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Effectiveness of a Structured Exercise Program in Reducing Postpartum Low Back Pain and Improving Functional Ability in Women Following Vaginal Delivery

Nivedi Jain[1], Dr. Smita Barya[2], [3]Dr. Veenodini Warhade, [4]Dr. Jafar Khan, [5]Dr. Payal Sharma, [6]Dr. Renuka Pal, [7]Dr. Vaishnavi Jaykant kania, [8]Krati Jain, [9]Nandini Paliwal, [10]Dilawar khan, [11]Dr. Vivek Jain

[1] M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan.
[2]Professor, Department of Obstetrics & Gynaecology, Pacific College of Physiotherapy, Pacific Medical University, Udaipur, Rajasthan, India
[3]Professor & Head, Department Of Physiology, Pacific Medical College & Hospital, Pacific Medical University, Udaipur, Rajasthan, India
[4]Dean & HOD, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan
[5]Assistant Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan
[6]Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan
[7]Assistant Professor, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan
[8]M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan
[9]M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan.
[10]M.P.Th. scholar, Pacific college of Physiotherapy, Pacific medical university, Udaipur, Rajasthan.
[11]Principal, Renaissance school of Paramedical and Physiotherapy, Indore, Madhya Pradesh

Corresponding Author
Nivedi Jain,Postgraduate Student
Department of Physiotherapy,Pacific College of Physiotherapy, Pacific Medical University
Udaipur, Rajasthan, India, Email: [student email]
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KEYWORDS

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Abstract

Background
Postpartum low back pain is a common musculoskeletal condition that can lead to functional limitations and reduced quality of life in women following childbirth.
Objective
To evaluate the effectiveness of a structured exercise program in reducing low back pain and improving functional ability among postpartum women following vaginal delivery.
Methods
A randomized controlled study was conducted on 60 postpartum women (0–3 months after vaginal delivery). Participants were randomly allocated into two groups: an exercise intervention group (n = 30) and a control group (n = 30). The intervention group received a structured exercise program for 6 weeks, while the control group received standard postnatal care. Outcome measures included the Oswestry Disability Index (ODI) and Back Pain Functional Scale (BPFS). Statistical analysis was performed using paired and independent t-tests, with the level of significance set at $p < 0.05$.
Results
Both groups demonstrated improvement; however, the exercise group showed a significantly greater reduction in pain (ODI: 27.11 ± 4.92 to 20.03 ± 4.36) compared to the control group (31.42 ± 3.14 to 24.97 ± 3.89). Functional ability improved more in the exercise group (BPFS: 31.42 ± 5.80 to 40.54 ± 6.20) than in the control group (27.46 ± 3.18 to 33.44 ± 2.38), with statistically significant differences between groups ($p < 0.05$).
Conclusion
A structured exercise program is effective in reducing postpartum low back pain and improving functional ability. Incorporating exercise-based rehabilitation into routine postnatal care may enhance recovery and overall quality of life in postpartum women.

INTRODUCTION

Pregnancy and childbirth are associated with significant physical, hormonal, and biomechanical changes that can influence a woman's musculoskeletal health. Among

the various musculoskeletal complaints experienced during and after pregnancy, low back pain is one of the most common and disabling conditions. Postpartum low back pain affects a considerable proportion of women following delivery and can negatively impact their ability to perform daily activities, care for their newborn, and maintain overall quality of life. Although many women experience improvement in symptoms after childbirth, a substantial number continue to suffer from persistent low back pain during the postpartum period.

The development of postpartum low back pain is multifactorial. During pregnancy, the body undergoes several adaptations to support fetal growth and prepare for childbirth. Hormonal changes, particularly increased secretion of relaxin, progesterone, and estrogen, contribute to ligamentous laxity and joint mobility. While these changes facilitate delivery, they may also reduce stability of the lumbopelvic region. Simultaneously, progressive weight gain and enlargement of the uterus shift the body's center of gravity anteriorly, resulting in increased lumbar lordosis and altered posture. These biomechanical changes place additional stress on the lumbar spine, pelvic girdle, and surrounding musculature.

Furthermore, stretching and weakening of the abdominal muscles during pregnancy can compromise trunk stability and spinal support. The separation of the rectus abdominis muscles, commonly known as diastasis recti, may further impair core muscle function. Following vaginal delivery, recovery of these muscles and restoration of normal biomechanics occur gradually. During this period, women often experience reduced muscle strength, decreased endurance, and impaired lumbopelvic stability, making them more susceptible to low back pain.

The postpartum phase also introduces new physical demands that can contribute to the persistence of symptoms. Activities such as lifting and carrying the infant, prolonged breastfeeding positions, repetitive bending, inadequate rest, and sleep deprivation place additional strain on the back and pelvic structures. These factors can interfere with recovery and may prolong pain and functional limitations. Persistent postpartum low back pain can affect maternal well-being, reduce participation in household and occupational activities, and negatively influence psychological health.

Exercise therapy has emerged as an important conservative intervention for the management of postpartum musculoskeletal disorders. Regular physical activity and structured exercise programs can help restore muscle strength, improve flexibility, enhance posture, and promote functional recovery. In particular, exercises focusing on core stabilization, pelvic floor strengthening, and lumbopelvic control have shown promising results in improving spinal stability and reducing pain. Strengthening deep stabilizing muscles such as the transversus abdominis, multifidus, diaphragm, and pelvic floor muscles plays a vital role in restoring normal movement patterns and supporting the spine during daily activities.

Exercise is a cost-effective, safe, and non-pharmacological approach that can be easily incorporated into postpartum rehabilitation programs. In addition to reducing pain, exercise may improve physical function, increase confidence in movement, enhance quality of life, and promote overall maternal health. Despite the recognized benefits of exercise, there remains limited evidence specifically examining its role in reducing postpartum low back pain among women who have undergone vaginal delivery. Moreover, adherence to exercise programs and awareness regarding postpartum

rehabilitation remain areas requiring further attention.

Therefore, the present study aims to analyze the role of exercise in reducing post-pregnancy low back pain among women following vaginal delivery. The findings of this study may contribute to a better understanding of the effectiveness of exercise-based interventions and support the development of evidence-based physiotherapy strategies for postpartum women. By identifying the impact of exercise on pain reduction and functional recovery, this study seeks to promote healthier postpartum rehabilitation practices and improve the quality of life of new mothers.

MATERIALS AND METHODS

Study Design

A randomized controlled study was conducted to evaluate the effectiveness of a structured exercise program in reducing postpartum low back pain and improving functional ability.

Study Setting

The study was carried out in the Department of Physiotherapy at Pacific Medical College and Hospital, Udaipur, Rajasthan, India.

Participants

A total of 60 postpartum women were recruited within 0–3 months following vaginal delivery.

Inclusion Criteria

1. Women aged between 20 and 40 years
2. 0–3 months postpartum following vaginal delivery
3. Presence of low back pain
4. Willingness to participate in the study

Exclusion Criteria

1. History of cesarean section
2. Severe musculoskeletal or neurological disorders
3. Pregnancy-related complications requiring medical restriction
4. History of spinal surgery

Sample Size and Group Allocation

Participants were randomly allocated into two groups using a simple randomization method:

- **Exercise Group (n = 30):** Received a structured exercise program
- **Control Group (n = 30):** Received standard postnatal care

INTERVENTION PROTOCOL

Exercise Group

Participants underwent a structured exercise program for a duration of 6 weeks, which included:

- Stretching exercises
- Strengthening exercises
- Core stabilization exercises
- Pelvic floor muscle training

Exercises were initially performed under supervision and subsequently continued at home as per instructions.

Control Group

Participants received standard postnatal care, including general advice on posture and daily activities, without any structured exercise intervention.

OUTCOME MEASURES

- **Oswestry Disability Index (ODI):** Assessed the level of disability due to low back pain
- **Back Pain Functional Scale (BPFS):** Assessed functional ability

Measurements were recorded at baseline (pre-intervention) and after completion of the 6-week intervention period (post-intervention).

STATISTICAL ANALYSIS

Data were analyzed using appropriate statistical methods:

- Paired *t*-test was used for within-group comparisons
- Independent *t*-test was used for between-group comparisons
- The level of statistical significance was set at $p < 0.05$

Result

Table 1 Distribution of Age Group

Age	Number of Patients	Percentage
18-20	5	8
21-23	8	13
24-26	14	23
27-29	15	25
30-32	11	18
33 -35	7	12
Total	60	100

Out of 60 patients studied, 5(8%) had their age between 18-20 years,8(13%) had age between 21-23 years,14(23%) had age between 24-26 years,15(25%) had age between 27-29 years,11(18%) had age between30-32years, 7(12%) had age 33 -35 years. Mean ± SD of age in the entire study group was 27 ± 4.3 years and minimum-maximum age range was 18-35 years.

Diagram 1 Showing the bar diagram distribution of age group

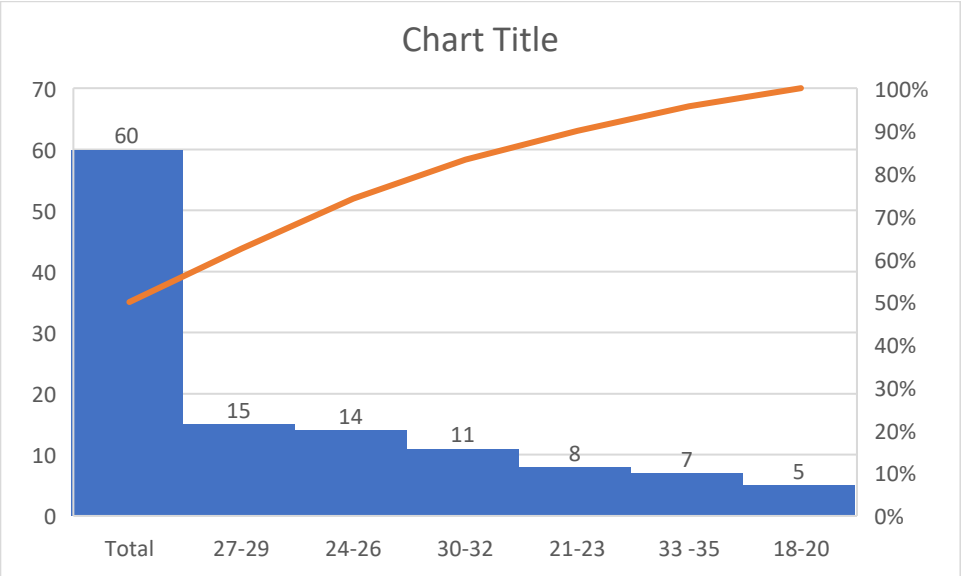

Table 2.1 Distribution of Pain (Exercise Intervention Group)

Age Group	Pre ODI	Post ODI
18–20	18.66	13.66
21–23	21.5	14.5
24–26	30	22.66
27–29	28.71	20.42
30–32	34	26.6
33–35	30.33	20.3

Pain	Mean ± SD (n=30)	Range
ODI Pre	27.11 ± 4.92	18.66 – 34
ODI POST	20.03 ± 4.36	13.66 – 26.6

Mean ODI pain score decreased from 27.11 ± 4.92 (pre) to 20.03 ± 4.36 (post), indicating a reduction in pain after intervention.

2.2 Control Group

Age Group	Pre ODI	Post ODI
18–20	29	21
21–23	28.5	20.5
24–26	28.87	23.25
27–29	31.87	27.25
30–32	34.5	28.33
33–35	35.75	29.5

Control	Mean ± SD (n=30)	Range
ODI Pre	31.42 ± 3.14	28.5 – 35.75
ODI POST	24.97 ± 3.89	20.5 – 28.33

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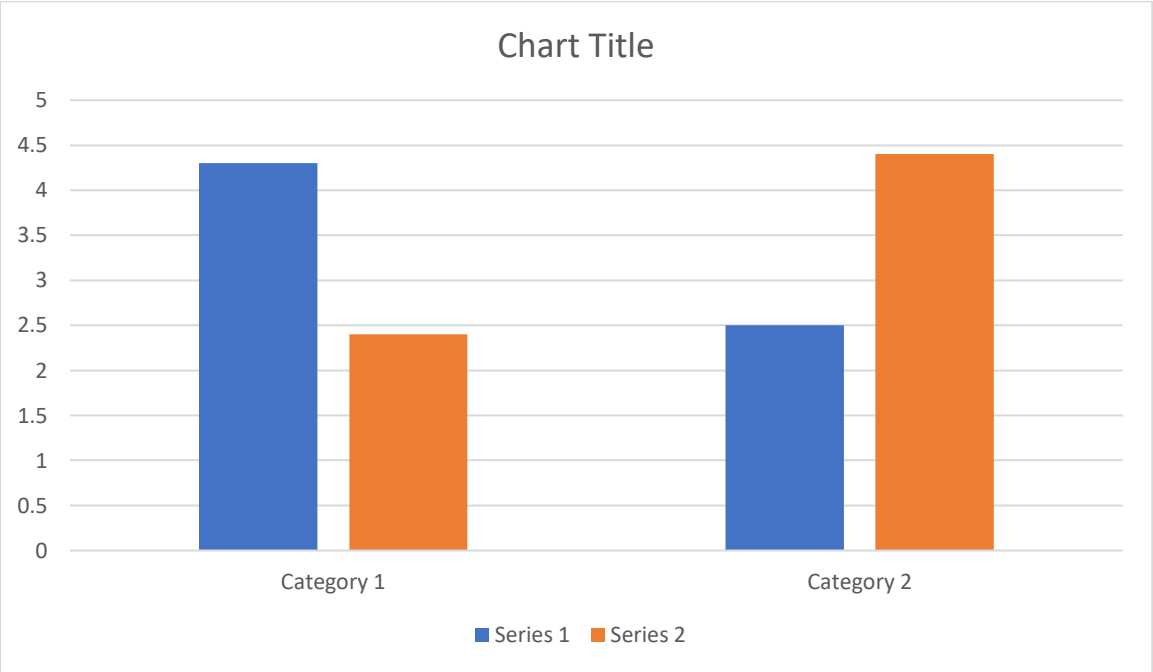
Diagram 2.1 Showing the bar diagram distribution of pain



2.2 Control Group

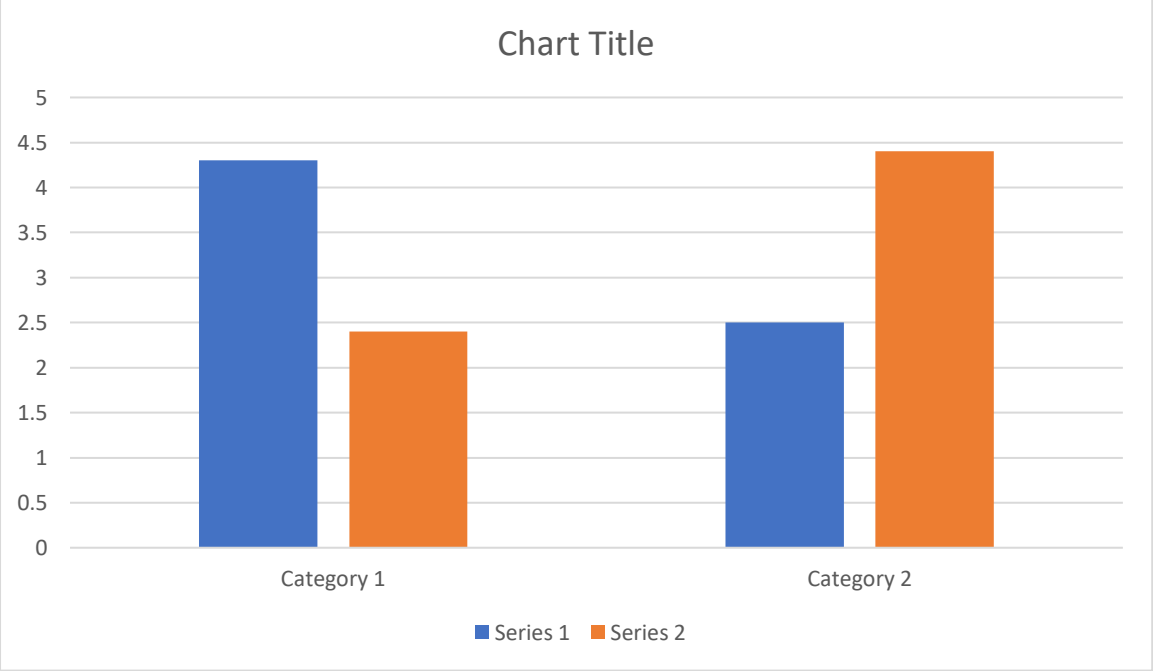


Table 3.1 Exercise Intervention Group

Age Group	Pre BPFS	Post BPFS
18–20	39.66	49.66
21–23	37.33	43.16
24–26	28.16	41.83
27–29	29.42	41
30–32	24.6	31.6
33–35	29.33	36

Age Group	Pre BPFS	Post BPFS
18–20	29	34
21–23	31	35.5
24–26	30.37	35.8
27–29	26.62	33.5
30–32	24.5	32.6
33–35	23.25	29.25

Variable	Mean ± SD	Range (Min–Max)
Pre BPFS	31.42 ± 5.80	24.60 – 39.66
Post BPFS	40.54 ± 6.20	31.60 – 49.66

Variable	Mean ± SD	Range (Min–Max)
Pre BPFS	27.46 ± 3.18	23.25 – 31
Post BPFS	33.44 ± 2.38	29.25 – 35.8

"Mean BPFS score increased from 31.42 ± 5.80 to 40.54 ± 6.20, indicating improvement in functional ability and reduced disability."

3.2 Control Group

Diagram 3.1 Showing the bar diagram distribution of disability

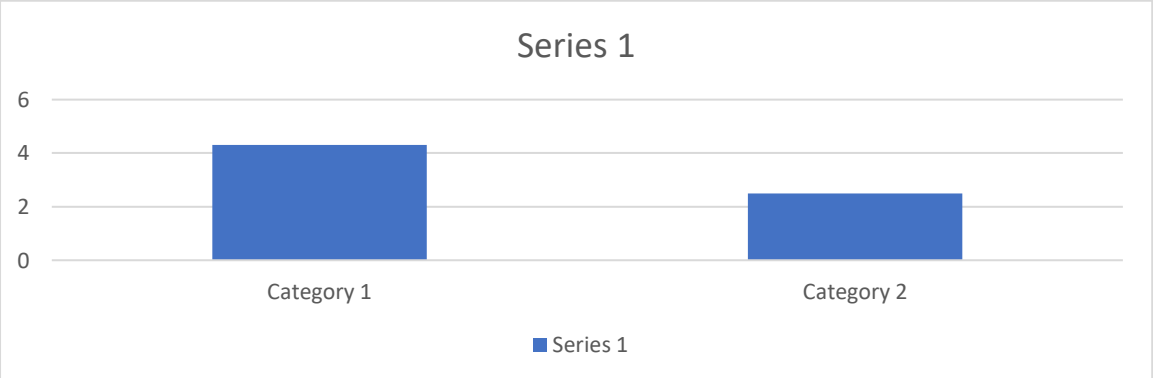


Diagram 3.2

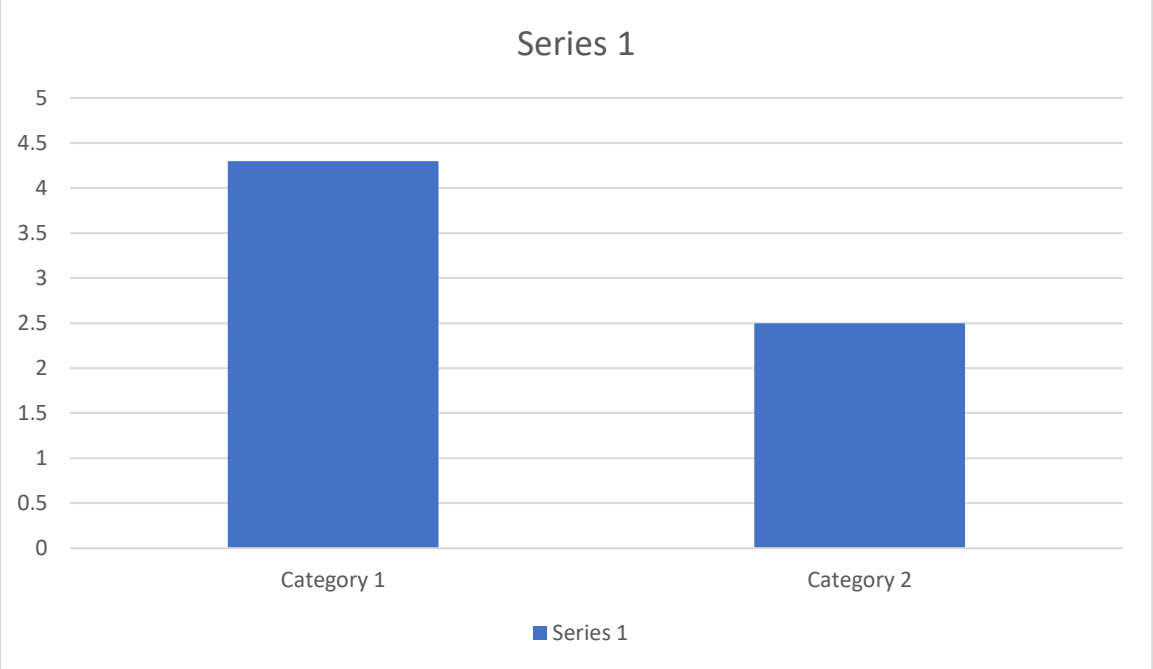


Table 4 Age-wise Distribution of Patients in Group A and Group B

Age	Group A (n=30)		Group B (n=30)	
	Number of Patients	Percentage	Number of Patients	Percentage
18–20	3	10%	2	7%
21–23	6	20%	2	7%
24–26	6	20%	8	27%
27–29	7	23%	8	27%
30–32	5	17%	6	20%
33–35	3	10%	4	13%
Total	30	100	30	100

The age distribution in both Group A and Group B is fairly comparable across all categories. The majority of participants in both groups fall within the 24–29 years age range.

Diagram 4 Showing the bar diagram age-wise distribution of patients in Group A and Group B

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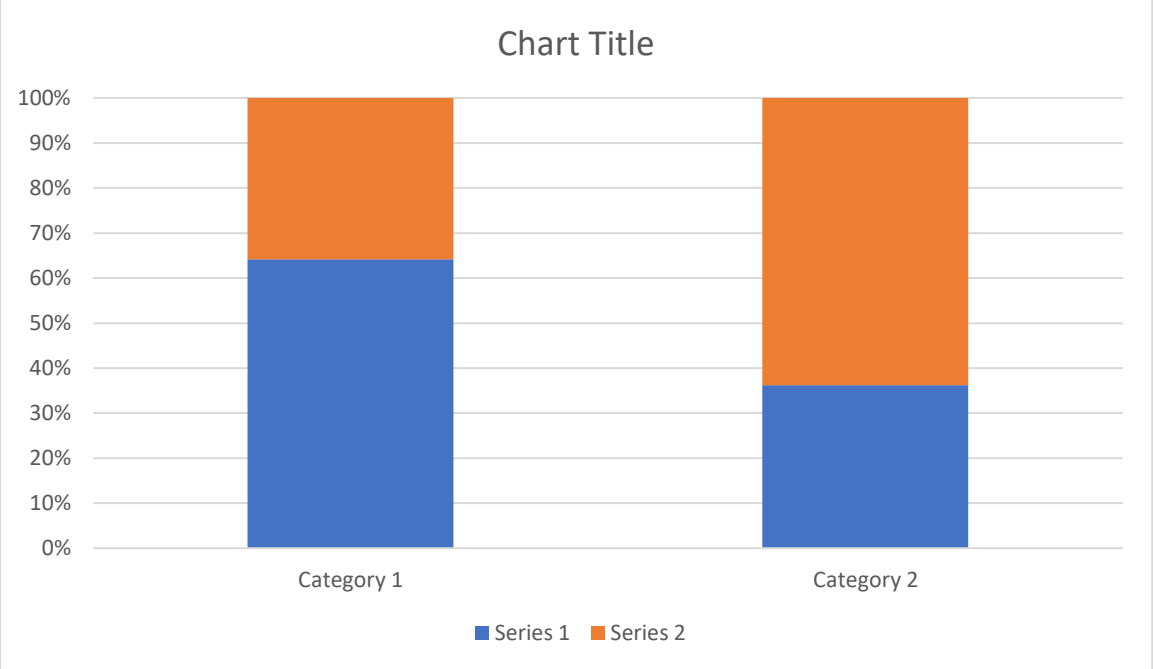
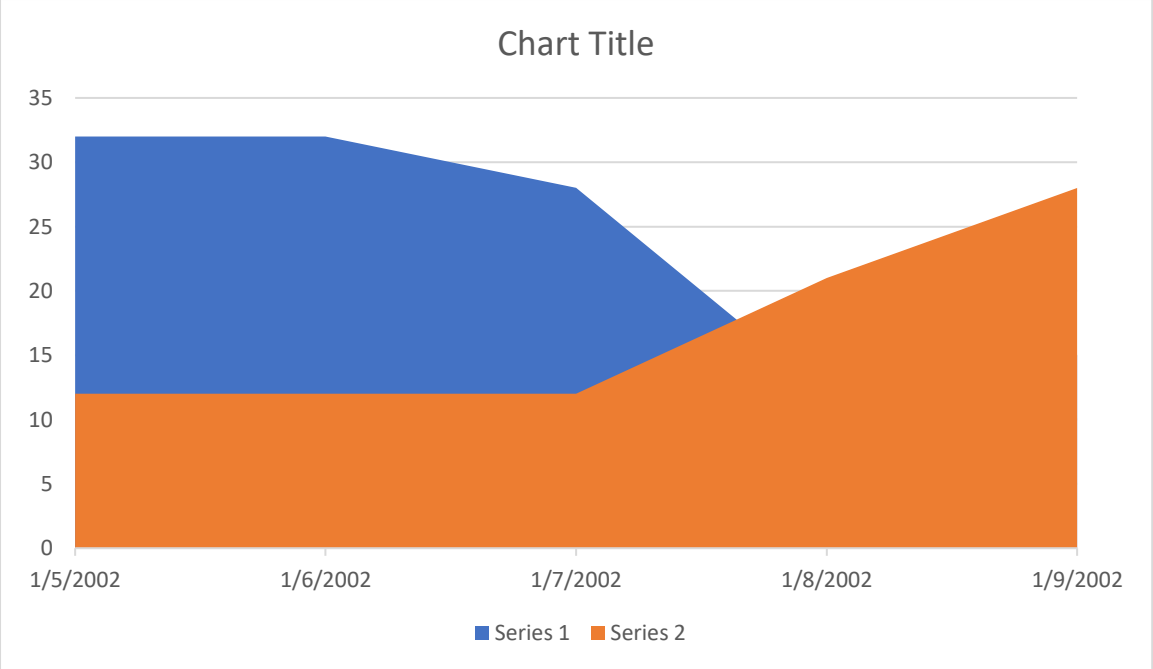


Table 5 Comparison of Age-wise Distribution between Group A and Group B

Agess	Group A (n=30)	Group B (n=30)			Statistics test value
	Number of Patients	Percentage	Number of Patients	Percentage	
18–20	3	10%	2	7%	X^2 = 2.79,P =>0.73(NS)
21–23	6	20%	2	7%	
24–26	6	20%	8	27%	
27–29	7	23%	8	27%	
30–32	5	17%	6	20%	
33–35	3	10%	4	13%	
Total	30	100	30	100	

The age distribution between Group A and Group B is comparable, with no significant difference observed ($\chi^2 = 2.79$, $p = 0.73$).

Table 4



RESULTS

A total of 60 postpartum women participated in the study and were equally divided into exercise and control groups (n = 30 each). The mean age was **27 ± 4.3 years** (range: 18–35 years), with no significant difference between groups (p = 0.73).

Pain and Disability (ODI)

Both groups showed a significant reduction in ODI scores:

- **Exercise Group:** 27.11 ± 4.92 → 20.03 ± 4.36
- **Control Group:** 31.42 ± 3.14 → 24.97 ± 3.89 ($p < 0.001$)

The improvement was significantly greater in the exercise group ($p < 0.05$).

Functional Ability (BPFS)

Both groups demonstrated significant improvement:

- **Exercise Group:** 31.42 ± 5.80 → 40.54 ± 6.20
- **Control Group:** 27.46 ± 3.18 → 33.44 ± 2.38 ($p < 0.001$)

The exercise group showed significantly greater improvement ($p < 0.05$).

Summary

Structured exercise resulted in greater reduction in pain and improvement in functional ability compared to standard care.

DISCUSSION

The present study aimed to analyze the role of exercise in reducing postpartum low back pain among women following vaginal delivery. The findings demonstrated that participants who engaged in a structured exercise program experienced greater reductions in pain and improvements in functional ability compared to those receiving routine postnatal care alone. These results indicate that exercise is an effective intervention for managing

postpartum low back pain and enhancing recovery after childbirth.

The reduction in pain observed in the exercise group may be attributed to improved strength and activation of the core and pelvic stabilizing muscles. Pregnancy-related changes, including abdominal muscle stretching, ligamentous laxity, and altered posture, can compromise lumbopelvic stability and contribute to low back pain. Structured exercises targeting these impairments likely improved spinal support and reduced mechanical stress on the lumbar region, leading to pain relief.

Significant improvements in functional ability were also observed among participants in the exercise group. Postpartum women frequently perform activities such as lifting, carrying, and feeding their infants, which may aggravate low back pain. Improved functional scores suggest that participants were better able to perform daily activities with less discomfort following the exercise intervention. This finding highlights the clinical importance of incorporating exercise into postpartum rehabilitation programs.

The results of the present study are consistent with previous studies reporting the beneficial effects of exercise therapy in postpartum women. Strengthening and stabilization exercises have been shown to improve muscular support, enhance postural control, and reduce disability associated with postpartum low back pain. The current findings further support the role of physiotherapy-led exercise programs in promoting recovery and improving maternal health outcomes.

Although both groups demonstrated some improvement over time, the greater improvements observed in the exercise group suggest that structured exercise provides benefits beyond natural postpartum recovery. While physiological healing and gradual restoration of musculoskeletal function occur after childbirth, targeted exercise appears to accelerate this process and optimize functional outcomes.

The study has certain limitations. The sample size was relatively small, which may limit the generalizability of the findings. Additionally, the intervention period was limited, and long-term follow-up was not conducted to determine whether the improvements were sustained over time. Future studies with larger sample sizes and longer follow-up periods are recommended to further establish the long-term effectiveness of postpartum exercise programs.

Overall, the findings of this study suggest that structured exercise is an effective and safe intervention for reducing postpartum low back pain and improving functional ability among women following vaginal delivery. Incorporating exercise-based physiotherapy into routine postpartum care may contribute to faster recovery, improved functional independence, and enhanced quality of life.

CONCLUSION

The findings of the present study suggest that structured exercise is an effective intervention for reducing postpartum low back pain and improving functional ability among women following vaginal delivery. Participants who underwent the exercise program demonstrated greater improvements in pain and functional performance compared to those receiving routine postnatal care alone. The observed benefits may be attributed to enhanced core muscle strength, improved lumbopelvic stability, and better neuromuscular control. These results support the incorporation of structured exercise programs into postpartum rehabilitation to promote recovery, reduce disability, and improve the quality of life of postpartum women.

LIMITATIONS

The study had certain limitations. The sample size was relatively small, which may limit the generalizability of the findings. The intervention period was limited, and no long-term follow-up was conducted to assess the sustainability of the improvements. In addition, the study relied on self-reported outcome measures, which may be subject to response bias. Furthermore, only women following vaginal delivery were included, limiting the applicability of the results to the wider postpartum population.

FUTURE RECOMMENDATIONS

Future studies should include larger and more diverse populations to improve the external validity of the findings. Long-term follow-up is recommended to evaluate the persistence of treatment effects. The inclusion of objective outcome measures, such as muscle strength assessment and functional performance testing, would provide a more comprehensive evaluation of exercise effectiveness. Comparative studies investigating different exercise protocols, durations, and delivery methods may further help identify the most effective rehabilitation strategies for postpartum low back pain.

ETHICAL APPROVAL

Ethical approval was obtained from the Institutional Ethics Committee of Pacific Medical College and Hospital, Udaipur. All procedures involving human participants were carried out in compliance with institutional and ethical guidelines.

INFORMED CONSENT

Written informed consent was obtained from all participants prior to their inclusion in the study. Participants were adequately informed about the purpose, procedures, potential risks, and benefits of the study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest related to this study.

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