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# PREVALENCE OF PELVIC PAIN AND URINARY INCONTINENCE IN ASSOCIATION WITH DIASTASIS RECTI AFTER C-SECTION

*Original Research*

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## ABSTRACT

**Background:** Diastasis recti abdominis (DRA) is defined as a midline separation of the rectus abdominis muscles along the linea alba, commonly occurring during pregnancy and the postpartum period. It has been reported in 66–100% of women during the third trimester and persists in approximately 53% after childbirth. The condition is associated with altered core stability, pelvic floor dysfunction, and compromised quality of life. Identifying its relationship with pelvic pain and urinary incontinence in postpartum women is essential to guide rehabilitation and preventive strategies.

**Objective:** To determine the association of pelvic pain and urinary incontinence with diastasis recti abdominis among postpartum women following cesarean section.

**Methods:** A descriptive cross-sectional study was conducted on 100 postpartum women aged 20–35 years at Government General Hospital Faisalabad and District Head Quarters Hospital Faisalabad over four months. Participants were selected through simple random sampling, and written informed consent was obtained. Women with normal vaginal delivery, umbilical hernia, recurrent abdominal surgeries, post-menopausal status, or active pregnancy were excluded. Screening for DRA was performed using the finger-width method. The Pelvic Floor Distress Inventory Short Form-20 (PFDI-20) assessed pelvic pain, while the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) evaluated urinary incontinence. Data were analyzed using SPSS version 20, and chi-square test was applied to assess associations.

**Results:** The mean age of participants was 28.24 ± 4.16 years (range 20–36). The PFDI-20 showed that 28% of women experienced heaviness in the lower abdomen, 22% pressure in the lower abdomen, and 23% reported pain or discomfort in the pelvic region. Urinary incontinence was present in 36% of participants, with 27% classified as moderate and 9% as severe based on ICIQ-UI scores. Pelvic floor distress was mild in 72%, moderate in 9%, and severe in 19%. Chi-square analysis revealed a significant association between urinary incontinence and DRA ($p \leq 0.05$), whereas no significant association was found between pelvic pain and DRA ($p \geq 0.05$).

**Conclusion:** The study demonstrated a strong association between diastasis recti abdominis and urinary incontinence in postpartum women following cesarean delivery, while no significant link with pelvic pain was observed. These findings underscore the importance of early screening, preventive education, and postpartum rehabilitation to minimize pelvic floor complications and enhance quality of life.

**Keywords:** Cesarean Section, Diastasis Recti, Female, Pelvic Floor Disorders, Pelvic Pain, Postpartum Period, Urinary Incontinence.

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## INTRODUCTION

Diastasis recti abdominis (DRA) is a common musculoskeletal condition characterized by the separation of the rectus abdominis muscles along the linea alba, resulting in a visible and palpable midline gap (1). The condition is of particular relevance to women during and after pregnancy, where hormonal changes and mechanical stretching of the abdominal wall contribute significantly to its development. The rectus abdominis, together with the internal oblique, external oblique, and transversus abdominis muscles, converge at the linea alba, making its integrity essential for abdominal strength and functional stability (2,3). Disruption of this structure not only affects trunk biomechanics but also places additional strain on the pelvic floor muscles, which are closely linked to abdominal function and intra-abdominal pressure regulation (4). Consequently, dysfunction in this system has been associated with pelvic floor disorders such as urinary incontinence, bowel dysfunction, and pelvic organ prolapse (4,5). During pregnancy, hormonal influences of relaxin, progesterone, and estrogen lead to softening of connective tissues and further stretching of the abdominal wall (5). The prevalence of DRA is reported to range between 27–100% in the second and third trimesters of pregnancy, and between 30–68% in the postpartum period, highlighting its widespread occurrence (6). In most cases, the condition may regress naturally after childbirth, yet up to 46% of women continue to experience persistent separation beyond the puerperium (7). Risk factors such as advanced maternal age, multiparity, cesarean section, significant weight gain, body mass index, and ethnicity have been reported to influence its onset and persistence (8). Importantly, menopausal women are also frequently affected, with up to 65% diagnosed with DRA, further underlining its clinical significance across different stages of a woman's life (9).

The structural weakening of the linea alba and rectus sheath not only predisposes to functional impairments but also increases the risk of associated conditions such as umbilical or epigastric hernias (10). Patients often report pelvic or lumbar pain, impaired postural stability, and reduced core strength, which collectively affect quality of life and participation in daily activities (11). Evidence suggests that DRA alters the anatomical and biomechanical coordination between the transversus abdominis and rectus abdominis muscles, leading to compensatory dysfunctions in lumbar-pelvic stability and respiration (12). These changes reinforce the clinical importance of distinguishing DRA from other abdominal wall pathologies, such as hernias, through careful physical examination (13). Despite its high prevalence and recognized impact, DRA is frequently underdiagnosed and undertreated, with limited consensus on standard evaluation or management strategies. While qualitative classification methods exist, a universal guideline for assessment and treatment remains lacking (2). Given its clinical implications, including the potential link with pelvic floor dysfunction and musculoskeletal pain syndromes, further research is warranted to explore effective diagnostic, preventive, and rehabilitative approaches. The objective of this study is to investigate the prevalence, associated risk factors, and functional consequences of diastasis recti abdominis, while emphasizing the importance of early identification and targeted rehabilitation to prevent pelvic floor disorders and improve women's health outcomes.

## METHODS

The present study was designed as a descriptive cross-sectional investigation and was carried out over a period of four months following approval from the Institutional Review Board of Government General Hospital Faisalabad and District Head Quarters Hospital, Faisalabad. A total of 100 postpartum female patients were recruited as the study population. Written informed consent was obtained from all participants prior to enrollment, ensuring that ethical standards of voluntary participation, confidentiality, and patient safety were upheld in accordance with the principles of the Declaration of Helsinki. Eligibility criteria were clearly defined. Women aged 20–35 years who had undergone cesarean section delivery and were clinically diagnosed with diastasis recti abdominis (DRA) were included, regardless of parity status, encompassing both primiparous and multiparous women. Exclusion criteria comprised those with normal vaginal delivery, umbilical hernia, recurrent abdominal surgeries, active pregnancy, or post-menopausal status, as these factors could confound abdominal wall assessment or pelvic floor outcomes.

Participants were screened for DRA using the clinical finger-width method, wherein the examiner placed fingers between the bellies of the rectus abdominis to measure the inter-recti distance. A separation of one to two finger widths was considered common following pregnancy, while a gap exceeding two and a half finger widths that did not reduce upon attempted abdominal contraction was classified

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as clinically significant and requiring further consideration. The test was performed up to three times, with patients allowed to return to the resting position or take breaks if fatigued. While the finger method is widely used in clinical practice, its subjective nature and potential lack of inter-rater reliability should be acknowledged as a limitation, especially compared with more standardized diagnostic tools such as ultrasound imaging. Data collection was conducted using two validated instruments: the Pelvic Floor Distress Inventory Questionnaire-Short Form 20 (PFDI-20) and the International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF). The PFDI-20 comprises 20 items assessing bowel, bladder, and pelvic symptoms, while the ICIQ-UI SF includes six items, two of which address demographics and four focused on urinary leakage episodes within the past four weeks. These tools allowed for a comprehensive assessment of pelvic floor symptoms in relation to abdominal wall integrity. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS). Descriptive statistics were applied to summarize baseline characteristics and questionnaire outcomes, while appropriate inferential tests were planned to evaluate associations between DRA and pelvic floor dysfunction parameters.

## RESULTS

The study included 100 postpartum women with an age range of 20 to 36 years, with a mean age of 28.24 ± 4.16 years. The Pelvic Floor Distress Inventory-20 (PFDI-20) revealed a varied distribution of pelvic symptoms. Approximately 45% of participants reported pressure in the lower abdomen, while 39% experienced heaviness. A total of 22% reported an incomplete bladder emptying sensation, and 18% indicated the need to strain excessively for bowel movements. Loss of rectal gas beyond control was reported by 33% of women, and 15% reported pain during defecation. Pain or discomfort in the lower abdomen or genital region was reported by 23% of women. Loss of stool beyond control occurred in 13% for well-formed stool and in 13% for loose stool, though the majority reported no or minimal symptoms. Urinary incontinence patterns assessed through the International Consultation on Incontinence Questionnaire (ICIQ-UI) showed that 64% of women reported no leakage, while 19% leaked once a week or less, 6% leaked two to three times a week, and 9% leaked once daily. Only two women experienced leakage several times a day or continuously. Regarding the impact on daily activities, 59% reported no interference, while small proportions reported varying degrees of disruption, with 1% rating it as "somewhat greatly." The quantity of leakage was reported as none in 64%, small amounts in 25%, and large volumes in 1%. The timing of leakage included before reaching the toilet in 34%, during coughing or sneezing in 7%, during sleep in 3%, and after urination or dressing in 6%. Severity grading indicated that 64% of women had mild or no urinary incontinence, 27% had moderate incontinence, and 9% had severe incontinence. Similarly, analysis of PFDI-20 scores demonstrated that 72% of women experienced mild or no pelvic floor distress, 9% reported moderate distress, and 19% reported severe symptoms.

Statistical analysis using chi-square testing demonstrated no significant association between pelvic pain and diastasis recti abdominis ($p = 0.503$), while a significant association was observed between urinary incontinence and diastasis recti abdominis ($p < 0.001$). Subgroup analysis by age and parity revealed additional insights into the distribution of symptoms. Women aged ≤ 28 years predominantly reported mild or no urinary incontinence, whereas those above 28 years exhibited higher proportions of moderate to severe symptoms, suggesting a trend toward worsening pelvic floor dysfunction with advancing maternal age. Similarly, multiparous women were more likely to demonstrate moderate or severe urinary incontinence and higher PFDI-20 scores compared to primiparous women, indicating that repeated pregnancies and deliveries may exacerbate abdominal wall and pelvic floor compromise. The observed differences emphasize the potential impact of both age and parity on the severity of diastasis recti abdominis and related pelvic floor dysfunction.

**Table 1: Demographic Information**

| Variable | Constructs | |
|---|---|---|
| Age | Minimum | 20 |
| | Maximum | 36 |
| | Mean (SD) | 28.24 (4.16) |

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**Table 2: Descriptive Statistics of Pelvic Floor Distress Inventory Questionnaire Short Form-20**

| Question | No | Not at all | Somewhat | Moderately | Quite a bit |
|---|---|---|---|---|---|
| | Frequency | Frequency | Frequency | Frequency | Frequency |
| 1. Pressure in lower abdomen | 45 | 11 | 22 | 17 | 5 |
| 2. Heaviness in lower abdomen? | 39 | 13 | 28 | 14 | 6 |
| 3. Bulge or something out that you see in vaginal area? | 75 | 9 | 12 | 4 | 0 |
| 4.Do you have to push on vagina to have a complete bowel movement? | 71 | 15 | 10 | 4 | 0 |
| 5. Experience feeling of incomplete bladder movement? | 62 | 8 | 22 | 7 | 1 |
| 6.Do you have to push up in vaginal area with your fingers to start urination? | 76 | 8 | 11 | 4 | 1 |
| 7. Need to strain too hard to have a bowel movement? | 63 | 14 | 18 | 5 | 0 |
| 8. Feel you have not completely emptied your bowel movement? | 71 | 10 | 13 | 6 | 0 |
| 9.: Do you lose stool beyond your control if your stool is well formed? | 75 | 12 | 9 | 3 | 1 |
| 10. Do you lose stool beyond your control if your stool is loose liquid? | 77 | 10 | 13 | 3 | 0 |
| 11. Loose gas from the rectum beyond your control? | 51 | 12 | 33 | 2 | 2 |
| 12. Have pain when you pass your stool? | 76 | 7 | 15 | 2 | 0 |
| 13. Experience a strong sense of urgency and have to rush a bathroom to have a bowel movement? | 78 | 1 | 18 | 2 | 1 |
| 14. Does part of your stool ever pass-through rectum and bulge outside after bowel movement? | 89 | 8 | 3 | 0 | 0 |
| 15. Experience frequent urination? | 63 | 9 | 19 | 9 | 0 |
| 16. Experience a urine leakage associated with urgency to go to the bathroom? | 70 | 10 | 13 | 7 | 0 |
| 17. Experience a urine leakage related to laughing, coughing or sneezing? | 72 | 13 | 12 | 3 | 0 |
| 18. Experience a small amount of urine leakage? | 73 | 9 | 14 | 4 | 0 |
| 19. Have trouble emptying your bladder? | 73 | 8 | 17 | 2 | 0 |
| 20. Experience pain of discomfort in lower abdomen or genital region? | 56 | 12 | 23 | 7 | 1 |

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**Table 3: Iciq Ui Score**

| Mild/No Urinary Incontinence (0-3) | Moderate Urinary Incontinence (4-9) | Severe Urinary Incontinence (10-21) |
|---|---|---|
| 64% | 27% | 9% |

**Table 4: Pfdi-20 Score**

| Mild/No Pelvic floor distress (0-60) | Moderate Pelvic floor distress (61-120) | Severe Urinary Incontinence (121-300) |
|---|---|---|
| 72% | 9% | 19% |

**Table 5: Association of Pelvic Pain and Urinary Incontinence With DRA**

| Constructs | Pelvic Pain | Urinary Incontinence |
|---|---|---|
| p-value | 0.503 | 0.000 |

**Table 6: Subgroup Analysis of Urinary Incontinence and Pelvic Floor Distress by Age and Parity**

| Subgroup | Mild/No Urinary Incontinence (%) | Moderate Urinary Incontinence (%) | Severe Urinary Incontinence (%) | Mild/No Pelvic Floor Distress (%) | Moderate Pelvic Floor Distress (%) | Severe Pelvic Floor Distress (%) |
|---|---|---|---|---|---|---|
| Age ≤ 28 years (n≈50) | 72 | 20 | 8 | 78 | 8 | 14 |
| Age > 28 years (n≈50) | 56 | 34 | 10 | 66 | 10 | 24 |
| Primiparous (n≈50) | 70 | 22 | 8 | 76 | 8 | 16 |
| Multiparous (n≈50) | 58 | 30 | 12 | 68 | 10 | 22 |

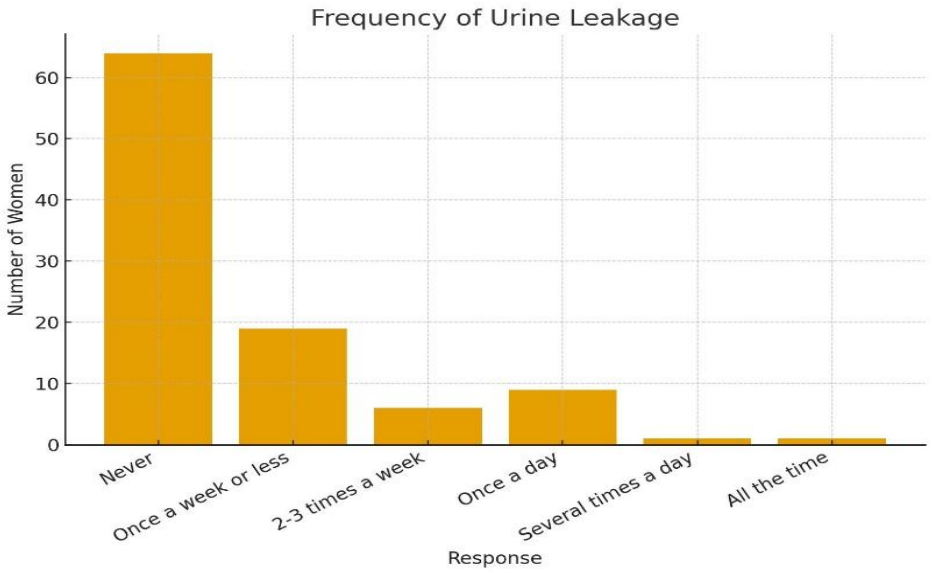


*Figure 1 Frequency of Urine Leakage*

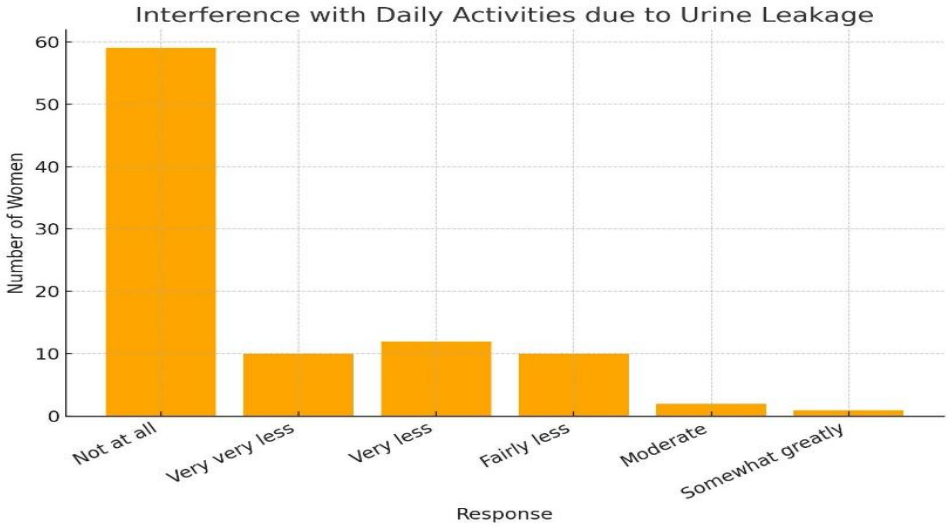


*Figure 2 Interference with Daily Activities dua to Urine Leakage*

## DISCUSSION

The findings of this study provide valuable insight into the relationship between diastasis recti abdominis (DRA), pelvic pain, and urinary incontinence among postpartum women following cesarean section. The observed prevalence of urinary incontinence and its significant association with DRA are consistent with prior research, where strong statistical relationships were reported between inter-recti distance and urinary dysfunction (12,13). The current results strengthen the evidence that DRA is not only a cosmetic concern but also a functional disorder contributing to pelvic floor dysfunction. Furthermore, the lack of significant association between pelvic pain and DRA aligns with previous findings that reported no meaningful correlation between pubic symphysis pain or postpartum pelvic pain and the presence of DRA (13,14). Comparison with earlier studies demonstrates that the age range of participants (20–35 years) is a critical group where DRA is most commonly reported after cesarean delivery. While some research has suggested higher prevalence in women over 35 years of age, other investigations indicate that DRA frequently occurs in women younger than 35 who undergo cesarean

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section (15). This variability underscores the multifactorial nature of DRA, where both age and mode of delivery play contributory roles. The present study's subgroup analysis further suggested that multiparity and advancing maternal age may exacerbate the severity of urinary incontinence and pelvic floor distress, which resonates with reports linking repeated cesarean deliveries to increased prevalence and persistence of DRA (16).

Symptom patterns in the study population demonstrated high rates of abdominal heaviness, lower abdominal pressure, rectal gas loss, and discomfort in the lower abdomen and genital region, which mirror observations in prevalence-based studies of postpartum women where urinary and fecal leakage were recorded alongside reduced abdominal strength (17). Such functional impairments reinforce the importance of addressing DRA as a clinical issue beyond aesthetics. The high proportion of women experiencing urinary incontinence in this study also supports earlier evidence indicating a strong correlation between DRA and stress urinary incontinence, with reported positive correlations such as r=0.283 (18). Rehabilitation emerges as a central implication of these findings. Evidence suggests that postpartum rehabilitation focusing on transversus abdominis strengthening and posture maintenance can reduce the risk and impact of DRA (19). Specific exercises such as curl-ups, modified curl-ups, and abdominal crunches have demonstrated measurable reductions in inter-recti distance in both immediate postpartum and later recovery phases (20,21). However, inconsistencies remain in the literature regarding the most effective exercise protocols, with some studies cautioning against direct rectus abdominis exercises due to the potential to worsen separation (22). These debates emphasize the need for standardized rehabilitation protocols tailored to postpartum women with varying severities of DRA.

A notable strength of the present study is its focus on postpartum women following cesarean section, a group that is often underrepresented in DRA research, despite having elevated risk. The use of validated questionnaires such as the PFDI-20 and ICIQ-UI SF ensured a structured assessment of pelvic floor symptoms, providing reliable data on symptom prevalence and severity. However, several limitations must be acknowledged. The reliance on the finger-width method for diagnosing DRA, while practical, introduces subjectivity and lacks the precision of imaging techniques such as ultrasound. Furthermore, the absence of quantitative measurement of inter-recti distance limits the ability to correlate severity of DRA with functional outcomes. The study also excluded women with vaginal deliveries and post-menopausal women, which narrows generalizability, as DRA has been documented in these groups as well. Future research should focus on incorporating objective diagnostic measures such as ultrasonography to provide more accurate assessments of inter-recti distance and muscle function. Longitudinal studies following women from pregnancy through the postpartum period would offer a better understanding of the natural progression and resolution of DRA. Additionally, controlled trials comparing rehabilitation strategies are essential to identify evidence-based interventions that can be standardized into clinical practice. Overall, the findings of this study confirm a significant association between DRA and urinary incontinence while reinforcing the lack of association with pelvic pain. The outcomes highlight the importance of early postpartum rehabilitation, awareness, and preventive measures to mitigate the functional impairments caused by DRA. By addressing both physical and functional consequences, future clinical management strategies can improve postpartum quality of life and reduce long-term morbidity in women affected by DRA.

## CONCLUSION

This study concludes that women with diastasis recti following cesarean section commonly experience pelvic floor dysfunction, with urinary incontinence showing a strong and consistent association with the condition. In contrast, pelvic pain was not significantly linked, highlighting the variability of symptoms among affected women. These findings emphasize the importance of recognizing diastasis recti not merely as an aesthetic concern but as a clinically relevant condition with functional implications. Early identification, targeted rehabilitation, and preventive strategies during and after pregnancy hold significant potential in reducing the burden of pelvic floor complications and improving postpartum quality of life.

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**AUTHOR CONTRIBUTION**

| Authors | Contribution |
|---|---|
| Izza Ayub | Conception or design of the work<br>Acquisition, Analysis, or Interpretation of data for the work<br>Revising it critically for important intellectual content<br>Final approval of the version to be published |
| Noor Habiba | Drafting the work<br>Acquisition, Analysis, or Interpretation of data for the work<br>Revising it critically for important intellectual content |
| Warda Imran | Acquisition, Analysis, or Interpretation of data for the work |
| Arwa Nadeem | Drafting the work |
| Sara Riaz | Conception or design of the work<br>Acquisition, Analysis of data for the work |
| Areesha Ali | Conception or design of the work<br>Acquisition, Analysis of data for the work |
| Rimsha Saleem | Conception or design of the work<br>Acquisition, Analysis of data for the work |

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