Cohort Study

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Incidence and predictors of postoperative severe acute pain within 24 hours after cesarean section performed under spinal anesthesia at public hospitals in West Shoa, Ethiopia, 2022 prospective cohort study

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Background: Acute postoperative pain is common after a caesarean section; the mother suffers severe pain in the first 24 h after the caesarean section compared to spontaneous birth. Failure to discover predictors of pain leads to maternal dissatisfaction, increased expenses, and restricted movement; it increases the risk of deep vein thrombosis, lengthens hospital stays, and decreases social intimacy.

Methods and materials: An institution-based prospective cohort study was conducted among 422 women who went to undergo caesarean sections under spinal anaesthesia at public hospitals in West Shoa from 30 July to 30 October. Participants were selected by systematic random sampling. Data were collected by a structured questionnaire, and the collected data were entered into SPSS version 20 and exported into STATA 64 for analysis. The results were presented in tables and figures. Risk factors were assessed by Poisson regression with a robust standard error.

Results: The overall incidence of severe postoperative pain after a caesarean section performed under spinal anaesthesia within 24 h of follow-up was 50.4% [95% confidence interval (CI): 40.7, 60.1]. Preoperative anxiety risk ratio 1.7 (95% CI: 1.4–2.0), preoperative pain risk ratio 1.3 (95% CI: 1.0–1.48), type of incision risk ratio 11.3 (95% CI: 1.1–1.6), spinal anaesthesia without adjuvants risk ratio 4.1 (95% CI: 1.5–10.9), and duration of surgery risk ratio 1.5 (95% CI: 1.3–1.8) were found to be predictors for postoperative severe acute pain after caesarean section performed under spinal anaesthesia.

Conclusion: In this study, the overall incidence of severe acute pain after a caesarean section under spinal anaesthesia was high. Preoperative fear, duration of the operation, preparatory pain, spinal anaesthesia without the use of adjuvants, and the type of incision were risk factors for severe acute postoperative pain after a caesarean section under spinal anaesthesia.

Keywords: cohort study, modified passion regression, risk ratio

Introduction

Pain is a sensory and emotional experience influenced by physiological, sensory, affective, cognitive, sociocultural, and behavioural factors. Pain is the biggest expected problem in the postoperative period[1,2,15]. Acute pain occurs after tissue damage related to surgery and usually subsides during healing, which usually takes up to 3 months; after that, the pain is considered chronic or constant[3,4,16–20]. In developing countries, postoperative pain management can be particularly difficult for several reasons, including patient expectations of postoperative pain (who, therefore, do not seek pain relief) and a high patient–carer ratio that limits pain assessment and administration of appropriate analgesics[5,20,21,22]. Caesarean section is the most common delivery procedure in the world, and pain is a major problem in the postoperative period. During the last three decades, spinal anaesthesia has become the preferred anaesthesia for better foetal and maternal outcomes in caesarean sections[6,7,23–27]. However, the main disadvantage of spinal anaesthesia is the lack of permanent postoperative analgesia, which requires the administration of additional analgesics. Poor pain management leads to postoperative maternal dissatisfaction, poor infant care,

HIGHLIGHTS

- Postoperative acute pain in caesarean section was high.
- Pain is an unpleasant and disappointing experience in postoperative periods.
- This is a single-arm cohort study.

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Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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postpartum depression, persistent pain, and increased mortality and morbidity[8–10,28,29].

Effective postoperative analgesia is critical, as women who have had a caesarean section experience pain after surgery, and pain relief is a top priority. The most popular methods of analgesia are systemic and intrathecal administration of opioids, patient-controlled analgesia, anti-inflammatory drugs, and regional nerve blockers. These methods can be combined with multimodal analgesia, resulting in synergistic pain relief with fewer side effects and long-term, high-quality pain management after surgery[9,11,30,31,32,33,41–44]. Postoperative pain management practise is below the standard and complex in developing countries due to unbalanced patient–healthcare relationships, patient education about pain (expectancy), availability of analgesics, and access to infrastructure compared to developed countries, and ensuring pain prevention and management suggests that reducing problematic burdens through research may encourage them to emphasise pain management practises[12,39,40].

Previous studies have shown that the incidence of acute postoperative pain after the caesarean section was 78.4–92.7% in developing countries, suggesting that pain management needs improvement[1,5]. Inadequately treated postoperative pain can delay patients' recovery and ability to return to daily functional activities. Early recovery is especially important for a patient who has to care for a newborn soon after surgery. Studies have shown that inadequately managed pain after a caesarean section is associated with an increased incidence of chronic pain. Poor management of acute postoperative pain can contribute to medical complications such as pneumonia, deep vein thrombosis, infection, chronic pain, and depression[13,14,40].

Poor management of acute postoperative pain after caesarean section is one of the most common harms in the world, especially in developing countries such as Ethiopia, which has unwanted health, economic, and psychological effects on patients and increases the risk of developing chronic pain. In Ethiopia, most health professionals believe that spinal anaesthesia is the only pain relief in the postoperative period, and according to my search, it does not emphasise pain in patients using general anaesthesia. No studies have been published on the incidence and predictors of acute postoperative pain for caesarean sections performed under spinal anaesthesia, although there is some information on acute postoperative pain after caesarean sections performed under spinal anaesthesia and general anaesthesia. Previously, the study conducted in our country was a cross-sectional study, which is not sufficient evidence to establish a causal relationship, and some of the studies conducted once were cohort studies with odd ratio measurements that cannot be used in common[1–7,39,45,48].

Objectives

General objective

(1) To assess incidence and predictors of postoperative severe acute pain within 24 h of caesarean section performed under spinal anaesthesia at public hospitals in West Shoa, Ethiopia, 2022.

Specific objectives

(1) To determine the incidence of postoperative severe acute pain within 24 h after a caesarean section was performed under spinal anaesthesia at public hospitals in West Shoa, Ethiopia, 2022.
(2) To identify predictors of postoperative severe acute pain within 24 h after a caesarean section was performed under spinal anaesthesia at public hospitals in West Shoa, Ethiopia, 2022.

Methods and materials

Study area and period

The study was conducted in hospitals found in West Shoa, Oromia Region, Ethiopia. Ambo is the capital city of the West Shoa zone, located 114 km to the west of Oromia. Around 495 753 reproductive-age women and about 100 283 mothers gave birth per year in this zone. In this zone, there are eight public hospitals, 92 health centres, and 528 health posts. There is one teaching referral hospital, three general hospitals, and four primary hospitals. Ambo, Gedo, and Ginde be-ret are general hospitals, whereas Guder, Bako, and Inchini are primary hospitals[1,2]. The study was conducted from 20 April 20 to 20 May 2021, registered in the Research Registry with UIN 8777, Research Registry.pdf, and the methodology in this study has been reported according to STROSS guidelines 2021[50].

Study design

An institution-based prospective cohort study was conducted.

Population

Source population

All women who underwent caesarean sections under spinal anaesthesia in West Shoa zone public hospitals during the study period.

Study population

All women who underwent caesarean sections under spinal anaesthesia in a selected public hospital of West Shoa zone.

Eligibility criteria

Inclusion criteria

(1) American Society of Anesthesiology (ASA) II and ASA III mothers.

Exclusion criteria

(1) Chronic use of opioids and known psychiatric women.
(2) Complete failed spinal anaesthesia.

Sample size determination and sampling techniques

Sample size determination

The sample size was calculated manually based on a single population proportion by assuming 50% of the mothers have

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post-caesarean section severe acute pain after spinal anaesthesia as no similar study was found (to obtain the maximum representative sample size) with 95% confidence level and $\alpha = 5\%$. Therefore, the total sample size was

$$n = (Z\ a/2)^2 \times p \times q/d^2$$
$$= (1.96)^2 \times 0.5 \times 0.5/(0.05)^2$$
$$= 384,$$

where,
n = sample size,
Z = desired 95% confidence, $Z = 1.96$;
a = stands for alpha value
p = proportion severe postoperative pain assuming 50%.
$q = 1 - p = 1 - 0.5 = 0.5$.
d = is the margin of sampling error tolerated (5%).

By adding a non-response rate of 10%, therefore final sample size was 422.

Sampling technique

From eight public hospitals that are the site for caesarean sections in West Shoa, four hospitals, Ambo University Referral Hospital (AURH), Ambo General Hospital (AGH), Gedo and Guder Hospitals, were selected by lottery method. After allocating caesarean sections for four selected public hospitals by proportional allocation to size (PAS), the study unit was determined from 525 mothers estimated to have undergone caesarean sections in four hospitals during the study period; 422 participants were recruited with a probability of about 80%. Considering the consecutive patients coming for a caesarean section as a sampling frame, data were collected on four mothers for every five who went for a caesarean section. One number was selected by the lottery method for exclusion, and selection was made on the rest of the numbers in both groups until the required sample size was reached (Fig. 1).

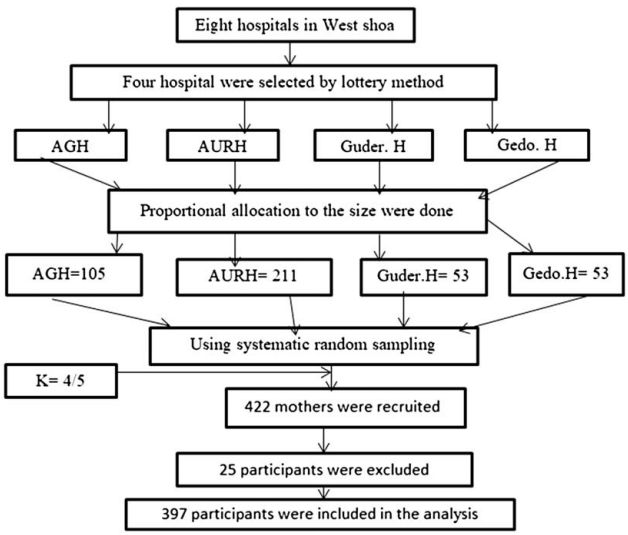


Figure 1. Sampling procedure on assessment and related risk factors of acute postoperative pain after caesarean sections under spinal anaesthesia in West Shoa hospital. AGH, Ambo General Hospital; AURH, Ambo University Referral Hospital.

Study variables

Dependent variable

Postoperative severe acute pain (Yes or No).

Independent variables

Maternal socio-demographical conditions

(1) Age,
(2) BMI,
(3) educational level,
(4) marital status, and
(5) monthly income.

Preoperative obstetric characteristics and conditions

(1) Preoperative anxiety and analgesia used;
(2) ASA status of the patient;
(3) parity;
(4) previous caesarean section; and
(5) gestational age.

Intraoperative anaesthesia and surgery-related conditions

(1) Duration of surgery;
(2) intraoperative analgesic use;
(3) use of spinal adjuvant and nerve block;
(4) incision type and length of incision; and
(5) dose of local anaesthetic.

Postoperative-related conditions

(1) Systemic analgesia used and
(2) wound infiltration.

Operational definitions

(1) *Severe acute pain*: When the mother's numeric rating score (NRS) score is greater than or equal to 7.
(2) *Numerical Pain Score*: It is a method of pain assessment that is an easy and less complicated way to understand.
(3) *Pain-in NRS*: Described as 0–no pain, 1–3 mild pain, 4–6 moderate pain and 7–10 severe pain.



(4) *Preoperative anxiety*: When calculated State-Trait Anxiety Inventory (STAI) score is greater than 44.
(5) *Spinal anaesthesia wears*: When the spinal anaesthesia is no longer effective, the patient gradually feels and begins to move.
(6) *Partial failed spinal anaesthesia*: Is defined as there being partial sensory and motor block but need supplemental analgesia to complete surgery.
(7) *Complete failed spinal anaesthesia*: No sensory block that requires repeating spinal anaesthesia or conversion of general anaesthesia to precede surgery.

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Study protocol

Mothers undergoing caesarean sections under spinal anaesthesia were evaluated five times. *Time 1*.

Assessment of pre-caesarean section: on the day of caesarean section, one trained anaesthetist interviewed all mothers planning to have a caesarean section under spinal anaesthesia in the operating rooms of four selected hospitals. Mothers provided socio-demographic and clinical information; where necessary, information was collected from maternal health reports. Preoperative anxiety symptoms were assessed using the STAI score, and a numerical pain rating scale was used to determine preoperative pain at the intended surgical site. Mothers were given verbal instructions for using the NRS, which were presented as a picture printed on a page. Mothers were asked to indicate pain using a scaled NRS score when appropriate. The first six digits on the left were interpreted as 'no pain, mild to moderate pain' and the last four on the right as 'severe pain'. After leaving the operating room, mothers were given a copy of the NRS pain scale to assess pain.

Time 2. During surgery, bupivacaine dose, adjuvant use, and incision type were recorded. *Time 3*. Post-Caesarean Assessment: Immediate Post-Operation Period: before assessment of pain level based on NRS scores, mothers were admitted to the post-anaesthesia care unit (PACU) and gynaecology/obstetrics department. At T2, a pain rating tool (NRS) was developed with mothers, and their doubts about scoring were clarified. The gynaecologist/obstetrician provided the mothers with standard pain management instructions for managing postoperative pain in the ward. Guidelines for postoperative analgesia were based on available medications.

Time 4. Assessment of pain at T12 was done using the NRS score. Mothers were asked to rate the worst moment of their pain at the surgical site based on the NRS scale. Mothers were asked if painkillers were given in the ward, and mothers were asked about the painkillers. *Time 5*. The final pain score was determined from T24 to the NRS score. According to professional judgement, postoperative pain was treated at all four points as well as with analgesia in the hospital, but it was suggested that patients with four NRS values should receive analgesia. The instruments used in this study included: The Pain Numerical Score (NRS) – a self-reported pain intensity tool. The NRS score is on an 11-point scale, with the pictorial arrow indicating pain intensity ranging from 'no pain' to 'very severe pain'. Numerical value 0–10 based on score 0-1-2-3-4-5-6-7-8-9-10. Based on previous studies, clinically severe pain was defined as an NRS score of 7[3]. A version of the NRS score was translated into Afaan Oromo and Amharic, which is the local language of West Shoa. All mothers were trained to complete the NRS scales at T1, T2, T3, and T4. STAI: This structured observational measure is used to assess maternal preoperative anxiety. The scale was used in the surgical centre waiting room immediately before surgery and before spinal anaesthesia was administered. Preoperative anxiety was considered present if the total STAI score was more than 44[44].

Data quality control and assurance

Two data collectors, one anaesthetist and one midwife and supervisor, were trained for each selected hospital and briefed about the general significance of the study tool used. After giving the training for those data collectors for about 2 days, data were collected based on the structured questionnaire and adopted tool. Pretest was done on 5% of the calculated sample size at Bako hospital. The principal investigator and supervisor evaluated the collected data's completeness, clarity, and accuracy.

Data analysis

The collected data were entered into SPSS version 20 and exported to STATA 64 for analysis. Poisson regression with a robust standard error was employed, and bivariable analysis was initially used to obtain a variable candidate for multiple variable studies with a *P* value less than 0.25. Predictors were determined by multivariable Poisson regression with a robust standard error. The resulting *P* value of less than 0.05 is considered statistically significant in the multivariable analysis. Data were summarised and displayed with tables and figures.

Ethical considerations

Ethical clearance was obtained from the College of Medicine and Health Science ethical clearance committee before the start of the study, and an official support letter was written to responsible personnel at each hospital to obtain permission for data collection. Informed written consent was obtained from each voluntary participant for the study after giving full information about the use and importance of conducting the survey, that is involvement in the study on a voluntary basis. Confidentiality was preserved at all levels of the survey by avoiding personal identifiers and using codes to identify patients.

Results

Socio-demographic characteristics

In this study, 397 mothers were included for analysis, giving a response rate of 94.1%. The mean age of the participants was 26.96 ± 4.37. Three hundred seventy-two (93.7%) were married, and 25 (6.3%) were single. One hundred thirty-three (33.5%) mothers have the educational status of secondary school, and six (1.5%) mothers are master's holders, respectively. One hundred seventy-eight mothers were from a rural part of West Shoa, and 219 were from the urban part of West Shoa (Table 1).

Obstetric characteristics and preoperative factors of mothers who underwent caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022 (n = 397)

Of the total participants, 259 (65.2%) and 138 (34.8%) were multiparous and nulliparous, respectively. Two hundred eleven (53.1%) mothers were delivered on an elective basis, and 359 (90.4%) mothers were ASA class II. One hundred fifteen (15%) participants had preoperative anxiety, and 63 (15.9%) mothers had preoperative pain. Regarding previous caesarean section history, 173 (43.6%) participants had previous caesarean section history (Table 2).

Intraoperative anaesthesia and surgery-related characteristics of mothers who underwent caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022 (n = 397)

The duration of a caesarean section that took less than 45 min was 251 (63.2%). Twenty-eight (7.15) spinal anaesthesia

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Table 1

Socio-demographic characteristics of 397 mothers who underwent caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022.

Variable	Categories	Frequency	Percentage
Age	18–24	114	28.7%
	25–34	263	66.2%
	34–47	26	6.5%
Income	< 4000	37	9.7%
	4000–8000	91	22.9%
	> 8000	269	67.7%
BMI	18.5–24.9	181	45.6%
	25–34.9	213	53.7%
	> 35	3	0.76%
Marital status	Single	39	9.8%
	Married	352	91.2%
Educational status	No formal education	26	6.6%
	Read and write	108	27.2%
	Primary school	14	3.5%
	Secondary school	134	33.7%
	Diploma	22	5.5%
	Degree	87	21.9%
	Masters	6	1.5%
Residency	Rural	200	50.4%
	Urban	197	49.6%

procedures were performed with the addition of adjuvants, and pethidine was used in 13 (44.8%) of these procedures as an adjuvant. Regarding postoperative pain management, 129 (32.5%) mothers were managed by giving tramadol through an intravenous line (Table 3).

Incidence of postoperative severe acute pain in caesarean sections performed under spinal anaesthesia in West Shoa, Ethiopia, 2022

In this study, the total incidence of postoperative severe acute pain after spinal anaesthesia in the caesarean section was 50.4% [95% confidence interval (CI): 40.7, 60.1]. At the two time points, participants experienced comparable pain at T12 and T24. However, the proportion of pain was slightly higher at T24. On the other hand, the proportion of participants experiencing severe acute pain increased from 5% at T2 to 21.7% at T12 and increased to 23.7% at T24 hours (Fig. 2).

Table 2

Obstetric characteristics and preoperative factors of mothers who underwent caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022 ($n = 397$).

Variable	Categories	Frequency	Percentage
Classification of c/s	Elective	219	55.1%
	Emergency	189	44.9%
Preoperative anxiety	Yes	115	28.9%
	No	282	71.1%
Preoperative pain	Yes	200	50.4%
	No	197	49.6%
Previous c/s	Yes	227	57.2%
	No	225	42.8%
Preoperative analgesia	Yes	200	50.4%
	No	197	49.6%
Parity	Nulliparous	139	35%
	Multiparous	258	65%
Chronic illness	Yes	40	10%
	No	357	90%
ASA status	ASA II	289	72.8%
	ASA III	38	21.2%

ASA, American Society of Anesthesiology.

Table 3

Intraoperative anaesthesia and surgery-related characteristics of mothers who underwent caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022 ($n = 397$).

Variable	Categories	Frequency	Percentage
Use of adjuvants	Yes	200	50.4%
	No	197	49.6%
Type of incision	Midline	324	81.6%
	Transverse	73	20.4%
Duration of surgery	≤ 45 min	251	63.2%
	> 45 min	146	36.8%
Dose of bupivacaine	10 mg	153	38.7%
	12.5 mg	192	48.4%
	15 mg	52	13.9%
Supplementary drugs	Yes	200	50.4%
	No	197	49.6%
Systemic analgesia	Morphine	93	23.4%
	Diclofenac	59	14.9%
	Pethidine	83	20.9%
	Tramadol	129	32.5%
	Paracetamol	39	9.8%

Bivariable analysis of predictors of postoperative severe pain in mothers who underwent caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022

Preoperative anxiety, preoperative pain, type of incision, spinal anaesthesia without adjuvants and duration of surgery, classification of caesarean section, spinal anaesthesia without supplemental drug, and mothers who have chronic diseases were predictors of postoperative severe acute pain in caesarean sections performed under spinal anaesthesia on a bivariable analysis of Poisson regression with robust standard error (Table 4).

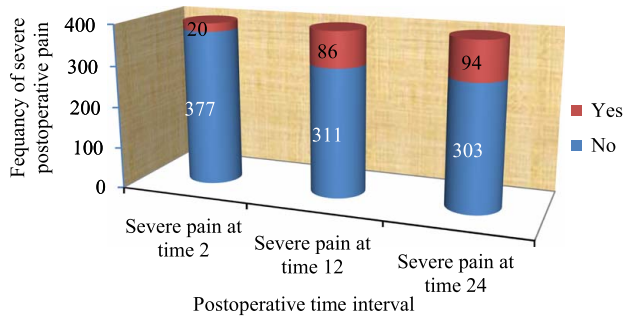


Figure 2. Incidence of postoperative severe acute pain within 24 h after caesarean sections performed under spinal anaesthesia at public hositals in West Shoa, 2022.

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Table 4

Bivariable analysis of predictors of postoperative severe pain in mothers who underwent caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022.

	Postoperative severe pain			
Variable	**Yes**	**No**	**CRR**	***P***
Age				
18–24	57	57	1	
25–34	127	136	0.98 (– 0.3–0.3)	0.94
34–47	16	10	1.23 (– 0.86–1.75)	0.46
Income				
< 4000	23	14	1	
4000–8000	46	45	0.81 (0.58–1.12)	0.41
> 8000	131	138	0.78 (0.59–1.0)	0.28
BMI				
18.5–24.9	88	93	1	
25–34.9	111	102	1.07 (0.87–1.30)	0.62
> 35	1	2	0.68 (0.13–3.42)	0.707
Marital status				
Single	19	20	1.21 (0.85–1.7)	0.28
Married	181	171	1	
Residency				
Rural	91	109	0.97 (0.8–1.18)	0.79
Urban	87	110	1	
Educational status				
No formal education	20	6	1	
Read and write	51	57	0.6 (0.45–0.8)	0.06
Primary school	8	6	0.74 (0.45–1.2)	0.47
Secondary school	68	66	0.65 (0.50–0.9)	0.102
Diploma	10	12	0.59 (0.35–0.97)	0.17
Degree	39	48	0.58 (0.42–0.79)	0.05
Masters	4	2	0.86 (0.47–1.58)	0.79
Classification of c/s				
Elective	99	120	1	
Emergency	108	77	1.4 (1.1–1.6)	0.003
Preoperative anxiety				
Yes	96	19	2.26 (1.9–2.7)	< 0.001
No	104	178	1	
Preoperative pain				
Yes	56	144	2.06 (1.7–2.4)	< 0.001
No	7	190	1	
Previous c/s				
Yes	89	138	.0.95 (0.78–1.2)	0.63
No	111	114	1	
Preoperative analgesia				
Yes	25	175	1	
No	19	178	0.87 (0.6–1.15)	0.33
Parity				
Nulliparous	67	72	1.21 (0.85–1.7)	0.27
Multiparous	131	127		
Chronic illness				
Yes	29	11	0.67 (0.53–0.82)	< 0.001
No	171	186	1	
ASA status				
ASA II	115	174	1	
ASA III	15	23	0.76 (0.51–1.15)	0.19
Use of adjuvants				
Yes	3	197	1	
No	25	172	4.9 (1.7–14)	0.003
Type of incision				
Midline	140	184	1	
Transverse	60	13	1.9 (1.6–2.24)	< 0.001
Duration of surgery				
≤ 45 min	96	155	1	
> 45 min	104	42	1.86 (1.5–2.3)	< 0.001
Dose of bupivacaine				
10 mg	88	65	0.26 (0.2–0.72)	0.262
12.5 mg	89	103	0.04 (0.42–0.5)	0.85
15 mg	23	29	1	
Supplementary drugs				
Yes	21	179	1	
No	10	187	0.7 (0.55–0.94)	0.016
Drug used for postoperative pain management				
Morphine	49	44	1	
Diclofenac	31	28	0.99 (0.7–1.34)	0.98
Pethidine	36	47	0.82 (0.6–1.13)	0.22
Tramadol	71	58	1.1 (0 8–1.3)	0.73
Paracetamol	13	20	0.74 (0.47–1.19)	0.22

ASA, American Society of Anesthesiology; CRR, crude risk ratio.

Multivariable analysis predicts severe postoperative acute pain after caesarean sections under spinal anaesthesia in West Shoa, Ethiopia, 2022 (n = 397)

In this study, the presence of preoperative anxiety was a predictor of postoperative severe acute pain than mothers without preoperative anxiety [adjusted risk ratio 1.7 (CI: 1.4–2.0) with a *P* value of <0.001). Mothers who had preoperative pain were predictors of postoperative severe acute pain [adjusted risk ratio 1.3 (CI: 1.0–1.48) with a *P* value of 0.015]. A transverse incision was a predictor of postoperative severe acute pain [adjusted risk ratio 11.3 (CI: 1.1–1.6) with a *P* value of 0.001]; spinal anaesthesia procedures without adjuvants was another predictor of postoperative severe acute pain [adjusted risk ratio 4.1(CI: 1.5–10.9) with a *P* value of 0.005]; and duration of the caesarean section which took more than 45 min was a predictor of postoperative severe acute pain in caesarean sections performed under spinal anaesthesia [adjusted risk ratio 1.5 (CI: 1.3–1.8) with a *P* value of <0.001] (Table 5).

Discussion

The prevention and management of pain after surgery have substantially improved, thanks to modern anaesthesiology. However, surgery patients' top concern is still postoperative pain[3]. Patient discomfort and decreased satisfaction may be caused by postoperative pain[4]. According to this study, the overall incidence of severe postoperative pain within 24 h of follow-up after caesarean section performed under spinal anaesthesia was 50.4% (95% CI: 40.7, 60.1), which is low compared to a 2016 study in South Africa, where the prevalence of moderate-to-severe postoperative pain was 85.5% of women; in addition to this, a cross-sectional study done in Hawasa, where the prevalence of pain was 89.8% of women undergoing caesarean section[34.] Moreover, in another cross-sectional study in Debre Tabor, the incidence of postoperative pain was 37.7% within 1 h and 76.7% 6 h after surgery[35,] and a cross-sectional study in Addis Ababa, where the incidence of acute postoperative pain was 76.2% of all participants[36]. This difference may be due

Table 5

Multivariable analysis of predictors of severe postoperative acute pain after caesarean section under spinal anaesthesia in West Shoa, Ethiopia, 2022 ($n = 397$).

		Postoperative severe pain				
Variable	**Classifications**	**Yes**	**No**	**CRR (95% CI)**	**ARR (95% CI)**	***P***
Preoperative anxiety	Yes	96	19	2.26 (1.9–2.7)	1.7 (1.4–2.0)	< 0.001
	No	104	178	1	1	
Preoperative pain	Yes	56	144	2.06 (1.7–2.4)	1.3 (1.0–1.48)	0.015
	No	7	190	1	1	
Classification of caesarean section	Elective	99	120	1	1	0.251
	Emergency	108	77	1.4 (1.1–1.6)	1.1 (0.93–1.32)	
Supplementary drugs	Yes	21	179	1	1	
	No	10	187	0.7 (0.55–0.94)	1.0 (0.75–1.4)	0.818
Chronic illness	Yes	29	11	0.67 (0.53–0.82)	0.8 (0.61–1.1)	0.092
	No	171	186	1	1	
Use of adjuvants	Yes	3	197	1	1	0.005
	No	25	172	4.9 (1.7–14)	4.1 (1.5–10.9)	
Dose of bupivacaine	10 mg	88	65	0.26 (0.2–0.72)	1.2 (0.87–1.6)	0.282
	12.5 mg	89	103	0.04 (0.42–0.5)	1.1 (0.79–1.4)	0.653
	15 mg	23	29	1	1	
Duration of surgery	≤ 45 min	96	155	1	1	< 0.001
	> 45 min	104	42	1.9 (1.6–2.24)	1.5 (1.3–1.8)	
Type of incision	Classical	140	184	1	1	0.001
	Transverse	60	13	1.9 (1.6–2.24)	1.3 (1.1–1.6)	

Key: 1 – reference group; ARR, adjusted risk ratio; CI, confidence interval; CRR, crude risk ratio.

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to the definition of postoperative acute pain in our case: postoperative acute pain is defined as an NRS score greater than 7, while former pain was defined as an NRS score greater than 4. However, the incidence of severe postoperative acute pain in this study was high compared to a prospective cohort study in which the incidence of severe postoperative acute pain in children was 15.8% of all participants[37]. Differences may be due to population differences, and differences may also be due to differences in postoperative pain assessment and management.

The incidence of severe acute postoperative pain in this study may be due to the insufficient assessment of pain intensity and failure to manage pain according to WHO guidelines, as a cross-sectional study in West Shoa shows that only (51.8%) of cases were assessed for pain. A pain intensity measure was used to assess pain within 48 h after surgery (46.3%) in patients who received a pain assessment within 48 h after surgery. A weak opioid (tramadol) is most often prescribed, followed by NSAIDs for postoperative analgesia, which do not meet the WHO guidelines[42]. And in contrast to this study, a descriptive correlational study reported an incidence of severe acute pain after caesarean section in 77% of all participants[43]. This may be due to the difference in study populations, as only our study population included caesarean sections performed under spinal anaesthesia.

In this study, preoperative anxiety predicted severe postoperative pain after a caesarean section was performed under spinal anaesthesia. This result was consistent with a prospective cohort study with 279 participants[44], which was an observational study conducted in northwestern Ethiopia.[45], with a cross-sectional study done in Addis Ababa[45,46]. This can be justified because the patient's preoperative anxiety level affects the perception of postoperative pain, and patients with high anxiety should be identified preoperatively to adjust pain management strategies[45–49].

In this study, mothers with preoperative pain were significant predictors of acute postoperative pain. This finding was consistent with a cross-sectional study conducted in Debre Tabor[46]. This can be justified by the fact that preoperative pain increases pain sensitivity and central sensitivity to postoperative pain[49]. Preoperative pain affects the course of postoperative pain[48]. In this study, we found that adding an adjuvant to spinal anaesthesia reduced severe acute pain after surgery. Similar results were found in a cross-sectional study in Brazil[18]. This can be explained by the fact that the addition of opioids prolongs the duration of analgesia and the effect of local anaesthetics[15]. This may be further explained because adjuvant drugs are administered with local anaesthesia to improve the latency, onset, and duration of local anaesthesia and reduce the side effects of local anaesthesia, according to a systematic review of postoperative pain management guidelines[38]. In this study, a caesarean section lasting more than 45 min increased the risk of postoperative pain by 1.9% compared to a section lasting less than 45 min. Our finding was consistent with a cross-sectional study conducted by Hawasa[35]. This may be due to increased tissue damage and internal organ manipulation (inflammation), which causes pain[2]. However, unlike this study, a prospective observational study in northwestern Ethiopia and another cross-sectional study from the University of Gonder[9] reported the duration of caesarean delivery as not predictive of postoperative pain. The most likely reason for this discrepancy may be due to differences in sample size and study design.

The results of this study showed that a transverse incision was associated with severe postoperative acute pain after caesarean section, which is comparable to an observational study in northwestern Ethiopia[47] and another cross-sectional study in Addis Ababa[45]. This could be explained as the nerve supply to the skin and subcutaneous tissue may be impacted by a transverse incision. Iliohypogastric and ilioinguinal nerve injuries can result from transection or entrapment in the pelvic region[5]. A future

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study should be done by considering all possible perioperative factors that may cause postoperative acute pain.

Conclusion and recommendation

Conclusion

In this study, the total incidence of postoperative severe acute pain was high. Preoperative anxiety, preoperative pain, spinal anaesthesia without adjuvant, and type of incision were predictors for postoperative acute pain in caesarean sections performed under spinal anaesthesia.

Recommendation

For healthcare providers

Consider postoperative pain intensity as a fifth vital sign using various pain rating scales, communicate with other integrated departments to ensure better control, and develop an overall plan to reduce the problem of pain prevalence. To the hospital management: since they are the most decisive people in the hospital, they must come up with a plan to manage this caesarean postoperative pain.

For researchers

We recommend researchers to carry out additional cohort studies on postoperative severe acute pain after caesarean sections performed under spinal anaesthesia.

Limitations of the study

Ethiopia does not have a national pain rating scale or pain score questionnaire. Very little literature needs to be discussed on this topic.

The size of the spinal needle, experience of anaesthetist, and the number of attempts to administer spinal anaesthesia were not considered in this study.

Ethical approval

Ethical approval was secured from Ambo University Referral Hospiatal Institutional Review Board. Ethical clearance was obtained from the College of Medicine and Health Science ethical clearance committee before the start of the study, and an official support letter was written to responsible personnel at each hospital to obtain permission for data collection.

Consent

Informed written consent was obtained from each voluntary participant for the study after giving full information about the use and importance of conducting the study.

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None. Self-sponsored.

Author contribution

All authors contributed to the design, conceptualisation, editing, and manuscript writing.

Conflicts of interest disclosure

There are no conflicts of interest.

Research registration unique identifying number (UIN)

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Guarantor

Zenebe Bekele.

Data availability statement

The data in this review are not sensitive in nature and are accessible in the public domain. The data are, therefore, available and not of a confidential nature.

Provenance and peer review

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