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ASSOCIATION OF DIASTASIS RECTUS ABDOMINIS WITH LUMBOPELVIC PAIN AND UROGYNECOLOGICAL COMPLAINS IN POST-PARTUM FEMALES, A CROSS-SECTIONAL SURVEY.

Original Research

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Acknowledgement: The authors extend their gratitude to DHQ Hospital Haripur and all participants for their cooperation throughout the study period.

Conflict of Interest: None Grant Support & Financial Support: None

ABSTRACT

Background: Diastasis rectus abdominis (DRA) is a condition characterized by the separation of the rectus abdominis muscles due to stretching and thinning of the linea alba. It commonly occurs during pregnancy and the postpartum period. DRA has been implicated in contributing to lumbopelvic pain (LPP) and various urogynecological complaints. Understanding its association with these issues in postpartum females is essential to inform preventive and rehabilitative strategies.

Objective: To determine the association between DRA and lumbopelvic pain as well as urogynecological complaints in postpartum females.

Methods: A descriptive cross-sectional study was conducted at DHQ Hospital Haripur from July 2023 to December 2023. A total of 104 postpartum females diagnosed with DRA via ultrasonography were enrolled through convenience sampling. Data on pain and functional limitations were collected using the Numerical Pain Rating Scale (NPRS), Oswestry Disability Index (ODI), Pelvic Floor Distress Inventory (PFDI), and Pelvic Floor Impact Questionnaire (PFIQ-7). Normality was assessed using the Shapiro-Wilk test. Non-parametric tests including Pearson's chi-square and Spearman's rho correlation were used. A p-value of <0.05 was considered statistically significant.

Results: The mean age of participants was 34.21±4.90 years. The mean interrectus distance (IRD) at the umbilicus was 25.68±6.83 cm. The chi-square test revealed no significant association between DRA and NPRS (p=0.387), ODI (p=0.150), PFDI (p=0.523), or PFIQ-7 (p=0.285). No significant correlation was observed between DRA and demographic variables, except a weak positive correlation between comorbidities and PFDI (ρ=0.209, p=0.034).

Conclusion: DRA was not significantly associated with lumbopelvic pain or urogynecological complaints in early postpartum females. However, symptoms may manifest over time due to cumulative biomechanical stress, especially in women with higher BMI or persistent DRA.

Keywords: Diastasis Rectus Abdominis, Lumbopelvic Pain, Low Back Pain, Pelvic Floor Muscles, Postpartum Period, Urogynecological Complaints, Ultrasonography.

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INTRODUCTION

Diastasis rectus abdominis (DRA) is a condition marked by the separation of the rectus abdominis muscles, typically accompanied by stretching of the linea alba and protrusion of the abdominal wall (1). Although the musculofascial continuity remains intact, the pathological widening between the rectus muscles can result in visible bulging of abdominal contents and a central herniation due to increased intra-abdominal pressure (2). Distinct from true hernias, DRA does not involve a fascial defect, but it does lead to general laxity of the anterior abdominal musculature. Most literature defines DRA by an interrectus distance (IRD) of 2 cm or more, typically measured using ultrasound or manual palpation techniques (3). Pregnancy remains the most common cause of this condition, due to the substantial mechanical and hormonal changes associated with gestation, although obesity and previous abdominal surgeries have also been identified as contributing factors (4). Studies indicate that laxity of the myofascial tissues, particularly the linea alba and occasionally the linea semilunaris, significantly contributes to the pathogenesis of DRA (5). In a clinical assessment of 92 women diagnosed with DRA, the linea alba was found to stretch up to 5 cm in 82% of cases and even up to 6 cm in 2% of cases, indicating a notable compromise in fascial integrity (6). A separate ultrasound-based study demonstrated that postpartum women exhibited almost double the interrectus distance compared to their nulliparous counterparts, with a gradual decline over six months postpartum but rarely returning to baseline (7). Additionally, muscle strength in abdominal flexors and rotators was significantly reduced in postpartum women compared to nulliparous women, highlighting the functional consequences of DRA (8).

Although DRA is more frequently observed in women during the third trimester and immediate postpartum period, its prevalence extends beyond childbearing years. Reports indicate that 39–45.5% of women continue to have DRA six months postpartum, and approximately one-third still experience it at one year (7,8). Moreover, studies have found its presence in 27% of women during the second trimester and up to 100% in the third trimester, as well as 39% prevalence in older multiparous women undergoing hysterectomy and 52% in postmenopausal women, suggesting DRA's persistence beyond reproductive age (9). Despite its frequency, DRA remains underdiagnosed and poorly understood in clinical practice, particularly in low-resource settings. Beyond structural implications, DRA has considerable functional consequences. The condition disrupts the co-contraction mechanism between abdominal and pelvic floor muscles, often resulting in lumbopelvic pain, pelvic organ prolapse (POP), stress urinary incontinence (SUI), and fecal incontinence (FI) (10). It has been observed that women with DRA report significantly higher levels of lumbopelvic discomfort than those without the condition (11). Since the abdominal musculature plays a vital role in postural stability, trunk mobility, respiration, and visceral support, its dysfunction may contribute to a wide array of secondary complications (8,10). Higher IRD has also been negatively correlated with abdominal flexor strength and control, further linking DRA to impaired musculoskeletal function (6,7). Additionally, studies using visual analogue scale (VAS) scores have consistently reported higher pain intensity in women with DRA compared to those without (5,9).

The presence of DRA has also been associated with diminished quality of life (QOL), particularly due to its linkage with pelvic floor dysfunction (PFD), which encompasses POP, SUI, FI, and even sexual dysfunction (10). Support-related pelvic floor dysfunction (SPFD) is frequently seen in women with DRA, who often demonstrate weakened pelvic floor muscles and a higher prevalence of urinary incontinence and organ prolapse than unaffected counterparts (2,5). While some studies strongly support these associations, others report conflicting findings regarding the causality and extent of pelvic floor involvement, indicating a need for further research in this area (12). Despite its well-documented prevalence and clinical implications globally, research on DRA remains scarce in Pakistan. Only two studies have explored its prevalence locally, and both relied on manual methods for IRD measurement, which lack the precision of ultrasonography. This lack of standardized diagnostic methods and the general unawareness within the medical community have led to underrecognition and undertreatment of DRA and its related complications. Therefore, the present study aims to investigate the impact of DRA in postpartum women in Pakistan using ultrasonography as the diagnostic tool. This will help establish a clearer understanding of its association with lumbopelvic pain and urogynecological complaints and may guide the development of targeted therapeutic strategies to prevent long-term morbidity.

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METHODS

The present study employed a descriptive cross-sectional design to investigate the association between diastasis rectus abdominis (DRA) and lumbopelvic pain (LPP) along with urogynecological complaints in postpartum females. A total of 104 postpartum women diagnosed with DRA were enrolled through convenience sampling, a non-probability method based on the accessibility of participants to the researcher. Although this method is practical, it may introduce sampling bias, limiting generalizability. Eligibility criteria included postpartum females within 12 months of delivery, confirmed with DRA through ultrasound. Participants with a history of pelvic floor surgery, neurological disorders, connective tissue diseases, or who refused to provide consent were excluded. Ethical approval was obtained from the Institutional Review Board, and all participants provided written informed consent. The study adhered to the ethical principles outlined in the Declaration of Helsinki. Data collection tools included structured proformas and validated questionnaires. The interrectus distance (IRD)—the primary diagnostic marker of DRA—was measured above, at, and below the umbilicus using diagnostic ultrasonography, the gold standard for such assessments due to its reliability and non-invasiveness. Lumbopelvic pain was assessed using the Numeric Pain Rating Scale (NPRS) and the Oswestry Disability Index (ODI), both of which are validated tools for quantifying pain intensity and functional disability. Urogynecological complaints were evaluated using the Pelvic Floor Distress Inventory (PFDI-20) and Pelvic Floor Impact Questionnaire (PFIQ-7), including their respective subscales—POPDI-6, CRADI-8, UDI-6 for the PFDI, and bladder, bowel, and vaginal subdomains for the PFIQ (4,7,13).

Data analysis was conducted using SPSS version 23. Continuous variables such as age, weight, BMI, parity, and gestational age were summarized using means and standard deviations. Categorical variables including occupation, delivery mode, BMI categories, and presence of comorbidities were presented as frequencies and percentages. The normality of continuous variables (IRD, NPRS, ODI, PFDI, PFIQ) was tested using the Shapiro-Wilk test, skewness and kurtosis analysis, and histogram visualization. The results confirmed that the data were non-normally distributed; hence, non-parametric statistical tests were employed. Associations between categorical variables were assessed using Pearson's Chi-square test, particularly for the categorized forms of pain, disability, and urogynecological symptoms. For ordinal and continuous variables, including postpartum months, BMI, and gravida, Spearman's Rho correlation was applied to evaluate the relationship with DRA, LPP, and urogynecological scores. A p-value of less than 0.05 was considered statistically significant.

RESULTS

The normality of data was assessed using the Shapiro-Wilk test, skewness, kurtosis, and histogram analysis. The interrectus distance at, above, and below the umbilicus, NPRS, Oswestry Disability Index (ODI), Pelvic Floor Distress Inventory (PFDI), and Pelvic Floor Impact Questionnaire (PFIQ) were all found to be non-normally distributed ($p < 0.05$). This confirmed the need for non-parametric statistical tests for subsequent analysis. The mean interrectus distance for participants with diastasis rectus abdominis (DRA) was 25.68±6.83 cm at the umbilicus, 17.88±2.97 cm above, and 2.97±0.69 cm below. Lumbopelvic pain measured via NPRS had a mean score of 5.20±1.32, with the majority of participants (81.7%) reporting moderate pain. Disability due to pain, assessed by the ODI, had a mean score of 22.94±6.07, with 64.4% experiencing moderate disability. The impact of urogynecological complaints on quality of life was assessed using the PFDI and PFIQ, with both scoring a mean of 196.00±22.91 and 196.00±22.90 respectively. Among PFDI subscales, moderate impact on QOL was reported by 88.5% in the POPDI-6, 89.4% in the CRADI-8, and 86.5% in the UDI-6. Severe impact was noted in 41.3% of overall PFDI scores. For the PFIQ-7 subdomains, 56.7% reported severe impact related to bladder symptoms, 60.6% for bowel symptoms, and 59.6% for vaginal/pelvic symptoms. Pearson's chi-square test showed no statistically significant association between mean interrectus distance and NPRS ($p = 0.387$) or ODI scores ($p = 0.150$). Similarly, no significant association was found between mean interrectus distance and PFDI or PFIQ scores or their subscales, with all p-values exceeding 0.05. Although the linear-by-linear association for CRADI-8 reached a p-value of 0.016, other indicators within the same test were non-significant, suggesting a potentially weak or inconsistent relationship.

Spearman's rho correlation also indicated no statistically significant correlation between DRA (mean IRD) and any of the independent variables such as BMI at the time of delivery ($\rho = -0.120$, $p = 0.227$), weight gain, parity, gravida, delivery mode, postpartum duration, or breastfeeding status. Similarly, there was no significant correlation between lumbopelvic pain and any demographic or obstetric variables. However, a weak but statistically significant correlation was observed between comorbidities and PFDI scores ($\rho = 0.209$, $p = 0.034$), indicating that existing health conditions may modestly influence the severity of pelvic floor distress symptoms. A categorical analysis was performed to assess the association between diastasis rectus abdominis (DRA) severity and both pain intensity (NPRS) and disability due to pain (ODI). DRA was categorized as mild, moderate, or severe based on interrectus distance at the umbilicus. The

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results revealed that moderate DRA was the most frequently observed category among participants with moderate pain (24 cases) and moderate disability (13 cases). Mild DRA was predominantly associated with mild (6 cases) and moderate pain (12 cases), as well as mild (4 cases) and moderate disability (4 cases). In contrast, participants with severe DRA were more likely to report moderate (7 cases) or severe pain (6 cases) and a higher number of cases with severe disability (9 cases). Although the distribution suggests a trend in which increasing DRA severity may align with higher levels of pain and functional impairment, no statistical test showed a significant association in earlier analyses. Nonetheless, this categorical cross-tabulation adds important context, indicating a potential gradient in symptom burden across DRA severity levels, which may warrant further investigation in larger or longitudinal datasets.

Table 1: Tests of Normality

Variables		**Skewness (z-value)**	**Kurtosis (z-value)**	**Shapiro-Wilk Test**
Diastasis Rectus Abdominis	interrectus distance at umbilicus	11.83	34.76	0.000
	interrectus distance above umbilicus	1.01	0.59	0.002
	interrecutus distance below umbilicus	-0.33	-0.89	0.006
Lumbopelvic Pain	NPRS	0.24	5.66	0.000
	Oswestry Disability Index	1.56	0.49	0.000
Urogynecological complain	PFDI	3.21	2.61	0.000
	PFIQ	-3.57	0.91	0.000

Table 2: Descriptive Statistics of Participants

	Mean ±Std	**Range**	**Minimum**	**Maximum**
Age	34.21±4.90	25	20	45
Weight before pregnancy	58.96±10.17	49	40	89
Weight at the time of pregnancy	70.02±11.73	50.0	50.0	100
Height	5.20±0.55ft	4.5ft	1.4ft	5.9ft
BMI before Pregnancy	23.17±4.0708	24.9	13.3	38.2
BMI during Pregnancy	27.13±4.37	19.2	18.6	37.8
Weight gain	10.61±5.89 kgs	28.30	2.0	30.3
Parity	4±1.4	6	2	8
Gravida	4±1.4	7	1	8
Weight of last baby	3.45± 0.64	4	2	6
Gestational age at the time of delivery (weeks)	38.45±2.69	27	15	42

Descriptive Analysis of categorical study demographic variables

		Frequency	Percentage
Occupation	Jobber	30	28.8%
	house wife	74	71.2%
BMI before pregnancy	Below 18.5 (Underweight)	10	9.6%
	18.5 – 24.9 (Healthy Weight)	67	64.4%
	25.0 – 29.9 (Overweight)	19	18.3%
	30.0 - >30.0 (Obesity)	8	7.7%
BMI during pregnancy	Below 18.5 (Underweight)	1	1.0%
	18.5 – 24.9 (Healthy Weight)	37	35.6%

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		Mean ±Std	Range	Minimum	Maximum
	25.0 – 29.9 (Overweight)		38		36.5%
	30.0 - >30.0 (Obesity)		28		26.9%
Mode of Delivery	C-section		64		61.5%
	Vaginal delivery		40		38.5%
Time passed after delivery	<1 month		19		18.3%
	1 month		13		12.5%
	2 months		29		27.9%
	3 months		17		16.3%
	4 months		13		12.5%
	5 months		13		12.5%
Have you had other abdominal surgeries?	Yes		79		76.0%
	No		25		24.0%
Comorbidities	Nil		51		49.0%
	HTN		21		20.2%
	Diabetes		23		22.1%
	Both		9		8.7%
No. of babies	1 baby		97		93.3%
	2 babies		7		6.7%
Are you breastfeeding?	Yes		77		74.0%
	No		27		26.0%

Table 3: Descriptive Analysis of continuous study variables

Study Variables		**Mean ±Std**	**Range**	**Minimum**	**Maximum**
DRA	interrectus distance at umbilicus (cm)	25.68±6.83	54	16	70
	interrectus distance above umbilicus (cm)	17.88±2.97	13	12	25
	interrectus distance below umbilicus (cm)	2.97±0.69	3.5	1	4.5
LPP	NPRS	5.20±1.32	6	2	8
	Oswestry Disability Index	22.94± 6.07	37	5	42
	PFDI	196.00±22.91	104.66	133.20	237.86

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Study Variables		**Mean ±Std**	**Range**	**Minimum**	**Maximum**
Urogynecological Complains	Pelvic Organ Prolapse Distress Inventory (POPDI-6)	53.09±9.65	45.83	25.00	70.83
	Colorectal Anal Distress Inventory 8 (CRAD-8)	52.70±9.05	53.13	21.88	75.00
	Urinary Distress Inventory (UDI-6)	50.91±11.19	66.67	16.67	83.33
	PFIQ-7	196.00±22.90	104.60	133	237
	Bladder or Urine	65.09±10.15	52.33	33.30	85.63
	Bowel or Rectum	65.32±10.12	52.33	38.06	90.39
	Vagina or Pelvis	65.59±10.99	71.36	19.03	90.39

Descriptive Analysis of categorical study variables

Study Variables				Frequency		Percentage	
LPP	NPRS	1-3 MILD		1	0	0%	8.7%
				2	8	7.7%	
				3	1	1.0%	
		4-6 MODERATE		4	18	17.3%	81.7%
				5	23	22.1%	
				6	44	42.3%	
		7-10 SEVERE		7	9	8.7%	9.6%
				8	1	1.0%	
				9	0	0%	
				10	0	0%	
	Oswestry Disability Index	5-14 (Mild disability)		3		2.9%	
		15-24 (Moderate Disability)		67		64.4%	
		25-34 (Severe disability)		30		28.8%	
		35-50 (Completely disabled)		4		3.8%	
Urogynecological complains	PFDI	1-100 (Mild effect on QOL)		0		0%	
		101-199 (Moderate effect on QOL)		61		58.7%	
		200-300 (Severe effect on QOL)		43		41.3%	
	PFDI – subscales	Pelvic Organ Prolapse Distress Inventory 6 (POPDI-6)	1-33 (Mild effect on QOL)	8		7.7%	
			34-66 (Moderate effect on QOL)	92		88.5%	
			67-100 (Severe effect on QOL)	4		3.8%	
		Colorectal-Anal Distress Inventory 8 (CRAD-8)	1-33 (Mild effect on QOL)	2		1.9%	
			34-66 (Moderate effect on QOL)	93		89.4%	
			67-100 (Severe effect on QOL)	9		8.7%	
		Urinary Distress Inventory 6 (UDI-6)	1-33 (Mild effect on QOL)	2		1.9%	
			34-66 (Moderate effect on QOL)	90		86.5%	
			67-100 (Severe effect on QOL)	12		11.5%	
	PFIQ-7	1-100 (Mild effect on QOL)		0		0%	
		101-199 (Moderate effect on QOL)		61		58%	

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Study Variables			**Mean ±Std**	**Range**	**Minimum**	**Maximum**
		200-300 (Severe effect on QOL)		43	41%	
	PFIQ-7 Subscales	Bladder or Urine		1-33 (Mild effect on QOL)	0	0%
				34-66 (Moderate effect on QOL)	45	43.3%
				67-100 (Severe effect on QOL)	59	56.7%
		Bowel or Rectum		1-33 (Mild effect on QOL)	0	0%
				34-66 (Moderate effect on QOL)	41	39.4%
				67-100 (Severe effect on QOL)	63	60.6%
		Vagina or Pelvis		1-33 (Mild effect on QOL)	0	0%
				34-66 (Moderate effect on QOL)	42	40.4%
				67-100 (Severe effect on QOL)	62	59.6%

Table 4: Chi-Square Analysis of the Association Between Mean Interrectus Distance and Pain, Disability, and Urogynecological Complaint Variables in Postpartum Females

Variable	**Test Type**	**Chi-Square Value (χ^2)**	**Degrees of Freedom**	**P-value**
NPRS	Pearson Chi-Square	138.083	134	0.387
	Likelihood Ratio	92.589	134	0.998
	Linear-by-Linear Association	0.375	1	0.540
Oswestry Disability Index	Pearson Chi-Square	221.789	201	0.150
	Likelihood Ratio	139.262	201	1.000
	Linear-by-Linear Association	1.831	1	0.176
POPDI-6	Pearson Chi-Square	109.464	134	0.523
	Likelihood Ratio	59.844	134	1.000
	Linear-by-Linear Association	0.164	1	0.685
CRAD-8	Pearson Chi-Square	136.026	134	0.435
	Likelihood Ratio	56.740	134	1.000
	Linear-by-Linear Association	5.798	1	0.016
UDI-6	Pearson Chi-Square	91.770	134	0.998
	Likelihood Ratio	61.066	134	1.000
	Linear-by-Linear Association	0.493	1	0.483
PFIQ-7: Bladder/Urine	Pearson Chi-Square	71.613	67	0.285
	Likelihood Ratio	97.051	67	0.010
	Linear-by-Linear Association	0.986	1	0.321
PFIQ-7: Bowel/Rectum	Pearson Chi-Square	70.710	67	0.355
	Likelihood Ratio	94.619	67	0.015
	Linear-by-Linear Association	0.024	1	0.877
PFIQ-7: Vagina/Pelvis	Pearson Chi-Square	113.583	134	0.899
	Likelihood Ratio	91.706	134	0.998
	Linear-by-Linear Association	0.221	1	0.638

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Table 5: Correlation between independent variables and Mean IRD

Variables	Mean Inter-rectus Distance	
	Spearman Correlation Coefficient (ρ)	P-value
BMI at time of delivery	-.120	.227
Weight Gain	-.088	.376
Parity	-.016	.871
Gravida	-.056	.575
Mode of delivery	-.075	.447
Post-partum months	.056	.571
Other abdominal surgeries	.007	.940
Comorbidities	.028	.777
No. of babies in last delivery	.020	.842
Weight of baby	-.001	.990
Breastfeeding	.007	.947
Gestational age at the time of delivery	-.161	.103

Table 6: Spearman Correlation Between Independent Variables and Lumbopelvic Pain and Urogynecological Complaints in Postpartum Females

Independent Variables	Lumbopelvic Pain (NPRS)	P-value	Lumbopelvic Disability (ODI)	P-value	Urogynecological Complaints (PFDI)	P-value	Urogynecological Impact (PFIQ)	P-value
BMI at time of delivery	-0.025	0.798	0.080	0.419	-0.011	0.912	0.033	0.736
Weight Gain	0.040	0.689	0.010	0.923	-0.120	0.224	0.111	0.262
Parity	0.068	0.496	0.074	0.453	0.149	0.132	0.107	0.281
Gravida	0.058	0.557	0.091	0.360	0.148	0.133	0.116	0.239
Mode of delivery	-0.017	0.863	0.046	0.642	-0.111	0.263	0.059	0.554
Postpartum months	-0.058	0.559	-0.121	0.220	-0.126	0.202	-0.077	0.436
Other abdominal surgeries	0.092	0.353	-0.047	0.637	0.150	0.128	-0.015	0.877
Comorbidities	-0.027	0.782	-0.067	0.497	0.209	0.034	-0.030	0.759
No. of babies in last delivery	-0.006	0.954	0.056	0.571	-0.066	0.503	-0.070	0.482
Weight of baby	0.118	0.233	0.177	0.072	-0.128	0.196	-0.081	0.411
Breastfeeding	0.141	0.153	-0.172	0.080	0.042	0.675	0.037	0.707
Gestational age at delivery (weeks)	-0.031	0.754	-0.054	0.587	0.142	0.152	0.062	0.529

Note: NPRS = Numeric Pain Rating Scale, ODI = Oswestry Disability Index, PFDI = Pelvic Floor Distress Inventory, PFIQ = Pelvic Floor Impact Questionnaire.

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Table 7: Categorical Association between DRA Severity, NPRS, and ODI

	NPRS	NPRS	NPRS	ODI	ODI	ODI	ODI
	Mild	Moderate	Severe	Complete Disability	Mild Disability	Moderate Disability	Severe Disability
DRA Severity							
Mild	6	12	2	7	4	4	5
Moderate	21	24	18	16	15	13	19
Severe	8	7	6	7	1	4	9

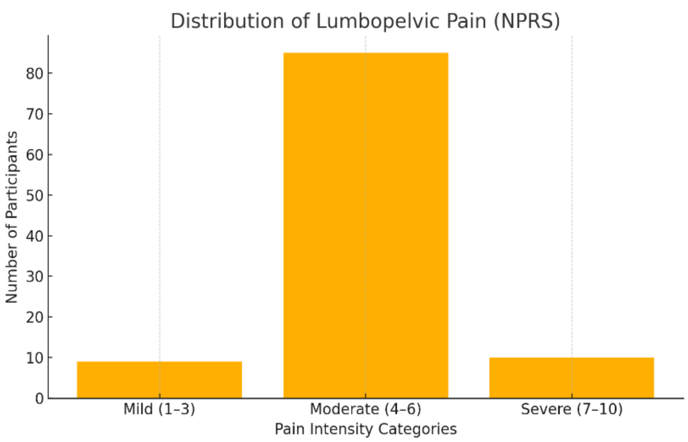

Figure 1 Distribution of Lumbopelvic Pain (NPRS)

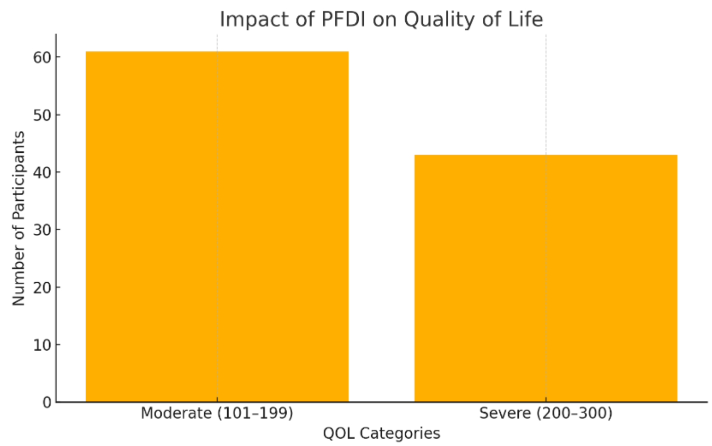

Figure 2 Impact of PFDI on Quality of Life

DISCUSSION

The absence of a universally accepted definition of diastasis rectus abdominis (DRA) has contributed to wide variations in prevalence and diagnostic criteria across studies. Discrepancies stem from inconsistent interrectus distance (IRD) cut-off values, differing anatomical landmarks used for measurement, levels of muscular activation during assessment, and variation in measurement tools, populations, and parity status (14). Diagnostic thresholds have ranged from as low as 10 mm to over 2.5 cm depending on the location of the IRD assessment, with certain definitions derived from cadaveric studies and others from imaging techniques in nulliparous women (15). The IRD reference ranges proposed in prior literature, although valuable, may not adequately reflect postpartum anatomical changes, thus limiting their applicability to postpartum populations. The current study aimed to investigate the association between DRA and lumbopelvic pain (LPP) and urogynecological complaints among postpartum females. Findings revealed no statistically significant relationship between DRA severity and either pain intensity or functional disability as measured by the NPRS and Oswestry Disability Index, respectively. Similarly, no significant association was observed between DRA and urogynecological symptoms assessed via PFDI and PFIQ-7. These outcomes are consistent with previous reports that have demonstrated similar levels of lumbopelvic discomfort in women both with and without DRA during the early postpartum period (16). It is plausible that the biomechanical consequences of DRA—such as impaired abdominal support or altered load transfer—may require a longer duration to manifest in clinical symptoms like persistent pain or dysfunction. In contrast, studies reporting higher prevalence of DRA in women seeking physiotherapy for LPP may reflect cumulative effects over time, rather than immediate postpartum changes (17).

Contradictory findings in the literature suggest that factors beyond IRD magnitude—such as the functional integrity and load-transmitting capacity of the linea alba—may play a moderating role in determining symptom severity. Biomechanical studies have shown that force transmission across the linea alba is not solely dependent on the width of the IRD, indicating that individuals with similar degrees of separation may experience variable clinical outcomes (18). Therefore, the presence of DRA alone may not be sufficient to predict dysfunction, supporting the theory that lumbopelvic pain and associated limitations may develop in a subset of women with reduced force transference capability, while others with the same structural abnormality remain asymptomatic. With respect to urogynecological outcomes, findings of the current study also align with prospective investigations that found no increased incidence of pelvic organ prolapse (POP) or urinary incontinence in women with DRA. Retrospective studies suggesting otherwise may have been

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confounded by unaccounted pre-existing symptoms or long-term pelvic floor strain (19,20). In particular, the failure to assess urogynecological symptoms prior to pregnancy constitutes a notable limitation in the present study. Preconceptional pelvic floor dysfunction has been shown to elevate the risk of persistent postpartum symptoms by up to fourfold, indicating a strong confounding influence that could have altered the interpretation of the observed associations (21).
Strengths of the study include the use of ultrasonography for precise IRD measurements and validated outcome tools for assessing LPP and urogynecological symptoms, enhancing the reliability of findings. However, the reliance on convenience sampling may have limited the representativeness of the sample. Additionally, the cross-sectional design restricted the ability to explore causality or observe the evolution of DRA-related symptoms over time. Future research should incorporate longitudinal follow-up, stratify participants by baseline pelvic health status, and assess the mechanical function of the linea alba rather than relying solely on IRD width. Including regression modeling may further clarify multivariate interactions and identify predictors of symptomatic progression in women with DRA. In conclusion, while the current findings did not demonstrate an association between DRA and lumbopelvic pain or urogynecological complaints in the early postpartum period, the complexity of DRA as a multifactorial condition necessitates a more nuanced understanding that considers structural, functional, and temporal variables in its clinical assessment and management.

CONCLUSION

This study concluded that diastasis rectus abdominis (DRA) does not appear to be associated with lumbopelvic pain or urogynecological complaints in women during the early postpartum period. While these findings align with certain international research, they also differ from others, highlighting the complexity of DRA's clinical impact. The absence of association at this stage suggests that early postpartum DRA may not be a standalone contributor to functional impairments. However, long-term outcomes, particularly in women with persistent separation or elevated BMI, may differ. These insights emphasize the need for individualized assessment and reinforce the importance of further longitudinal research to understand the evolving implications of DRA beyond the immediate postpartum phase.

Author Contribution

Author	Contribution
Neelam Javed	Substantial Contribution to study design, analysis, acquisition of Data Manuscript Writing Has given Final Approval of the version to be published
Kainaat Khan Rabbani	Substantial Contribution to study design, acquisition and interpretation of Data Critical Review and Manuscript Writing Has given Final Approval of the version to be published
Aqsa Lakhani	Substantial Contribution to acquisition and interpretation of Data Has given Final Approval of the version to be published
Hafiza Sidrah Fareed	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Mujeeb ur Rahman	Contributed to Data Collection and Analysis Has given Final Approval of the version to be published
Ayesha Afsar	Substantial Contribution to study design and Data Analysis Has given Final Approval of the version to be published
M Behzad Ali*	Contributed to study concept and Data collection Has given Final Approval of the version to be published
Sana Muneeb	Writing - Review & Editing, Assistance with Data Curation

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