



Evaluation of the Functional Status of Post Caesarean Women with Low Back Pain Using Psoas Major Exercise: A Randomized Clinical Trial



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Abstract

Low back pain and functional limitations have been commonly reported in postnatal women who underwent a cesarean section (C-section). Despite the understanding that the Psoas major muscle, an important lumbar spine stabilizer, is critical in the treatment of low back pain, only limited studies on the benefits of Psoas major exercise intervention in postpartum C-section women prevail. Therefore, the present study aims to determine the influence of psoas major exercise in postnatal cesarean women with low back pain, and functional impairments. 60 women who had C-section deliveries participated in the present prospective randomized study either in the control group A (n = 30) or in the interventional group B (n = 30). The Roland-Morris Low Back Pain and Disability Questionnaire (RMQ) and NPRS (Numerical Pain Rating Scale) were utilized as standardized assessment tools and the outcome measures revealed that intervention with designed Psoas major exercises in postnatal C-section women significantly alleviated low back pain and improved functional status ($p < 0.001$). The study results, thus clearly demonstrate the beneficial influence of Psoas major exercise in postnatal C-section women, and emphasize the need for further large cohort studies.

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Contents

Abstract.....	392
1 Introduction.....	393
2 Materials and Methods.....	393
3 Results and Discussions.....	394
4 Conclusion.....	396
Acknowledgments.....	396
References.....	397

1 Introduction

Caesarean section (C-section) birth is a frequent surgical procedure that has grown in popularity in modern obstetrics. While C-section births are frequently necessary to protect the safety of both the mother and the baby, they can bring particular obstacles to postpartum recovery and maternal well-being (Angolile et al., 2023). According to the RM questionnaire, 71% of women have back pain after many years of delivery (Yaqoub et al., 2022), and those who undergo C-sections may have difficulty returning to their full-fledged regular activities due to variables such as discomfort, decreased mobility, and weaker core muscles (Jansen et al., 2013). Descriptive statistics have also indicated that 7 out of 10 women who give birth have back discomfort and require timely intervention in order to prevent deterioration in the functional status (Kan, 2020; Betran et al., 2016). While postnatal back pain due to abdominal muscle, and pelvic floor weakness have been investigated in earlier studies, only recent studies have started focusing on the Psoas muscle (Solanki & Malawade, 2022). The Psoas major muscle is the most significant muscle that overlies the vertebral column, which is part of the hip flexor group and is located deep within the abdominal cavity, connecting the lumbar spine to the lower extremities (Bastiaenen et al., 2008; Parikh & Suchi, 2016). Owing to the fact that there exists limited evidence on Psoas major muscle strengthening in treating post-C-section low back pain, the present study aimed to evaluate the functional status of postnatal caesarean women with low back pain using the RM questionnaire and NPRS (numerical pain rating scale). The results of the study bring to light that Psoas major exercise significantly improves functional capacity by alleviating low back pain.

2 Materials and Methods

This randomized clinical trial for assessing the impact of Psoas exercise on relieving lower back and improving functional status in post-caesarean delivery women was conducted at the OBG department in Trichy SRM Medical College Hospital and Research Centre, after IEC approval and informed consent from the participants. The study was conducted for a duration of 6 months and the study participants were allocated using a simple random sampling method. The study group comprised of group A (control group) and group B (interventional group). The inclusion criteria were women aged 21 to 30 years, who underwent LSCS and scored 4-7 in NPRS with no other comorbidities. The exercises were categorized into 5 levels till the 12th week and each level had 2 to 3 exercises based on their intensity (Table1, Figure1). The control group was considered as placebo and the interventional group participants were asked to follow their routine lifestyle.

Exercise protocol

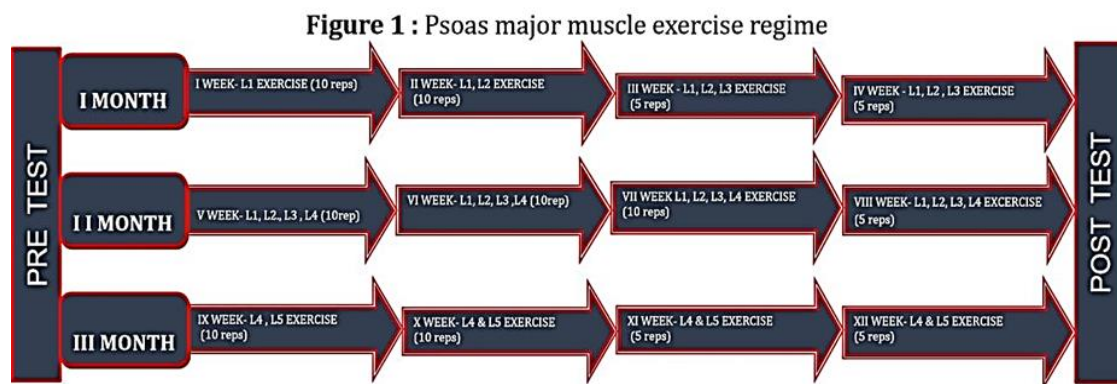
The exercise protocol pertaining to various levels is listed in Table 1, and a schematic illustration of the exercise regimen during the I, II, and III months is presented in Figure 1.

Table 1: Psoas major muscle exercise regime

S.No	LEVEL	EXERCISES
1	Level -1	Pelvic bridging and spinal twists
2	Level- 2	Knee-hand balance and side bending
3	Level- 3	Forward bending: try to touch the opposite leg, back arching forward stance and bridging with side movement
4	Level- 4	Bridging with rotation and single stretch
5	Level- 5	90-90 position, Rolling like a ball and supine cycling

Table 1: The table describes the designed exercises and their levels that were utilized for the for strengthening and toning the Psoas major muscle in post caesarean women

Roland-Morris Low Back Pain and Disability Questionnaire (Roland & Fairbank, 2000), and NPRS were used as standardized assessment tools to evaluate the effects of postnatal Psoas major exercises on postpartum low back pain, and functional disability in women who delivered through C-section at the 2nd review.

**Figure 1:** The figure represents the designed Psoas major exercise regime for post-natal caesarean women with low back pain. The exercise regime focused in strengthening the muscle and regaining the functional capacity, thereby providing relief from back pain.

3 Results and Discussions

The effect of exercises that focus on Musculoskeletal parameters has gained recent attention in past-partum delivery and functional capacity (Thabet & Alshehri, 2019). Post-caesarean pain relief is considered essential for the optimal care of the baby by the mother, and physical therapy treatment combined with manual therapy has been reported to be effective in treating low back pain (Hui, 2017). In conjunction, the influence of stretching and strengthening the lumbar segment, Psoas, in patients with low/unilateral back pain has also been brought to attention (Volpato et al., 2014; Sajko & Stuber, 2009). However, studies regarding the effect of Psoas exercise on post-caesarean low back pain is scantily available, and hence the present study aimed to evaluate the effect of Psoas major muscle exercise in alleviating low back pain in post-caesarean primipara and multipara women using the RMQ and NPRS applications. The designed Psoas major exercise program focused on enhancing the functional capacity of the Psoas major muscle and simultaneously relaxing the overactive core muscles, which are the primary pain-producing factors. Since activation of the deep trunk muscles is crucial, the exercise program included coactivation and grouped synergies of the superficial trunk muscles (Hoy et al., 2010; Krismer & Van Tulder, 2007; Ongley et al., 1987; Gustiani et al., 2022). Thus, the study aimed to regain strength and muscle tone in the Psoas major muscle, and thereby performance. As indicated in Figure 2, Figure 3, the RMQ, NPRS data for assessing the impact of the designed exercises on low back pain in

post cesarean women, revealed that the interventional group B exhibited significantly lowered back pain ($p < 0.001$) when compared to the control group A.

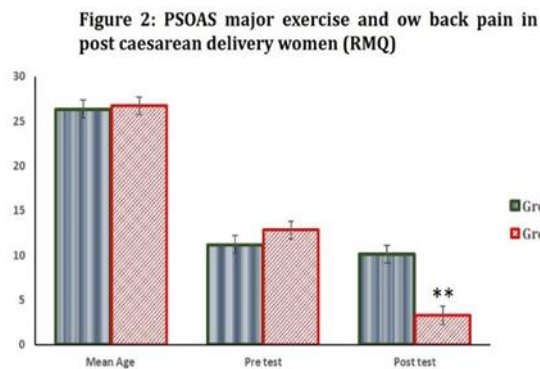


Figure 2: Post evaluation of the Psoas major exercise with the RMQ revealed that it significantly alleviated post-caesarean back pain ($p < 0.001$) when compared to the control group.

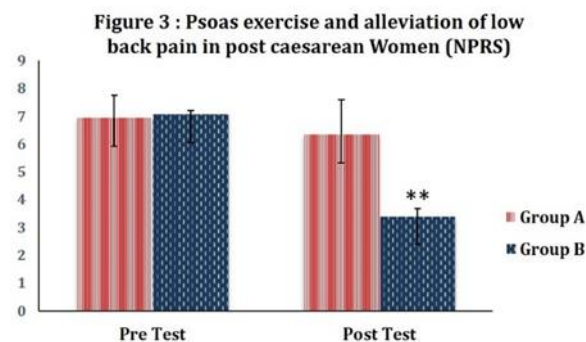


Figure 3: Post evaluation of the Psoas major exercise in women with post caesarean back pain using NPRS also revealed that the participants were significantly relieved of the low back pain when compared to the control group ($p < 0.001$).

Earlier studies that focused in understanding low-back pain have brought to light that low-back pain is likely caused by atrophy, inhibition of the deep segmental muscles like the Psoas major, and overactivity of the long superficial muscles of the trunk with decreased dynamic activity, and increased disability. Other causatives discussed for low back pain include findings that suggest that women who undergo caesarian section tend to gain weight as well fatty infiltration of the muscles leading to stress in their lower back and precipitating persistent low back pain. Hence early introduction of the Psoas exercise programs is suggested in rehabilitating the tone, and strength of the Psoas muscle to pre-pregnant stature, preventing low back pain, and limiting the severity of functional disability (Mbada et al., 2013; Volpato et al., 2014). Similar studies have also observed that there exists a positive correlation between symptom duration of pain and fat percentage in multifidus and Psoas major muscles. Further, as fatty infiltration grades increase by one unit, it is found that the pain level also increases by 0.8 (Barker et al., 2004; Salah El-din Mahmoud et al., 2016).

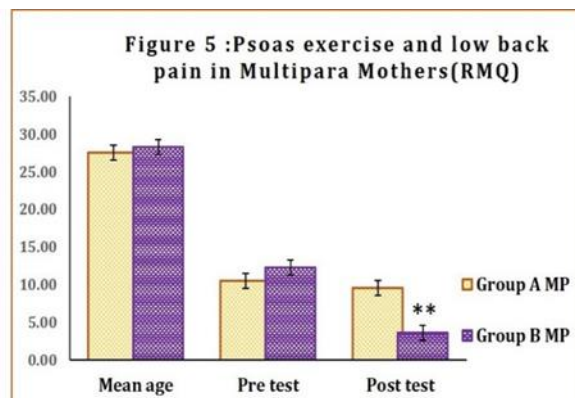
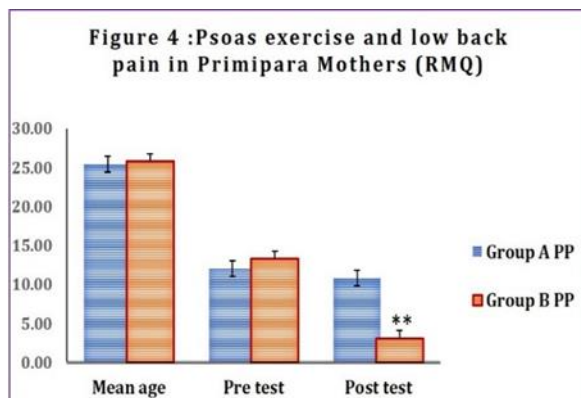


Figure 4, 5: Post evaluation of the Psoas major exercise with the RMQ revealed that the Psoas major exercise aided Primipara mothers and multipara mothers in having improved functional status and ($p < 0.001$) significantly low back pain.

In conjunction, the results of the present study are also reflective of these findings and demonstrate clearly the beneficial effects of the Psoas major exercise for post-caesarian back pain. The study also additionally analyzed the impact of the Psoas major muscle exercise in the functional status of the primipara and multipara women (Penn & Ghaem-Maghani, 2001; Visconti et al., 2020; Jackson & Paterson-Brown, 2001). As indicated

in Figures 4, 5, it can be observed that both the study groups displayed significantly lowered back pain after the strengthening exercises ($p < 0.001$). Cumulatively, the results of the present study highlight that the exercise intervention clearly improved functional capacity in the post cesarean study participants by primarily alleviating the low back pain in these participants. Further, the study results highlight the critical role of the Psoas muscle as an important core skeletal muscle in the human body which connects the trunk to the lower extremities, and also as an important force transmitter from the visceral organs ([Bogduk et al., 1992](#); [Santaguida & McGill, 1995](#); [Hajibandeh et al., 2024](#); [Bell & Andersson, 2016](#)).

4 Conclusion

The present study results reveal that the Psoas major exercise program is extremely beneficial in improving the functional status, and alleviating back pain in postnatal cesarean women. Further large-scale randomized controlled trials involving postnatal women who undergo normal vaginal and C-section deliveries will consolidate the effect of the postnatal Psoas strengthening exercise program in rehabilitating to prenatal functional capacity and thereby alleviation of low back pain.

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