



Mini Review

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An Overview of the Studies on Diastasis Recti Abdominis in Postpartum Women



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Abstract

Introduction: Local and systemic changes that occur during pregnancy and child birth return to pre-pregnancy state during the postpartum period which is marked by musculoskeletal issues due to hormonal influence. This in turn adversely affects the rectus abdominis muscle causing Diastasis Recti Abdominis (DRA).

Objectives: To analyze the prevalence, commonly used assessment techniques, treatment options, and research output of DRA in postpartum women.

Methods: Electronic search of Pub Med, Science Direct, Ovid, Scopus, and Web of Science was carried out. A data extraction form was structured and the analysis was performed.

Results: Total of 77 articles on DRA in postpartum women were analyzed after applying the exclusion criteria. The results were suggestive of the high global prevalence of postpartum DRA. The trend in research in the field of DRA and postpartum has increased drastically in recent years. Ultrasound imaging was found to be the most reliable tool of assessment in DRA although palpation is clinically accepted as a reliable method.

Conclusion: There is evidence from the literature supporting the high prevalence of DRA which needs to be addressed. International guidelines for the cut-off value for IRD to determine the DRA along the linea alba is lacking. Efforts are necessary to determine better strategies to prevent DRA and IRD, thereby reduce the incidence of secondary hernia and its complications. The awareness about the antenatal and postnatal care is equally important which requires contribution from clinicians across the health care profession.

Keywords: Diastasis Rectus Abdominis; Inter Rectus Distance; Postpartum; Postnatal

Abbreviations: DRA: Diastasis Recti Abdominis; IRD: Inter Rectus Distance; LA: Linea Alba; MRI: Magnetic Resonance Imaging; CT: Computerized Tomography

Introduction

Abdominal wall is essential for the optimum functioning of the lumbo-pelvic region through multiple mechanisms which include the transfer of force through fascia by tensing it. Pregnancy affects the rectus abdominis muscle which alters its attachment due to the growing belly. Stretching and thinning of the Linea Alba (LA) increases the Inter Rectus Distance (IRD) and separates linea alba [1-4]. The alteration in the spatial relationship of muscle angle and attachment may alter the line of action of the muscle and thus their ability to produce torque [1,2,5-7]. Diastasis recti abdominis (DRA) may be defined as "an impairment characterized by the separation of the two rectus abdominis muscles along the line alba". Immediate postpartum, the prevalence of DRA above the umbilicus is 68% and that below the umbilicus is 32%. DRA may result in herniation of abdominal viscera and a considerably large DRA may hamper the posture and interfere with trunk flexion, rotations, ventilarion, and trunk

stability. This may cause compromised support for the organs in the abdominal and pelvic region [3,6]. A larger percentage of patients with DRA were diagnosed with urinary incontinence, fecal incontinence, pelvic organ prolapse and myofascial pelvic pain [8]. Long term manifestations of DRA are back pain, poor posture, pelvic floor problems and gastrointestinal disturbance [9].

Various methods are in practice to assess DRA, such as finger width method, ultrasonography, calipers, tape measurement, Magnetic Resonance Imaging (MRI), Computerized Tomography (CT) scans and Biodex system-4 [10,11]. Conservative management of DRA focuses on postnatal exercise which alleviates postnatal depression, limits the DRA progression, increases the general well-being of the women, improves the cardiovascular endurance and stimulates the weight loss [12,13]. Surgical management (Abdominoplasty) is indicated if a

woman has failed to restore her optimal functions like transfer of load through pelvic girdle, resolve pain or pelvic floor problems and restore gastrointestinal disturbance after an optimal rehabilitation at the end of one year postpartum or if the IRD is very severe and the abdominal content can be palpated or if there is a hernia and if there is unlocking of sacroiliac joint or pubic symphysis during single leg raise [14,15].

“Bibliometrics is a systemic method for evaluation of research output that can help map changes in the interest of scientific community over time and can provide insights into both quantitative and qualitative research trends on specific topic” [16]. To the best of our knowledge, there is no bibliometric analysis done specifically in this area. Hence, this study is being considered to provide an accurate survey of the published research work and examine the trends within this research discipline and also, to attempt establish the lacunae in this field of research so as to give a direction to the future research work in DRA and postpartum.

Aim

To obtain a comprehensive view of the prevalence, assessment techniques, management options and research output in the area of postpartum diastasis recti.

Objectives

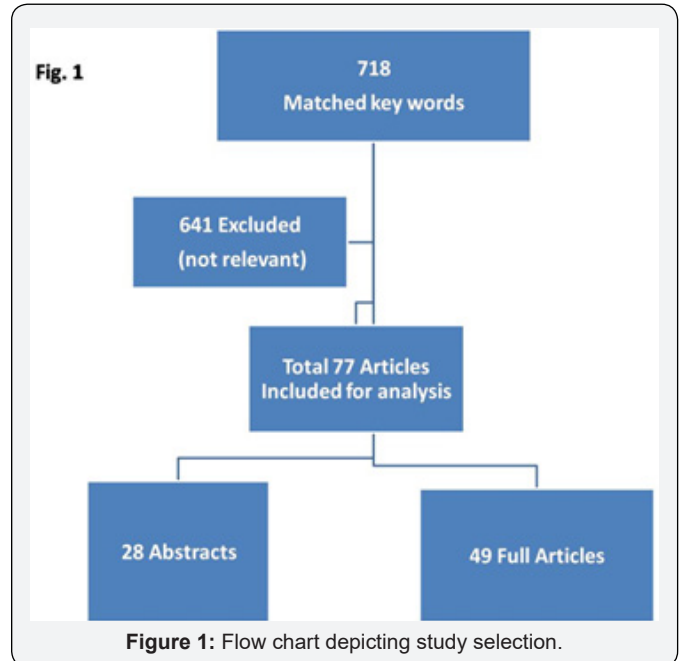
- a) To analyze the prevalence of DRA in postpartum women.
- b) To analyze the commonly used assessment techniques for DRA in postpartum women.
- c) To analyze the treatment options for the DRA in postpartum women.
- d) To analyze the research output of DRA in postpartum women.

Methodology

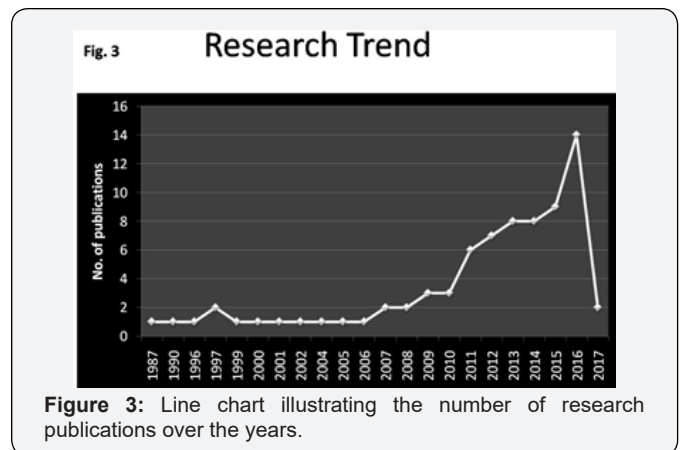
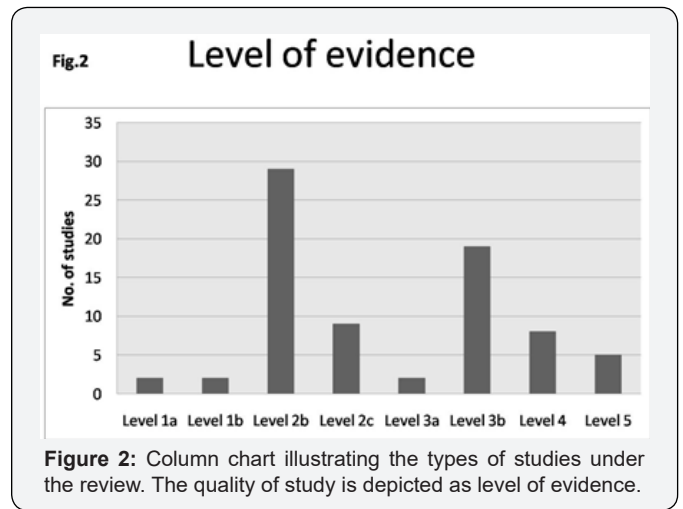
An electronic search of Pub Med, Science Direct, Ovid, Scopus and Web of Science was performed. Key words such as ‘Diastasis recti’, ‘Postpartum, Inter rectus distance’ and ‘Diastasis Recti Abdominis muscle’, with boolean words ‘AND/OR’ was used. All the studies on the postpartum diastasis recti were included and exclusion criteria were applied. The abstracts and full articles were screened by two reviewers independently and those which fulfilled the inclusion and exclusion criteria were included. Any disagreement between the two reviewers was sorted out by a third expert. Each study was evaluated with respect to the study design, assessment techniques, intervention used, etc.

A total of 718 articles yielded by inputting the key words. Exclusion criteria were applied, based on which 627 articles were excluded as they were not relevant to this study and 14 articles were excluded as they were published in journals which were not indexed or deviated from the ethical guidelines. Seventy seven articles were selected for analysis (Figure 1). A data

extraction form was structured and the analysis was performed using Microsoft excel and the data was presented in the form of counts, percentage, and frequencies.



Result



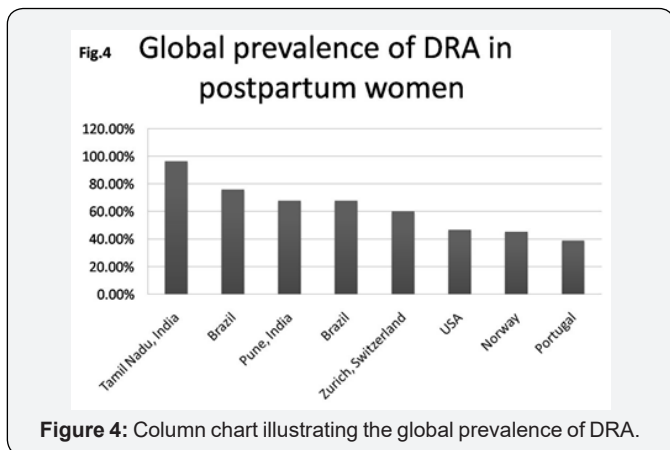


Figure 4: Column chart illustrating the global prevalence of DRA.

The study design ranged from systematic reviews and meta-analysis to case studies (Figure 2). The number of publications, contributed by over 190 authors, have increased consistently from 2011 and peaked in 2016 with 14 research publications on Diastasis recti in postpartum women (Figure 3). The prevalence of DRA in postpartum women around the globe is quite high, the highest being in India (96.55%) (Figure 4).

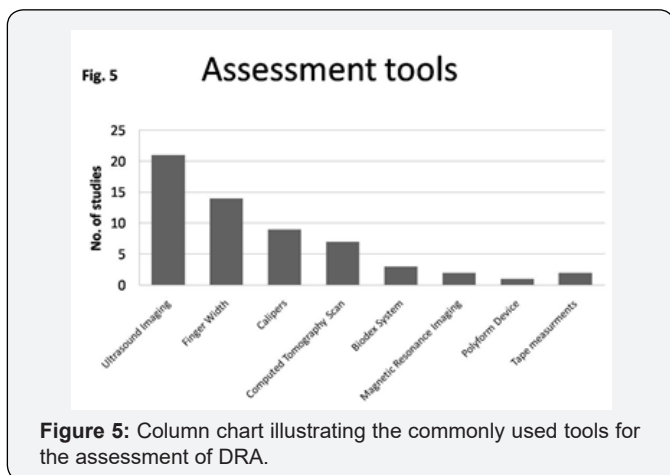


Figure 5: Column chart illustrating the commonly used tools for the assessment of DRA.

Ultrasound Imaging which is widely accepted as a reliable tool to measure DRA, was used in 22 studies. Finger width method was found to be the second most commonly used outcome measure to assess DRA and was used in 14 studies, followed by calipers, which were used in 9 studies (Figure 5).

Visual Analog Scales (Cronbach-alpha of 0.9117) [17], Pelvic Floor Distress Inventory(Cronbach's alpha 0.71-0.84) [18], Pelvic Floor Impact Questionnaire(Cronbach's alpha 0.88-0.94) [18] and Modified Oswestry Low Back Pain Disability Questionnaire(Cronbach's alpha 0.8107) [19] were used in the studies to rate pain, quality of life and activity of daily living outcomes. Pelvic Floor Distress Inventory(Cronbach's alpha 0.71-0.84) and the Pelvic Floor Impact Questionnaire (Cronbach's alpha 0.88-0.94), were used to assess low back pain and pelvic floor problems secondary to DRA.

Abdominal exercises were found to be widely used to reduce the DRA in postpartum women and were noted to yield positive

results. Transverse Abdominis activation was found to be helpful along with adjuncts like Kinesio Taping and abdominal Corsets. Plastic & Reconstructive Surgery Journal had a maximum number of citations (239) from 2001-2013 with an average impact factor of 2.10. The average impact factor of Aesthetic Plastic Surgery journal is 1.20 with 176 citations between 1997 and 2013. Journal of Orthopedic & Sports Physical Therapy was cited 105 times between 2011 and 2016 with an average impact factor of 1.80.

Discussion

Our analysis reveals the prevalence of DRA to be 100% at gestational week and naturally fades off to around 35% at 6 months postpartum. The findings of our study are consistent with previously published prevalence studies [1,20-22]. Furthermore the prevalence of DRA increases with parity and surgeries of the abdomen [23]. The prevalence of DRA was similar among multipara and primipara at umbilicus but below the umbilicus, multipara had more [6]. DRA is usually linked to many other conditions like myofascial pelvic pain 33%, urinary incontinence 48%, fecal incontinence 7%, uterus prolapse 52%, bladder prolapse 57% and rectal prolapse 43%. Studies have shown an association of DRA with conditions like low back pain and lumbo-pelvic pain [21,23-25].

According to 'Noble Criteria', DRA is said to be positive if a gap of 2 finger width is present at the umbilicus, above the umbilicus or below [26]. One of the studies that was published in the year 1987 states that the anterior aspect of the rectus sheath is presumed to be stronger below the umbilicus as all the four muscles of anterior abdominal wall cross below the umbilicus, thus the additional reinforcement prevent the separation of Rectus Abdominis below umbilicus. The two heads of the rectus abdominis muscle resemble "V" as they originate at the pubis. The criteria of more than two finger widths, therefore, may not be appropriate below the umbilicus. A separation of greater than one finger width might be indicative of significant DRA below the umbilicus [27]. A cadaver study carried out in 1996 concludes that IRD more than 10mm above the umbilicus, 27mm at the level of the umbilicus and 9 mm below the umbilicus could be pathological DRA [28]. Another study published in 2005 proclaims DRA as a widening of the IRD more than 2.5cm at one or more assessment points using digital calipers [13]. A study published in 2009 suggests that in nulliparous women, the linea alba should be considered normal when the IRD width is less than 15mm, at the xiphoid level, 22mm at 3cm above the umbilicus and 16mm at a level 2cm below the umbilicus [29]. Hence, standardization in this regard needs to be established.

Taking in to consideration the findings of the published research works analyzed in the current study, we could conclude that ultrasound scanning is the gold standard tool to assess DRA and is the most widely used tool for this purpose and is also valid and highly reliable [29-32]. Ultrasound imaging has a limitation when used on larger IRD, which is substantiated

by a study carried out in 2015. A study in 2013 was conducted to check the concurrent validity of digital nylon calipers and ultra sound imaging (USI) with respect to IRD measurement. For the measurements of IRD with calipers, ICC of 0.79 and 0.71 with abdominal muscles at rest and abdominal muscles contracted respectively were documented, which were similar to measurements made with USI above the umbilicus. The values obtained below the umbilicus with caliper and USI were not comparable [33].

Clinically finger width method and tape measurements have been used, probably because of its cost effectiveness and accessibility. Palpation showed good intra-rater reliability between days which was expressed by a weighted Kappa (wK) higher than 0.7 for two assessors and moderate inter-rater reliability ($wK \frac{1}{4}$ 0.534). This may be attributed to variations in the assessors' experience, finger width and soft tissue pressure. A study in 2012 on test-retest and intra-rater reliability of palpation recorded an intra-class correlation coefficient (ICC) value ranging between 0.74 and 0.90 for test-retest measurements. For the intra-rater reliability, ICC values were above 0.90 [34]. Palpation has enough reliability to be used in the clinical setup but USI is highly accurate. Till date, there are no published studies available to assess the reliability of tape measurements.

Even though the prevalence of DRA is high, there are only a few intervention studies which gives a clear picture as to which exercises are beneficial for preventing and managing DRA. Antenatal exercise has also proved to be beneficial in the prevention and management of DRA. A study in 1999 states that 'drawing-in' helps in reducing DRA [35] but a couple of studies [20,36,37]. contradict the statement by stating 'drawing-in' resulted in the widening of the IRD. It is worth noting that these were one time studies aiming to check the effect of 'drawing-in' and not interventional and lacked long term follow up. In 2005 a study demonstrated that the prevalence of DRA was less when the women did antenatal exercises compared to women who did not exercise [13]. There is a need for the development and conduct of standardized interventions for the prevention and management of DRA.

Conclusion

There is evidence from the literature clearly supporting the high prevalence of DRA even after 6 months postpartum which needs to be addressed. There is need for international guidelines for the cut-off value for IRD to determine the DRA along the linea alba. There is a need for a standardized Questionnaire for DRA and its validation which may be universally accepted. The literature review reveals that till date only one published randomized control trial exists pertaining to exercise and kinesio taping in patients with postpartum DRA. Therefore, there is a clear need for high-quality research to determine the best strategy to prevent DRA and reduce the IRD, in an attempt to minimize the associated consequences. It may be recommended that pregnant

women be educated about the DRA and its consequences so as to prevent it right from the antenatal period. The awareness about the antenatal and postnatal care is equally important.

Limitation

There have been best possible efforts made to extract the research work from the search engines but the possibilities of manual error may not be ruled out. Efforts have been made to translate the non- English publications within our limitations. Since the ongoing trials were excluded, we cannot, therefore, avoid the possibility that we may not have included some eligible studies.

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