

A COMPARATIVE STUDY ON THE EFFECTIVENESS OF MEDICATIONS ALONE VERSUS MEDICATIONS COMBINED WITH POSTNATAL EXERCISES IN PAIN MANAGEMENT FOLLOWING CESAREAN SECTION

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Abstract

Maternal healing and quality of life can be greatly impacted by pain after caesarean section. The inclusion of physiotherapy-based postnatal activities may provide increased recovery advantages, even though pharmaceutical management is still the major therapeutic approach. The purpose of this study was to evaluate the effectiveness of medications alone versus medications with postnatal exercises for managing postpartum pain in women.

Methods

A cross-sectional study was conducted on 120 women who had an elective caesarean section done under spinal or epidural anesthesia over three months before and who had taken or taking painkillers or practiced postpartum exercises. Based on the treatment approach, the participants were divided into two groups: 83 received medication alone, and 37 received medication together with postpartum exercises. Data was gathered using a standardized questionnaire. Chi-square test, Paired sample t test, independent t test and one way ANOVA tests were used for statistical analysis.

Results

The results showed that pain severity and treatment type were significantly correlated. Comparing women who had medications and postnatal exercises together, the former reported far less pain and no instances of severe pain. Exercise was also rated as moderately to extremely efficient by 94.6% of participants and 91.9% of them thought that postpartum exercises need to be a regular component of rehabilitation from caesarean sections.

Conclusion

According to the study, postpartum exercises should be a part of routine postnatal care for pain management following a caesarean section. More knowledge, accessibility, and policy inclusion of postnatal physiotherapy in maternity care protocols are necessary since physiotherapy therapies enhance pain outcomes and functional recovery.

Introduction

Caesarean section (CS) is a surgical method of childbirth involving abdominal (laparotomy) and uterine (hysterotomy) incisions to deliver the fetus. Since its first recorded use in the 11th century, the procedure has evolved substantially due to advances in surgical techniques, anesthesia,

antisepsis, and obstetric care. Once associated with extremely high maternal mortality, CS has become one of the most commonly performed surgical procedures worldwide, particularly in high-income countries, where it is now routine in modern obstetric practice (Sung and Mahdy, 2023).

Despite its life-saving role in managing obstetric complications, the use of caesarean section has increased far beyond medically justified levels. The World Health Organization has stated that population-level CS rates above 10–15% do not confer additional reductions in maternal or neonatal mortality. Nevertheless, global CS rates have risen steadily, reaching over 21% of all births, with projections estimating nearly 30% by 2030 (Boerma et al., 2018; Betran et al., 2021). This rise reflects a complex interplay of medical, socioeconomic, institutional, and non-medical factors, including maternal request, fear of labor pain, medico-legal concerns, and disparities between public and private healthcare systems.

In low- and middle-income countries (LMICs), including Pakistan, the situation is particularly concerning, as overuse and underuse of CS coexist. National data reveal marked regional disparities, with many districts exceeding recommended CS rates while others lack access to timely surgical care (Javed et al., 2023). Studies from tertiary hospitals in Pakistan highlight associations between caesarean delivery and factors such as primigravidity, limited antenatal care, prior CS, and clinician-driven decision-making (Amjad et al., 2020; Singh et al., 2020). These trends raise concerns about unnecessary surgical exposure, inequitable access, and increased maternal morbidity.

Beyond immediate surgical risks, caesarean delivery is associated with significant short- and long-term maternal consequences, particularly postoperative and chronic pain, psychological distress, impaired recovery, and reduced quality of life. Poorly managed post-caesarean pain can delay mobilization, interfere with breastfeeding, increase opioid use, and contribute to chronic postoperative pain and mental health disorders. While pharmacological pain control remains central to postoperative care, growing evidence supports the role of multimodal strategies, including physiotherapy, exercise, and non-pharmacological interventions, in improving recovery outcomes. However, such approaches remain underutilized in many LMIC settings, underscoring the need for context-specific

research to optimize post-caesarean pain management and maternal rehabilitation.

Methods

Study Design and Setting

A cross-sectional study was conducted in tertiary-care hospital settings.

Study Population

Women of reproductive age (18–45 years) who had undergone caesarean section under spinal or epidural anesthesia and had received treatment for post-caesarean pain.

Sample Size and Sampling

A total of 120 participants were recruited using convenience sampling. Participants were categorized into two groups based on treatment modality: medication only (n=83) and medication plus postnatal exercises (n=37).

Inclusion Criteria

- Women who had an elective caesarean section performed under spinal or epidural anesthesia.
- Women who had undergone caesarean section almost 3 months before.
- Patients who received medications or were engaged in postnatal exercises for pain management post caesarean section.
- Females who are willing to participate in the study.

Exclusion Criteria

- Women who had emergency caesarean section.
- Women who had caesarean section under patient controlled or general anesthesia.
- Women who had surgical complications after caesarean section.
- Women who encountered major pregnancy related complications.
- Women who had health issues that make it unsafe for them to exercise after giving birth, as recommended by the accompanying healthcare professional.
- People who were reluctant or unable to take part in the research for the full length.

Data Collection Tool

A self-structured, standardized questionnaire was used to collect sociodemographic data, obstetric history, pain scores, treatment type, and perceptions regarding postnatal exercises.

Statistical Analysis

Data were analyzed using SPSS. Descriptive statistics were computed. Inferential analysis included chi-square tests for associations between categorical variables, paired t-tests for within group comparisons, independent t-tests for between-group differences, and One-way ANOVA was conducted to evaluate whether baseline pain intensity differed significantly across age groups and BMI categories. A p-value <0.05 was considered statistically significant.

Results

This chapter outlines the findings of the study, which explored the nature, management, and outcomes of post-cesarean pain among women. Data was collected from 120 participants who fulfilled the inclusion criteria, and both descriptive and inferential statistics were applied. The results are presented in a structured sequence, beginning with participants' baseline characteristics and demographic profiles, followed by their pain experiences and management practices. The latter sections analyze the effectiveness of different interventions and provide statistical comparisons within and between groups.

The first part of the results highlights sociodemographic details such as age distribution and body mass index (BMI), which are crucial for understanding the general profile of the study population. As maternal health outcomes are often influenced by these variables, presenting them provides a foundation for interpreting later findings. Information on reproductive and obstetric histories, including number of pregnancies, prior cesarean deliveries, gynecological surgeries, and pregnancy complications, is also described. This background allows identification of subgroups that may be more vulnerable to postoperative complications or pain.

The subsequent results describe the time elapsed since the cesarean section and the type of anesthesia administered, both of which are important factors in understanding recovery patterns. Pain-related findings are then detailed, including pre-treatment pain intensity, common pain locations, and activities affected. These results provide insight into the multidimensional impact of pain, not only on women's physical recovery but also on their ability to rest, care for infants, and maintain household responsibilities. Another focus of the results is women's healthcare-seeking behavior and treatment choices. The findings distinguish between those who relied exclusively on medications and those who combined medications with exercise. Additional information is presented about the types of medications and exercises used, along with exercise frequency, reflecting current trends in self-care and guided rehabilitation. These observations also highlight gaps in non-pharmacological management that may be addressed in future clinical guidelines.

Finally, the results examine the effectiveness of interventions through statistical analyses. Paired t-tests evaluated changes in pain scores before and after treatment, while independent t-tests compared medication-only and medication-plus-exercise groups. Chi-square tests were applied to assess associations between treatment types and outcomes, and ANOVA was used to explore variations in pain scores across age and BMI groups. Together, these inferential tests provide evidence of the effectiveness of different management strategies and clarify whether baseline characteristics influenced pain perception.

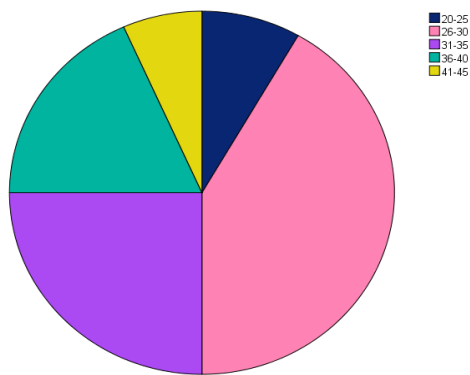
Beyond the statistical findings, these results also have important implications for maternal health and recovery after cesarean delivery. The study highlights not only the extent and intensity of pain but also the ways in which it interferes with women's daily functioning and quality of life. By examining both pharmacological and non-pharmacological strategies, the results provide evidence that comprehensive management—especially the inclusion of exercise alongside medication—can lead to more effective recovery.

This emphasizes the need for patient education, structured rehabilitation programs, and clinical policies that address postoperative pain holistically rather than relying solely on pharmacological measures. In this way, the findings of this study contribute to improving standards of care and inform future research on maternal rehabilitation. In summary, this chapter offers a comprehensive overview of participants' profiles, pain characteristics, and treatment outcomes. The descriptive results illustrate who the women were and the difficulties they faced, while the inferential

findings highlight which strategies were most effective.

The following tables and figures present these findings in a detailed and organized manner, allowing for a clearer understanding of both descriptive and inferential results. Each table is accompanied by an interpretation that connects the numerical values to their clinical relevance and practical implications. This approach not only summarizes the statistical outcomes but also highlights their importance in the context of maternal recovery and postoperative care.

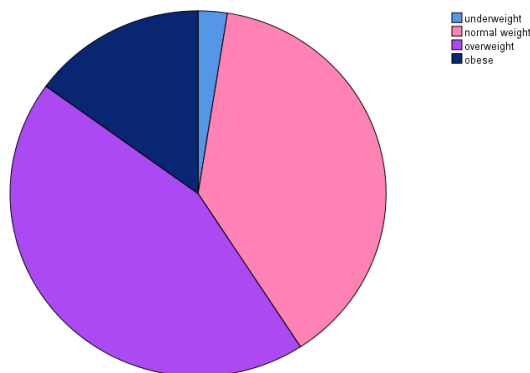
Figure.1. Age groups of participants



All the participants were divided into five age groups 21-25, 26-30, 31-35, 36-40 and 41-45. The pie chart is showing distribution among all these age groups. It illustrates that the largest segment of participants (41.7%) were in the 26-30 years group, followed by 31-35 years (25%) and 36-40 years (18.3%). A smaller proportion of women were aged 20-25 years (8.3%) and 41-45 years (6.7%), indicating fewer participants at the

extremes of reproductive age. The chart highlights that women in their late twenties and early thirties formed the majority, which corresponds to the peak childbearing years. This age concentration suggests that most cesarean deliveries in the sample occurred among women in early adulthood, while advanced maternal age contributed only a minor share.

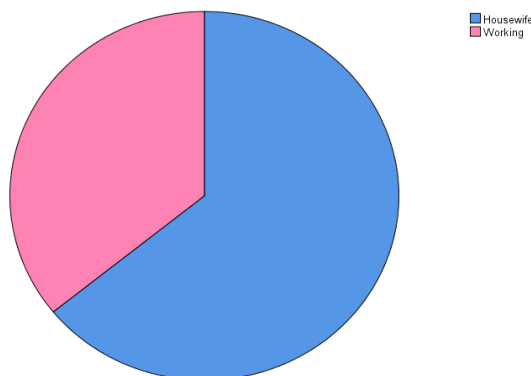
Figure.2. BMI of participants



The BMI of participants were divided into 4 groups as underweight, normal weight, overweight and obese. The BMI distribution pie chart above shows the distribution of participants in all these four groups. It shows that overweight women represented the largest portion (44.2%), followed by those with a normal BMI (38.3%). A smaller percentage was obese (15%), while underweight women formed only 2.5% of the sample. This

distribution demonstrates that the majority of women fell in the average-to-high BMI categories, reflecting common trends observed in obstetric populations. The chart visually emphasizes the predominance of overweight women, which may have clinical implications for recovery and pain management after cesarean delivery. It also suggests that nutritional and weight-related factors could play an indirect role in shaping postoperative outcomes.

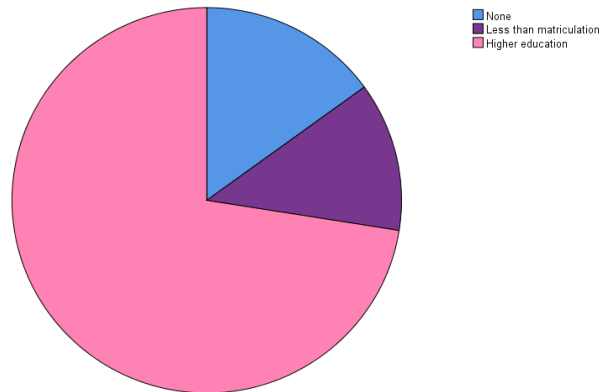
Figure.3. Occupation status of participants



Among the 120 women included in the study, the majority were housewives (n = 77; 64.2%), while 43 participants (35.8%) were working women (either employed or self-employed). This indicates

that most participants were not formally engaged in paid work, which is consistent with the cultural and socioeconomic background.

Figure.4. Education status of participants



Out of the 120 women included in the study, 18 participants (15.0%) reported having no formal education, while 15 participants (12.5%) had

some schooling but less than matriculation level. The majority of women, 87 participants (72.5%), had attained matriculation or higher education.

Table.1. Frequency distribution of participants according to Reproductive and Obstetric history:

Variable	Categories	Frequency (n)	Percentage (%)
Number of total pregnancies	1	39	32.5
	2	44	36.7
	≥ 3	37	30.8
Number of C-sections	1	74	61.7
	2	39	32.5
	≥ 3	7	5.8
History of gynecological surgeries	Yes	10	8.3
	No	110	91.7
Complications during pregnancy	Yes	33	27.5
	No	87	72.5

There were fewer higher-order pregnancies among women, with the majority having one or two pregnancies (32.5% and 36.7%, respectively). Only 30.8% of the people had ≥ 3 pregnancies. 32.5% had had two prior C-sections, compared to the majority (61.7%) who had had one. Few had

three C-sections only. Merely 8.3% of respondents mentioned having had gynecological surgery in the past. Pregnancy complications were nonexistent for a significant portion (72.5%). But roughly one-fourth (27.5%) did, suggesting a significant risk group.

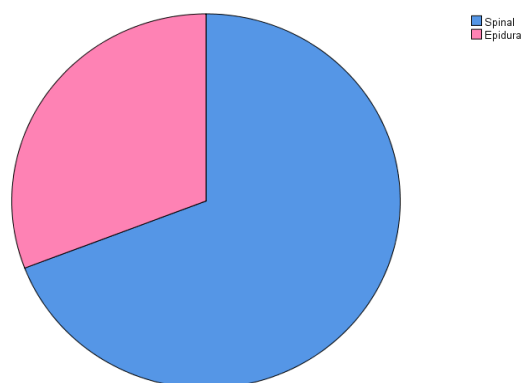
Table.2. Frequency distribution of participants by Time since C section

Variable	Categories	Frequency(n)	Percentage (%)
Time since C section	3-5 months	75	62.5
	6-8 months	41	34.2
	9-11 months	4	3.3

The table illustrates that the majority of women (62.5%) were between three to five months post-cesarean, while 34.2% were six to eight months postpartum. Only a small minority (3.3%) were in

the nine to eleven months category. This shows that most participants were in the relatively early recovery phase, when post-surgical discomfort and rehabilitation needs are still prominent.

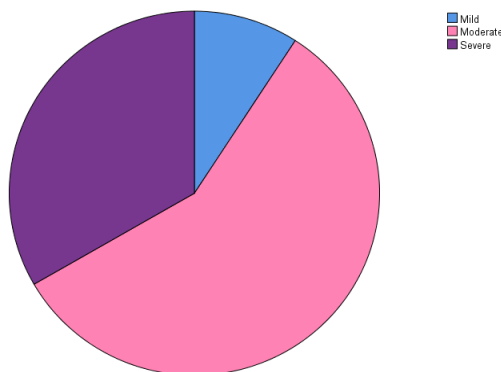
Figure.5. Anesthesia type used



The Pie chart on types of anesthesia demonstrates that spinal anesthesia was the most common (69.2%), while epidural was less frequently used (30.8%). The dominance of spinal anesthesia reflects standard obstetric practices in many

settings, where it is preferred for its safety and effectiveness. These results confirm that the majority of participants were still in the active recovery phase and had undergone standard anesthesia procedures

Figure.6. Pre-Treatment pain scores of participants



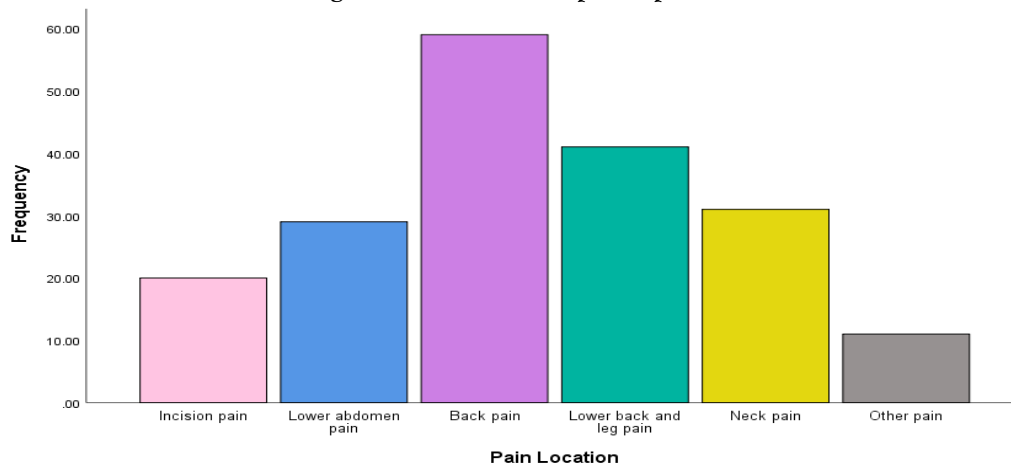
The above Pie chart describes the Pre-treatment pain scores of participants. Before receiving any intervention, the majority of participants experienced moderate pain (57.5%), followed by a considerable proportion reporting severe pain (33.3%), while only a small minority (9.2%)

described their pain as mild. This distribution clearly indicates that untreated post-cesarean pain tends to be of moderate to severe intensity for most women, underscoring the substantial physical burden associated with the procedure. The findings emphasize the necessity of timely and

structured pain management strategies, as unmanaged pain can interfere with rest, mobility, infant care, and overall recovery. Moreover, these results are consistent with previous studies that have highlighted moderate-to-severe postoperative pain as a frequent issue among cesarean patients,

particularly in the early recovery phase. The data therefore reinforces the clinical importance of comprehensive pain control, not only for comfort but also to reduce the risk of chronic pain development and delayed rehabilitation.

Figure.7. Pain Sites of participants



Pain complaints were distributed across several body regions, with back pain (30.9%) and lower back with leg pain (21.5%) emerging as the most prevalent complaints. Incisional pain (10.5%) and lower abdominal pain (15.2%) were also frequently observed, while 16.2% of women reported neck pain, highlighting that discomfort was not confined to the surgical site alone. A smaller proportion (5.8%) described pain in other regions, reflecting the widespread musculoskeletal involvement that can follow cesarean delivery. The predominance of back and lower limb-related pain

suggests biomechanical strain, altered posture, and the physical demands of infant care as contributing factors. These findings underline that post-cesarean pain is not limited to acute surgical pain but extends to functional musculoskeletal discomfort, which can hinder mobility and daily activities. Therefore, rehabilitation strategies should not only address incisional healing but also incorporate postural education, strengthening, and flexibility exercises to support overall recovery and prevent long-term complications.

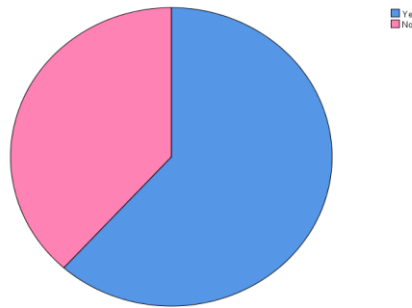
Table.3. Activities affected due to Pain:

Activities affected	Frequency (n)	Percentage (%)
Sleep or rest	53	44.2
Infant care	20	16.7
Household activities	15	12.5
None	32	26.7
Total	120	100.0

In the above table, activities affected due to pain were divided into three main disturbances as sleep or rest, infant care and hindrance in household activities or tasks. Sleep and rest were the most commonly affected activities (44.2%), indicating that pain significantly interfered with recovery by disturbing the body’s natural healing process. Infant care, reported as affected by 16.7% of women, reflects how pain can hinder maternal bonding, breastfeeding, and the ability to meet newborn needs, thereby adding emotional strain to physical discomfort. Household activities were disrupted for 12.5% of participants, demonstrating that functional independence in

daily routines is also compromised. Interestingly, 26.7% of women reported no limitations, which may reflect individual variations in pain tolerance, coping mechanisms, or access to better support systems. The dual burden of disrupted rest and caregiving emphasizes the wide-ranging implications of post-cesarean pain, not only on maternal health but also on family wellbeing. These findings highlight the need for a holistic management approach that prioritizes both effective pain relief and strategies to restore daily functionality, including tailored rehabilitation, counseling, and family support systems.

Figure.8. Consulting Healthcare Professional for Pain:



The Pie Chart above describes the trends among participants on consulting healthcare professional for pain management. A majority of participants (61.7%) reported consulting healthcare professionals for pain relief, reflecting a positive tendency toward proactive health-seeking behavior. However, a considerable proportion (38.3%) did not seek any professional advice, which highlights an important gap in care. This reliance on self-management or neglect of treatment may be attributed to cultural beliefs that normalize postpartum pain, limited accessibility to

healthcare services, financial constraints, or a lack of awareness regarding available options. Such behavior places women at risk of prolonged discomfort, delayed recovery, and possible development of chronic pain syndromes. The findings underline the importance of patient education, counseling, and community-level interventions that encourage timely reporting of pain. Strengthening healthcare accessibility and addressing cultural barriers could ensure that more women receive adequate postoperative pain management.

Table.4. Frequency distribution of participants by Treatment type:

Treatment type used	Frequency (n)	Percentage (%)
Medications	83	69.2
Medications+ Exercise	37	30.8
Total	120	100.0

Most participants (69.2%) relied exclusively on medications for pain relief, reflecting a predominant preference for pharmacological approaches in managing post-cesarean discomfort. This trend may be influenced by the widespread availability of medications, their rapid action, and the perception that pharmacological options are the most effective form of treatment. However, 30.8% of women reported using a combination of medications and exercise, which indicates an emerging recognition of the role of physical rehabilitation as a supportive measure. The inclusion of exercise alongside medication suggests that some participants were either guided by healthcare professionals or had greater awareness of the benefits of mobility and rehabilitation in recovery. Despite this, the relatively smaller proportion of women adopting

exercise points to a gap in clinical practice and patient education, where non-pharmacological strategies are not yet fully integrated into standard care. Evidence from literature consistently supports that exercise can improve circulation, reduce musculoskeletal strain, and enhance overall recovery, making its limited uptake an important area of concern. If exercise interventions were more routinely encouraged and supervised by healthcare providers, a greater proportion of women could potentially achieve faster pain relief and functional restoration. These findings therefore highlight the need to promote multimodal pain management strategies, combining pharmacological relief with physical rehabilitation, to achieve more comprehensive recovery outcomes after cesarean delivery.

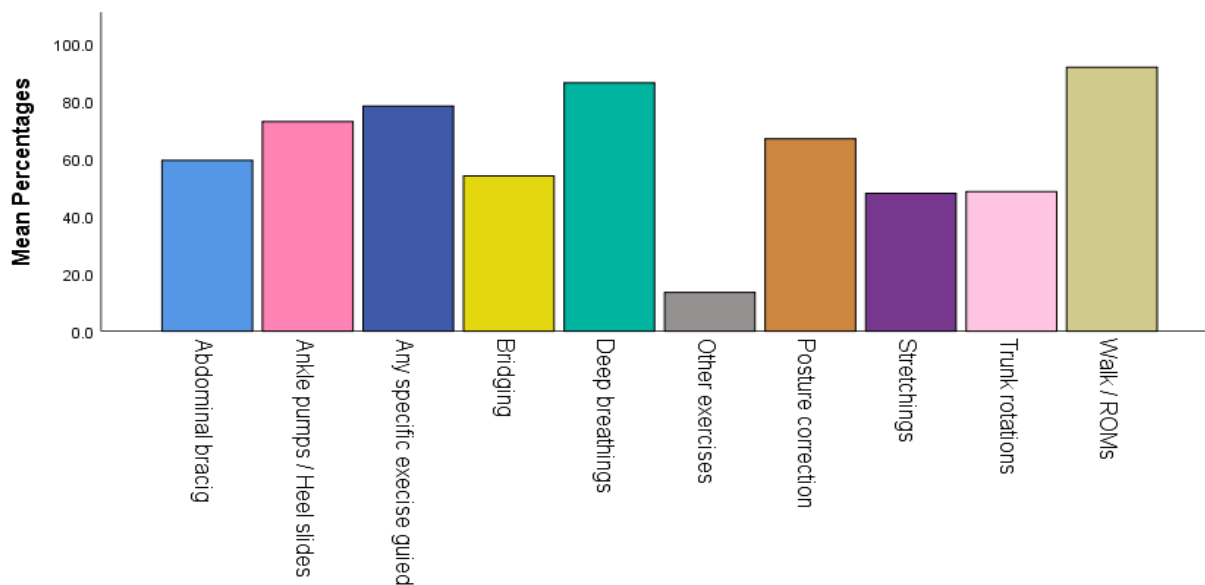
Table.5. Medication type used by Participants

		Frequency (n)	Percentage (%)
Medication type used	Prescribed medications	88	37.6
	Over the counter drugs	62	26.5
	Complementary or traditional treatment methods	73	31.2
	Others	11	4.7
Total		120	100

Prescription medications were the most frequently used option (73.9%), showing that most women relied on treatments recommended by healthcare professionals. Traditional or complementary methods were also common (61.3%), highlighting the cultural influence and trust in home-based remedies. Over-the-counter medications were reported by 52.1% of participants, indicating that many women engaged in self-management to cope with pain. This overlap suggests that several women used more than one approach, combining formal medical treatments with traditional

practices. The strong reliance on complementary approaches may further reflect issues of accessibility, affordability, or dissatisfaction with formal healthcare services. These findings emphasize the importance of patient education about safe medication practices and the potential dangers of unsupervised drug use. They also point to the need for healthcare professionals to acknowledge cultural preferences while ensuring that women are guided toward safe and effective multimodal pain management strategies.

Figure.9. Exercise type used:



Postnatal exercises

Gentle walking and range of motion exercises were the most frequently practiced activities (91.9%), closely followed by deep breathing exercises (86.5%), showing that women favored simple, low-impact methods that were easy to perform during recovery. Posture correction (67.6%) and abdominal bracing (59.5%) were also fairly common, indicating awareness of the importance of core stability and spinal alignment. Less common, though still practiced, were bridging (54.1%), trunk rotations (48.6%), and stretching (48.6%), which may require greater effort and thus

were less consistently adopted. The inclusion of guided exercises in 78.4% of cases reflects a notable degree of professional involvement, suggesting that structured advice plays a role in encouraging exercise adherence. Overall, the trend indicates that participants preferred exercises that were both practical and comfortable, aligning with their physical capacity during the postpartum period. These findings highlight the value of prescribing safe, simple, and sustainable exercises to support pain relief and functional recovery.

Table.6. Frequency of exercise:

Frequency of exercise	Frequency (n)	Percentage (%)
Once daily	11	29.7
Twice daily	19	51.4
Occasionally (1-2 times/week)	5	13.5
Performed only couple of times / stopped early	2	5.4
Total	37	100.0

More than half of the participants (51.4%) reported performing exercises twice daily, which reflects a high level of compliance and commitment among this subgroup. A smaller portion (29.7%) engaged once daily, suggesting a moderate but consistent level of adherence to recommended routines. Others demonstrated less frequent participation, with 13.5% performing exercises only occasionally, and a small group (5.4%) discontinuing early after starting. This variability underscores the differences in personal motivation, family or professional support, and individual pain tolerance that influence exercise

behavior. The fact that some women could not sustain regular practice may also point to barriers such as fatigue, lack of time due to childcare responsibilities, or insufficient guidance on exercise techniques. Nevertheless, the overall trend shows that a majority of women were able to incorporate exercise into their recovery regimen, reflecting its acceptability and perceived benefits. These findings emphasize the importance of providing structured follow-up, continuous motivation, and professional support to enhance adherence and maximize the positive outcomes of postpartum rehabilitation.

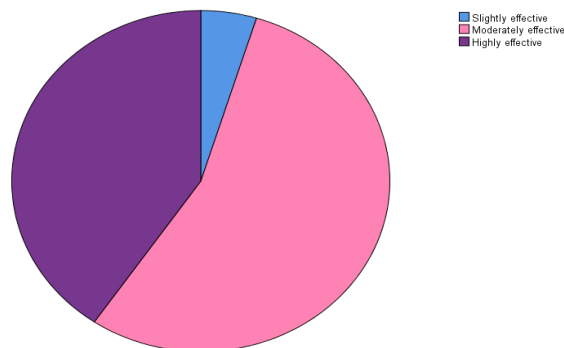
Table.7. Post- treatment pain score:

Post- treatment pain score	Frequency (n)	Percentage (%)
No pain	16	13.3
Mild	52	43.3
Moderate	50	41.7
Severe	2	1.7
Total	120	100

The table above describes the frequencies and percentages of the post treatment pain intensities experienced by patients. Following treatment, the majority of participants reported either mild pain (43.3%) or moderate pain (41.7%), while 13.3% of women indicated complete absence of pain. Only a very small fraction (1.7%) continued to experience severe pain, representing a dramatic improvement compared to pre-treatment findings where severe pain was much more common. This shift in distribution demonstrates the clear effectiveness of interventions in reducing post-cesarean discomfort and improving women’s recovery experiences. The substantial decrease in severe pain suggests that the treatments were

successful in addressing the most intense forms of pain, which are often the most debilitating. However, the persistence of mild-to-moderate pain in a large proportion of women indicates that complete recovery is not universal and that individualized management strategies remain essential. These results highlight the importance of follow-up care, patient education, and possibly the integration of multimodal approaches—combining medication, exercise, and counseling—to achieve better long-term outcomes. Ultimately, while the interventions were effective in significantly lowering pain severity, they also underscore the need for continuous attention to residual pain for optimal postpartum recovery.

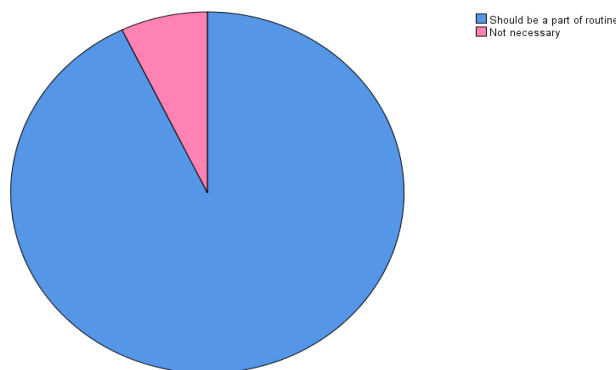
Figure.10. Effectiveness of exercise



Most participants rated exercises as either moderately effective or highly effective, while only a small fraction considered them slightly effective.

This distribution reflects that the majority of women experienced meaningful pain relief and functional improvement through exercise.

Figure.11. Opinion on post-natal exercises



A strong majority of women (91.9%) expressed the view that postpartum exercises should be a regular part of recovery, while only 8.1% did not support

this idea. This indicates a high level of acceptance and positive attitude toward rehabilitation practices among participants.

Table.8. Association between Education stats and Treatment type used

		Treatment type used			Pearson Chi Square + df	P-value
		Medications	Medications+ Exercise	Total		
Education	None	18	0	18	20.291 + 2	<0.001
	Less than matriculation	15	0	15		
	Higher education	50	37	87		
Total		83	37	120		

The results revealed a significant association ($\chi^2 = 20.291, df = 2, p < 0.001$). Women with higher education were considerably more likely to adopt

a combination of medication plus exercises, while those with no or lower education predominantly relied on medication alone. This finding indicates

that education level played an influential role in shaping treatment preferences among post-cesarean women

Table.9. Association between Occupation status and Treatment type used

		Treatment type used			Pearson Chi square + df	p-value
		Medications	Medications+ Exercise	Total		
Occupation	Housewife	68	9	77	36.932 + 1	<0.001
	Working	15	28	43		
Total		83	37	120		

The results showed a statistically significant association ($\chi^2 = 36.932$, $df = 1$, $p < 0.001$). Working women were far more likely to adopt the combined approach of medication plus exercises, whereas housewives predominantly relied on

medication alone. This suggests that occupation status played a critical role in determining the preferred mode of pain management following cesarean section.

Table.10. Association between Pain improvement and Treatment type used (Chi square)

		Treatment type used			Pearson chi Square value & df	p-value
		Medications	Medications+ Exercise	Total		
Pain	Improved	31	33	64	27.632 & 1	<0.001
	Not improved	52	4	56		
Total		83	37	120		

Those who used both medicine and exercise reported better pain relief (33 out of 37), compared to just 31 out of 83 who took just

medication. Association showing statistically significant results ($p = < 0.001$), reflect that combination therapy is more effective.

Table.11. Association between Treatment type used and Post-treatment pain scores (Chi square)

		Treatment type used			P value
		Medications	Medications+ Exercise	Total	
Post-treatment score	Pain	No pain	1	15	<0.001
		Mild	31	21	
		Moderate	49	1	
		Severe	2	0	
Total		83	37	120	

Those who used both medicine and exercise reported better pain relief, as 15 out of 37 reported no pain after treatment, compared to just 1 out of

83 who took just medication. Association showing statistically significant results ($p = < 0.001$), reflect that combination therapy is more effective.

Table.12. Within group comparison (Paired sample t test)

Variable	Mean ± SD	Mean Difference (Pre-Post)	t (df)	P-value
Pre-treatment Pain score	2.24± 0.61	0.93	12.04(119)	<0.001
Post-treatment Pain score	1.32± 0.72			

The results showed that pre-treatment scores (M = 2.24, SD = 0.61) were significantly higher than post-treatment scores (M = 1.32, SD = 0.72). The

mean reduction in pain was 0.93 points, $t(119) = 12.04$, $p < .001$. This indicates a statistically significant improvement in pain after treatment.

Table.13. Between group comparison (Independent t test)

Group	Mean ± SD	Mean Difference	t (df)	p-value
Medications only	0.65 ± 0.79	-0.89	-6.11 (118)	<0.001
Medications + Exercises	1.54 ± 0.61			

The medication-only group demonstrated a mean improvement of 0.65 (SD = 0.79), while the medication plus exercise group achieved a higher mean improvement of 1.54 (SD = 0.61). The comparison revealed a statistically significant difference between the two groups, $t(118) = -6.11$,

$p < 0.001$, with a mean difference of -0.89. These findings suggest that incorporating exercise alongside medications leads to a significantly greater reduction in pain than using medications alone.

Table.14. One Way ANOVA for comparison of Pre-treatment Pain scores across Age Groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.657	4	.414	1.125	.348
Within Groups	42.334	115	.368		

A one-way ANOVA was conducted to compare pre-treatment pain scores across different age groups. The results showed no statistically significant difference among the age groups, $F =$

1.125 , $p = 0.348$. This indicates that baseline pain intensity did not vary meaningfully with participants' age.

Table.15. One Way ANOVA for comparison of Pre-treatment Pain scores across BMI groups

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.424	3	.141	.377	.770
Within Groups	43.567	116	.376		

The results show no statistically significant difference in pre-treatment pain scores across different BMI groups ($F = 0.377$, $p = 0.770$). This indicates that BMI groups did not influence baseline pain intensity.

Discussion

The present study evaluated long-term post-caesarean pain outcomes among women receiving medication alone compared with those receiving medication combined with postnatal exercises. The findings demonstrated that a substantial proportion of women continued to experience pain three months or more after caesarean delivery, highlighting the persistence of postoperative discomfort beyond the immediate recovery period. Importantly, women who participated in structured postnatal exercise programs in addition to pharmacological management reported significantly lower pain levels than those managed with medication alone. These results support the study hypothesis and indicate that multimodal pain management strategies are more effective than pharmacological treatment in isolation.

The superiority of combined therapy was confirmed through both categorical and continuous analyses. Chi-square testing revealed a strong and statistically significant association between treatment type and pain severity, with the majority of women in the medication-plus-exercise group reporting only mild pain and none experiencing severe pain. In contrast, severe pain persisted exclusively in the medication-only group. Paired and independent samples t-tests further demonstrated a clinically meaningful reduction in pain scores among women who exercised postnatally, with nearly a one-point greater reduction compared to medication alone. These findings are consistent with prior evidence showing that physiotherapy improves circulation, reduces scar stiffness, enhances core muscle activation, and promotes functional recovery after caesarean delivery (Çıtak Karakaya et al., 2012; Stone et al., 2021).

Contextually, these findings are particularly relevant in Pakistan, where postpartum care predominantly focuses on pharmacological

treatment and physiotherapy services are rarely integrated into routine obstetric practice. Cultural norms, limited awareness, and early resumption of domestic responsibilities often discourage women from engaging in safe postnatal exercises, potentially prolonging pain and functional impairment. Although factors such as age, BMI, anesthesia type, and history of previous caesarean sections were examined, one-way ANOVA results indicated that neither age nor BMI significantly influenced baseline pain intensity. This suggests that the observed improvements were primarily attributable to the intervention rather than demographic characteristics, reinforcing the effectiveness of exercise-based rehabilitation across diverse patient profiles.

Clinically and socially, these findings underscore the importance of adopting integrated post-caesarean care models that combine medication with structured postnatal exercise programs. Persistent pain was found to interfere with essential activities such as sleep, infant care, and mobility, echoing previous research linking inadequate pain control with impaired maternal functioning and delayed recovery. By reducing pain severity and enhancing functional independence, postnatal physiotherapy has the potential to improve maternal well-being, reduce chronic pain risk, and strengthen mother-infant bonding. These results support existing literature advocating for multimodal, low-cost rehabilitation strategies and provide strong evidence for incorporating postnatal exercise into standard postpartum care protocols to improve long-term recovery outcomes after caesarean section.

Conclusion

This study concludes that post-caesarean pain is a common and multifaceted problem that extends beyond surgical incision discomfort, significantly affecting musculoskeletal health, daily functioning, and maternal wellbeing several months after delivery. While pharmacological management remains the cornerstone of pain control, the findings clearly demonstrate that integrating postnatal exercises with medication leads to significantly greater pain reduction and functional improvement than medication alone.

The benefits of combined therapy were consistent across age and BMI groups, indicating broad applicability. Pain-related disruptions to sleep, infant care, and mobility highlight the clinical and social importance of effective pain management. Overall, the study supports a multimodal, patient-centred approach to post-cesarean care, emphasizing that structured exercise is a feasible, low-cost, and effective adjunct that should be routinely incorporated into postpartum recovery protocols to optimize long-term maternal outcomes.

Recommendations

- Incorporate structured postnatal exercise programs into routine cesarean aftercare
- Train maternity healthcare providers in basic postnatal physiotherapy guidance
- Develop national guidelines supporting multimodal pain management strategies

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