Effect of Post-natal Exercises Bundle Sessions on Mothers' Recovery after Caesarean Section

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Abstract

Background: Postpartum recovery period is usually longer for cesarean births. Physiological concern of women after cesarean birth may include pain, fatigue, activity intolerance and incision problems**.** Educating post cesarean section mother about benefits of early exercises on her recovery is a main nursing role. **Aim:** To evaluate the effect of post-natal exercises bundle sessions on mothers' recovery after caesarean section**. Design:** A quasi-experimental (experiment & control group) research design was used to conduct this study**. Setting*:*** The study was conducted at outpatient clinics of New Obstetrics and Gynecology Hospital and at Obstetrics and Gynecology wards of Main Mansoura University Hospital**. Sample:** A convenient sampling technique of 100 mothers undergone caesarean section within three months, admitted to the previously mentioned setting were divided into two groups as (experiment & control group) including 50 mothers in each one**. Tools**: A Structured Interviewing Questionnaire, Pain assessment scale, and Structured Assessment Sheet. **Results:** study findings by an Independent t-test showed similarity in the pain mean score before the exercise intervention (t=1.25, P=0.213). Compared to after post-natal exercises, with a statistical significant differences between the experimental and control group (t=5.73, P ≤0.001) with very huge effect size of the exercise intervention (d=1.15). Also, there was a statistically significant difference in most recovery indicators among post-caesarean mothers in both groups. **Conclusion**: The result was concluded that implementation of post-natal exercises bundle sessions had a positive effect on improving mothers' recovery after caesarean section. **Recommendations**: Post-natal exercises are recommended to be taught to mothers after caesarean section during antenatal period.

Keywords: Caesarean Section, Mothers' Recovery, Post-natal Exercises.

Introduction

However, despite the ongoing new method that has now become the standard intervention for the complex labor globe, the rate of cesarean sections is rising, which can be ascribed to both social and technological advancements. A significant milestone in each woman's life is becoming a mother. The most significant time in a woman's life is the postpartum phase, which coincides with her transition into parenting. First-time mothers, in particular, may worry about how they will manage to care for both themselves and their baby. Pregnant women generally feel powerless to influence the course of their pregnancies. The mother's mobility is limited to the house after giving delivery. This 40-day confinement period is thought to be a critical time for the women (**WHO, 2021).**

According to **Kepley (2023),** giving birth is the unique instance in which pleasure and suffering coexist simultaneously. The experience of having a kid is a life-altering one. After the baby is born and the placenta is expelled, the mother goes through a phase of physical and mental recovery called the postpartum period. The general goal is for all of the woman's systems to recover from the effects of pregnancy and return to their pre-pregnancy form by six weeks after delivery **(Mundhra, 2024).**

Women should begin exercising after giving birth as soon as they feel capable, but this should be done gradually. Resuming exercise very soon after giving birth reduces the risk of postpartum depression. After giving birth, some women develop stress incontinence **(Almuqbil,et; al, 2022**).

Exercises for the pelvic floor will aid in its rehabilitation, but women typically need to perform certain obstetric exercises as directed by their health care providers. Exercise should not be resumed too soon after a cesarean section. For the first three months after a cesarean section, exercise should be mild and should not involve significant abdominal work. Basic workouts are ones that work a lot of the body's muscles **(Inge, 2022, Malik, 2024).**

These movements are typically multi-joint and work the bigger muscles of the body, such the legs, back, and chest, but they also work the smaller muscles, the shoulders, arms, calves, abdominal muscles, and auxiliary muscles. It is important to encourage the parturient mother and labor to adopt a reasonable fitness regimen throughout pregnancy. Walking, relaxation, and other physical activities can be promoted as a component of a healthy lifestyle. Even beyond the month of pregnancy, certain activities that target the pelvic floor and abdominal muscles or relieve pain like backaches or cramps will be beneficial **(Delgado, 2024).**

In obstetric practice, caesarean sections are life-saving managements that are widely used. The morbidity and mortality from caesarean sections have significantly decreased due to advancements in anesthetic services and better surgical procedures. Six exercises on a regular basis becomes a habit, but even the most necessary and well-intentioned activities can be sidetracked by disruptions like changes in lifestyle. Exercise has gradually gained recognition as being goo d for women at any stage of the reproductive process **(Filippi, et al., 2015, Santos-Rocha, 2022**).

Exercises are physical exertion of the body. They help to improve the muscle tone of the abdomen and pelvic floor and also bladder and bowel function. Postnatal exercises are playing important roles such as encourage drainage of lochia , encourage ante version of the uterus, minimize the risk of deep venous thrombosis (DVT), contraction and relaxation of the pelvic floor muscles, diminish respiratory and vascular complications, minimize future prolapse and stress incontinence, prevent backache and genital prolapse, help in losing extra body weight and getting fit and healthy, concentrate on proper postures, body alignments and keep abdominal muscles contracted **(Kalariya, 2015, Rani et al., 2016, Lowe, 2024**).

Deep breathing, walking, and abdominal exercises like abdominal breathing, head and shoulder rising, leg raising, circulation exercises of feet & hands, and knee rolling are among the suggested postpartum exercises. Numerous studies claim that various postpartum workouts help people with back pain, diastasis recti, stress incontinence, postpartum depression, and other health issues. However, according to estimates, between 65% and 85% of people worldwide do not exercise sufficiently when they are in a postnatal ward for clinical placement (**Rani et al., 2016, Selman, 2022).**

The American College of Obstetricians and Gynecologists (ACOG) and The Royal College of Obstetricians and Gynecologists (RCOG) recommend postpartum exercises to improve mothers' health, facilitate return to pre-pregnant condition, and prevent of postpartum complications **(Santos-Rocha, 2022**).

Significance of the study

The number of women giving birth via cesarean section is rising, and the rate of cesarean sections has unsettlingly increased over the past 20 years. Minister of Health Khaled Abdel-Ghaffar slammed the skyrocketing rates of C-section deliveries in Egypt, mentioning that Egypt is ranked first globally in the number of C-section deliveries which make up 75-80% of deliveries, in comparison to an average of 25-30% worldwide. Perineal pain or discomfort is also extremely elevated. According to the researchers' clinical observations, many moms acquired post-operative complications at home, and they neglected postpartum workouts because they were inexperienced **(El-Gundy Z, 2022).**

Exercise as a physical activity consisting of planned, structured, and repetitive bodily movements done to enhance one or more components of physical fitness, is an essential element of a healthy lifestyle, and obstetrician–gynecologists and other obstetric care providers should encourage their patients

to continue or to commence exercise as an important component of optimal health **(Santos-Rocha, 2022**). Hence, the study was conducted to evaluate the effect of post-natal exercises bundle sessions on mothers' recovery after caesarean section.

Aim of the study

The study aimed to evaluate the effect of post-natal exercises bundle sessions on mothers' recovery after caesarean section.

Research hypothesis:

An improvement in post- caesarean section recovery for mothers undergone post-natal exercises bundle sessions will be achieved.

Method

Design

A quasi-experimental research design (an experiment & control group) was used.

Setting

The study was conducted at outpatient clinics of New Obstetrics and Gynecology Hospital and at Obstetrics and Gynecology wards of Main Mansoura University Hospital**.**

Sample size and sampling technique:

The sample size was calculated using the G*Power equation for two independent matched samples with continuous outcome and based on the study parameters of previous study of Kaur, Kaur, & Sikka, (2015).

$$n = \left(\frac{Z_{1-\alpha/2} + Z_{1-\beta}}{ES} \right)^2$$

In this equation, n represents the sample size, the level of significance is 5%, Z1-α/2 is 1.96, 1-β is the selected power (P) at 80%, Z1-β is 0.84, and the effect size (ES) was estimated to be medium at 0.44. Therefore, a sample size of 42 mother is expected. Considering a dropping out rate of 20%, a total sample of 50 is required for each group. Hence, the total required sample size is 100.

A convenient sampling technique was used to recruit 100 caesarean section mothers, admitted to the previously mentioned setting were divided into two groups as (experimental& control group) including 50 post caesarean section mothers in each one.

Participants:

Mothers admitted to previous mentioned setting, prepared for caesarean section and fulfilling the following inclusion criteria:

Inclusion criteria:

- Mothers age (18- 35 years).
- Gestational age with (36 to 40 weeks).
- Mothers who undergone caesarean section of the lower segment under spinal anesthesia.
- Ready to participate in the study

Exclusion criteria:

- High-risk pregnancy with any medical disorders.
- Complications as intra and post caesarean section hemorrhage and eclampsia.
- Classical CS or Lower Segment Cesarean Section (LSCS) under general anesthesia.

Tools of data collection

Three tools were used in this study as follows:

Tool (I): A Structured Interviewing Questionnaire;

Designed by the researchers after reviewing the relevant literature, it consisted of two parts:

Part One: Covered data related to the socio-demographic characteristics of mothers (age, education, and residence).

Part two: Covered the clinical and obstetric data as (para and gestational age, indication for C.S).

Tool II: Pain assessment scale (Using the numerical pain rating scale): It was adopted from **McCaffery and Beebe (1993).** To assess level of pain, mother was given a score from 0 (no pain) to 10, with 1-3 indicating mild pain, 4-6 indicating moderate pain, 7-9 indicating severe pain, and 10 indicating the worst pain. The pain was measured two times, at baseline before early bed exercise and movement and immediately after movement and exercises.

Tool III: Structured Assessment Sheet: To evaluate post caesarian section recovery such as use of analgesia after movement, passage of first flatus, initiation of oral intake, duration of catheterization, self-void after removal of catheter, breast-feeding and holding the baby independently.

Phase I: Preparation Phase

1. **Administrative process:**

Ethical Considerations:

The research proposal was accepted by the Mansoura University Faculty of Nursing's Ethical Research Committee. A letter from the dean of Mansoura University's faculty of nursing was used to formally grant authorization. The researchers met both medical and nursing directors of the selected settings to clarify the purpose of the study and

get their approval. The mothers were met by the researchers to explain the study's goal and obtain their cooperation in carrying it out. Mothers were informed of the purpose and advantages of the current trial before giving their informed consent to participate. Researchers told the mothers they were studying that they could leave the study at any time. They also received assurances that the information they provided would be kept private.

2. Developing the study tools:

Three tools were be developed by researchers after reviewing the related recent national and international literatures.

Validity

Data collection tools were tested and juried for the content validity by 3 specialists in maternity nursing field and 2 specialists in community health nursing reviewed the instruments for comprehensiveness, application, clarity, and relevance before evaluating the content validity, no modification was done.

Reliability

The tools of data collection were tested for its reliability by using Cronbach's α (alpha) test in Statistical Package for Social Science (SPSS) version 21. . According to Cronbach's alpha coefficient test, tool I's reliability of internal consistency was 0.887, whereas tool II's was 0.933.

Pilot study

To assess the clarity and feasibility of the data collection tools, a pilot study was conducted on 10% (10 mothers) of the total sample in the test to evaluate the generated tools' usability, simplicity, clarity, and applicability. The required adjustments were made. The study's overall sample includes the pilot study. Based on the findings of the pilot study, no modification was done to produce the final form of the tools.

Phase II: Implementation phase:

Data was collected through a period of three months from July 2024 to the end of October 2024 from 9 AM to 5 PM, four days per week (Saturday& Monday for experiment group data collection) and (Sunday& Wednesday for control group data collection) in pervious mentioned setting.

Researchers interviewed each woman at outpatient antenatal unit before S.C, and collected the data recorded in the questionnaire for both groups. This occurred after full explanation the nature of the study and took oral consent to be included in the study. They were met the mothers individually and was explained the aim of the study after introducing themselves to the participants. Approximately, 20- 30 minutes was taken to complete data collection tools. Regarding mothers in the experimental group, the researchers prepared an educational bundle sessions based on review of the literatures for post-cesarean section exercises such as deep breathing exercise, leg exercises, and technique of getting out of bed.

Exercises bundle sessions through information brochure were given to (experiment group) including graphical representation and full prescription of the exercises to be carried out. Researchers ensured about precautions to be taken when carrying out the exercises and frequency of each one. Follow up and feedback was provided by researchers immediately in post-caesarian section period about compliance to exercises at postpartum ward.

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A standard nursing care which did not include any educational sessions was given to the control group and was followed up during this period.

In order to provide post-natal exercises bundle after a cesarean section, a regimen was first created. The following were the data collection tools: The interview schedule that includes the day of identification numerical scale for rating pain, a structured nursing evaluation form to evaluate post-operative recovery in terms of the need of analgesics following post-natal exercises, length of catheterization, self-voiding following catheter removal, occurrence of the first flatus, start of oral intake, breastfeeding, and carrying the infant on one's own. A pilot study was carried out in a labor room to evaluate the study's viability following instrument validation.

The experiment group's done post-natal exercises, meaning that they had had a cesarean section six hours earlier. The moms were evaluated for post-operative pain both before and after they were exercised at 6–8hours following a caesarean section, the

mothers of the control group were evaluated without any interventions using standard routine care, such as walking around, as is often done in a labor room.

Throughout the process, the participants (control and experimental groups) were observed and their level of discomfort was tracked. Using a structured assessment sheet, the participants were evaluated for post-operative pain intensity, post-ambulation analgesia use, catheterization duration, self-voiding after catheter removal, first flatus, oral intake initiation, breastfeeding, and independent baby holding shortly after post-natal exercises.

The sessions were included a simple and clear information about post-natal exercises. It also included the preparation of educational materials such as Photos, videos, and brochure.

Phase III: Evaluation phase:

After 6-8 hours, the same instruments were used to evaluate the effect of post-natal exercises bundle sessions on mothers' recovery after caesarean section.

Statistical analysis:

The collected data were coded and entered into the Statistical Package of Social Sciences (SPSS) version 24. After complete entry, data were explored to detect any error, then, it was analyzed by the same program for presenting frequency tables with percentages. Qualitative data was presented as number and percent. Besides, Quantitative data were described as mean ±SD as appropriate. The study data were tested for normality by the Kolmogorov-Smirnov test. For normally distributed variables, an independent t-test was used to indicate an actual difference between main study variables mean scores before and after the application of the intervention. Cohen's d statistic was computed to evaluate the effect size of the program on key study variables. The Chi-Square and Exact tests (Monte Carlo) was used to check whether the variables are independent of each other or not. All tests were performed at a level of significance (P-value) equal or less than 0.05 was considered to be statistically significant.

Results:

Table 1: shows similarity between the experimental and control groups in terms of all socio-demographic characteristics. Significance tests indicate non-significant differences in age (P=0.932), education (P=0.647), residence (P=0.159), marital status (P=0.357), occupation (P=0.556), and income (P=0.704) between the experimental and control groups. The mean age of the experimental group was 25.92±4.72, and 26.00±4.58 for the control group. In 60% of the experimental group and 52% of the control group had a diploma. Regarding residence, 48% of the experimental group and 62% of the control group resided in urban areas. In terms of marital status, 90% of the experimental group and 96% of the control group were married. In relation to occupation, a large percentage of both groups were employees and did not have enough income.

Table 2 reveals homogeneity between the experimental and control groups in terms of all clinical and obstetric data. The chi-square test demonstrates insignificant differences in parity (P=0.300), gestational age (P=0.419), type of cesarean section (P=0.216), indication for cesarean section (P=0.128), number of cesarean sections (P=0.224), and practicing physical exercise during pregnancy (P=0.182) between the experimental and control groups. In 58% of the experimental group and 68% of the control group were multiparous. Regarding type of cesarean section, 56% of the experimental group and 68% of the control group had planned section. In terms of the indication for cesarean section, 54% of the sections in the experimental group and 34% in the control group were related to maternal causes. As for physical exercise, 86% of the experimental group and 94% of the control group didn't practice any physical exercise during pregnancy.

An Independent t-test showed similarity in the pain mean score before the exercise intervention (t=1.25, P=0.213). Compared to post-natal exercises, there were statistical significant differences between the experimental and control group (t=5.73, P ≤0.001) with very huge effect size of the exercise intervention (d=1.15) as shown in **Table 3**.

Figure 1 portrays the distribution of the pain levels of the studied mothers after cesarean section in both the experimental and control groups before and after post natal exercises. Before the post natal exercises, 28%

of the experimental group and 18% of the control group reported a similar worst pain level. In contrast, after natal exercises, the worst pain level improved to a severe level among 8% of the experimental group, compared to 32% in the control group. Additionally, a chi-square test demonstrates similarity in the pain levels before the exercise intervention between both study groups (P=0.480), compared to significant differences between both study groups after the exercise intervention (P≤0.001).

Table 4 shows comparisons of the studied mothers (experimental and control groups) in terms of post-cesarean recovery indicators. It is illustrated that mothers in the experimental group were significantly more able than those in the control group to start oral fluids within an hour after surgery (60% vs. 28%, respectively) with a highly significant difference (P=0.001). 74% of the experimental group needed only one analgesic injection after cesarean section to reduce post-natal pain compared to 44% of the mothers in the control group, with a highly significant difference (P=0.002). Regarding the passage of the first flatus, 66% of the experimental group passed the first flatus within an hour compared to 30% of the control group, which was highly significant (P≤0.001). Concerning self-voiding after the removal of the catheter, 46% of the experimental group self-voided after catheterization within an hour compared to only 22% of the control group, which was highly significant (P=0.001). Furthermore, 78% of the experimental group started breastfeeding and holding the baby independently at six hours after the section compared to 54% of the control group, which was significant (P=0.011).

Table 5 reveals comparisons of averages of post-cesarean recovery indicators in the experimental and control groups. It is illustrated that mothers in the experimental group were significantly more able than those in the control group to start oral fluid in a short period with a mean of (1.34±0.59) compared to (2.07±0.84) hours in the control group. This mean difference is significant (P≤0.001) with a high effect size (d=1.01). Similarly, the experimental group passed the first flatus within (50.66±1.06) compared to (65.04±3.34) minutes in the control group, which was highly significant (P≤0.001) with a very huge effect size of the exercise intervention (d=5.8).

As regards self-void after the removal of the catheter, the experimental group was able to self-void after catheterization within (1.75±0.44) compared to (2.33±0.76) hours in the control group, which was highly significant (P≤0.001) with an elevated effect size of the exercise intervention (d= 0.93). Finally, the mothers in the experimental group started breastfeeding and holding the baby independently at (6.32±1.57) after the section compared to (13.34±2.45) hours in the control group, which was significant (P≤0.001)

Table (1): The studied mothers' Scio-demographic characteristics, (n=100)

Items	Experimental group (n=50)		Control group (n=50)		Significance test
	No.	%	No.	%	
Age					
18 < 24	18	36	17	34	t=0.086 P=0.932
24 < 30	22	44	24	48	
30 -35	10	20	9	18	
Mean(SD)	25.92(4.72)		26.00(4.58)		
Educational level					
Diploma	30	60	26	52	X^2_{MC} =0.897 P=0.647
University	17	34	19	38	
Higher studies	3	6	5	10	
Residence					
Rural	26	52	19	38	X^2 =1.980 P=0.159
Urban	24	48	31	62	
Marital status					
Married	45	90	48	96	X^2_{MC} =2.297 P= 0.357
Divorced	3	6	2	4	
Widow	2	4	0	0	
Occupation					
Employee	18	36	20	40	X^2 =1.173 P= 0.556
Housewife	19	38	14	28	
Private work	13	26	16	32	
Income					
Not enough	29	58	26	52	X^2MC=0.764 P=0.704
Enough	18	36	22	44	
Enough and saving	3	6	2	4	

Table (2): The studied mothers' clinical and obstetric data, (n=100)

Items	Experimental group (n=50)		Control group (n=50)		Significance test
	No.	%	No.	%	
Parity					
Primiparou	21	42	16	32	X^2=1.073 P=0.300
Multiparous	29	58	34	68	
Gestational age					
36-<38	18	36	22	44	t=0.811 P=0.419
38-40	32	64	28	56	
Mean(SD)	38.28(0.96)		38.12(1.00)		
Type of caesarean section					
Planned	28	56	34	68	X^2=1.528 P=0.216
Emergency	22	44	16	32	
Indication for caesarean section					
Maternal indication	27	54	17	34	X^2=4.109 P=0.128
Fetal indication	16	32	22	44	
Combined indication	7	14	11	22	
Number of caesarean section					
Primary	24	48	18	36	X^2=1.478 P=0.224
Repeated	26	52	32	64	
Practicing physical exercise during pregnancy					
No	43	86	47	94	X^2=1.778 P=0.182
Yes	7	14	3	6	

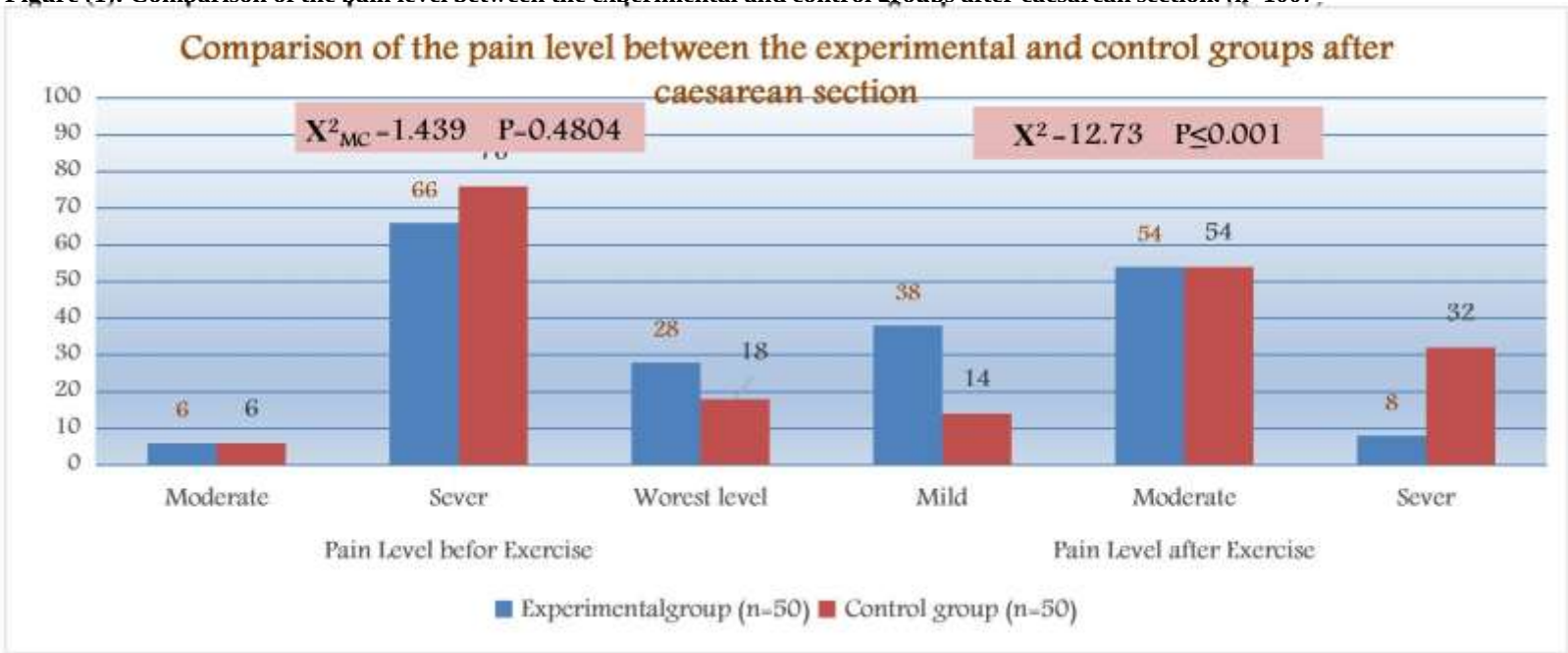
P-value for Chi-square or exact tests (Fisher and Monte Carlo) and/or Independent t test, **P** Significance * Significant ($p \leq 0.05$).

Table (3): Comparison of the pain mean scores between the experimental and control groups before, and after exercise program, (n=100)

Phases of the study	Experimental group (n=50)		Control group (n=50)		Significance test between mean scores	Effect size (Cohen's d)
	Mean	SD	Mean	SD		
Pain score						
Before post-natal exercises	8.50	1.21	8.20	1.17	t=1.25 P=0.213	-----
After post-natal exercises	4.12	1.00	6.08	2.20	t=5.73 P≤0.001	1.15

t: Independent t-test, d: Effect size of t tests (Cohen's d) d<0.2 small, d=0.5 medium, d>0.8 large, Significant (p≤ 0.05).

Figure (1): Comparison of the pain level between the experimental and control groups after caesarean section. (n=100)



P-value for Chi-square or exact tests (Monte Carlo test)* Statistically significant level at $P < 0.05$.

Table (4): Comparison of the recovery variables between the experimental and control groups after caesarean-section, (n=100)

Recovery variables	Experimental group (n=50)		Control group (n=50)		Significance test
	No.	%	No.	%	
Use of analgesia after movement					
One injection	37	74	22	44	X^2 =9.301 P=0.002
2-3 injection	13	26	28	56	
Passage of first flatus					
Within 1 hour	33	66	15	30	X^2 =12.98 P≤0.001
After 1 hour	17	34	35	70	
Initiation of oral intake					
Within 1 hour	30	60	14	28	X^2 =10.39 P=0.001
After 1 hour	20	40	36	72	
Duration of catheterization					
6-12 hours	5	10	8	16	X^2 =1.694 P=0.454
13-18 hours	19	38	22	44	
19-24 hours	26	52	20	40	
Self-void after removal of catheter					
<1 hour	23	46	11	22	X^2 =14.122 P=0.001
1-2 hour	24	48	22	44	
>2 hour	3	6	17	34	
Breast-feeding and holding the baby independently					
At 6 hour	39	78	27	54	X^2 =6.417 P=0.011
>6 hour	11	22	23	46	

P-value for Chi-square, **P** Significance * Significant (p≤ 0.05).

Table (5): Comparison of the post-operative recovery variables mean score between the experimental and control groups after caesarean-section, (n=100)

Recovery variables	Experimental group (n=50)		Control group (n=50)		Significance test	Effect size (Cohen's d)
	Mean	SD	Mean	SD		
Duration of catheterization after caesarean section **(In hours)**	18.88	4.78	18.98	5.65	t=0.095 P=0.9241	0.01
Start of oral intake after caesarean section **(In hours)**	1.34	0.59	2.07	0.84	t=5.02 P≤0.001	1.01
Self-void after removal of catheter **(In hours)**	1.75	0.44	2.33	0.76	t=4.76 P≤0.001	0.93
Breast-feeding and holding the baby independently **(In hours)**	6.32	1.57	13.34	2.45	t=17.05 P≤0.001	3.41
Passage of first flatus **(In minutes)**	50.66	1.06	65.04	3.34	t=29.01 P≤0.001	5.8

t: Independent t-test, d: Effect size of t tests (Cohen's d) d<0.2 small, d=0.5 medium, d>0.8 large, Significant (p≤ 0.05).

Discussion:

Caesarean section involves making an incision in the mother's uterus and lower abdomen wall. Mothers who have had cesarean sections need special care, and providing them with this care might be difficult **(Ricci, 2024).** A small amount of attention to the post-operative phase will ensure that the post-operative time is safe and healthy. After a cesarean section, post-natal exercises are essential for assisting the patient in regaining normal physiology and preventing or reducing post-operative problems. Exercise after giving birth speeds up wound healing and muscle regeneration. Once the effects of the regional anesthesia have subsided, the post-caesarean mother should be urged to get up and attempt to use the restroom (**Malik, 2024).** Hence, this study is aimed to evaluate the effect of post-natal exercises bundle sessions on mothers' recovery after caesarean section.

The results of the study indicate that there was no discernible difference between the experimental and control groups prior to postpartum exercises. However, following birthing activities, discomfort mean scores decreased considerably. According to an Independent t-test, a statistical significant differences between the experimental and control group (t=5.73, P ≤0.001). The experiment group's reduction of pain score was more pronounced, as evidenced by a very huge effect size of the exercise intervention. According to the researchers, it demonstrated the advantages of postpartum exercise. This outcome is consistent with the findings of (**El-Sayed 2020**).

Numerous research on caesarean sections have documented a higher risk of maternal complications, including postpartum depression, infection, thrombosis, hemorrhage, and hysterectomy **(Almuqbil,et; al, 2022**) According to the UK's obstetric anesthesia

standards, a cesarean patient's post-operative care should follow the same protocols as those for suture pain for all post-operative patients **(Bogod, 2019)**. The control group's caesarean section mothers' pain score was higher than that of the experimental group, suggesting that postpartum workouts can help reduce postoperative discomfort (**Yangchen, 2023).**

The results of this study demonstrated that, following a caesarean section, the worst pain level improved to a severe level among nearly one tenth of the experimental group, compared to nearly one third in the control group after postnatal exercises. It validated the good efficacy of postpartum activities, according to the experts and study of **(Negi, 2023)**.

The results of the current investigation demonstrated that most of recovery indicators among post-caesarean mothers in the experiment and control groups differed statistically significant. It illustrated the effectiveness of postpartum activities, according to the researchers.

This outcome was consistent with a study by (**Hou; et al 2023**) that found that removing the urine catheter as soon as possible after a caesarean section improved the patient's first-void discomfort and recovery time following the anesthesia.

Early catheter spontaneous voiding, postpartum exercises, removal, early peristalsis movement initiation, early postpartum feeding, and other supportive measures like privacy and ambulation can all increase the chances of a full recovery **(Youness& Ibrahim, 2017).**
Therefore, the current study examined the post-operative recovery in terms of the degree of pain experienced by the post-caesarean mother, the use of analgesics following postpartum exercises, the length of catheterization, the self-voiding after catheter removal, the occurrence of the first flatus, the initiation of oral intake, breastfeeding, and the ability to hold the baby independently.

An opposed to the control group, the experiment group's mean post-operative pain score following postpartum activities was significantly lower, according to the study's findings. (**Hou; et al 2023**) study, which found that the mean ambulation duration was statistically significant at 13.15 hours for the 4-hour catheterized group and 25.46 hours for the 24-hour catheterized group, was consistent with these findings **(Rupich et al., 2018**).
A study of **(Ali, Hassan& Ghani, 2020)** which indicate opposite results where exercises may not play an obvious role in the perception of pain intensity, as revealed by no statistically significant difference between study and control group.

Additionally, compared to the control group, the experimental group's maximum individuals began oral intake substantially earlier, according to the current study. A randomized controlled trial by **(Mohamed; et al 2023**), in which they examined the early feeding group vs. routine feeding group in post-caesarean moms, supported the findings. Significantly, the results showed that compare d to the control group, women in the early feeding group experienced a quicker restoration of bowel function and left mobilization earlier.

According to the current study's findings, the majority of the experiment group's individuals started breastfeeding at six hours earlier than the control group. The study by (**Elliott-Carter N. & Harper, 2012)** found that keeping mothers and newborns together following a caesarean section and early ambulation has several advantages, including fostering breastfeeding and maternal-infant bonding, two crucial aspects of care. According to the findings, women who had cesarean sections recovered more quickly with their babies if they were ambulated early.

The current study's findings also demonstrated a substantial difference between the experimental and control groups' post-operative recovery. **(Alphones & Miranda, 2023**) study on the impact of planned early ambulation on selected postnatal activities of post-caesarean patients found that there was a significant difference between the activities performed by the experimental and control groups, as demonstrated by the experimental group's superior activities. The current study's findings were consistent with that study. This demonstrated how planned early ambulation helped post-caesarean patients resume their activities. In a similar study by (**Brites et al. 2023**) also showed that postpartum women who are able to exercise without reducing their

typical level of activity may experience psychological and physical advantages.

According to the results of another study on the impact of early post-cesarean section exercises on early resumption of women's functional activities, which stated that early post-cesarean section exercises may be effective in enhancing the recovery of the mothers as revealed by earlier passage of flatus, reducing postpartum complaints, as well as enhancing the resumption of functional and daily activities.

Conclusion:

Based on the results and hypothesis of the pre study, the study findings concluded implementation of post-natal exercises bu sessions had a positive effect on improving moth recovery after caesarean section

Recommendations:

Based on the findings of this study, the following recommendations are suggested:

- Post-natal exercises are recommended to be taught to mothers after caesarean section during antenatal period.
- Because post-natal exercises can improve mothers' recovery from caesarean sections and lower post-operative problems, they can be included in nursing practice in the labor room.
- Post-natal exercises could be applied as a non-pharmacological method and complementary therapy along with routine care as a preparation technique to manage pain after caesarean section
- Development and implementation of Post-natal exercises training program for mothers should be considered
- Replication of the current study on a larger probability sample and in other settings to generalized results

References

1. Alphones, C. K., & Miranda, J. P. (2023). Effectiveness of Planned Early Ambulation on Postoperative Recovery among Cesarean Mothers: A Quasi-experimental study in Mangaluru. *Journal of Health and Allied Sciences NU*, *13*(04), 551-556.
2. Ali, S. M., Hassan, S. A., & Ghani, R. M. (2020). Effect of early post-cesarean section exercises on early resumption of women's functional activities. *Egyptian Nursing Journal*, *17*(2), 135-145.
3. Almuqbil, M., Kraidiye, N., Alshmaimri, H., Almutiri, A., Alanazi, A., Hjeij, A., ... & Asdaq, S. M. B. (2022). Postpartum depression and health-related quality of life: a Saudi Arabian perspective. *PeerJ*, *10*, e14240.
4. Bogod, D., Mushambi, M., & Craig, S. K. (2019). Guidelines for the provision of anaesthesia services for an obstetric population. *London, Royal College of Anaesthetists*.
5. Brites-Lagos, C., Ramos, L., Szumilewicz, A., & Santos-Rocha, R. (2023, October). Feasibility of a Supervised Postpartum Exercise Program and Effects on Maternal Health and Fitness Parameters—Pilot Study. In *Healthcare* (Vol. 11, No. 20, p. 2801).
6. Delgado, A., Amorim, M. M., Oliveira, A. D. A. P., Amorim, K. C. S., Selva, M. W., Silva, Y. E., ... & Katz, L. (2024). Active pelvic movements on a Swiss ball reduced labour duration, pain, fatigue and anxiety in parturient women: a randomised trial. *Journal of Physiotherapy*, *70*(1), 25-32.
7. ELLIOTT- CARTER, N. E. V. A., & Harper, J. (2012). Keeping mothers and newborns together after cesarean: how one hospital made the change. *Nursing for Women's Health*, *16*(4), 290-295.
8. El-Sayed, H., Elmashad, H. A., & Kandeel, H. A. (2020). Effect of early progressive bed exercise and movement on recovery after caesarean section. *IOSR J Nurs Health Sci*, *9*, 47-56.
9. Filippi, V., Ganaba, R., Calvert, C., Murray, S. F., & Storeng, K. T. (2015). After surgery: the effects of life-saving caesarean sections in Burkina Faso. *BMC pregnancy and childbirth*, *15*, 1-13.
10. Hou, D., Jia, Y., Han, A., Hu, Q., Li, J., & Liang, W. (2023). Effect of urinary catheter removal at different times after caesarean section: A systematic review and network meta-analysis. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, *280*, 160-167.
11. Inge, P., Orchard, J. J., Purdue, R., & Orchard, J. W. (2022). Exercise after pregnancy. *Australian journal of general practice*, *51*(3), 117-121.
12. Kepley, J. M., Bates, K., & Mohiud din, S. S. (2023). Physiology, maternal changes. In *StatPearls [Internet]*.
13. Kalariya, M. (2015). A Study to Assess Effectiveness of Structured Teaching

Programme on Knowledge and Practice Regarding Postnatal Exercises among Postnatal Mother in Selected Hospitals of Valsad District. *International Journal of Nursing Education and Research*, *3*(3), 281-283.

14. Lowe, R. (2024). *Prevention of Venous Thromboembolism Through Nursing Education on Thromboprophylaxis and Standardization in Utilization of Prevention Protocols: A Quality Improvement Project* (Doctoral dissertation, Jacksonville University).
15. McCaffery, M., & Beebe, A. (1993). Pain: Clinical Manual for Nursing Practice. Baltimore: V.V. Mosby Company.
16. Mohamed Salim, A., Ahmed Mansour, A. E., Aly, A. A. E., & Elsayed, S. (2023). Early Versus Delayed Oral Feeding after Uncomplicated Cesarean Section. Benha Journal of Applied Sciences, 8(11), 25-28.
17. Malik, N., Kapoor, B., Singh, R., Sarkar, R., & Khan, I. A. (2024). Cesarean Section Trends and Associated Factors at a Tertiary Care Center in India: A Retrospective Study. *Cureus*, *16*(11), e73308.
18. Mundhra R, Gupta DK, Bahadur A, Kumar A, Kumar R. Effect of Enhanced Recovery after Surgery (ERAS) protocol on maternal outcomes following emergency caesarean delivery: A randomized controlled trial. Eur J Obstet Gynecol Reprod Biol X. 2024 Jun;22:100295. [PMC free article] [PubMed]
19. Negi, V., Mohanta, B., & Pareek, S. (2023). Early verse conventional ambulation on postoperative pain among women with lower segment cesarean section. *Journal of Datta Meghe Institute of Medical Sciences University*, *18*, 455 - 459.
20. Rupich, K., Missimer, E., O'Brien, D., Shafer, G., Wilensky, E. M., Pierce, J. T., & Welch, W. C. (2018). The benefits of implementing an early mobility protocol in postoperative neurosurgical spine patients. AJN The American Journal of Nursing, 118(6), 46-53.
21. Ricci, S. (2024). *Essentials of maternity, newborn, and women's health nursing*. Lippincott Williams & Wilkins.ss1r8
22. Rani, V., Andarieh, M., & Heidary, F. (2016). Effectiveness of planned teaching programme on practice of post natal exercises among mothers who have undergone lower segment cesarean section. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*, *5*(11), 3782-3788.
23. Selman R, Early K, Battles B, Seidenburg M, Wendel E, Westerlund S. Maximizing Recovery in the Postpartum Period: A Timeline for Rehabilitation from Pregnancy through Return to Sport. Int J Sports Phys Ther. 2022 Oct 1;17(6):1170-1183. doi: 10.26603/001c.37863. PMID: 36237644; PMCID: PMC9528725.
24. World Health Organization. Caesarean Section Rates Continue to Rise, Amid Growing Inequalities in access Geneva World Health Organization 2021 Available from:https://www.who.int/news/item/16-06-2021-caesarean-section-rates-continue-to-rise-amid-growing-inequalities-in-access Last accessed on 2023 Dec 18.
25. Yangchen, T., Smitha, M. V., & Sethi, P. (2023). Effectiveness of Scheduled Early Ambulation on Maternal Outcomes in Post caesarean in Odisha, Eastern India. *Indian Journal of Continuing Nursing Education*, *24*(2), 184-189.
26. Youness, E. M., & Ibrahim, W. H. (2017). Effect of early and progressive exercises on post-caesarean section recovery among women attending women's Heath Hospital. International Journal of Advanced Nursing Studies, 6 (2) 71-78.
27. Zeinab El-Gundy, Egypt has highest rates of C-section deliveries globally: Health minister, Monday 19 Sep 2022.