RESEARCH

Relationship Between Pain Severity in Post-Caesarean Section and Its Preoperative Factors

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ABSTRACT

Background: According to the World Health Organization (WHO), the global prevalence of cesarean section (C-section) reaches 21% of all deliveries and is expected to increase to 29% by 2030. This major surgery is associated with moderate to severe postoperative pain. Previous studies have shown that factors such as emergency cases, preoperative anxiety, previous C-sections, length of surgery, type of anesthesia, and pain medication are all important factors contributing to post-C-section pain.

Objective: To identify preoperative factors that affect post-cesarean pain, including age, gravida, previous C-section, anthropometry, preeclampsia (PE), fetal malposition, premature rupture of the membranes (PROM), human immunodeficiency virus (HIV), malnutrition, preterm labor, hepatitis B, anemia, and emergency procedure.

Methods: A cross-sectional study was conducted at dr. Soehadi Prijonegoro Hospital, Sragen, Indonesia. The inclusion criteria are: (1) willing to participate in this study, (2) age more than 18 years old, (3) cooperative and communicative, and (4) not in disability condition. We analyzed the data using Wilcoxon and Spearman's tests with Statistical Package for the Social Sciences (SPSS) version 25. This research has conducted ethical approval by the Ethics Committee.

Results: From 30 subjects, the age spread between 22 to 44 years, with 20% being older than 35 years pregnant women. Most patients experienced moderate (Numeric Rating Scale [NRS] 4 to 6: 60%) and severe pain (NRS 7 to 10: 30%) 12 hours after surgery. While at 24 hours, the majority experienced mild (NRS 1 to 3: 36.7%) to moderate pain (NRS 4 to 6: 46.7%). Our analysis did not identify any preoperative factors significantly related to pain levels after 12- and 24-hours following C-section ($p > 0.05$).

Conclusion: There is no relationship between preoperative factors and postoperative pain. Nonetheless, pain management should be tailored to each patient's clinical condition.

Keywords: cesarean section; numeric rating scale; postoperative pain; preoperative factors; surgery

INTRODUCTION

Caesarean section (C-section) is one of the surgical procedures mostly done in the world, and it has become the second most common obstetric surgery used in Indonesia.[1] According to World Health Organization (WHO), C-section use continues to rise globally, accounting for more than 1 in 5 (21%) childbirths. In Indonesia itself, the C-section rate increased from 4.0% in 1998 to 18.5% in 2017.[2] This number is predicted to continue rising over the coming decade, with nearly 29% of all births likely to take place by C-section by 2030.[3] The high rate of this procedure is associated with the increase of mothers and fetus morbidity. This procedure can be done considering medical indications such as the indication of the mother, like failure to progress in labor and a history of previous caesarean section, and the sign of the fetus, like fetal distress in advanced maternal age, or both.[4–6]

C-sections are associated with moderate to severe postoperative pain, influencing postoperative recovery, patient satisfaction, breastfeeding success, and mother-child bonding.[7] It is important to assess the severity and risk factors of pain for clinicians to give the proper management, thus improving patient quality of life and reducing chronic pain in the future.[8,9] Previous study has shown that intraoperative factors such as length of surgery, type of anesthesia administered, and type of pain medication used are all important factors contributing to post-C-section pain.[10] The use of preemptive analgesia, such as ketamine and fentanyl combination, before the onset of surgical incision stimulation was considered to prevent central sensitization.[9] Nonetheless, Haeruddin et al. found no significant relationship between the combination of parecoxib and epidural analgesic bupivacaine and the NRS score.[11] In a randomized prospective study conducted by Maged et al. in 2018, it was observed that the local application of dexamethasone was more efficient in reducing postoperative pain than its systemic administration, even though it had a relatively weaker antiemetic effect.[12] Some studies also found that emergency cases were associated with higher pain scores.[13]

Studies about preoperative factors affecting pain after C-section remain limited. A study by Borges et al. in 2016 demonstrated that preoperative anxiety increases the likelihood of experiencing moderate to severe postoperative pain among women undergoing cesarean section.[14] Bimrew et al. found a significant association between patients with previous C-sections and pain after the surgery.[15] Only a few studies in Indonesia shows the factors influencing pain after C-section.[16,17] Thus, this study provides information on patient pain severity of post-C-section and the preoperative risk factors in the Indonesian population, hoping to help clinicians determine the proper medication to reduce pain.

METHOD

A cross-sectional study was conducted at RSUD dr. Soehadi Prijonegoro, Sragen, Indonesia, from October to December 2022. The inclusion criteria are: (1) willing to participate in this study, (2) age more than 18 years old, (3) cooperative and communicative, and (4) not in disability condition. All the subjects homogeneously received spinal anesthesia before the surgery and non-steroidal anti-inflammatory drugs for post-surgery analgesia. The study investigated the presence of preoperative factors in cesarean patients, such as gravida status, previous C-section,

anthropometry, preeclampsia (PE), fetal malposition, preterm premature rupture of the membranes (PPROM), human immunodeficiency virus (HIV), malnutrition, preterm labor, hepatitis B, anemia, and emergency procedure, while assessing the pain directly gathered from the patient. We used a numeric rating scale (NRS) to measure pain intensity at 12- and 24-hours post-surgery. The NRS was spread from 0 (no pain) to 10 (severe pain). The data were analyzed using the Wilcoxon and Spearman's tests, with Statistical Package for the Social Sciences (SPSS) version 25. This research has received ethical approval from the Ethics Committee of dr. Soehadi Prijonegoro Hospital prior to the study.

RESULT

From this study, we obtained 30 participants with no dropouts, aged between 22 to 44 years old, with 20% being older than 35 years pregnant women. The preoperative factors we observed are shown in Table 1.

Most patients experienced moderate (NRS 4 to 6: 60%) and severe pain (NRS 7 to 10: 30%) 12 hours after surgery. While at 24 hours, the majority experienced mild (NRS 1 to 3: 36.7%) to moderate pain (NRS 4 to 6: 46.7%). The decreased level of pain from 12 to 24 hours in our patients was found to be significant ($p \leq 0.05$) (Table 2).

Table 1. Demographic and preoperative factors

Items	Total (n)	%
Demographics		
Age		
> 35 Years old	6	20
≤ 35 Years old	24	80
Education		
Low education	5	16.7
High education	25	83.3
Preoperative factors		
Multigravida	23	76
Anaemia	1	3.3
C-section history	14	46.7
Fetal malposition	5	16.7
Hepatitis B	1	3.3
HIV	3	10
Malnutrition	1	3.3
Overweight-obese	10	33.3
PROM	5	16.7
Preeclampsia	9	30
Emergency	24	83.3

Table 2. The NRS severity at 12 and 24 hours after C-Section

NRS	Mild 1 to 3	Moderate 4 to 6	Severe 7 to 10	p-value
12 hours	10%	60%	30%	0.003
24 hours	36.7%	46.7%	16.7%	

Out of the 30 participants, we discovered that 40% experienced decreased pain levels. This decrease in pain ranged from moderate to mild for 23.3% of the participants, severe to moderate for 13.3%, and severe to mild for 3.4%. Additionally, 56.67% of the subjects had no change in pain severity, and only one patient experienced increased pain from

mild to severe. Although our analysis did not identify any preoperative factors significantly related to pain levels after 12 and 24 hours following a C-section (with $p > 0.05$), it is worth noting that all the participants who experienced a decrease in pain had no malnutrition (0%) or anemia (0%) (Table 3).

Table 3. The relationship between pain in 12- and 24-hours following C-section with its preoperative factors

		NRS 12-hours	NRS 24-hours
Gravida	Correlation Coefficient	-0.345	-0.149
	Sig. (2-tailed)	0.062	0.433
Anemia	Correlation Coefficient	-0.074	0.070
	Sig. (2-tailed)	0.698	0.713
C-section history	Correlation Coefficient	-0.013	-0.092
	Sig. (2-tailed)	0.944	0.627
Fetal malposition	Correlation Coefficient	-0.143	-0.006
	Sig. (2-tailed)	0.452	0.976
Hepatitis B	Correlation Coefficient	-0.074	-0.222
	Sig. (2-tailed)	0.698	0.239
HIV	Correlation Coefficient	0.266	0.084
	Sig. (2-tailed)	0.156	0.660
Malnutrition	Correlation Coefficient	-0.074	0.070
	Sig. (2-tailed)	0.698	0.713
Overweight-obese	Correlation Coefficient	0.088	-0.057
	Sig. (2-tailed)	0.668	0.782
PROM	Correlation Coefficient	-0.143	-0.006
	Sig. (2-tailed)	0.452	0.976
Preeclampsia	Correlation Coefficient	-0.101	-0.009
	Sig. (2-tailed)	0.594	0.962
Emergency	Correlation Coefficient	0.178	0.112
	Sig. (2-tailed)	0.346	0.554

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

DISCUSSION

Postoperative pain is considered a form of acute pain due to surgical trauma with an inflammatory reaction and initiation of an afferent neuronal barrage.[18] Acute pain occurs following tissue injury associated with surgery and should resolve during healing. This normally takes up to 3 months, after which pain is chronic or persistent.[19] Pain after a C-section often occurs; typically, the

severity spreads form moderate to severe.[7] Our research confirms that the severity of pain during the initial 12 hours following the procedure is consistent with this finding.

Multiparas were previously thought to experience more pain after surgery than primiparas due to severe adhesions resulting from previous surgery, which can cause greater operative difficulties

and increased pain sensitivity in patients. Yang *et al.* found that multiparas require extra analgesia than the primiparas, which could indicate postoperative analgesia requirement. The odds ratio for the multiparas to experience inadequate analgesia was 1.57 (95% CI, 1.22–2.02).[20] Bimrew *et al.* also found a significant relationship between patients with previous C-sections and pain after the surgery. This relationship was attributed to increased postsurgical adhesions, resulting in longer operation times and more trauma, which worsened postoperative pain.[15] In contrast, our study found no link between surgery history and pain development (NRS 12-hours [p = 0.944] and NRS 24-hours [p = 0.627]). Women who have undergone multiple previous surgeries may possess enhanced mental preparedness to manage pain compared to those with only one previous surgery. Consequently, when accounting for various individual factors, there appears to be no disparity in pain severity between women with a history of C-sections and those without.[10] A study from China also found that multiparous women who had their first repeat C-section are less likely to experience inadequate pain relief than primiparous women in the first 48 hours after surgery.[21]

Our findings also did not show any relationship between emergency C-sections and pain (NRS 12-hours [p = 0.346] and NRS 24-hours [p = 0.554]). A study in Australia found no relationship between persisting pain and emergency or elective procedures in C-sections.[22] However, a study conducted in Turkey found that patients who underwent emergency C-sections under spinal or general anesthesia had higher Numeric Rating Scale (NRS) scores compared to those who underwent elective C-sections (with p<0.001).[13] Emergency C-sections tend to be more stressful with a greater degree of anxiety and pain and also express negative feelings towards delivery as compared to those undergoing elective.[23]

Inadequate nutrition can hinder recovery because wounds require energy, protein, vitamins, and minerals to heal properly.[24,25] Protein is an essential element that plays a vital role in maintaining and repairing body tissues. The reduction of protein levels will lead to a decrease in the development of collagen and slow the wound-healing process.[26] In addition, anemia caused by iron deficiency and folic acid may also develop in such cases.[27] Moreover, Aji *et al.'s* cross-sectional study reveals a significant link between nutritional status, anemia, and wound healing in post-cesarean section patients.[28] Wound healing involves a complex interplay between numerous cell types, cytokines, mediators, and the vascular system. Poor healing increases the risk of wound infections or complications, lengthens hospital stays, magnifies patient discomfort, and slows the return to activities of daily living.[29] This is consistent with our study, which found that subjects who experienced a significant decrease in pain showed no signs of malnutrition (0%) or anemia (0%).

One limitation of this study is that it may not accurately reflect the larger population due to the limited sample size and single-center involvement. It might also explain why all the preoperative factors we discovered were insignificant. Therefore, further research with more extensive and diverse people from multiple centers is necessary. Additionally, the current study only focused on preoperative factors and pain

severity in the first 12 and 24 hours after C-section. It did not explore other potential factors that may contribute to pain development, such as intraoperative and postoperative factors. Future studies should consider these aspects to obtain a more complete understanding of postoperative pain after C-section. Despite these limitations, this study highlights the need for individualized pain management strategies that consider patients' medical history and nutritional status.

CONCLUSION
Most patients experienced moderate to severe pain 12 hours postoperation and mild to moderate pain 24 hours postoperation. Our study found no significant relationship between preoperative factors and postoperative pain.

Nonetheless, pain management should be tailored to each patient's clinical condition. With the increasing rate of C-sections globally, clinicians must pay attention to pain severity and risk factors such as nutritional status to improve patient outcomes and quality of life.

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