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Abstract

Purpose: Diastasis recti abdominis (DRA) denotes an anomalous separation of the rectus muscles throughout their longitudinal axis, devoid of fascial irregularities. The current study sought to determine the prevalence of DRA and its potential association with pelvic floor muscular strength and urinary incontinence in the gynaecological population of Faisalabad. This was a cross-sectional study.

Materials and Methods: A Convenient sampling technique was used for collecting data. A sample of 100 females from government hospitals of Faisalabad was taken. Study was conducted in Faisalabad from February 2018 to May 2018. Inclusion criteria of the research was, immediate postpartum ladies, females aged 18 to menopausal age, and females who had normal vaginal birth. Manometric techniques were employed to quantify the strength of the pelvic floor muscles (PFMS), with outcomes represented in cmH2O. The incidence of urinary incontinence (UI) was ascertained by querying patients regarding any manifestations postpartum. The extent of diastasis recti abdominis (DRA) was gauged utilizing fingerbreadth assessments of the rectus abdominis muscles. This particular measurement spanned a distance of 4.5 cm both superior and inferior to the umbilicus, aligned with the linea alba.

Findings: Results were analyzed through SPSS version 26. Diastasis recti abdominis was found to be present in 57% of the females. 7% of the women had very weak pelvic floor muscle, 38% had weak, 50% had moderate strength and 5% had good strength of pelvic floor muscles. Out of 100, urine incontinence was found in 59% females. There was no statistically significant correlation observed between diastasis recti abdominis muscle and either urinary incontinence or pelvic floor muscle strength, with a p-value exceeding 0.05.

Implications to Theory, Practice and Policy: Incorporate routine DRAM screening for postpartum gynecological patients. Educate women about DRAM, its risk factors, and prevention strategies. Promote postpartum exercises and physical therapy to strengthen abdominal muscles and pelvic floor. Provide nutritional counseling to address obesity, a risk factor for DRAM. Implement a multidisciplinary approach involving gynecologists, physiotherapists, and nutritionists. Conduct additional research on the long-term consequences of DRAM and effective interventions. Conduct awareness campaigns targeting both healthcare providers and the public to increase DRAM awareness.

Keywords: *Diastasis Recti Abdominis, Multiparous, Pelvic Floor Muscles Physiotherapy, Pregnancy, Urine Incontinence*

1.0 INTRODUCTION

Diastasis recti abdominis (DRA) is a condition characterized by an atypical separation of the rectus muscles along their full longitudinal extent, albeit without any fascial irregularities [1] . This separation transpires as a result of increased intra-abdominal pressure, which augments the force exerted on the linea alba, consequently broadening the inter-rectus gap. The threshold for defining a diastasis is an inter-rectus distance of 2 cm [2]. DRA is taxonomically categorized based on its proximity to the umbilical region; it can manifest superiorly, inferiorly, or circumferentially around the umbilicus, while its absence is noted in specific primiparous women. The severity of this condition is stratified into three distinct categories: Mild, representing a separation of 2-3 fingerbreadths; Moderate, characterized by a gap of 3-4 fingerbreadths; and Severe, where the chasm exceeds 4 fingerbreadths [3].

Diastasis recti is more common during pregnancy, however obesity and previous abdominal surgery can also be reasons [4]. The old age, females over 35 years, high birth weight babies, pregnancies with multiple births, caesarean sections, unnecessary abdominal workouts after the 1st trimester of pregnancy, tremendous weight loss that occurs naturally or after bariatric surgery, and prior or repeated abdominal surgery are all the risk factors for diastasis recti [5]. Diastasis recti can cause pelvic floor muscle weakness and urinary incontinence [6]. Diastasis of the rectus abdominis is also linked to low backache as it also weakens the muscles around the trunk so it may put extra pressure on the lower back causing backache [7]. Due to distorted posture and pelvic instability, the posterior gluteal muscles overwork, contributing to sciatica [8].

In an examination of 92 females diagnosed with diastasis recti, the inter-recti distance unveiled that 82% of subjects demonstrated a stretching limitation of the linea alba up to 5 cm, with a more extensive reach of 6 cm observed in a scant 2% of the cohort [9]. Another investigative endeavor, leveraging ultrasonography, juxtaposed the inter-rectus distances between nulliparous and postpartum women. It was discerned that postpartum females exhibited an approximately twofold augmentation in the inter-rectus distance, escalating from a range of 0.5-1.0 cm to 1.2-2.3 cm [4]. Interestingly, while there was a consistent decrement in the inter-rectus distance in the postpartum group over time, the baseline metrics remained elusive even at the 6-month evaluations. Furthermore, pregnancy appears to exert an impact on abdominal muscular strength: nulliparous women manifested optimal trunk flexor and rotator strength ratings of 5/5, whereas their counterparts at 6 months post-partum exhibited a diminished strength of 4/5 [9].

Pelvic floor dysfunction (PFD) encompasses a spectrum of conditions including pelvic organ prolapse (POP), urinary incontinence (UI), and sexual dysfunction [10]. Recognized risk factors contributing to the prevalence of POP and UI comprise parity, advancing age, and obesity [11]. The precise etiological factors underlying diastasis recti abdominis (DRA) remain obfuscated; however, there is a consensus that weakened connective tissue could be a concomitant result of both DRA and pelvic floor dysfunction. The scientific literature presents a dichotomy of evidence regarding the association between DRA and pelvic floor muscle dysfunction [12]. Historical research paradigms have discerned a heightened prevalence of UI, POP, and fecal incontinence amongst women with DRA compared to those without this condition. Additionally, investigative scrutiny elucidating the prevalence of DRA within a urogynecological cohort has been instrumental in delineating the interrelationship between DRA and pelvic floor dysfunction [13].

Both conservative and surgical treatments are available for diastasis recti. In severe circumstances, abdominoplasty, a cosmetic surgical treatment, is used to treat diastasis recti. Functional daily activities, back care, bracing, Tupler method, faradic stimulation, and exercises are all examples of conservative therapy. Exercise programmes are intended to reduce impairments or help women restore their functions while they are getting ready for the baby's arrival and caring for the newborn. Exercise is known to give a variety of psychological and physical benefits to the body, including increased mental health, stronger self-esteem, and a better sense of control over one's body image. It assists in the maintenance of a healthy body weight and inhibits the accumulation of body fat [14].

The integrity of both abdominal and pelvic floor muscles (PFM) is integral to maintaining optimal pelvic and abdominal biomechanics. Individuals with diastasis recti abdominis muscle (DRAM) often exhibit a potential inclination towards diminished strength in the pelvic floor muscles, subsequently amplifying the risk of UI [15]. However, several scholarly investigations have presented inconclusive associations between diastasis of the rectus abdominis, pelvic organ prolapse, and lumbar discomfort [12, 16-18]. Hence, the contention remains unresolved as to whether an exacerbated DRA, characterized by an elongated inter-rectus distance, is inherently linked to a heightened prevalence of UI and compromised pelvic floor muscle robustness. In light of this, the primary aim of the current study was to delineate the prevalence of diastasis recti abdominis amongst the gynecological populace in Faisalabad, while concurrently exploring its potential correlation with pelvic floor muscle fortitude and urinary incontinence manifestations. While DRAM is a widely recognized postpartum condition, there is a noticeable literature gap in the context of this specific population and geographical region. Investigating this relationship is crucial, as it may provide essential insights for clinicians and therapists, guiding improved preventive and therapeutic approaches for those affected.

Statement of Problem

This study investigates the prevalence of Diastasis Recti Abdominis (DRA) among postpartum women in Faisalabad and examines its association with pelvic floor muscle strength and urinary incontinence. It aimed to address the gap in understanding and management of DRA in gynecological and postpartum care.

The study of Diastasis Recti Abdominis (DRA) in Faisalabad, it could be reasonably inferred that it draws upon principles from epidemiology. The focus of this study on the incidence of DRA, its link with pelvic floor muscle strength, and urine incontinence is consistent with epidemiological approaches, which aimed to identify and quantify health patterns in communities.

2.0 MATERIALS AND METHODS

The current study aimed to deploy a cross-sectional study. For this purpose a convenient sampling technique was used for collecting data. A sample of 100 females aged 18 to 45 years from government hospitals of Faisalabad was taken in the immediate post-partum interval with normal vaginal birth. The open Epitool software was used to compute the sample size. Study was conducted in Faisalabad from February 2018 to May 2018. Inclusion criteria of the research was, immediate postpartum ladies, females aged 18 to menopausal age, and females who had normal vaginal birth. Females having a history of miscarriage, females who had lower C-sections or any

other abdominal surgery in the preceding six months, and females who were unwilling to participate were excluded.

The strength of the pelvic floor muscles (PFMS) was gauged using manometry while participants assumed the lithotomy position. Measurements were indexed in cmH2O, with interpretative brackets as follows: a range of 7.5 to 14.5 cmH2O was denoted as extremely weak pressure; 14.6 to 26.5 cmH2O represented weak pressure; 26.6 to 41.5 cmH2O corresponded to moderate pressure; 41.6 to 60.5 cmH2O signified good pressure; and readings surpassing 60.6 cmH2O were categorized as strong pressure [19]. The presence of urinary incontinence (UI) was ascertained through patient testimonies, specifically inquiring about episodes of involuntary urine expulsion subsequent to childbirth. For evaluation purposes, subjects were instructed to recline in a supine orientation, with arms entwined across their thorax. Subsequent directives entailed the engagement of their abdominal musculature to the point of elevating their scapulae off the examination surface.

The extent of diastasis recti abdominis (DRA) was evaluated through a fingerbreadth method. The girth between the dual recti abdominis muscles along the linea alba was manually discerned, both 4.5 cm cephalad and caudad from the umbilicus. These separation measurements were undertaken across all aforementioned regions, with a pronounced frequency at the umbilical locus. DRA was typified as a breadth commensurate with or exceeding that of two fingers. Conversely, the absence of DRA was characterized by either an absence of separation or a delineation narrower than two fingers [20].

Results were analyzed through SPSS version 26. The descriptive data obtained were statistically analyzed by frequency distribution and percentages were calculated. To check the association of diastasis recti abdominis with pelvic floor strength and urine incontinience, chi square test was used. All ethical concerns were taken into account. Participant's privacy was prioritized. Informed consent form was signed by all participants prior to participation in the study.

3.0 FINDINGS

Table 1 presents the demographic statistics of the participants. Age was divided into four categories, 34% females were of age between 18 to 25 years, 34% were of age between 26 to 33 years, 23% women were of 34 to 41 years and 9% were above 41 years. Out of 100 women, 22% had normal BMI, 55% were overweight and 23% were obese.

Table 1: Demographic Statistics

Demographic statistics		**f(%)**
Age	18-25y	34(34)
	26-33y	34(34)
	34-41y	23(23)
	>41y	9(9)
BMI	Underweight (<18.5)	0(0)
	Normal (18.5 to 24.9)	22(22)
	Overweight (25.0 to 29.9)	55(55)
	Obese (30.0 or higher)	23(23)
	Total	**100(100)**

Diastasis recti abdominis was found to be present in 57% of the females (Figure 1). Figure 2 shows that 7% of the women had very weak pelvic floor muscle, 38% had weak, 50% had moderate strength and 5% had good strength of pelvic floor muscles. Out of 100, urine incontinence was found in 59% females (Figure 3).

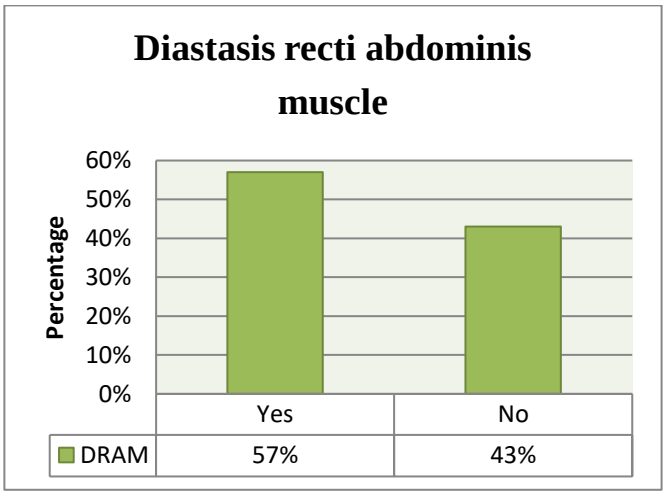

Figure 1: Bar Chart of Diastasis Recti Abdominis Muscle (DRAM)

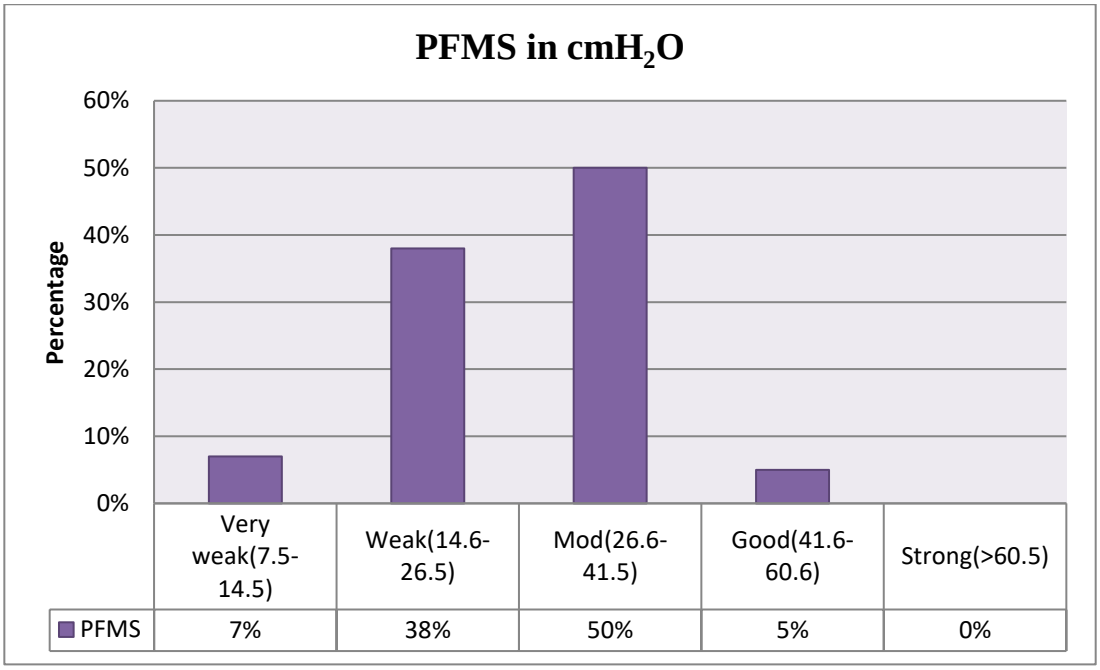

Figure 2: Bar Chart of Pelvic Floor Muscle Strength (PFMS)

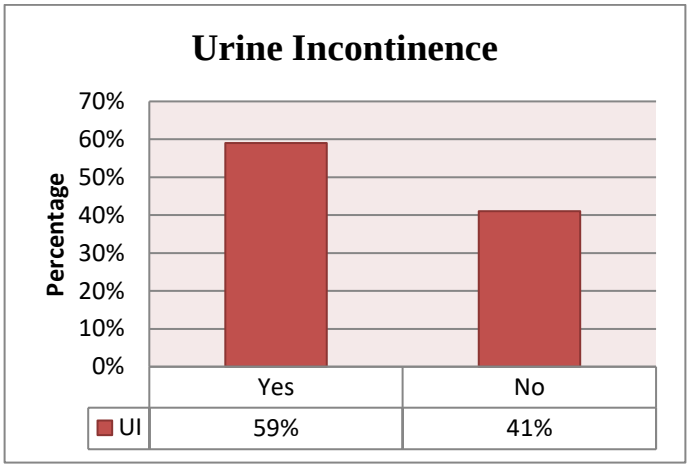

Figure 3: Bar Chart of Urine Incontinence (UI)

Table 2 shows the results of chi square test. No statistical significant association was found between diastasis recti abdominis muscle and urine incontinence (p>0.05). No statistical significant association was found between diastasis recti abdominis muscle and pelvic floor muscle strength (p>0.05).

Table 2: Chi-Square Tests

Chi-Square Tests

	DRAM*UI				DRAM*PFMS			
	Value	**df**	**Asymptotic Significance (2-sided)**	**Exact Sig. (2-sided)**	**Value**	**df**	**Asymptotic Significance (2-sided)**	**Exact Sig. (2-sided)**
Pearson Chi-Square	.317	1	.574		1.217	3	.749	.794
Likelihood Ratio	.316	1	.574		1.236	3	.744	.806
Fisher's Exact Test				.682	1.248			.794
Linear-by-Linear Association	.313	1	.576		.851	1	.356	.391
N of Valid Cases	100				100			

Discussion

Diastasis recti abdominis (DRA) is a condition characterized by the abnormal separation of the rectus muscles along their entire length, yet notably without any fascial irregularities [1]. Such a separation transpires when intra-abdominal pressure surges, leading to an augmented strain on the linea alba and consequently expanding the inter-rectus distance. For a separation to be clinically recognized as a diastasis, the inter-rectus distance should be at least 2 cm [2]. The current study aimed to ascertain the prevalence of diastasis recti abdominis and evaluate its potential correlation

with pelvic floor muscle integrity and urinary incontinence within the gynecological cohort of Faisalabad.

Results of present study showed that 34% females were of age between 18 to 25 years, 34% were of age between 26 to 33 years, 23% women were of 34 to 41 years and 9% were above 41 years. Out of 100 women, 22% had normal BMI, 55% were overweight and 23% were obese. Diastasis recti abdominis was found to be present in 57% of the females. 7% of the women had very weak pelvic floor muscle, 38% had weak, 50% had moderate strength and 5% had good strength of pelvic floor muscles. Out of 100, urine incontinence was found in 59% females. Chi-square test showed no statistical significant association was found between diastasis recti abdominis muscle and urine incontinence or pelvic floor muscle strength ($p>0.05$).

Adkitte et al. conducted a study on 100 women in rural and urban areas from which 50 were urban and 50 were from rural areas. The incidence of diastasis in immediate post-partum females was 68% [21]. In present study the prevalence of DRAM was found less as compared to that study. Another study said that the prevalence of mild diastasis recti abdominis was higher before and after childbirth [22].

In the academic discourse, it's well-acknowledged that the synergy between abdominal musculature and pelvic floor muscles (PFMs) is integral to the biomechanics of the pelvic-abdominal region. Their collaborative regulation of intra-peritoneal pressure is pivotal. Given this interplay, females presenting with diastasis recti abdominis (DRA) might exhibit a heightened susceptibility to diminished PFM fortitude, subsequently culminating in clinical manifestations such as urinary incontinence (UI) and pelvic organ prolapse [15]. This present study, however, found no statistically significant link between DRAM and pelvic floor muscle weakness or urine incontinence. Q Wang et al. corroborated the findings of the current study by stating that women with DRAM were not more likely to have decreased pelvic floor muscles or elevated UI at 6-8 weeks postpartum [23].

This study was limited by its small sample size of 100 immediate post-partum females. The study sample was limited to females from government hospitals in Faisalabad, which may not represent the broader population. The findings might not be applicable to women from different geographic regions or healthcare settings. In order to strengthen the study outcomes and their applicability to a larger population, it is recommended that larger, diverse studies with longitudinal designs be carried out.

3.0 CONCLUSION AND RECOMMENDATIONS

Conclusion

In conclusion, in female participants from Faisalabad, there was no statistically significant correlation between diastasis recti abdominis and either urine incontinence or pelvic floor muscle strength. While these conditions were prevalent in immediate postpartum women and may coexist in some individuals, the study found no direct connection between them.

Recommendation

The current study recommends:

- Incorporate routine DRAM screening for postpartum gynecological patients.

- Educate women about DRAM, its risk factors, and prevention strategies.
- Promote postpartum exercises and physical therapy to strengthen abdominal muscles and pelvic floor.
- Provide nutritional counseling to address obesity, a risk factor for DRAM.
- Implement a multidisciplinary approach involving gynecologists, physiotherapists, and nutritionists.
- Conduct additional research on the long-term consequences of DRAM and effective interventions.
- Conduct awareness campaigns targeting both healthcare providers and the public to increase DRAM awareness.

Future research should aim to include a more diverse and representative sample of women. It would be prudent to incorporate participants from an array of socioeconomic contexts, disparate healthcare environments, and diverse geographical regions. This expansive approach would not only augment the generalizability of the outcomes but also furnish a richer, more nuanced understanding of the prevalence and interlinkages between diastasis recti abdominis (DRA), pelvic floor muscle robustness, and urinary incontinence episodes.

Conflict of Interest

The authors declare no conflict of interest.

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