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## A Study of Incidence of Diastasis Recti in Amateur Male Weightlifting Athletes

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**Keywords***Diastasis recti, Intra-Rectal Distance, Weightlifting, Male athletes, Core stability, BMI.***ABSTRACT****Background:**

Diastasis Recti Abdominis (DRA) is characterized by separation of the rectus abdominis muscles due to widening of the linea alba. Although extensively studied in postpartum women, its epidemiology in male athletic populations remains poorly defined. Repetitive elevation of intra-abdominal pressure during resistance training may predispose individuals to fascial attenuation. **Aim:** To determine the incidence and severity of diastasis recti among amateur male weightlifting athletes. **Materials and Methods:** A prospective observational study was conducted among 100 amateur male weightlifters aged 18–25 years with  $\geq 3$  years of resistance training. Intra-Rectal Distance (IRD) was measured at the umbilical level using palpation confirmed with digital calipers during a head-lift maneuver. DRA was defined as IRD  $> 2$  cm and graded as mild (2–3 cm), moderate (3–4 cm), or severe ( $> 4$  cm). Data were analyzed using descriptive statistics. **Results:** The incidence of DRA was 52%. Mild separation was observed in 32%, moderate in 14%, and severe in 6%. Higher BMI categories were associated with greater severity of separation. **Conclusion:** Diastasis recti is prevalent among amateur male weightlifters. Repetitive intra-abdominal loading and elevated BMI appear contributory. Routine screening and structured core stabilization programs are recommended.-

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**INTRODUCTION:**

The anterior abdominal wall plays a fundamental role in trunk stabilization, respiration, posture maintenance, and efficient force transmission during dynamic movement<sup>1,2</sup>. The linea alba, a fibrous midline structure formed by the decussation of the aponeuroses of the external oblique, internal oblique, and transversus abdominis muscles, provides tensile integrity to the abdominal wall<sup>3,4</sup>. Its structural organization allows multidirectional load distribution and resistance to intra-abdominal pressure. Any compromise in this fascial complex may result in

altered biomechanics and reduced abdominal wall competence.

Diastasis Recti Abdominis (DRA) refers to widening and thinning of the linea alba leading to increased inter-rectus distance. Although DRA is most commonly associated with pregnancy due to hormonal influences and mechanical stretching<sup>5</sup>, growing evidence suggests that it may also occur in males under conditions of sustained mechanical stress<sup>6-8</sup>. Connective tissue remodeling, collagen subtype variation, and alterations in cross-link density have been implicated in fascial weakening<sup>9-12</sup>. Obesity further compounds this process by increasing baseline intra-abdominal pressure and promoting progressive midline stretching<sup>11,19</sup>.

In resistance training populations, intra-abdominal pressure may rise substantially during compound lifts to enhance spinal stiffness and optimize load transfer<sup>13,14</sup>. The Valsalva maneuver, frequently used during heavy lifting, transiently increases abdominal cavity pressure to create a stabilizing “internal brace.” While

biomechanically advantageous, repeated high-load exposure may impose cumulative tensile stress on the linea alba<sup>15</sup>. Over time, this may exceed elastic recovery capacity, resulting in gradual widening and structural attenuation.

The global increase in recreational weightlifting participation has expanded the population exposed to repetitive intra-abdominal loading. However, epidemiological data evaluating DRA in male athletes remain limited and fragmented<sup>16-18</sup>. Most existing literature focuses on postpartum women, leaving a significant gap regarding male athletic cohorts. Emerging research suggests that DRA may be present in men without overt symptoms, potentially remaining undetected until complications such as abdominal wall weakness or hernia formation arise<sup>6,20</sup>.

From a public health perspective, undiagnosed DRA may contribute to altered trunk biomechanics, impaired force transmission, and increased susceptibility to musculoskeletal dysfunction (24,25). In athletic populations, compromised midline integrity may reduce performance efficiency and increase risk of secondary injuries. Early identification and preventive strategies could therefore have meaningful implications for long-term musculoskeletal health.

Despite increasing interest in abdominal wall biomechanics, robust data regarding the incidence and severity of DRA among amateur male weightlifters are scarce. Understanding the epidemiology of DRA in this population is essential for informing screening practices, physiotherapy interventions, and injury prevention strategies. Accordingly, the present study aimed to determine the incidence and severity of diastasis recti among amateur male weightlifting athletes.

## MATERIALS AND METHODS:

### Study Design and Ethical Approval:

This prospective observational study was conducted over a period of 18 months at the Department of Community Physiotherapy, D.Y. Patil College of Physiotherapy, Kolhapur, Maharashtra, India. The study protocol was reviewed and approved by the Institutional Ethical Committee of D.Y. Patil Education Society (Deemed to be University), Kolhapur. Written informed consent was obtained from all participants prior to inclusion in the study. Confidentiality of participant information was strictly maintained throughout the research process.

### Participants and Sampling:

Data were collected from amateur male weightlifting athletes using a convenience sampling method. Participants were recruited from local fitness centers and weightlifting training facilities. Athletes were approached individually, and the purpose, procedure,

and potential benefits of the study were explained before enrollment.

The target population consisted of amateur male weightlifting athletes aged 18–25 years actively engaged in resistance training.

### Inclusion Criteria

- Male weightlifting athletes aged 18–25 years
- Minimum weightlifting experience  $\geq 3$  years
- Daily weightlifting duration  $\geq 3$  hours
- Body Mass Index (BMI)  $\geq 30$  kg/m<sup>2</sup>
- Willingness to participate in the study

### Exclusion Criteria:

- Participation in multiple sports activities
- History of abdominal surgery
- Recent abdominal trauma
- Presence of abdominal hernia
- Female athletes or pregnant individuals
- Participants unwilling to provide consent

### Study Materials and Equipment:

- Examination plinth/bed
- Universal measuring caliper
- Data collection sheet
- Intra-Rectal Distance (IRD) assessment protocol
- Four-type classification grading system

### Study Procedure:

After ethical approval, eligible participants were recruited and baseline demographic data were recorded. All assessments were conducted in a controlled clinical environment under standardized conditions. Participants were instructed to avoid strenuous physical activity 24 hours prior to testing. Participants were positioned in supine lying with hips and knees flexed and instructed to perform a controlled head-lift maneuver. Palpation was performed along the linea alba to identify medial borders of the rectus abdominis muscles, followed by confirmation using a digital caliper measurement. Standardized posture correction and testing intervals were maintained throughout.

Outcome Measure – Intra-Rectal Distance (IRD) Index

Diastasis recti was assessed using the Intra-Rectal Distance (IRD) measurement. Diastasis recti was considered positive when IRD  $> 2$  cm.

### Grading of Diastasis Recti:

- 0–1 finger width: Normal
- 2–3 finger width: Mild DRA
- 3–4 finger width: Moderate DRA
- $> 4$  finger width: Severe DRA

**Statistical Analysis:**

All quantitative variables were expressed as mean ± standard deviation where appropriate. Categorical variables were presented as frequencies and percentages. Descriptive statistical analysis was performed to determine incidence and severity distribution of diastasis recti among participants.

**RESULTS:**

A total of 100 amateur male weightlifting athletes were included in the final analysis. The mean participant age was 22.4 ± 2.1 years.

The sociodemographic characteristics of participants are summarized in Table 1. The majority of athletes belonged to the 21–25-year age group and had comparable resistance training exposure.

The overall incidence of diastasis recti abdominis (DRA) was 52%, with 52 participants demonstrating measurable separation and 48 participants showing no diastasis (Table 2). The pie diagrammatic representation of incidence is illustrated in Figure 1.

BMI distribution among participants is presented in Table 3. Most athletes fell within Grade 1 and Grade 2 obesity categories. The graphical representation of BMI classification is shown in Figure 3.

Severity grading based on the Intra-Rectal Distance (IRD) index demonstrated that mild diastasis recti was the most common presentation (32%), followed by moderate (14%) and severe separation (6%) as shown in Table 4 and Figure 4.

Age distribution of participants is illustrated in Table 5 and graphically represented in Figure 2.

Overall, higher BMI categories constituted the majority of affected individuals, suggesting a possible association between increased abdominal load and rectus muscle separation.

**Table 1. Sociodemographic Characteristics of Study Participants**

| Variable                | Category     | n   | %    |
|-------------------------|--------------|-----|------|
| Age Group (years)       | 18–20        | 28  | 28%  |
|                         | 21–23        | 36  | 36%  |
|                         | 24–25        | 36  | 36%  |
| Gender                  | Male         | 100 | 100% |
| Training Experience     | ≥3 years     | 100 | 100% |
| Daily Training Duration | ≥3 hours/day | 100 | 100% |

**Table 2. Incidence of Diastasis Recti Among Participants**

| Result Category | Frequency (n) | Percentage (%) |
|-----------------|---------------|----------------|
| DRA Present     | 52            | 52%            |
| DRA Absent      | 48            | 48%            |
| <b>Total</b>    | <b>100</b>    | <b>100%</b>    |

**Table 3. BMI Classification of Participants**

| BMI Category              | Frequency (n) | Percentage (%) |
|---------------------------|---------------|----------------|
| Grade 1 Obesity (30–34.9) | 38            | 38%            |
| Grade 2 Obesity (35–39.9) | 34            | 34%            |
| Grade 3 Obesity (≥40)     | 28            | 28%            |

**Table 4. Severity Grading of Diastasis Recti Based on IRD Index**

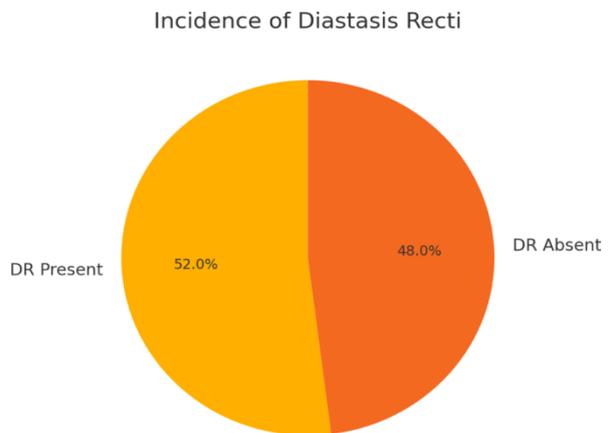
| IRD Grade        | Interpretation  | Frequency (n) | Percentage (%) |
|------------------|-----------------|---------------|----------------|
| 0–1 Finger Width | Normal (No DRA) | 48            | 48%            |
| 2–3 Finger Width | Mild DRA        | 32            | 32%            |
| 3–4 Finger Width | Moderate DRA    | 14            | 14%            |
| >4 Finger Width  | Severe DRA      | 6             | 6%             |

**Table 5. Distribution of Participants Based on Age**

| Age Group (Years) | Frequency (n) | Percentage (%) |
|-------------------|---------------|----------------|
| 18–20             | 28            | 28%            |
| 21–23             | 36            | 36%            |
| 24–25             | 36            | 36%            |

The incidence of diastasis recti among amateur male weightlifters was found to be 52%, indicating a substantial prevalence within this athletic population. Most cases were categorized as mild separation (32%), followed by moderate (14%) and severe diastasis (6%). Higher BMI categories constituted the majority of affected individuals, suggesting a potential association between increased abdominal load and rectus muscle separation.

The highest proportion of athletes belonged to the 21–25 year age group, corresponding to peak training intensity and resistance load exposure. Despite being young and physically active, a considerable proportion demonstrated measurable abdominal wall separation.



**Figure 1: Pie diagrammatic presentation of incidence of diastasis recti.**

**Tabular Presentation Of Distribution Of Participants Based On Age**

**Table 2 : Distribution of participants based on age**

| Age group (years) | Frequency (n) | Percentage (%) |
|-------------------|---------------|----------------|
| 18 - 20           | 28            | 28%            |
| 21 - 23           | 36            | 36%            |
| 24 - 25           | 36            | 36%            |

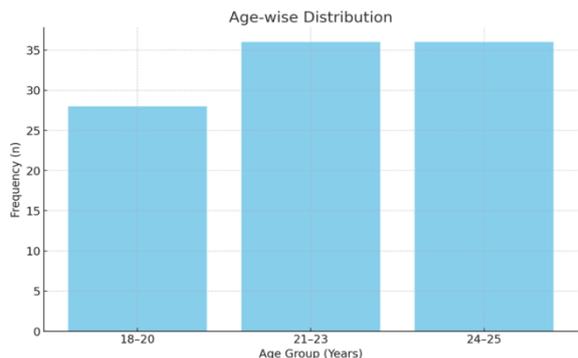


Figure 2: Graphical presentation of distribution of participants based on age.

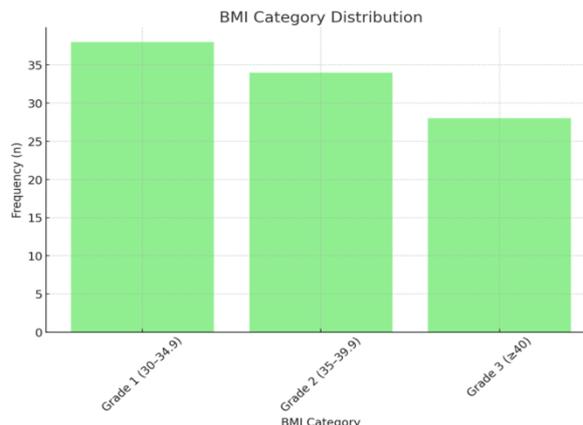


Figure 3: Graphical presentation of BMI classification of participants.

**Tabular Presentation of Bmi Classification of Participants**

Table 3 : BMI classification of participants

| Bmi Category        | Frequency (n) | Percentage (%) |
|---------------------|---------------|----------------|
| Grade 1 (30 - 34.9) | 38            | 38             |
| Grade 2 (35 - 39.9) | 34            | 34             |
| Grade 3 (>=40)      | 28            | 28             |

**Tabular Presentation Of Grading Of Diastasis Recti Based On Ird Index**

Table 4 : Grading of diastasis recti based on IRD index

| Ird grade (finger width) | Interpretation | Frequency (n) | Percentage (%) |
|--------------------------|----------------|---------------|----------------|
| 0 - 1Finger width        | Normal(no dr)  | 48            | 48%            |
| 2 - 3Finger width        | Mild dr        | 32            | 32%            |
| 3 -4Finger width         | Moderate dr    | 14            | 14%            |
| >4Finger width           | Severe dr      | 6             | 6%             |

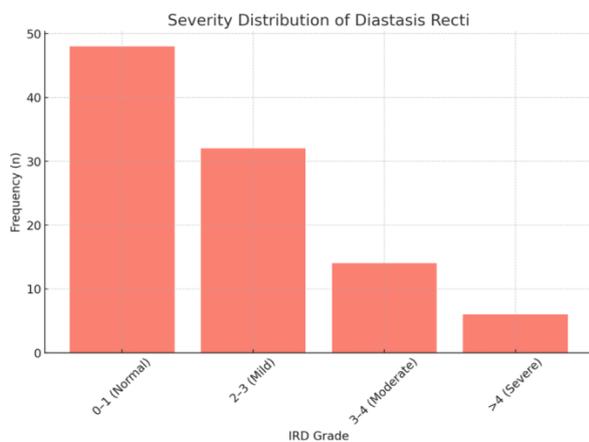


Figure 4: Graphical presentation of grading of diastasis recti based on IRD index.

**DISCUSSION:**

The present prospective observational study evaluated the incidence and severity of Diastasis Recti Abdominis (DRA) among amateur male weightlifting athletes. The findings demonstrated an incidence of 52%, indicating that more than half of the studied population exhibited measurable separation of the rectus abdominis muscles. These results highlight that DRA is not limited to postpartum populations and may represent an underrecognized musculoskeletal condition among young male athletes engaged in resistance training.

Traditionally, diastasis recti has been studied predominantly in women during pregnancy and the postpartum period; however, recent anatomical and surgical literature has identified male adults as an important yet understudied group affected by abdominal wall insufficiency<sup>11,15</sup>. The current findings support emerging evidence suggesting that repetitive mechanical stress and chronic increases in intra-abdominal pressure may contribute significantly to linea alba widening in physically active males.

Weightlifting requires sustained activation of core musculature to stabilize the spine during high-load exercises such as squats, deadlifts, and overhead presses. These movements frequently involve the Valsalva maneuver, which markedly elevates intra-abdominal pressure<sup>13,27</sup>. While such pressure enhances spinal rigidity and lifting performance, repeated exposure may progressively strain the connective tissue architecture of the linea alba. Biomechanical studies have demonstrated that excessive tensile loading can disrupt collagen fiber orientation, leading to fascial thinning and reduced abdominal wall integrity<sup>7,17</sup>. The relatively high incidence observed in this study may therefore reflect cumulative mechanical stress rather than acute injury.

An important observation of this study was the association between higher Body Mass Index (BMI) and increased severity of diastasis recti. Obesity is

recognized as a major contributor to abdominal wall weakness due to chronic elevation of intra-abdominal pressure and altered collagen metabolism<sup>19,20</sup>. Adipose tissue accumulation increases constant outward abdominal force, potentially accelerating fascial stretching when combined with resistance training loads. Similar findings have been reported in previous investigations evaluating abdominal wall disorders in overweight male populations<sup>22</sup>.

Most participants with DRA were asymptomatic, suggesting that the condition may remain clinically silent during early stages. This finding is clinically relevant because athletes may continue intensive training despite underlying structural compromise. Previous studies have indicated that increased inter-rectus distance may impair force transmission across the abdominal wall, reduce core stability, and predispose individuals to low back pain, ventral hernias, or performance limitations<sup>13,24</sup>. Early screening therefore becomes essential, particularly in amateur athletes who may lack professional supervision regarding lifting biomechanics and core conditioning.

From a physiotherapy and rehabilitation perspective, these findings emphasize the importance of preventive strategies targeting deep core stabilizers, including the transversus abdominis and pelvic floor musculature. Evidence suggests that targeted stabilization exercises can improve abdominal wall tension and potentially reduce inter-rectus distance<sup>14,26</sup>. Incorporating structured core training programs, breathing control techniques, and progressive load management into resistance training protocols may help minimize long-term abdominal wall dysfunction.

The study also has broader public health implications. The increasing popularity of recreational weightlifting worldwide has expanded exposure to high intra-abdominal pressure activities among young adults. Despite this trend, routine musculoskeletal screening in gym environments rarely includes assessment of abdominal wall integrity. Raising awareness among physiotherapists, trainers, and athletes regarding DRA could facilitate early detection and prevent chronic complications.

The strengths of this study include prospective design, standardized assessment using the Intra-Rectal Distance (IRD) index, and evaluation of a homogeneous athletic population exposed to similar mechanical stress patterns. However, certain limitations must be acknowledged. The study relied on clinical palpation and caliper measurement rather than ultrasound imaging, which may provide greater measurement precision. Additionally, the single-center design and relatively young age group may limit generalizability to broader athletic populations.

Longitudinal studies are needed to evaluate progression of diastasis recti over time and its relationship with functional outcomes.

Overall, the findings contribute to the limited literature addressing diastasis recti in male athletes and reinforce the concept that abdominal wall dysfunction should be considered a relevant sports-medicine and public health concern rather than a condition restricted to obstetric populations.

### **STRENGTHS AND LIMITATIONS**

Strengths include standardized measurement methodology and focused evaluation of a homogeneous athletic population.

Limitations include absence of ultrasound validation and lack of longitudinal assessment.

### **CONCLUSION:**

Diastasis recti was found to be prevalent among amateur male weightlifting athletes in the present study, with an incidence of 52%. This finding highlights that DRA is not limited to postpartum populations but may also represent a significant yet underrecognized condition in young male athletes exposed to repetitive mechanical stress. The association observed between elevated BMI and greater severity of separation suggests that increased adiposity may contribute to sustained abdominal wall strain, thereby promoting fascial attenuation. Additionally, repetitive intra-abdominal pressure generated during resistance training likely plays a contributory biomechanical role in midline widening.

These findings underscore the importance of early identification of abdominal wall alterations in weightlifting populations. Routine screening for inter-rectus distance and implementation of structured core strengthening interventions—particularly those targeting transversus abdominis activation and controlled load progression—may help prevent further progression of diastasis and reduce potential long-term complications. Integrating preventive strategies within athletic training programs may therefore have meaningful implications for maintaining abdominal wall integrity and optimizing musculoskeletal health outcomes.

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#### DATA AVAILABILITY:

The data will be made available at a reasonable request.

#### ETHICAL APPROVAL:

Ethical clearance was obtained from the Institutional Ethical Committee of D.Y. Patil College of Physiotherapy. Written informed consent was obtained from all participants.

#### AUTHOR'S CONTRIBUTIONS

Concept, design, literature search: IS, ND; Data acquisition: IS; Data analysis: IS; Manuscript preparation: IS; Manuscript editing and manuscript review: ND

#### PARTICIPANTS CONSENT:

Written informed consent was obtained from all participants prior to inclusion in the study.

#### FINANCIAL SUPPORT AND SPONSORSHIP:

Nil.

#### CONFLICTS OF INTEREST:

There are no conflicts of interest.

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