

The Effect of the Duration of the Mother-Newborn Stay after Caesarean Section on Maternal Pain and Satisfaction Level

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Abstract

Background: Mothers and newborns have an emotional need to be together. The study hospital continuously upgrades policies to promote bonding and minimize separation. Currently, three options are offered for a mother-newborn contact after Cesarean Section (CS): A brief bond immediately after birth (Regular); Partial contact until one hour newborn's age (Friendly); Continuous contact without separation (Gentle). **Aim:** The study aimed to assess how the duration of mother-newborn stay affects maternal pain and satisfaction. **Method:** Between August 2023 and July 2025, 62 women participated. Pain was measured by the Numeric Rating Scale (NRS): no pain (0); mild (1 - 3); moderate (4 - 7); severe (8 - 10). Satisfaction was assessed by the Comforts Scale Questionnaire, which evaluates provision of choice, nursing care, teaching maternal and newborn care, privacy, the physical environment, and confidence in newborn care. **Results:** The study found that more participants in a friendly stay reported a traumatic childbirth in the past. Women with academic education experienced less pain and were less confident in neonatal care. Participants in their first birth were less confident in neonatal care. Women in the gentle stay reported less pain compared to those in the friendly stay, and participants in the friendly stay reported less pain than those in the regular stay. An inverse relationship was found between pain levels and satisfaction with privacy, nursing care, physical environment, and overall satisfaction. **Conclusion:** The study highlights the importance of encouraging longer duration of mother-infant stay following cesarean section, which is associated with reduced pain, increased satisfaction with privacy, nursing care and physical conditions. Mothers with traumatic pregnancy history showed a higher demand for longer stay. Further research is needed to clarify the relationship between education and pain and satisfaction levels.

Keywords

Bonding, Childbirth, Mother-Newborn Together Stay, Satisfaction, Pain Level

1. Introduction

Mothers and newborns have an emotional and physiological need to be together from the moment of birth and during the hours and days that follow. Keeping mothers and newborns together is a safe and healthy birth practice. Routine separation of healthy mothers and newborns is harmful and negatively affects short- and long-term health outcomes and breastfeeding success [1]. The quality of the early parent-infant relationship is crucial for the child's optimal development, and parental sensitivity plays a key role in early interactions [2] [3]. The practice of separating mother and newborn is unique to the twentieth century and deviates from evolutionary history, where newborn survival depended on close and continuous maternal contact [4].

Therefore, the policies at the study Medical Center change from year to year in favor of the mother-newborn bond and reducing separation between them as much as possible, not only after normal birth, but also after cesarean sections. Today, there are three options at the study Medical Center for mother-newborn stay after cesarean section, according to the woman's wishes: 1) A short stay together immediately after birth at the operating room; 2) Partial stay together in the recovery unit up to the newborn's one hour; 3) Full stay together of the newborn with his mother without any separation at all. It was important to examine whether mother-newborn reunion after a cesarean section always has a positive effect and what is the optimal type of the mother-newborn together stay with regard to additional factors related to cesarean section, such as the level of pain and the satisfaction of the mother after a cesarean section?

One of the factors that can adversely affect the bond between mother and newborn is post-operative pain following a cesarean section [5]. Such pain may significantly hinder the recovery process for surgical patients, delaying both their overall recuperation and the resumption of daily activities [5]. Early recovery is particularly crucial for mothers, as they are required to care for their newborn soon after the procedure. Moreover, pain following a cesarean section is often linked to the development of chronic pain and post-traumatic stress disorder in women after surgery [5]. Effective interventions for post-operative pain relief among postpartum woman can enhance their quality of life and hold critical clinical importance [6]. A woman who chooses to stay with her baby (partial or no separation at all) from the moment of the cesarean birth should be kept comfortable in terms of pain, it was important to check whether the length of time spent with the baby immediately after surgery could be one of the factors that increases or decreases pain. What is the optimal duration of time of the mother-newborn together stay

among the three options available at the study hospital (Regular CS; Friendly CS; Gentle CS)?

In recent years, there has been a raised awareness among teams of the positive impact of early interaction between mother and newborn on the birth experience and the satisfaction of the mother. Early mother-newborn contact plays an important role in improving the satisfaction level, breastfeeding encouragement and preventing signs of post-partum depression and anxiety [7]-[9]. There is increasing interest in adopting family-friendly or gentle protocols for women having cesarean birth [10]. Determining the cesarean delivery care satisfaction level and identifying its determinants is important to strengthen the existing strategies [11]. Accordingly, the strategy of providing different options for mother-newborn stays together after a cesarean section is expected to improve the satisfaction of mothers. In addition, it is important to adapt the type of stay to different patient preferences.

The aim of this study was to assess the effect of the duration of the mother and newborn together stay after cesarean section (Regular CS; Friendly CS; Gentle CS) on the maternal pain and satisfaction level.

2. Research Design and Methodology

2.1. Study Design

This is a comparative cohort study with quantitative methodology exploring maternal pain and satisfaction level. This study was conducted in the Recovery Unit of the Gynecological Operating Room of the study Medical Center from August 2023 to July 2025.

2.2. Sample and Sampling Method

Convenience sampling was applied to recruit obstetrics after an elective caesarean section under spinal anesthesia with a normal singleton pregnancy and gestational age between 37 + 0 to 41 + 6 weeks. The sample included women who had had their first to third caesarean section with proper surgical procedure and post-surgical period without complications. All participants were without any background diagnoses or factors that could affect the level of pain. All participants were instructed about post-operative analgesic protocol. Only women who received treatment according to the existing pain protocol and didn't avoid analgesic treatment were included in the study.

At the beginning of the process, eighty-six women pre-surgery were recruited to the study, of whom sixty-two ultimately completed the study and filled out questionnaires after surgery.

2.3. Study Variables

2.3.1. Independent Variables

Socio-demographic factors of the mother

Age

Education

Marital status

Obstetric history

A traumatic event related to pregnancy or childbirth in the past

Duration of the mother-newborn together stay

There are several categories for independent variables:

Regular caesarean section. It is a short mother-newborn together stay during 5 - 10 minutes in the operating room and then transition of newborn to the neonatal ward by midwife.

Friendly caesarean section. Newborn stays with mother up to the one-hour post-birth and then transferred to the neonatal ward by midwife (duration of mother-newborn together stay in the recovery unit 30 - 40 min).

Gentle caesarean section. Newborn stays with his mother from the moment of birth continuously without separation and admission of a newborn done in the recovery unit by the newborn ward nurse.

(Duration of mother-newborn together stay is 2 hours.)

Participants chose their preferred mother-newborn stay (Regular, Friendly, or Gentle) during their pre-operative preparation, one day prior to the surgery. Their choice determined the recovery team's composition and responsibilities. In Regular and Friendly stays, the midwife is responsible for the initial newborn examination and the subsequent transfer to the neonatal ward for admission. In the Friendly stay, the newborn is under the recovery nurse's care until one hour of age, followed by transfer to the neonatal ward. The gentle stay requires an additional neonatal nurse on the recovery team who performs the newborn's admission close to the mother.

2.3.2. Dependent Variables

Pain level

The pain level after surgery was measured by the Numeric Rating Scale (NRS) [12].

Satisfaction

The satisfaction was measured by the Comforts Scale Questionnaire [13].

2.4. Data Collection Tools

2.4.1. Socio-Demographic Data Collection Tool

Socio-demographic questionnaire included age, education, marital status, obstetric history of the mother and presence of a traumatic event related to pregnancy or childbirth in the past in the anamnesis.

The measure of a traumatic event related to pregnancy or childbirth was included in the socio-demographic questionnaire. Participants provided a binary (Yes/No) response to indicate whether they had experienced such an event. It was clarified to the participants that this could refer to a single event or a series of events—such as bleeding, miscarriages, prolonged fertility treatments, or stillbirths—provided that the participant themselves subjectively defined the experience as traumatic. The primary emphasis of this measure was the participant's individual perception

of the event as a trauma.

2.4.2. Pain Level Data Collection Tool

Numeric Rating Scale (NRS) is a pain assessment scale used at the recovery ward and maternity ward. It is an 11-point numerical scale where 0 represents “no pain” and 10 represents “the worst pain imaginable” [12]. At Sheba Hospital, this scale is converted into a variable order with 4 levels: level 0 “no pain”; level 1 - 3 “mild pain”; level 4 - 7 “moderate pain”; level 8 - 10 “severe pain”. The important difference starts from pain level 4 - 7 and stronger because this pain level already requires treatment by the analgesic drugs. The NRS Scale Data was taken from the participant’s computerized records: five times at recovery ward, every thirty minutes and nine times at maternity ward, three times a day.

Pain protocol

Post-operative, recovery ward

- SOS Intravenous Pethidine 25 - 50 mg, min interval 15 minute, max. dose 100 mg.
- SOS Intravenous Morphine 5 - 10 mg, min interval 15 minute, max. dose 15mg.
- SOS Intravenous Paracetamol 1 g, min. interval 6 hours, max. dose 2 g/day.
- SOS Intravenous Dipyron 1 g, min interval 6 hours, max. dose 4 g/day.
- SOS Intravenous Ketorolac 30 mg, min. interval 8 hours, max. 3 times/day.

Post-operative, maternity ward

- SOS Intravenous Morphine 5 mg, min. interval 6 hours max. times 2/day.
- SOS Intravenous/Oral Paracetamol 1 g, min. interval 6 hours, max. dose 2 g/day.
- SOS Intravenous/Oral Dipyron 1 g, min interval 6 hours, max. dose 4 g/day.
- SOS Oral Ibuprofen 400 mg, min. interval 8 hours, max. dose 1200 mg/day.

Analgesic consumption was highly variable due to differences in pain thresholds among participants. As per routine ward round, patients who declined analgesics or had treatment limitations for other reasons were documented in nursing reports. Typically involving a combination of opioids and other drug classes. The main focus for study participation was the non-refusal of analgesics. The Numerical Rating Scale (NRS) was selected as the primary pain measure, as it ultimately provides the most reliable reflection of the participants’ subjective pain experience.

Primary endpoint for the pain variable. The proportion of women in the Gentle stay group reporting “no pain” (0) or “mild pain” (1 - 3) will be at least 20% higher compared to women in the Friendly and Regular stay across all pain assessments.

Secondary endpoint for the pain variable. The proportion of women in the Friendly stay group reporting “no pain” (0) or “mild pain” (1 - 3) will be at least 20% higher compared to women in the Regular stay group in their pain assessments in the recovery ward.

2.4.3. Satisfaction Data Collection Tool

The satisfaction was measured by the Comforts Scale questionnaire. A principal

components and reliability analysis of the tool demonstrated internal consistency using Cronbach's Alpha score of 0.7. The questionnaire was adapted for Hebrew-speaking women by structured translation process. The Cronbach's Alpha of the translated version was 0.92. The satisfaction data was collected by the Comforts Scale questionnaire for 72 hours of post-surgery. The answers to the questions are recorded using a Likert scale from 1 to 5. The questionnaire consists of six dimensions: "Confidence in newborn care"—ten questions (Cronbach's Alpha 0.91), "Nursing care after birth/surgery"—eight questions (Cronbach's Alpha 0.88), "Provision of Choice"—seven questions (Cronbach's Alpha 0.91), "Physical Environment"—seven questions (Cronbach's Alpha 0.83), "Respect for Privacy"—five questions (Cronbach's Alpha 0.82), "Nursing care during childbirth/surgery"—three questions (Cronbach's Alpha 0.82).

Primary endpoint regarding the satisfaction variable. Women in the Gentle group will have a satisfaction variable score at least 10 points higher, based on means, than subjects in the Friendly and Regular groups in all dimensions of the questionnaire and across all stages of the study.

Secondary endpoint regarding the satisfaction variable. Participants in the Friendly stay will have a satisfaction variable score at least 5 points higher, based on means, than subjects in the Regular stay in all dimensions of the questionnaire and across all stages of the study.

3. Results

In the study, from August 2023 to July 2025, data were collected from 62 hospitalized women after planned Cesarean Section: 33 (53.2%) in a Regular stay, 12 (19.4%) in a Friendly stay and 17 (27.4%) in a Gentle stay.

3.1. Socio-Demographic Data Analysis

A statistically significant difference ($P = 0.019$) was found between participants in a friendly stay and participants in a regular stay with regard to a traumatic event related to pregnancy and childbirth in the past. 75% of participants in a friendly stay reported a traumatic event related to pregnancy and childbirth in the past, compared to 33.3% of participants in a regular stay (**Table 1, Figure 1**).

Table 1. Socio-demographic data.

		Type of stay		
		Regular	Friendly	Gentle
Age	35 and younger	16 (48.5%)	5 (41.7%)	12 (70.6%)
	Above 35	17 (51.5%)	7 (58.3%)	5 (29.4%)
Education level	Academic	10 (30.3%)	3 (25.0%)	3 (17.6%)
	Nonacademic	23 (69.7%)	9 (75.0%)	14 (82.4%)
Family status	Stable partnership	31 (93.9%)	11 (91.7%)	15 (88.2%)
	Not in stable partnership	2 (6.1%)	1 (8.3%)	2 (11.8%)

Continued

Pregnancy number	First	9 (27.3%)	3 (25.0%)	3 (17.6%)
	Second	9 (27.3%)	1 (8.3%)	7 (41.2%)
	Third	6 (18.2%)	5 (41.7%)	5 (29.4%)
	Fourth and more	9 (27.3%)	3 (25.0%)	2 (11.8%)
Birth number	First	11 (33.3%)	3 (25.0%)	4 (23.5%)
	Second	10 (30.3%)	3 (25.0%)	11 (64.7%)
	Third	12 (36.4%)	6 (50.0%)	2 (11.8%)
Caesarean section number	First	16 (48.5%)	3 (25.0%)	7 (41.2%)
	Second	8 (24.2%)	5 (41.7%)	10 (58.8%)
	Third	9 (27.3%)	4 (33.3%)	0 (0%)
Traumatic event in the past*	Yes	11 (33.3%)	9 (75.0%)	8 (47.1%)
	No	22 (66.7%)	3 (25.0%)	9 (52.9%)

*Fisher's Exact Test: regular vs friendly Pv = 0.019, regular vs no-separation Pv = 0.373, friendly vs gentle Pv = 0.251.

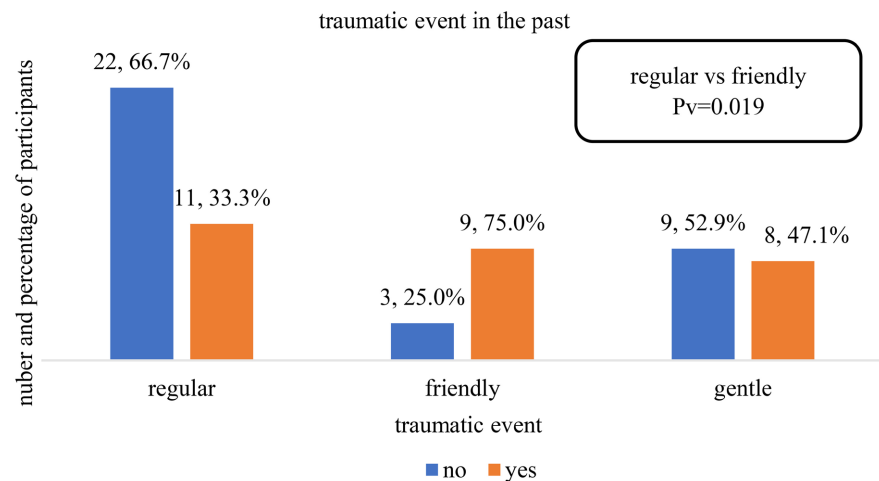


Figure 1. Traumatic event in the past.

3.2. Pain Level Analysis

3.2.1. Pain Level in Relation to Socio-Demographic Data

A statistically significant difference ($P = 0.002$) was found in the pain level at the fifth measurement in the Maternity Ward (ninth measurement out of fourteen) in relation to education background. The participant rate with no pain (0) or with mild pain (1 - 3) was higher among women with an academic education (87%) compared to participants with no academic education (50%) (Table 2, Figure 2).

A statistically significant difference ($P = 0.021$) was found in the pain index at the fifth measurement in the Maternity Ward (ninth measurement out of fourteen) in relation to number of births. More participants in their third and higher births reported moderate pain (4 - 7) (45%) compared to participants after their first birth (11.1%) and compared to participants in their second birth (12%) (Table 3, Figure 3).

Table 2. Pain level in relation to education level at the fifth measurement in the maternity ward.

Measurement 9-th (5-th in the maternity ward)		
Education level	Pain level	
	Without - mild pain	Moderate - severe pain
Nonacademic	8 (50.0%)	8 (50.0%)
Academic	40 (87.0%)	6 (13.0%)

χ^2 (Chi-square) test, Pv = 0.002.

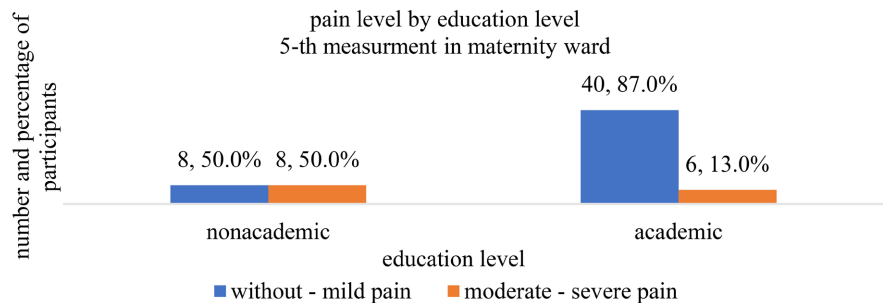


Figure 2. Pain level in relation to education level at the fifth measurement in the maternity ward.

Table 3. Pain level in relation to number of births at the fifth measurement in the maternity ward.

Measurement 9-th (5-th in the maternity ward)		
Birth number	Pain level	
	Without - mild pain	Moderate - severe pain
First	16 (88.9%)	2 (11.1%)
Second	21 (87.5%)	3 (12.5%)
Third and above	11 (55.0%)	9 (45.0%)

Fisher's Exact Test: 1-st vs 2-nd Pv = 0.999, 1-st vs 3-rd Pv = 0.033, 2-nd vs 3-rd Pv = 0.021.

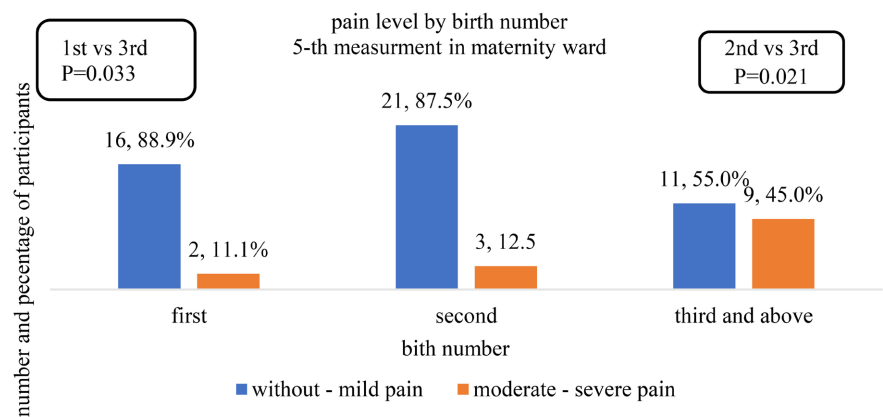


Figure 3. Pain level in related to number of births at the fifth measurement in the maternity ward.

3.2.2. Pain Level in Relation to Type of Stay

Regarding the primary endpoint, the Pain variable showed clinically and statistically significant differences (over 20%) ($P = 0.011$) in the fifth measurement in the Maternity Ward (ninth measurement out of fourteen) between the women with the Friendly stay and the Gentle stay—in the Friendly stay, 50.0% of the participants were without pain (0) or with mild pain (1 - 3), and in the Gentle stay, the rate of participants without pain (0) or with mild pain (1 - 3) was 94.1% (Table 4, Figure 4).

Table 4. Fifth pain measurement in the maternity ward in relation to type of stay.

Type of stay	Measurement 9-th (5-th in the maternity ward)	
	Pain level	
	Without - mild pain	Moderate - severe pain
General	26 (78.8%)	7 (21.2%)
Friendly	6 (50.0%)	6 (50.0%)
Gentle	16 (94.1%)	1 (5.9%)

Fisher's Exact Test: regular vs friendly $P_v = 0.077$, regular vs gentle $P_v = 0.237$, friendly vs gentle $P_v = 0.011$.

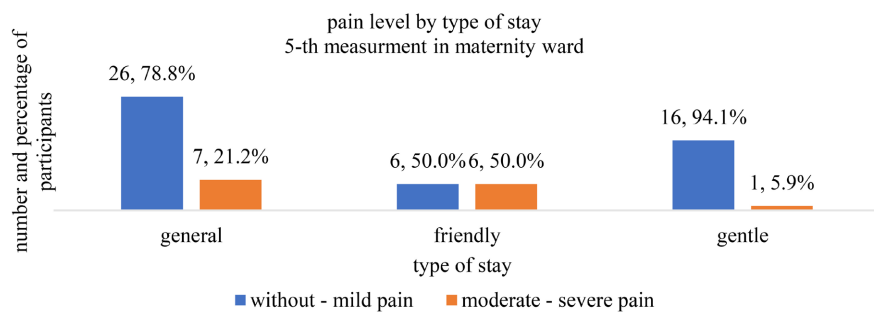


Figure 4. Fifth pain measurement in the maternity ward in relation to type of stay.

Table 5. Eighth pain measurement in the maternity ward in relation to type of stay.

Type of stay	Measurement 12-th (8-th in the maternity ward)	
	Pain level	
	Without - mild pain	Moderate - severe pain
General	23 (69.7%)	10 (30.3%)
Friendly	12 (100%)	0 (0%)
Gentle	14 (82.4%)	3 (17.6%)

Fisher's Exact Test: regular vs friendly $P_v = 0.042$, regular vs gentle $P_v = 0.499$, friendly vs gentle $P_v = 0.246$.

Regarding the primary endpoint, the Pain variable showed an additional clinically and statistically significant difference (over 20%) ($P = 0.042$) in the eighth measurement in the Maternity Ward (measurement twelve out of fourteen) be-

tween the participants in a Regular stay and the participants in a Friendly stay. In the Regular stay 69.7% of the participants were without pain (0) or with mild pain (1 - 3), compared to 100% of the participants in the Friendly stay who were without pain (0) or with mild pain (1 - 3) (Table 5, Figure 5).

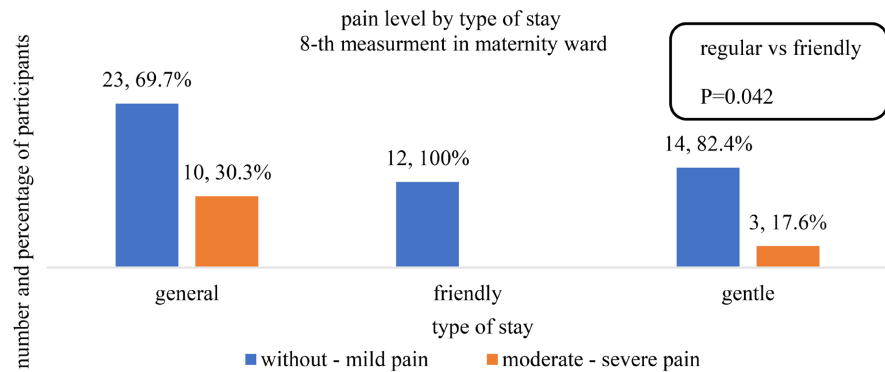


Figure 5. Eighth pain measurement in the maternity ward in relation to type of stay.

3.3. Satisfaction Analysis

A statistically significant difference ($P = 0.032$) was found in the category of “Confidence in newborn care” in relation to the education level. Participants with an academic education were less confident in neonatal care ($\mu = 42.13$, $ST = 4.75$) compared to participants with a nonacademic education ($\mu = 45$, $ST = 3.67$) (Table 6).

Table 6. Confidence in newborn care in relation to education level.

	Education level		Mean difference [95%CI]
	Nonacademic	Academic	
	N = 16	N = 46	
	μ (ST)	μ (ST)	
Confidence in newborn care	45.00 (3.67)	42.13 (4.75)	2.87 [0.25, 5.49]

Independent sample T-test, $P_v = 0.032$.

Table 7. Confidence in newborn care in relation to pregnancy number.

	Pregnancy number			
	1-st	2-nd	3-rd	4-th
	N = 15	N = 17	N = 16	N = 14
	μ (ST)	μ (ST)	μ (ST)	μ (ST)
Confidence in newborn care	40.27 (5.43)	43.00 (4.94)	42.56 (3.74)	45.86 (2.41)

One-way ANOVA $P_v = 0.011$, Post hock scheffe first vs fourth $P_v = 0.011$ with mean difference 5.59, 95%CI [1.19, 9.99].

A statistically significant difference ($P = 0.011$) was found in the category of

“Confidence in newborn care” in relation to the pregnancy number. Participants in their first pregnancy were less confident in neonatal care ($\mu = 40.27$, $ST = 5.43$) compared to participants in their fourth pregnancy ($\mu = 45.86$, $ST = 2.41$) (Table 7).

A statistically significant difference was found in the category of “Confidence in newborn care” in relation to the birth number. Participants in their first birth were less confident in neonatal care ($\mu = 40.28$, $ST = 5.12$) compared to participants in their second birth ($\mu = 43.92$, $ST = 4.28$) ($P = 0.036$) and compared to participants in their third birth ($\mu = 43.95$, $ST = 3.83$) ($P = 0.044$) (Table 8, Figure 6).

Table 8. Confidence in newborn care in relation to birth number.

	Birth number		
	1-st	2-nd	3-rd
	N = 20	N = 24	N = 18
	μ (ST)	μ (ST)	μ (ST)
Confidence in newborn care	40.28 (5.12)	43.92 (4.28)	43.95 (3.83)

One-way ANOVA, $P_v = 0.017$; Post hock scheffe: first vs second $P_v = 0.036$ with mean difference 3.64, 95%CI [0.19, 7.99], first vs third $P_v = 0.044$ with mean difference 3.67, 95%CI [0.08, 7.27].

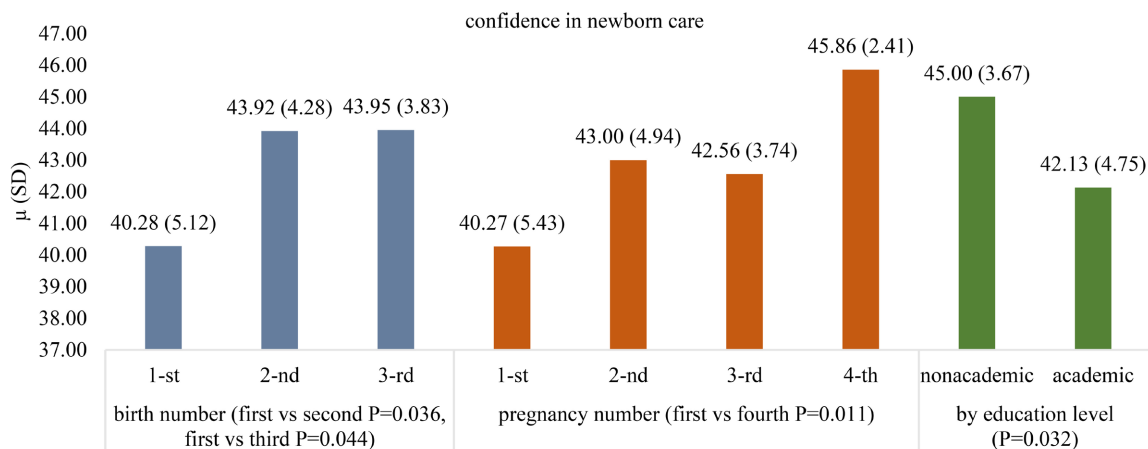


Figure 6. Confidence in newborn care in relation to education level, pregnancy number, and birth number among all participants.

Satisfaction in Relation to Pain Level

A statistically significant difference was found in satisfaction with privacy was higher in participants without pain or with mild pain compared to participants with moderate pain in the fourth measurement in the Recovery ward care ($\mu = 23.77$, $ST = 0.35$) versus ($\mu = 21.87$, $ST = 3.25$) ($P = 0.050$) and in the eighth measurement in the Maternity Ward ($\mu = 23.65$, $ST = 2.54$) versus ($\mu = 22.00$, $ST = 3.03$) ($P = 0.049$) (Table 9, Figure 7).

A statistically significant difference ($P = 0.049$) was found in satisfaction with

nursing care during childbirth/surgery which was higher in patients without pain or with mild pain ($\mu = 13.80$, $ST = 2.28$) compared to participants with moderate pain ($\mu = 12.48$, $ST = 2.79$) in the first measurement in the Maternity Ward (**Table 10**).

Table 9. Satisfaction with privacy in relation to pain level.

		Pain level		Mean difference [95%CI]
		Without - mild	Moderate	
		N, μ (ST)	N, μ (ST)	
Satisfaction with privacy	4-th measurement in recovery ward	47, 23.77 (0.35)	15, 21.87 (3.25)	1.9 [0, 3.80]
	8-th measurement in maternity ward	49, 23.65 (2.54)	13, 22.00 (3.03)	1.65 [0, 3.30]

Independent sample T-test: 4-th measurement in recovery ward $P_v = 0.05$, 8-th measurement in maternity ward $P_v = 0.049$.

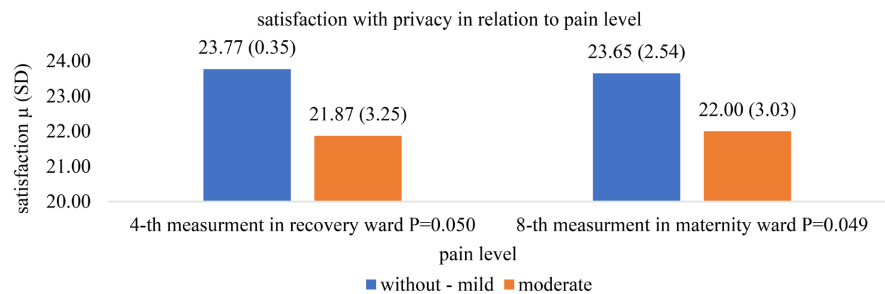


Figure 7. Satisfaction with privacy in relation to pain level.

Table 10. Satisfaction with nursing care during childbirth/surgery in relation to pain level.

		Pain level		Mean difference [95%CI]
		Without - mild	Moderate	
		N = 41 μ (ST)	N = 21 μ (ST)	
Satisfaction with labor and delivery nursing care	1-st measurement in maternity ward	13.80 (2.28)	12.48 (2.79)	1.33 [0.01, 2.65]

Independent sample T-test, $P_v = 0.049$.

A statistically significant difference ($P = 0.029$) was found in satisfaction with physical environment, which was higher in patients without pain or with mild pain ($\mu = 29.53$, $ST = 4.30$) compared to participants with moderate pain ($\mu = 24.92$, $ST = 6.51$) in the 7-th measurement in the Maternity Ward (**Table 11**, **Figure 8**).

A statistically significant difference was found in overall satisfaction score which was higher in participants without pain or with mild pain compared to participants with moderate pain in the seventh ($\mu = 171.78$, $ST = 17.88$) versus ($\mu = 160.00$, $ST = 20.00$) ($P = 0.044$) and the eighth ($\mu = 171.94$, $ST = 16.85$) versus ($\mu =$

159.38, ST = 22.95) (P = 0.031) measurements in the Maternity Ward (**Table 12, Figure 9**).

Table 11. Satisfaction with physical environment in relation to pain level.

	Pain level		Mean difference [95%CI]
	Without - mild	Moderate	
	N = 49	N = 13	
	μ (ST)	μ (ST)	
Satisfaction with 7-th measurement physical environment in maternity ward	29.53 (4.30)	24.92 (6.51)	4.51 [0.54, 8.68]

Independent sample T-test Pv = 0.029.

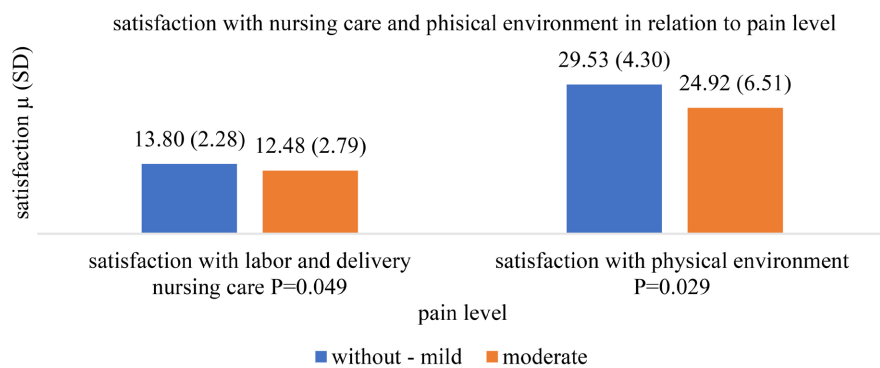


Figure 8. Satisfaction with nursing care during childbirth/surgery and physical environment in relation to pain level.

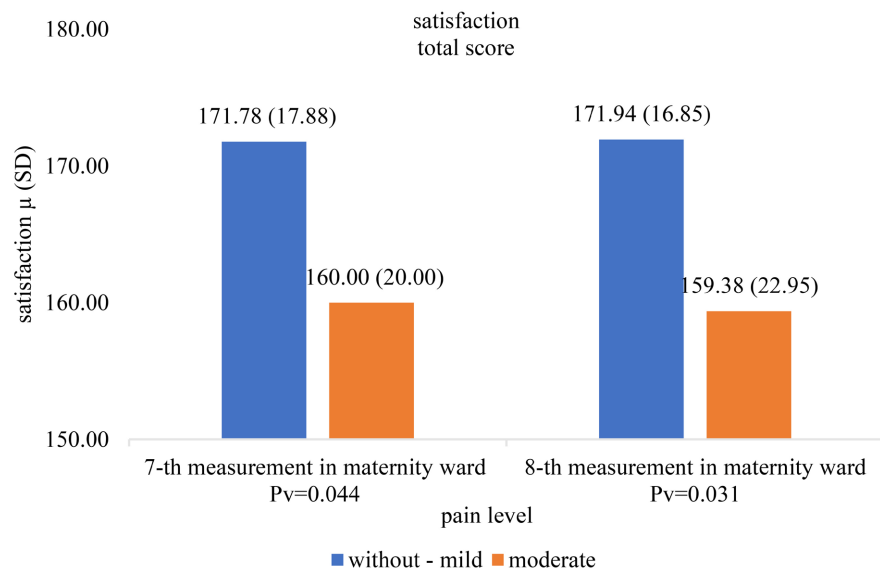


Figure 9. Overall satisfaction score, fourth measurement in the recovery ward and eighth score in the maternity ward.

A statistically significant difference was found in satisfaction with physical environment which was higher in patients with the Regular stay ($\mu = 30.06$, ST =

4.33) compared to the participants with the Friendly stay ($\mu = 26.58$, $ST = 5.35$) ($P = 0.042$) and Gentle stay ($\mu = 27.06$, $ST = 5.80$) ($P = 0.047$) (Table 13, Figure 10).

Table 12. Overall satisfaction score in relation to pain level.

		Pain level		Mean difference [95%CI]
		Without - mild N = 49 μ (ST)	Moderate N = 13 μ (ST)	
Satisfaction total score	7-th measurement in maternity ward	171.78 (17.88)	160.00 (20.00)	1.78 [-1.10, 4.67]
	8-th measurement in ward	171.94 (16.85)	159.38 (22.95)	12.55 [1.18, 23.93]

Independent sample T-test: 7-th measurement in maternity ward $P_v = 0.044$, 8-th measurement in maternity ward $P_v = 0.031$.

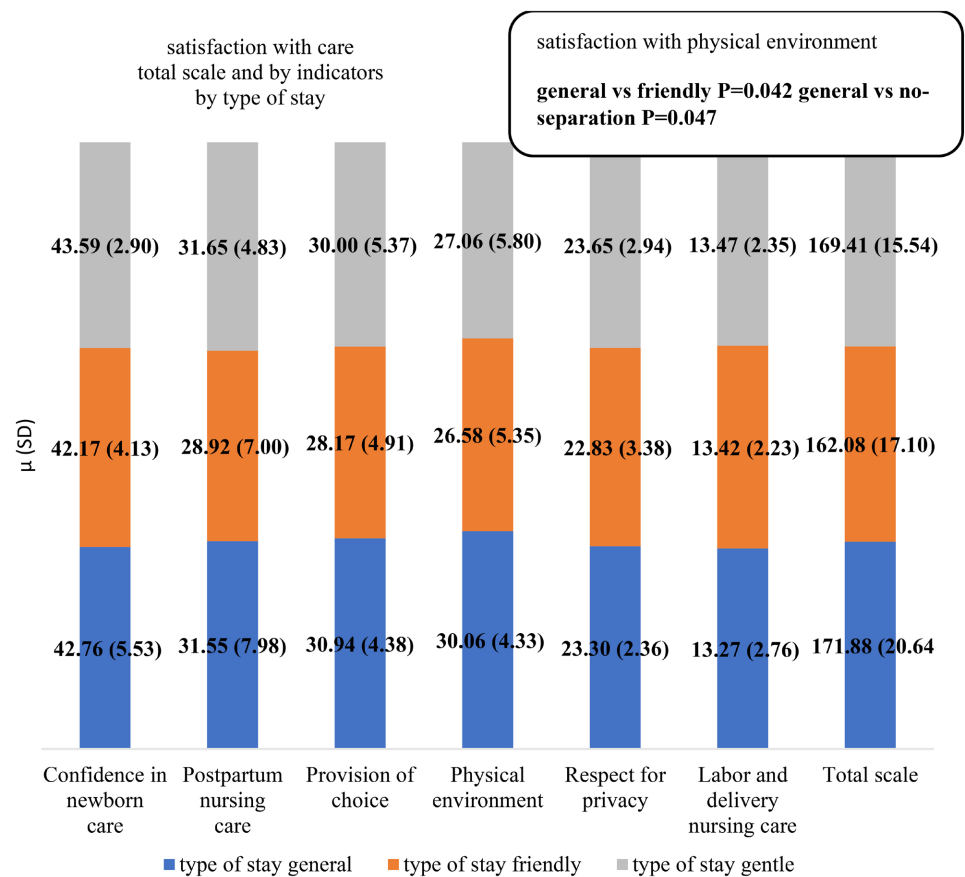


Figure 10. Satisfaction—overall score and by statements in relation to type of stay.

Based on the above data, it can be concluded that the findings regarding the satisfaction variable, despite their statistical significance, were small compared to the research hypotheses and did not reach the differences determined regarding the study’s secondary endpoint.

Table 13. Satisfaction—overall score and by statements in relation to type of stay.

Satisfaction indicator	Type of stay			
	Total	Regular	Friendly	Gentle
	N = 62 μ (SD)	N = 33 μ (ST)	N = 12 μ (ST)	N = 17 μ (ST)
Confidence in newborn care	42.87 (4.65)	42.76 (5.53)	42.17 (4.13)	43.59 (2.90)
Post-partum nursing care	31.06 (7.04)	31.55 (7.98)	28.92 (7.00)	31.65 (4.83)
Provision of choice	30.15 (4.81)	30.94 (4.38)	28.17 (4.91)	30.00 (5.37)
Physical environment*	28.56 (5.14)	30.06 (4.33)	26.58 (5.35)	27.06 (5.80)
Respect for privacy	23.31 (2.71)	23.30 (2.36)	22.83 (3.38)	23.65 (2.94)
Labor and delivery nursing care	13.35 (2.52)	13.27 (2.76)	13.42 (2.23)	13.47 (2.35)
Total scale	169.31 (18.80)	171.88 (20.64)	162.08 (17.10)	169.41 (15.54)

*Physical environment: one-way ANOVA, $P_v = 0.046$; Post hoc LSD: regular vs friendly $P_v = 0.042$ with mean difference 3.48, 95%CI [0.13, 6.83], regular vs gentle $P_v = 0.047$ with mean difference 3.0, 95%CI [0.04, 5.97].

4. Discussion

The present study aimed to examine pain level and patient satisfaction among hospitalized women after planned cesarean section, comparing different types of stay—regular, friendly, and gentle in relation to socio-demographic characteristics. The main findings revealed significant associations between type of stay and previous traumatic birth experiences, as well as differences in pain level and satisfaction with nursing care and physical environment. Women in the Friendly stay reported a higher prevalence of past traumatic pregnancy or childbirth, and demonstrated better pain control and overall satisfaction score compared to those in the Regular stay. Additionally, confidence in newborn care was lower among mothers experiencing their first birth and first cesarean section. Pain level was inversely associated with satisfaction across several domains, like satisfaction with privacy, satisfaction with nursing care during childbirth/surgery, satisfaction with physical environment and overall satisfaction score.

Recent literature emphasizes the crucial role of effective pain management and supportive environments in enhancing maternal outcomes following cesarean delivery [14] [15]. The evidence supports the current study findings that link effective pain control to several aspects of satisfaction.

The findings of the study indicate that the personalized type of stay has a positive effect on the level of pain. The evidence also supports the findings about increased pain levels after repeated cesarean section [16]. It can be concluded that the hypothesis that there is a significant relationship between the duration of mother-newborn together stay and the level of pain after cesarean section was confirmed overall. In addition, these findings achieved the study's primary endpoint, thereby highlighting their clinical significance.

Furthermore, women who have experienced traumatic pregnancy and childbirth

come to birth with the expectation of more personalized and considerate care and desire a friendly stay. The results align with recent evidence suggesting that person-centered supportive care in general and specifically gentle and friendly cesarean birth contribute to improved pain management, greater satisfaction with care, and increased maternal confidence [17]-[19].

Confidence in newborn care, which constitutes as aspect of maternal satisfaction, was found to be higher among women with previous childbirth experience. Consistent with prior research, primiparous mothers tended to have lower confidence and were more likely to make mistakes in neonatal care compared to multiparous mothers [20].

Nevertheless, the lower satisfaction scores related to the physical environment among women in the friendly and gentle stay were opposite to the findings in professional sources, showing that women with mother/baby care stay had a greater proportion of positive perceptions than women with other care modalities [21]. In the other side, evidence reveals a significant gap between women's birth plan expectations and post-partum experiences [22]. It can be assumed that women who decide to improve their birth experience by Friendly CS and Gentle CS express a desire for better physical conditions because of their high early expectations, regarding the service level of healthcare system and there is a gap between their expectations and really level of service. The hypothesis that there is a significant relationship between the duration of mother-newborn together stay and the mother's satisfaction after cesarean section wasn't confirmed and did not reach the differences determined regarding the study's secondary endpoint. But the fact that women who experienced a traumatic event related to pregnancy or childbirth choose a friendly stay indicates the need to explore the aspects and reasons that lead them to make this specific choice.

The study findings regarding mother's education contradicted the evidence. For example, it was found that women with higher education had less pain after cesarean section, while other researchers pointed to the opposite findings and their increased use of painkillers [23] or found education as a factor that does not affect pain at all [24]. It was also found that more educated mothers were less successful in confidence in newborn care, but professional sources report the great success of various education programs [25]-[27] and positive effect of a higher level of education on the newborn care knowledge and skills [28] [29]. Further studies could likely be able to clarify the differences in the evidence from the various studies.

Preventing separation between mother and newborn after cesarean section is essential, and developing interventions to achieve this goal also reveals additional aspects that could help in understanding the unique needs of a woman in cesarean labor and thus make the post-operative procedure as similar as possible to the mother-newborn interaction of a normal vaginal delivery.

5. Limitations

The current study had several limitations that could impact the understanding of

the findings.

The small number of participants was related to changes in pain management protocols in maternity wards and the study couldn't be continued due to this limitation. The representative sample may affect the generalizability of the results to a wider population and it is expected that the pain and satisfaction measures were not fully assessed because of the sample size. The sample size limitation may also explain the significance of the findings only in the point measures of pain level and certain aspects of satisfaction and not comprehensive tendencies.

Although multivariate analysis is the gold standard for analyzing outcomes with multiple variables, the too small sample size does not allow it to be performed. To address this limitation and to identify any consistent patterns or differences, we conducted comparisons of pain level and satisfaction against all background measures. The only differences that were found are reported and as can be seen from those results, no consistent differences were found.

The study's non-randomized design and the participants' self-selection of the stay type may introduce selection bias, as participants' preferences could reflect underlying baseline differences. This limits the ability to establish a definitive causal relationship between the chosen type of stay and the study outcomes.

Another limitation has a mental and psychological component and relates to hormonal changes in the woman around childbirth that can affect mood. A direct relationship was found between the level of pain and the well-known phenomenon of baby blues [30] and a positive correlation was found between the level of pain and testosterone levels after childbirth [31]. Therefore, the levels of pain and satisfaction of women who experienced similar phenomena could vary to some extent.

6. Conclusions

This study highlights the importance of promoting nursing projects that are designed to prevent mother-infant separation, especially following cesarean section.

Encouraging mother-newborn together stay promotes emotional bonding from the first meeting with the baby and thereby positively impacts maternal outcomes post-surgery.

The findings emphasize the importance of the duration of mother-newborn bonding after a cesarean section, which has been associated with reduced pain levels for women after cesarean delivery and, in turn, enhances satisfaction with various aspects of their birthing experience—satisfaction with privacy, nursing care and physical conditions.

In addition, a higher demand for staying with a baby was found among mothers who experienced a traumatic event related to pregnancy and childbirth. These women perceive staying with a baby as a therapeutic corrective experience.

However, study limitations such as small sample size and potential mood variations in the mother, such as the Baby Blues experienced post-partum could influence the generalizability of the findings and may affect the measurement of pain

and satisfaction levels.

Despite these limitations, the results offer important insights for healthcare providers and suggest that the implementation of nursing projects that allow newborns to stay with their mothers can potentially reduce pain and increase maternal satisfaction with the birth experience.

Further research is needed to clarify the relationship between educational background and the dependent variables, as current findings in this area remain inconclusive.

7. Recommendations

The study suggests for healthcare providers to develop nursing projects and interventions that encourage maternal-newborn together stay, as associated with reduced pain and satisfaction levels after cesarean delivery and to include these initiatives in standard maternity and neonatal treatment programs. The study results can recommend further research to deeper understanding of the relationship between education of the women and their pain and satisfaction levels after cesarean delivery. Furthermore, it's strongly recommended to offer a Friendly stay as a corrective experience for women who have experienced a traumatic birth in the past.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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