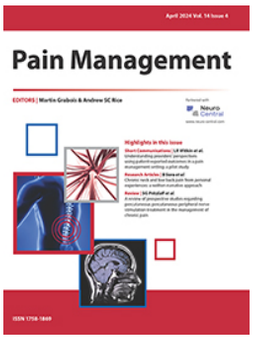

Pain Management

ISSN: (Print) (Online) Journal homepage: www.tandfonline.com/journals/ipmt20

Characteristics and predictors of pain among women who underwent cesarean section in Fiji

Ravneel Narayan, Masoud Mohammadnezhad, Nikansha Kumar & Sabiha Khan

To cite this article: Ravneel Narayan, Masoud Mohammadnezhad, Nikansha Kumar & Sabiha Khan (09 Jul 2024): Characteristics and predictors of pain among women who underwent cesarean section in Fiji, Pain Management, DOI: 10.1080/17581869.2024.2370757

To link to this article: https://doi.org/10.1080/17581869.2024.2370757

Published online: 09 Jul 2024.

PAIN MANAGEMENT
https://doi.org/10.1080/17581869.2024.2370757

Taylor & Francis
Taylor & Francis Group

PRELIMINARY COMMUNICATION

Characteristics and predictors of pain among women who underwent cesarean section in Fiji

Ravneel Narayan[a], Masoud Mohammadnezhad[*,b,c], Nikansha Kumar[d] and Sabiha Khan[d]

[a]Department of Anaesthesia, Intensive Care, Acute Pain & Hyperbaric Services, CWM Hospital, Suva, Fiji; [b]Faculty of Health, Education & Life Sciences, School of Nursing & Midwifery, Birmingham City University, Birmingham, UK; [c]Department of Health Education & Behavioral Sciences, Faculty of Public Health, Mahidol University, Nakhon Pathom, Thailand; [d]School of Public Health & Primary Care, Fiji National University, Suva, Fiji

ABSTRACT

Aim: To identify the characteristics and predictors of post cesarean section (CS) pain among women. **Materials & methods:** This quantitative study was conducted at Labasa hospital in Fiji over a 6-month period. A total of 312 mothers who received spinal, epidural and general anesthesia were included. Their pain score was assessed using the visual analogue scale 24 h postoperatively. **Results:** 70.8% women had either moderate or severe pain on the visual analogue scale. About 41.3% women expressed dissatisfaction with their pain management and 70.5% women had difficulties in performing activities due to pain. Lower parity was noted to be a positive predictor of pain among women undergoing CS. **Conclusion:** Adequate pain management for post-CS patient at Labasa hospital is lacking.

Plain language summary: Pain & pain control methods after surgical birth in Labasa, Fiji

What is the study about?: This study looked at what affects pain in women after delivering a baby through surgery, also known as surgical birth or cesarean section (CS), at Labasa Hospital in Fiji. Over 6 months, 312 mothers who had surgical births with different types of pain-reducing medicines took part in this study. Their pain was checked 24 h after surgery using a pain scale.

What were the results?: The results showed that 70.8% of women felt moderate to severe pain after their surgical birth. In addition, 41.3% of the women were not happy with their pain control, and 70.5% had difficulties doing their daily activities because of the pain. The study also found that first-time mothers were more likely to feel more pain after their surgical birth.

What do the results mean?: The key point of the study is that many women at Labasa Hospital are not getting enough pain relief after their surgical birth, especially first-time mothers. This shows there is a need to improve pain control methods for these patients. A better pain control could help these mothers get better more comfortably and feel more satisfied with their care.

ARTICLE HISTORY
Received 17 October 2023
Accepted 18 June 2024

KEYWORDS
analgesia; anesthesia; cesarean section; Fiji; pain; pain score; postoperative

1. Background

The rate of cesarean section (CS) continues to increase in high and low-middle income countries [1]. Regardless of its immediate and long-term complications, CS could be the only safest form of delivery in many mothers [2]. A study done by Ana Pilar Betran and colleagues based on the available representative data from various countries from 1990 to 2018 showed that 21.1% of women deliver through CS globally. The rise in CS has been noted in all regions as well. The largest rise was in Eastern Asia with 44.9%, Western Asia with 34.7%, Northern Africa with 31.5%, sub-Saharan Africa with 3.6% and Northern America with 9.5% [1]. The increase in the use of CS globally involves multiple factors and an interaction, including women and families' preferences, health professional's views and beliefs, convenience, remuneration, healthcare organization and financing structures. Some of these factors are country-specific, but others are universal and aligned with the values and perceptions underpinning contemporary societies [3–6].

Limited published literature is available on CS in Fiji. However, a comparative study on CS deliveries in Fiji from 1986 to 1996 stated that the CS rates in Fiji increased from 9.4 to 11.9%, a rise by 2.5% [7]. A retrospective audit study done at the Colonial War Memorial Hospital (CWMH) from 1 January 2016 to 31 December 2016 done among 1625 mothers who had CS revealed that the overall CS prevalence at CWMH was 20%. This, compared with the WHO optimal rate of 15%, is higher [8].

Pain is the commonest anticipated problem in the postoperative period after CS. Poorly managed moderate to severe pain after CS is associated with morbidities, patient discomfort, dissatisfaction, poor wound healing,

CONTACT Masoud Mohammadnezhad masoud.mohammadnezhad@bcu.ac.uk

delayed recovery, prolonged hospital stays, poor quality of life and chronic pain It also carries significant cost implications for the health system [8,9]. A study found that pain after CS causes difficulty in recovery [8]. This in turn causes interruptions in the bonding between the mother and the newborn. Other associated limitations related to pain include difficulty attaching and positioning for breastfeeding, personal hygiene and care, care of the newborn, routine activities including sitting-down, standing-up, walking and self-care [8,9]. Having a baby is considered as a pleasant event, but it can be scarring if the mother is suffering in pain [10]. Therefore, ensuring adequate acute pain management will go a long way in preventing the debilitating complications and ensuring a pleasant experience for pregnant mothers. Studies have suggested that 95% of the postoperative analgesia prescriptions are done by the surgeons especially in low-middle income countries however in high-income countries, anesthesia or acute pain services team prescribe immediate postsurgical analgesia [11,12]. These suggestions need further enlightenment in view of continuous failure of pain management after operations. An observational study to assess the effectiveness of postoperative pain management of patients undergoing elective CS showed that the obstetrics team prescribed postoperative pain relief in 81% of the patients while the remaining were managed by the anesthesia team. In terms of follow-up for pain management, most was by done by the obstetrics team as well accounting for 94% and the remainder were by the acute pain management service [12]. A study conducted in Fiji in 2006 showed that analgesia prescribing doctors were generally the obstetrics registrars who had performed the CS. Anesthetists were not involved at all in post-operative pain management. The more senior members prescribed non-narcotics in addition to narcotics while the junior doctors mostly prescribed narcotics only [13].

Despite there being no 'gold standard' to pain management after CS, there is a broad range and choice of pain control that is dependent on multitude of factors such as availability and cost of medications, established protocols and guidelines, choices of individuals, availability of resources and financial aspects [7]. An ideal post CS analgesic treatment is the one that is cost-effective, flexible and easy to apply and with insignificant effect on workload of staff. In addition, it would provide consistency and superiority while accommodating for the broad inter-patient variability with minimal side effects and complications. Any post CS management ideally should not hinder with the maternal effort in care of the newborn including breastfeeding and negligible transfer of drugs into breast milk. Thus, it is recommended to apply a multimodal opioid-based approach [7]. The multimodal regimen for pain management post-CS is based on clinical consensus [7–9].

Pain is not just a venomous experience itself, but it can have tremendous negative impact on every other component of the person's life including the changes in mood and capacity to function normally in daily routines [10]. Pain management is widely researched in developed countries [14–16]. However, in developing countries like Fiji, this phenomenon is not well understood due to dearth of research on the subject of postoperative pain management. There is little information about the current management of pain after obstetric surgery at Labasa hospital. Same is true for other divisional hospitals in Fiji as well as other smaller Pacific Island Countries. The knowledge of the important predictive factors for postoperative pain and analgesic consumption will enable early recognition of the at-risk patients. This will help in formulating an appropriate plan for effective pain management postoperatively. This study aims to determine the characteristics and predictors of pain among pregnant women undergoing CS in the obstetrics unit of Labasa Hospital.

2. Methodology

2.1. Study design & setting

This prospective quantitative study was conducted over a 6-month period between February and October 2020. This study was conducted at Labasa operating theatre and the maternal intensive care unit where all the mothers who have had a CS were admitted. It is a teaching hospital affiliated with the Fiji National University. The setting was chosen because the primary researcher was based at this facility at the time period during which data was collected.

2.2. Study sample

All mothers that have had a CS and admitted to maternal intensive care unit were considered for inclusion in this study. American Society of Anesthesiologists classes II and III pregnant women who received spinal, epidural and general anesthesia and those who consented to participate in the study were all included. Pregnant women with intraoperative complications, with still born babies, those needing intensive care unit admissions or high care admissions (mother), cognitively impaired person, under 18 years of age and women with missing files or inadequate documentation were excluded. Data from a total of 312 participants were analyzed in the study [17]. Figure 1 shows the sampling process.

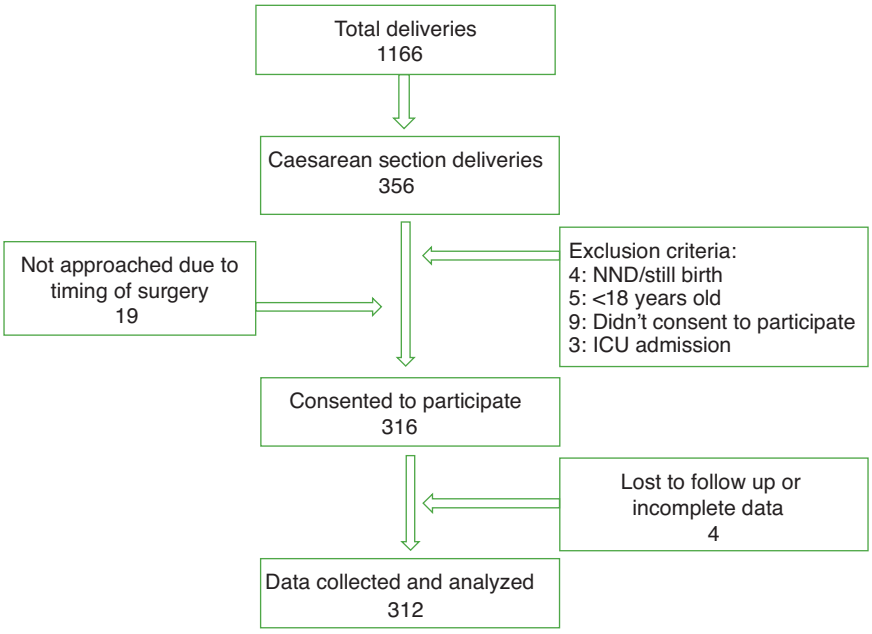

Figure 1. Participant sampling process.
ICU: Intensive Care Unit; NND: Neonatal death.

Table 1. Pain score interpretation.

Score	Interpretation
0–4	No pain
5–44	Mild pain
45–74	Moderate pain
75–100	Severe pain

Table 2. Functional scoring.

Score	Description
0	No pain/ no limitation to activity
1	Mild pain is present but does not limit activity
2	Can do most activities with rest
3	Unable to do some activities because of pain
4	Unable to do most activities because of pain
5	Unable to do any activity because of pain

2.3. Data collection tool

A data sheet was formulated that included the various variables collected from the patients' and their folder. The visual analogue scale (VAS) was used to assess pain [12,18–22]. The VAS is a continuous scale comprised of a horizontal (HVAS) or vertical (VVAS) line, usually 10 cm (100 mm) in length. The scale is anchored by 'no pain' (score of 0) and 'pain as bad as it could be' or 'worst imaginable pain' (score of 100 [100-mm scale]). The pain VAS is self-completed by the respondent. The respondent is asked to place a line perpendicular to the VAS line at the point that represents their pain intensity. Using a ruler, the score is determined by measuring the distance (mm) on the 10 cm line between the 'no pain' anchor and the patient's mark, providing a range of scores from 0 to 100. The pain was classified as either no pain, mild, moderate or severe pain (Table 1) according to WHO classification [23]. This scale was answered to in three different situations: with the patient at rest, when making movements such as sitting down or standing up and walking, aiming to analyze the different pain scores during basic activities.

In order to characterize the daily limitations caused by post-CS pain, a functional scoring system was used. The scoring system was based on a similar past study [24]. The participants were asked if pain is present. If the patient had pain, it was established if pain interferes with function. This was done by asking some of the activities daily performed, and the participants had to say yes (if the activity had been limited by pain), no (if the activity had not been limited by pain) and not performed (if the activity had not been performed at all). This questionnaire assessed the limitations for the following activities: sitting down and standing up, walking, performing personal hygiene, eating and breastfeeding. It was made clear to the respondent that limitations in function only apply if limitations are due to the pain being evaluated. The patient's pain's interference with activities produced a corresponding score on a scale of 0–5 (Table 2).

2.4. Study variables

Postoperative pain score according to the VAS and patients' functional score were the dependent variables. In this study, the socio-demographic variables such as age, ethnicity, marital status, education level, parity, pre-

vious CS, smoking status and presence of any medical comorbidities were considered as independent variables.

2.5. Recruitment of participants

The data collection was initiated 24 h after CS, when movement needs increase due to breastfeeding and care provided to the newborn, besides self-care, which contribute to generating more pain [13]. Data collection was done by the primary researcher with assistance from a colleague. The patients meeting inclusion criteria were recruited by the anesthetic registrar who was administering the anesthesia when they presented to the operating theatre for a CS. A written consent was secured that explained to the patient the purpose of the study and what is required in the study. Participants were also explained that confidentiality will be maintained and they will be allocated codes so their identity is concealed. The consent for elective cases were obtained preoperatively and for emergency cases consent was obtained after surgery in recovery room. This was done to ensure that patients who come as emergency are not consenting while they are in distress. Taking consent in recovery room ensured they were comfortable and understand the study before agreeing or disagreeing from participating. A written patient information sheet was provided to all participants. Patients were interviewed of their pain in the English language and a translator (medical staff) was used to communicate with those patients who did not understand English.

2.6. Data management & analysis

All patient details and variables from patient folders and drug charts were meticulously entered into Microsoft Excel to facilitate further data cleaning. This step ensured that the data was accurately organized and prepared for subsequent analyses. Once cleaned, the data was exported to SPSS software (Version 26) for both descriptive and inferential statistical analyses.

For the descriptive analysis, the data were summarized, and the results were presented in terms of numbers and percentages. This provided a clear and straightforward overview of the data, highlighting the distribution and frequency of various patient characteristics and treatment variables.

To explore the associations between pain and various independent variables, we employed inferential statistical methods. Specifically, the results were expressed as means with their corresponding standard deviations. This approach allowed us to quantify the central tendency and variability of pain scores within different patient groups.

An analysis of variance (ANOVA) test was conducted to determine the statistical significance of the observed differences. The ANOVA test is particularly useful for comparing means across multiple groups to see if at least one group mean is significantly different from the others. The threshold for statistical significance was set at a *p*-value of less than 0.05. If the *p*-value obtained from the ANOVA test was below this threshold, it indicated that the differences observed were unlikely to have occurred by chance, thereby affirming the presence of statistically significant associations.

2.7. Ethical consideration

Ethics approval was sought from the Fiji National University (FNU), College of Medicine, Nursing and Health Sciences- College Health Research Ethics Committee (CMNHS-CHREC) with the ID 134.19. Approval to conduct the audit was also sought from the Medical Superintendent of Labasa Hospital. Written informed consent (with rights to withdraw without any consequences), was taken from the patients and assurance of confidentiality and anonymity was provided to them throughout the course of the study and afterward as well. Patient management was continued to be entirely undertaken by the primary team. However, if during the course of the data collection it was noted that a patient's pain is not adequately managed then the researcher informed the primary team as soon as possible and ensured appropriate escalation of care.

3. Results

3.1. Characteristics of the participant

The baseline characteristics of the study participants are summarized in Table 3. Majority of participants (58.8%) were in the 20–29 years old category and of the I-Taukei ethnic group (75%). 221 (70.8%) women were married, 50 (16%) were single, 38(12/2%) were in a *de-facto* relationship while 3(1%) women were divorced. About 47.4% (148) women had attained tertiary qualification as their highest level of education, 46.2% (144) had attended secondary school for their highest level of education while 6.4% (20) women had not studied beyond primary school. In terms of parity, 82 (26.3%) women were pregnant for the first time, 183 (58.7%) women were in their second or third pregnancy and 47 (15%) were pregnant for fourth or more time. Majority (167–54.2%) of the participants were having caesarean delivery for the first time, 88 (28.2%) had one previous CS and 55(17.6%) had two or more previous CS. 286 (91.7%) women reported that they had never smoked cigarette while 26(8.3%) were smokers. 291 (93.3%) women did not have any comorbidities while 21 (6.7%) had some pre-existing medical conditions. Of these, seven (2.2%) women had rheumatic heart disease,

Table 3. Characteristics of women who underwent cesarean section at Labasa hospital (n = 312).

Characteristics	Frequency	Percentage
Age (years)		
<20	11	3.6
20–29	184	58.8
30–39	104	33.4
>40	13	4.2
Ethnicity		
I-Taukei	234	75
Fijian of Indian decent	73	23.4
Others	5	1.6
Marital status		
Married	221	70.8
Single	50	16
De-facto	38	12.2
Divorced	3	1
Education level		
Primary	20	6.4
Secondary	144	46.2
Tertiary	148	47.4
Parity		
1	82	26.3
2–3	183	58.7
≥4	47	15.0
Previous cesarean section	169	54.2
0	88	28.2
1	55	17.6
≥2		
Smoking status		
Yes	26	8.3
No	286	91.7
Comorbidities		
None	291	93.3
RHD	7	2.2
Asthma	6	2.0
DM/HTN	7	2.2
Epilepsy	1	0.3

DM: Diabetes mellitus; HTN: Hypertension; RHD: Rheumatic heart disease.

six (2.0%) has bronchial asthma, seven (2.2%) had pre-existing diabetes or hypertension and one (0.3%) was a known epileptic. Two most common indications for cesarean delivery were previous CS and fetal distress.

3.2. Pain score

Subjective pain scores of participants on the VAS are listed in Table 4. Pain is reported at rest and during activity (walking) at 24 h postop. About 70.5% of mothers had either moderate or severe pain at rest post CS.

3.3. Functional score

Objective assessment of pain level was done using a functional score. The results are shown in Table 5 below. About 70.5% of women were unable to do some daily activities because of pain and 2.9% were unable to do most activities due to pain.

3.4. Predictors of pain

Table 6 demonstrates association of pain with independent variables. Of all the variables that were looked into, lower parity (first time mothers) was found to be a positive predictor of pain ($p < 0.002$).

4. Discussion

This study aimed to determine the characteristics and predictors of pain among pregnant women undergoing CS in the obstetrics unit of Labasa Hospital. Majority of the participants undergoing CS were in the 20–29 years age group and I-taukei. A retrospective study among pregnant women who delivered at the CWMH Suva, Fiji, in 2016 demonstrated that majority of patients were I-Taukei (77%), 20–34 years old (60%) and primigravida (45.5%) [4]. According to the findings, 27.8% women had mild, 68.3% had moderate and 2.5% had severe pain 24 h post CS. The findings are similar to another study in a low income setting which concluded that from 300 participants, 71% had either moderate or severe pain at 24 h post surgery [12].

Inadequate postoperative pain control seems a universal surgical problem demonstrated in other low income and high-income countries. Factors that could be contributing to poor pain management include inconsistent pain assessment and irregular supplies of prescribed drugs. Prescribing orders could also play a role as many doctors write *pro re nata* (prn) orders rather than scheduled orders especially for opioids [25–27]. In contrast in a high income countries, Malaysia mean pain score on numerical rating scale at 24 h postop was 0.8 [28]. The participants received multimodal analgesia with regular opioids.

Average pain score at rest was 47 while with activity it was 52. A similar study conducted in Brazil in 2009 concluded that average pain score 24 h post-CS at rest was 43 and with activity as 62 [29]. Despite high incidence of pain, 58.7% of women reported that they were satisfied with their pain management. Similarly a study in Uganda reported 68% women being satisfied with their pain management despite more than 70% having moderate to severe pain on VAS assessment. The concerning part is that 41.3% of women were not satisfied with their pain management. It highlights the gaps in pain management and also the opportunity for improvement.

This study shows that 70.5% of women were unable to do some daily activities because of pain and 2.9% were unable to do most activities due to pain. In another study which assessed limitations to functional ability due to post CS pain, the daily activity limitations was present for 100% of the participants with regard to sitting down and

Table 4. Pain scores at rest and during activity 24 h postop.

Pain score	At rest		Activity	
	Frequency	Percentage	Frequency	Percentage
0–4 (no pain)	5	1.6	6	1.9
5–44 (mild pain)	87	27.9	64	20.5
45–74 (moderate pain)	213	68.3	214	68.6
75–100 (severe pain)	7	2.2	28	9.0

Table 5. Functional score of patients at 24 h postop.

Score	Frequency	Percentage
0	2	0.6
1	63	20.2
2	18	5.8
3	220	70.5
4	9	2.9
5	0	0

Table 6. Association of pain with independent variables.

Variables	At rest	
	mean ± SD	*p*-value
Age group		0.947
<20	44.4 ± 22.3	
20–29	47.2 ± 20.9	
30–39	46.0 ± 20.2	
>40	46.2 ± 24.7	
Ethnicity		0.629
I-taukei	46.0 ± 20.9	
Fijian of Indian decent	48.7 ± 20.3	
Others	46.6 ± 20.8	
Marital status		0.164
Married	48.7 ± 19.1	
Not married	41.7 ± 23.8	
Education level		0.173
Primary	39.0 ± 22.0	
Secondary	48.1 ± 20.9	
Tertiary	46.3 ± 20.4	
Parity		0.002
1	52.0 ± 16.8	
2–3	46.2 ± 21.6	
≥4	39.4 ± 21.5	
Previous cesarean section		0.280
0	48.4 ± 20.0	
1	44.8 ± 22.1	
≥2	44.4 ± 20.7	
Smoking status		0.397
Yes	46.4 ± 20.9	
No	50.0 ± 19.4	
Comorbidities/ Medical conditions		0.367
No	46.8 ± 20.8	
Yes	50.3 ± 20.6	

standing up, 95% regarding walking and 55% concerning personal hygiene [29].

The predictive factors for pain intensity may aid in identifying patients at greater risk for postoperative pain. Lower parity (first time mothers) was found to be a positive predictor of pain ($p < 0.002$). The relationship between parity and postoperative pain has not been extensively looked into in studies aiming to determine predictors of postoperative pain among pregnant mothers. A study among women having laparoscopic cholecystectomy showed that the abdominal wall laxity is an important factor affecting the type of postoperative pain [30]. Those who suffered from wound pain mostly did not experience abdominal wall distension before and have more rigid abdominal wall. Similarly, first time mothers are likely to have more rigid abdominal wall thus higher chances of experiencing post-operative pain.

Other studies that have evaluated predictors of post-op pain have found higher Body Mass Index (≥30), an increase in operation time (>60 min), single women, blood group type O and general anesthesia were found to be independent predictors for postcesarean pain intensity in other similar studies [31–37].

Study limitations include COVID-19 pandemic; during the initial stages of data collection, there were few COVID-19 positive cases detected at the study facility. As a result, data collection had to be stopped for a brief period of time, hence data collection was not done for 6 consecutive months. However, the period for data collection was extended with appropriate approvals to ensure full 6 months of data was collected. About 19 patients who had CS during the study period could not be approached due to timing of the procedure (late at night) as the anesthesia provider was not familiar with the study and did not approach them. The study is cross-sectional, was conducted at a single institution, so it may not be generalizable to the general population.

5. Conclusion

This study aimed to identify the characteristics and predictors of post-CS pain among women at Labasa Hospital in Fiji. The findings reveal significant insights into the pain experiences and management among the study participants. The key results indicate that a majority (70.8%) of women experienced moderate to severe pain 24 h post-CS, as assessed by the VAS. Additionally, a substantial portion (70.5%) of women reported difficulties in performing daily activities due to pain, and 41.3% expressed dissatisfaction with their pain management.

The study highlights lower parity (first-time mothers) as a significant predictor of higher pain levels, suggesting that women undergoing their first CS are at a greater risk

for experiencing intense postoperative pain. This association may be linked to the rigidity of the abdominal wall in first-time mothers, which could contribute to heightened pain perception.

The findings underscore a crucial gap in adequate pain management for post-CS patients at Labasa Hospital. Despite high levels of pain and functional impairment, a notable number of women were dissatisfied with their pain control, indicating an urgent need for improved pain management strategies.

Effective postoperative pain management is essential not only for enhancing patient comfort but also for preventing complications such as delayed recovery, poor wound healing and chronic pain. The study suggests that addressing the specific needs of first-time mothers and implementing a multimodal opioid-based approach, as recommended by current clinical consensus, could significantly improve pain management outcomes.

In summary, this study provides valuable data on the characteristics and predictors of post-CS pain among women in Fiji, emphasizing the need for enhanced pain management protocols to ensure better postoperative outcomes and overall patient satisfaction. Future research and policy efforts should focus on developing and implementing comprehensive pain management strategies tailored to the unique needs of this patient population.

Article highlights

- This prospective quantitative study conducted over a 6-month period, aimed to identify post-cesarean section (CS) pain characteristics and predictors among pregnant women, offering insights into low-middle income countries pain management practices.
- A data sheet was created, utilizing the visual analogue scale, a 10 cm continuous scale anchored by 'no pain' and 'worst imaginable pain,' to assess pain intensity in various situations.
- A functional scoring system revealed the extent of pain-related limitations, providing insights into the impact of pain on daily activities.
- The study participants predominantly comprised young, married, I-Taukei women, reflecting the demographic profile of obstetric patients at Labasa Hospital.
- Of the 312 participants analyzed, 58.8% were aged 20–29 years and 75% belonged to the I-Taukei ethnic group.
- At 24 h postop, 70.5% of mothers experienced moderate to severe pain at rest, indicating a pressing need for improved pain control strategies.
- Primiparous status emerged as a significant predictor of heightened pain intensity post-CS ($p < 0.002$).
- The study highlights the pervasive impact of post-CS pain on daily activities, with a substantial portion of women unable to perform routine tasks due to pain, emphasizing the urgency of effective pain control strategies.
- The study recommends a multimodal opioid-based approach for post-CS pain management, aiming for cost–effectiveness and minimal side effects.

Acknowledgments

We would like to thank all the study participants and those who were very supportive for their valuable time and participation in the study.

Author contributions

R Narayan: Conceived and designed the experiments; performed the experiments; analyzed and interpreted the data; contributed reagents, materials, analysis tools or data; wrote the paper. M Mohammadnezhad, N Kumar, S Khan: methodology; analyzed and interpreted the data; contributed reagents, materials, analysis tools or data; wrote the paper.

Financial disclosure

The authors have no financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

Competing interests disclosure

The authors have no competing interests or relevant affiliations with any organization or entity with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

Ethical conduct of research

Ethics approval was sought from the Fiji National University (FNU), College of Medicine, Nursing and Health Sciences- College Health Research Ethics Committee (CMNHS-CHREC) with the ID 134.19. Approval to conduct the audit was also sought from the Medical Superintendent of Labasa Hospital. Written informed consent (with rights to withdraw without any consequences), was taken from the patients and assurance of confidentiality and anonymity was provided to them throughout the course of the study and afterwards as well.

ORCID

Masoud Mohammadnezhad
https://orcid.org/0000-0002-5048-9719

References

Papers of special note have been highlighted as: • of interest; •• of considerable interest

1. Betran AP, Ye J, Moller AB, et al. Trends and projections of caesarean section rates: global and regional estimates. BMJ Glob Heal. 2021;6(6):e005671. doi:10.1136/bmjgh-2021-005671
2. Sung S, Mahdy H. Cesarean Section. StatPearls Publishing LLC; 2021. https://www.ncbi.nlm.nih.gov/books/NBK546707/

•• Highlighted for its relevance in providing fundamental knowledge about cesarean sections (CS), which is essential for contextualizing your research on post-CS pain management.

3. Saunders DL, Makutu S. Cesarean section deliveries in Fiji, 1986 to 1996. Pac Health Dialog. 2001;8(1):71–77.
4. Betran AP, Ye J, Moller A, et al. Trends and projections of caesarean section rates: global and regional estimates. BMJ Glob Health. 2021;6(6):e005671. doi:10.1136/bmjgh-2021-005671

   •• Provides comprehensive insights into global trends in CS rates, which serves as a crucial backdrop for understanding the context of your study.
5. Helms JE, Jennifer E. Physiology and treatment of pain. Crit Care Nurse. 2008;28(6):38–49. doi:10.4037/ccn2008.28.6.38

   •• Provides foundational knowledge on the physiology and treatment of pain, which serves as a crucial background for understanding your study's focus on post-CS pain.
6. Ismail S. What is new in postoperative analgesia after caesarean sections? Anaesth Pain Int Care. 2012;16(2):123–126.
7. McDonnell NJ, Keating ML, Muchatuta NA, et al. Analgesia after caesarean delivery. Anaesth Int Care. 2009;37(4):539–551. doi:10.1177/0310057X0903700418
8. Pan, ppan@wfubmc.edu PH. Post cesarean delivery pain management: multimodal approach. Int J Obstet Anesth. 2006;15(3):185–188. doi:10.1016/j.ijoa.2006.04.004

   •• Highlighted for its relevance in discussing post-cesarean pain management strategies, which aligns with the focus of your research on identifying predictors of post-CS pain.
9. Wong JON, Tan TD-M, Cheu NW, et al. Comparison of the efficacy of parecoxib versus ketorolac combined with morphine on patient-controlled analgesia for post-cesarean delivery pain management. Acta Anaesthesiol Taiwanica. 2010;48(4):174–177. doi:10.1016/j.aat.2010.09.001
10. Katz N. The impact of pain management on quality of life. J Pain Symptom Manage. 2002;24(1):S38–S47. doi:10.1016/s0885-3924(02)00411-6

    •• Delves into the broader impact of pain management on quality of life, which underscores the importance of your study in improving pain management practices among post-CS women.
11. Haider MR, Rahman MM, Moinuddin Md, et al. Ever-increasing caesarean section and its economic burden in Bangladesh. PLOS ONE. 2018;13(12):e0208623. doi:10.1371/journal.pone.0208623
12. Kintu A, Abdulla S, Lubikire A, et al. Postoperative pain after cesarean section: assessment and management in a tertiary hospital in a low-income country. BMC Health Serv Res. 2019;19(1):68. doi:10.1186/s12913-019-3911-x

    •• Highlighted for its relevance in discussing postoperative pain assessment and management in a low-resource setting, which may offer valuable insights for your study in Fiji.
13. Ismail S, Shahzad K, Shafiq F. Observational study to assess the effectiveness of postoperative pain management of patients undergoing elective cesarean section. J Anaesthesiol Clin Pharmacol. 2012;28(1):36–40. doi:10.4103/0970-9185.92432
14. Anigafutu B. An audit of acute pain management at the Colonial War Memorial Hospital. Master thesis. Suva, Fiji: Fiji National University. 2006.

    •• Provides local insights into acute pain management practices at the Colonial War Memorial Hospital, which could offer contextual relevance to your study on post-CS pain management in Fiji.
15. Bradshaw P, Hariharan S, Chen D. Does preoperative psychological status of patients affect postoperative pain? A prospective study from the Caribbean. Br J Pain. 2016;10(2):108–115. doi:10.1177/2049463716635680
16. Aubrun F, Valade N, Coriat P, et al. Predictive factors of severe postoperative pain in the postanesthesia care unit. Anesth Analg. 2008;106(5):1535–1541. doi:10.1213/ane.0b013e318168b2ce
17. Kevin M, Sullivan AGD, Roger AM. OpenEpi - Toolkit shell for developing new applications. 2021. https://www.openepi.com/SampleSize/SSPropor.htm
18. Bourdel N, Alves J, Pickering G, et al. Systematic review of endometriosis pain assessment: how to choose a scale? Hum Reprod Update. 2014;21(1):136–152. doi:10.1093/humupd/dmu046
19. Couper MP, Roger T, Frederick GC, et al. Evaluating the effectiveness of visual analog scales: a web experiment. Soc Sci Comput Rev. 2016;24(2):227–245. doi:10.1177/0894439305281503
20. Tood KH, Funk KJ, Funk JP, et al. Clinical significance of reported pain severity. Ann Emerg Med. 1996;27(4):485–489. doi:10.1016/s0196-0644(96)70238-x
21. Delgado DA, Lambert BS, Boutris N, et al. Validation of digital visual analog scale pain scoring with a traditional paper-based visual analog scale in Adults. global research & reviews. J Am Acad Orthop Surg Glob Res Rev. 2018;2(3):e088. doi:10.5435/JAAOSGlobal-D-17-00088
22. Apfelbaum JL, Chen C, Mehta SS, et al. Postoperative pain experience: results from a national survey suggest postoperative pain continues to be undermanaged. Anesth Analg. 2003;97(2):534–540. doi:10.1213/01.ANE.0000068822.10113.9E
23. Jenson MP, Chen C, Brugger AM. Interpretation of visual analog scale ratings and change scores: a reanalysis of two clinical trials of postoperative pain. J Pain. 2003;4(7):407–414. doi:10.1016/s1526-5900(03)00716-8
24. Halm M, Bailey C, St Pierre JS, et al. Pilot evaluation of a functional pain assessment scale. Clin Nurse Spec. 2019;33(1):12–21. doi:10.1097/NUR.0000000000000416
25. Soyannwo O. Post-operative pain control–prescription pattern and patients' experience. West Afr J Med. 1999;18(3):207–210.
26. Mwaka G, Thikra S, Mung'ayi V. The prevalence of postoperative pain in the first 48 hours following day surgery at a tertiary hospital in Nairobi. Afr Health Sci. 2013;13(3):768–776. doi:10.4314/ahs.v13i3.36
27. Woldehaimanot TE, Eshetie TC, Kerie MW. Postoperative pain management among surgically treated patients in an Ethiopian hospital. PLOS ONE. 2014;9(7):e102835. doi:10.1371/journal.pone.0102835
28. Jasim HH, Sulaiman SABS, Khan AH, et al. Factors affecting post caesarean pain intensity among women in the Northern Peninsular of

Malaysia. J Clin Diagn Res. 2017;11(9):IC07–IC11. doi:10.7860/JCDR/2017/25364.10630

29. Sousa LD, Pitangui PACR, Gomes Flávia, et al. Measurement and characteristics of post-cesarean section pain and the relationship to limitation of physical activities. Acta Paul Enferm. 2009;22(6):741–747. doi:10.1590/S0103-21002009000600003
30. Hsien CF, Wang CL, Long CY, et al. Factors associated with types and intensity of postoperative pain following gynecological laparoscopic surgery: a cross-sectional study. Biomed Res Int. 2017;2017:2470397. doi:10.1155/2017/2470397
31. Granot M, Lowenstein L, Yarnitsky D, et al. Postcesarean section pain prediction by preoperative experimental pain assessment. Anesthesiology. 2003;98(6):1422–1426. doi:10.1097/00000542-200306000-00018
32. Hsu YW, Somma J, Hung YC, et al. Predicting postoperative pain by preoperative pressure pain assessment. Anesthesiology. 2005;103(3):613–618. doi:10.1097/00000542-200509000-00026
33. Pen PH, Coghill R, Houle TT, et al. Multifactorial preoperative predictors for postcesarean section pain and analgesic requirement. Anesthesiology. 2006;104(3):417–425. doi:10.1097/00000542-200603000-00007
34. Victorin ES, Kowalski J, Lundeberg T. A new highly reliable instrument for the assessment ofpre- and postoperative gynecological pain. Anesth Analg. 2002;95(1):151–157; table of contents. doi:10.1097/00000539-200207000-00027
35. Nielsen PR, Nørgaard L, Rasmussen LS, et al. Prediction of post-operative pain by an electrical pain stimulus. Acta Anaesthesiol Scand. 2007;51(5):582–586. doi:10.1111/j.1399-6576.2007.01271.x
36. Lunn TH, Larsen LG, Kehlet H. Prediction of postoperative pain by preoperative nociceptive responses to heat stimulation. Pain. 2013;154(9):1878–1885. doi:10.1016/j.pain.2013.06.008
37. Ram N, Fong J, Nusair P, et al. Prevalence and characteristics of caesarean section among pregnant women who delivered at the Colonial War Memorial Hospital in Suva, Fiji, 2016. Pac J of Reprod Health. 2018;1(7):384–388. doi:10.18313/pjrh.2018.906

•• Provides local data on the prevalence and characteristics of CS in Fiji, which is directly relevant to your study location.