt.

ABSTRACT

Background: pain after a caesarean section is still a problem. Evaluation of the pain intensity needs selection a suitable anesthetic method, medication, and dosage, as well as the enhancement of postoperative pain therapy.

Aim of the work: To assess the successful of an ultrasound-guided transversus abdominis plane block following a caesarian operation regarding patient safety, pain treating, and satisfaction.

Patients and methods: Prospective observational research trial, whereas 200 of Gravid women shared and equally distributed to double collections, each collection includes 100 of women: first got TAP block and the other did not get TAP block. After the abdominal delivery, with evaluation of the pain intensity.

Results: The pain score, the requirement for extra rescue analgesia, and some minor problems were examined 2, 4, 8, 12, and 24 hours after procedure. In all time periods, the degree of discomfort in "group A" was considerably less than in "group B" (p >0.001). Only 42% of women in "group A" required further rescue analgesia, while 100% of women in "group B" did. Early on, at 2 hours post-operatively, nausea and vomiting were greater in women in "group B" compared to those in "group A," with a p-value of 0.037*. Intestinal motility was audible sooner in "group A" than in "group B," and the same was true for mobilization time and breast feeding, which were both earlier in "group A.".

Conclusion: Ultrasound guided TAP block showed an efficacy in controlling pain after cesarean section providing an effective and safe postoperative analgesia.

Keywords: *Caesarian section; Transversus abdominis; plane block; Ultrasound guided.*

Disclosure: *The authors have no financial interest to declare in relation to the content of this article. The Article Processing Charge was paid for by the authors.*
Authorship: *All authors have a substantial contribution to the article.*

INTRODUCTION

Surgery and anesthesia are important healthcare procedures that strive to reduce the risk of death and disability. Furthermore, anesthetic treatments aid in reducing the occurrence and severity of acute discomfort during and soon after surgery.[1] According to recent research, the caesarean birth rate has risen dramatically globally, including in Egypt.[2]

Fetal discomfort, presenting abnormalities, numerous pregnancies, fetal anomalies, past uterine surgery, systemic disorders, vertical maternal infections, and indications for labor or delivery are all reasons for a caesarean birth. The mother's request should not be the only cause for a caesarean section; it should be considered when the individual is suffering from a psychiatric disorder such as severe dread, worry, or panic.[3]

Postoperative pain typically contains nociceptive qualities, meaning it is caused by tissue or organ lesions that produce painful nociceptive impulses. Neuropathic pain may occur as a result of direct nerve damage, as well as tension or compression. In this scenario, very common surgeries like caesarean sections require extra attention, as they occur during a period of significant hormonal and emotional changes related to pregnancy and the birth of the baby, which can have a negative impact on postoperative pain, given the multifaceted nature of this experience.[4]

Controlling postoperative pain may be done in a variety of ways. The hunt for the optimal approach, however, is still underway. Several methods have been used. Nonetheless, employing opioids in a variety of ways is still the standard.[5]

The TAP block is a localized anesthetic technique that blocks the thoracolumbar nerves that run between the internal oblique and transversus abdominis muscles in the fascial plane. It's gaining popularity as a postoperative analgesic for lower abdominal procedures. [6]

The efficacy of TAP block in postoperative analgesia is comparable to morphine, with the added advantages of increased duration of analgesia, reduced postoperative opioid consumption, adequate pain management, and minimal adverse effects.[7]

Despite the fact that TAP block has a low complication risk and a high success rate when performed with ultrasonography, it is underused. This might be owing to a lack of ultrasound availability in most facilities, as well as absence of training in ultrasonography-guided block technique. [8]

The goal of this research was to see how effective an ultrasound-guided transversus abdominis plane block (TAP BLOCK) following a caesarian section was in terms of safety, pain management, and patient satisfaction.

PATIENTS AND METHODS

Prospective observational research was undertaken on 200 women who were scheduled for an optional caesarean section at Salah El-Awady Maternity Hospital and El-Hussein University Hospital.

The patients were divided into groups: Group (A): Included 100 women using ultrasound guided transversus abdominis plane (USG-TAP) block technique. **Group (B):** Included 100 women not using TAP block technique.

Inclusion criteria: age above 21 years, undergo CS with spinal anaesthesia and Body mass index (BMI) <30 kg/m2.

Exclusion criteria: Patient refusal, patient with known reaction to study drugs, patients on chronic analgesics and patients with coagulation disorders and thrombocytopenia.

All women were requested a written informed consent regarding the procedure according to the study protocol, and no harm to the women would be allowed and both groups were subjected to: History taking focusing on age, weight, height, personal habits, gravity, parity, history of abortion and number of times of abortion if present, medical history of being on any longtime medical treatment, surgical and family history and LMP for EDD, Patient examination focusing on abdomen and lower limbs for edema and varicosities if present, **Investigations:** according to departmental guidelines including: foetal ultrasonography, complete urine analysis, blood group, complete blood picture, liver function and enzymes, kidney functions, bleeding and clotting time, ECG, HIV antibodies, HCV antibodies and HBV antigens, A 500 ml saline solution IV was given before the operation, they were monitored by standard method (non-invasive arterial blood pressure, heart rate, and pulse oximiter for the duration of CS), a conventional spinal anesthesia was initiated as 2.2 ml of intrathecal hyperbaric bupivacaine (0.5%) was injected using a 25-gauge spinal needle with patients in the sitting position at the L 4/5 interspace under strict a septic precaution. To address hypotension, an IV crystalloid and ephedrine were given as required, as well as an IV infusion of oxytocin following birth. All women received 75mg diclofenac sodium IM /12 hours postoperatively. The rescue pain analgesia was given postoperatively for VAS >3 by ketolac (30mg IV).

In TAP block group: The TAP block was performed after the incision was closed and was guided by ultrasonography (USG). Bupivacaine 0.25 percent (20 ml) was used to accomplish the TAP block. One of the symptoms that medication has been deposited in the TAP plane in the fascial layer between the Internal Oblique and Transversus Abdominis muscles is drug backflow after injection. The technique is done on the other side, resulting in a bilateral TAP block.

In the other group: No additional procedure done after closure of the incision.

Follow up: for pain severity using VAS scale, time to the first analgesic request, total rescue analgesia consumption in 24 hours, intestinal motility, and time for first ambulation, breast feeding, and postoperative complications if present.

Statistical analysis: The data was gathered and tabulated using Microsoft Excel for Windows Office 2010 and statistically analysed utilising SPSS software version 20.0.0 programme (Statistical Package for Social Sciences). Descriptive statistics were calculated for numerical parametric data as median ±SD (standard deviation) and minimum and maximum ranges, as well as numerical non parametric data as median and first and third interquartile ranges, and categorical data as number and percentage. Tables and graphs were used to convey the data as needed. The mean and standard deviation were used to convey quantitative data, whereas the number and proportion were used to express qualitative data. T-test (for quantitative data) and chi-square (for qualitative data) were used to make comparisons (for qualitative data). A p-value of <0.05 was judged substantial; otherwise, it is not substantial. The p-value is a statistical indicator of the likelihood that a study's findings might have happened by chance.

RESULTS

Parameters	Group		Test	
	TAP block group N=100 Median ± SD	**Non TAP block group N=100 Median ± SD**	**t**	**p**
Age (year)	27.2 ± 6.4	28.6 ± 5.8		
Range	20 – 39	23 – 40	1.621	0.107
Weight (kg)	82.7 ± 8.11	84.5 ± 9.1	1.477	0.141

Height (cm)	169.44 ± 5.35	170.04 ± 6.09	0.740	0.460
BMI (kg/m^2)	30.1 ± 2.26	29.93 ± 2.56	0.498	0.619
Duration of operation (min)	38.84 ± 4.32	39.45 ± 3.94	1.043	0.298

t: Student t test

Table 1: Comparison of the study groups' demographic characteristics, anthropometric characteristics, and length of operation

There was statistically non- substantial variance between the studied groups regarding age. Mean age in TAP block and non TAP block groups is 27.2 and 28.6 years respectively. There was statistically non- substantial variance between the studied groups regarding weight, height, body mass index and duration of operation (Table 1).

Obstetric data	Group		Test	
	TAP block group N=100	**Non TAP block group N=100**	**t**	**p**
Gravity **Range** **Median ± SD**	1.0 – 6.0 3.8 ± 0.81	1.0 – 5.0 3.6 ± 0.62	1.961	0.051
Parity **Range** **Mean ± SD**	0.0 – 5.0 2.1 ± 0.54	0.0 – 4.0 1.98 ± 0.32	1.912	0.057
Abortion **Range** **Mean ± SD**	1.0 – 3.0 1.4 ± 0.38	1.0 – 3.0 1.34 ± 0.3	1.239	0.216

t: Student t test

Table 2: Comparison of the researched groups in terms of obstetric data

Studying obstetric data of patients showed that in Group A Gravity ranged from 1.0 –6.0 and parity ranged from 0.0 – 5.0 in addition 18 patients (18 %) suffered from abortion before. While in Group B Gravity ranged from 1.0 – 5.0 and parity ranged from 0.0 – 4.0 in addition 20 patients (20 %) suffered from abortion before. There was no statistically substantial variance between the two groups regarding gravity, parity, and history of abortion at p-value of 0.051, 0.057 and 0.718 respectively (Table 2).

VAS	Group		Test	
	TAP block group Median (range)	**Non TAP block group Median (range)**	**t**	**p**
At 2nd hour	1 (1 – 3)	3 (2 – 5)	13.881*	<0.001*
At 4th hour	2 (1 – 4)	7 (4 – 9)	18.018*	<0.001*
At 8th hour	3 (1 – 5)	5 (3 – 7)	8.519*	<0.001*
At 12th hour	1 (0 – 3)	4 (2 – 6)	10.277*	<0.001*
At 24th hour	1 (0 – 2)	2 (1 – 4)	14.688*	<0.001*

t: Student t test p≤0.001* is statistically highly substantial

Table 3: Comparison of the researched groups in terms of VAS over time after surgery

There was statistically substantial variance between the studied groups regarding VAS score at 2nd, 4th, 8th, 12th, and 24th hours after surgery which was substantially less in TAP block group. In each group, there is substantial change in VAS score over time (Table 3).

Parameter	Group		Test	
	TAP block group N=100 (%)	**Non TAP block group N=100 (%)**	**Test**	**p**
Need for rescue analgesia: **Yes**	42 (42%)	100 (100%)	χ^2= 81.690*	<0.001*
Time for first analgesia (hr): **Mean ± SD** **Range**	8.2 ± 1.626 5 – 10	2.6 ± 0.72 1 – 3	t= 31.491*	<0.001*

χ2 : chi square test t : student t test p≤0.001* is statistically highly substantial

Table 4: Comparison of the researched groups in terms of need for rescue analgesia

There was statistically substantial variance between the studied groups regarding time for first analgesia which was later in TAP group (mean 2.6 hour for Non TAP block group versus 8.2 hours in TAP block group).There was statistically substantial variance on the studied groups regarding frequency of patients who needed rescue

analgesia. 42% of those within TAP block group versus all the patients (100 %) within Non TAP block group needed analgesia (Table 4).

Total postoperative rescue analgesia requirement	TAP block group (N = 100)		Non TAP block group (N = 100)		χ^2	^{MC}p
	No.	%	No.	%		
No	58	58	0	0.0	151.750*	<0.001*
30mg ketolac	39	39	12	12		
60mg ketolac	3	3	76	76		
90mg ketolac	0	0.0	12	12		

χ2: Chi square test MC: Monte Carlo

p: p value for analyzing the groups that were examined

* Statistically substantial at p ≤0.05

Table 5: Comparison of the researched groups in terms of Total postoperative rescue analgesia requirement

In addition, there was a substantial variance between the analyzed groups according to total postoperative rescue analgesia of ketolac at p-value of <0.001*(Table 5).

Intestinal Motility	Group		Test	
	TAP block group N=100 (%)	**Non TAP block group N=100 (%)**	χ^2	**p**
At 2 hours	65	40	12.531*	<0.001*
At 4 hours	75	70	0.627	0.428
At 8 hours	90	88	0.204	0.651
At 12 hours	99	98	0.338	1.000
At 24 hours	100	100	-	-

χ2: Chi square test

*: Statistically substantial at p ≤ 0.05

Table 6: Comparison of the researched groups in terms of intestinal motility

Regarding intestinal motility, there was statistically substantial variance in auscultation using a stethoscope between the studied groups at 2 hours postoperatively at p-value of <0.001* while there was no substantial variance between both groups at 4, 8, 12 and 24 hours postoperatively (Table 6).

Time for first ambulation (hr)	Group		Test	
	TAP block group N=100	**Non TAP block group N=100**	**t**	**p**
Mean ± SD	3.74 ± 0.92	5.94 ± 0.95	16.636	<0.001*
Range	2 – 5.2	4.5 – 7.5		

t: Student t test p≤0.001* is statistically highly substantial

Table 7: Comparison of the researched groups in terms of time for first ambulation

There was statistically substantial variance in the examined groups in terms of time for ambulation which was substantially lower among TAP block group (Table 7).

Breast feeding	Group		Test	
	TAP block group N=100 (%)	**Non TAP block group N=100 (%)**	□□	**p**
At 2 hours	43 (43%)	12 (12%)	24.100*	<0.001*
At 4 hours	72 (72%)	46 (46%)	13.973*	<0.001*
At 8 hours	94 (94%)	86 (86%)	3.556	0.059
At 12 hours	98 (98%)	92 (92%)	3.789	0.052
At 24 hours	100 (100%)	100 (100%)	-	-

χ2: Chi square test FE: Fisher Exact test

*: Statistically substantial at p ≤0.05

Table 8: Comparison of the researched groups in terms of breast feeding over time

There was statistically substantial variance between the studied groups regarding breast feeding early at 2 and 4 hrs post operatively at p-value of <0.001, however there was no substantial variance difference later on post operatively (Table 8).

Nausea and vomiting	Group		Test	
	TAP block group N=100 (%)	**Non TAP block group N=100 (%)**	**χ^2**	**p**
At 2 hours	4	12	4.348*	0.037*
At 4 hours	3	4	0.148	1.000
At 8 hours	1	2	0.338	1.000
At 12 hours	0	1	1.005	FE p=1.000
At 24 hours	0	0	-	-

FE: Fisher Exact test χ2 chi square test

*p<0.05 is statistically substantial **p≤0.001 is highly substantial

Table 9: Comparison of the researched groups in terms of nausea and vomiting

There was statistically substantial variance between the studied groups regarding nausea and vomiting at 2 h post operatively at p-value of 0.037, however there was no statistically substantial variance later on post operatively (Table 9).

DISCUSSION

The visual analogue scale (VAS) is a pain rating scale whose values may be used to monitor a patient's pain development or to compare the pain of patients with comparable diseases.

There was a considerable reduction in the VAS reflecting pain felt by the TAP block group in the length of 2-24 hours at 2, 4, 8, 12, and 24 hours post-administration of TAP block, as compared to the VAS of the non-TAP block group in the same duration at p-value0.001.

Our findings corroborated those of Tarekegn et al., [9] who randomized 40 patients undertaking optional CS under spinal anesthesia to receive either bilateral 20 ml of 0.25 percent bupivacaine at the end of surgery (TAP group) or systemic analgesics (non-TAP group); there was a substantial variance in VAS scores at each time interval of 24 postoperative hours at rest.

Eslamian et al., [10] had comparable findings in their research of 50 pregnant women who were blindly assigned to receive either a TAP block with 15 ml 0.25 percent bupivacaine in both sides (group T, n = 25) or no blockade (group C, n = 25) at the conclusion of general anesthetic procedure. At 6, 12, and 24 hours post-surgery, the VAS pain ratings were evaluated while coughing and at rest. There was a substantial variance in the VAS pain scores recorded throughout time between the two groups for both rest and coughing.

Champaneria et al.[11] conducted a meta-analysis in which they examined and compared TAP block for pain management after CS to standard therapy. TAP block was found to be more efficient than control in treating pain in the research. When compared to placebo, TAP block effectively reduces pain.

Ng SC et al. [12] conducted a meta-analysis to assess the effectiveness of a high dosage of TAP block vs a low dose. According to the findings, both groups (high dosage and low dose) experienced equivalent postoperative analgesia and opioid-sparing effects (opioid consumption, time for first request and 24 h pain scores). As a consequence, it was determined that over a specific dose threshold, local anesthetics would provide no further benefit. Furthermore, low-dose post-cesarean TAP block techniques may lower the risk of local anesthetic toxicity without compromising analgesic effectiveness.

According to the existing data, ultrasound guided TAP block appears to be effective for postoperative analgesia. TAP block minimizes the need for analgesics and may lower pain ratings within the first 24 hours following CS, according to the research.

This seems to be in line with the findings of our research. In our research, women who had TAP block reported pain levels that were considerably lower than those in the non-TAP block group in terms of duration, which ranged from 2 to 24 hours.

The time necessary for the first analgesic dosage following caesarean section was shown to be longer in the TAP group, with a substantial variation between the two groups (average 2.6 hours for Non TAP block group vs. 8.2 hours in TAP block group) with a P value of <0.001*.

In their research, Jadon et al., [13] found that the median (IQR) time to first analgesic request was 11 hours (8-12) in the TAP group and 4 hours (2.5, 6) in the study group. This distinction was statistically substantial (P <0.0001).

Early at 2 hours postoperatively, reductions in postoperative nausea, vomiting, and antiemetic needs were exhibited with group A (TAP block group), with a significant variation, but this distinction was not statistically substantial after 4, 8, 12, and 24 hours postoperatively.

Siddiqui et al.[14] presented a meta-analysis to investigate the therapeutic efficacy of TAP block on nausea alone and reported no marked decrease in nausea score, which contradicts our findings. This, however, might be due to the varied dosages utilized. In our research, 42 percent of the subjects in "group A" (TAP block group) needed extra analgesics administered intravenously.

Auscultation using a stethoscope was performed at 2, 4, 8, 12, and 24 hour intervals to assess intestinal motility. It was discovered that TAP block group "group A" heard it first, followed by Non TAP block group "group B." At 2 hours after surgery, intestinal motility was substantially higher in "group A" than in "group B," but no substantial change was identified at 4, 8, 12, or 24 hours after surgery.

Charoenkwan and Matovinovic, [15] found in a Cochrane review that early postoperative eating following major gynecological surgery is safe and allows for faster recovery of bowel activity, a reduced hospital stay, and better satisfaction.

In terms of mobilization time and early breast feeding in women in the study groups, the TAP block group was shown to be faster than the other group.

Buluc et al.,[16] showed that Despite the fact that the total dose of meperidine used in PCA for post-operative analgesia was greater in group C than group T statistically (p=0.001; p <0.01) and the need for analgesia for the first time was longer in group T than group S (p=0.003; p <0.01), there was no substantial distinction in breast feeding and mobilization time between the two groups in their study.

In our study, minimal complications were detected as local anesthetic complications as hematoma and echemotic patch formation and systemic toxicity of bupivacaine as arrhythmia and hypotension was also minimal as the procedure was ultrasound guided with adequate visualization of the field and high ability of differentiating the muscle layers.

The ultrasonographic anatomy is suited for performing the TAP block as an efficient modality of postoperative analgesia after caesarean birth. TAP block has one major disadvantage: It doesn't provide visceral analgesia, for example. As a consequence, it's probable that this is why some trials have failed to show that TAP block is more effective than other therapies.

We looked through the literature and discovered that the majority of the research on TAP block approach was done on operations other than CS. As a result, we expect that our findings will lead to greater research on this topic, particularly given the dramatic rise in CS rates and the resulting demand for pain-free procedures

CONCLUSION

We concluded from this research that ultrasound guided TAP block has great effectiveness in reducing postoperative pain after caesarean section, providing efficacious and safe postoperative analgesia that improves early mother ambulation and breastfeed.

Conflict of interest : none

REFERENCES

1. Gan TJ. Poorly controlled postoperative pain: prevalence, consequences, and prevention. *J Pain Res.* 2017; 10:2287-98.
2. Mobarak EI, Sultan EA. Prevalence, Indications and Determinants of Caesarean Delivery in Alexandria, Egypt. *Egypt JHIPH*. 2019; 49(2):125-32.
3. Gungor I and Oskay U. Risky birth. In: Beji KN (ed). Women's health and diseases. Istanbul: *Nobel Medicine Bookstore.* 2015; 499-530.
4. Blanco, R, Ansari T, Girgis E. Quadratus lumborum block for postoperative pain after caesarean section: A randomised controlled trial. *Eur J Anaesthesiol*. 2015; 32(11),812-8.
5. Kerai S, Saxena KN, Taneja B. Post-caesarean analgesia: What is new? *Indian J Anaesth*. 2017; 61(3):200-14.
6. McMorrow RC, Ni Mhuircheartaigh RJ, Ahmed KA. Comparison of transversus abdominis plane block vs spinal morphine for pain relief after Caesarean section. *Br J Anaesth*. 2011; 106(5): 706-12.
7. Ahmad, M, Furqan A, Adnan M. Transversus abdominis plane block offers prolonged postoperative analgesia than surgical incision infiltration by bupivacaine in cesarean section patients. *Anaesthesia, Pain & Intensive Care*. 2019; 312-6.
8. Roy R, Pattnaik S. Modified Surgeon Assisted Bilateral TAP Block-A New TAP Block Technique. *J Anesth Crit Care Open Access*. 2016; 5(5): 00200.
9. Tarekegn, F, Eshetie S, Moges K. Efficacy of Transversus Abdominis Plane (TAP) Block as Part of Multimodal Analgesia after Cesarean Section Delivery. *J Anesth Crit Care Open Access*. 2015; 3(3): 00100.
10. Eslamian, L, Jalili Z, Jamal A. Transversus abdominis plane block reduces postoperative pain intensity and analgesic consumption in elective cesarean delivery under general anesthesia. *J Anesth*. 2012; 26(3): 334-8.
11. Champaneria R, Shah L, Wilson MJ. Clinical effectiveness of transversus abdominis plane (TAP) blocks for pain relief after caesarean section: a meta-analysis. *Int J Obstet Anesth*. 2016; 28: 45-60.
12. Ng SC, Habib AS, Sodha S. High-dose versus low-dose local anaesthetic for transversus abdominis plane block post-Caesarean delivery analgesia: a meta-analysis. *Br J Anaesth*. 2018; 120(2): 252-63
13. Jadon, A, Jain P, Chakraborty S. Role of ultrasound guided transversus abdominis plane block as a component of multimodal analgesic regimen for lower segment caesarean section: a randomized double blind clinical study. *BMC Anesthesiol*. 2018; 18(1): 53.
14. Siddiqui MR, Sajid MS, Uncles DR. A meta-analysis on the clinical effectiveness of transversus abdominis plane block. *J Clin Anesth*. 2011; 23(1): 7-14.
15. Charoenkwan K, Matovinovic E. Early versus delayed oral fluids and food for reducing complications after major abdominal gynaecologic surgery. *Cochrane Database Syst Rev*. 2014; 12: Cd004508.
16. Buluc, H, Ar AY, Turan G. The efficacy of transversus abdominis plane block for post-operative analgesia after the cesarean section performed under general anesthesia. *North Clin Istanb*. 2019; 6(4): 368-73.