

# Physiotherapy in Diastasis Recti: A Systematic Review

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**Abstract:** ***Objective:** To define and present the recommendation for management of patients with diastasis of rectus muscles for use as a basis for future guidelines. **Data Sources:** **Study Design:** Full text articles related to diastasis recti and physiotherapy were selected; observational, randomized control trial, systematic review articles which were published online in English language were included and rest were excluded. The search for information is taken in accordance with studies and articles that have been conducted in last 8 years. There is no geographical restriction for collecting information. Data is extracted from selected internet site such as PubMed, Google Scholars, Medline, Cochrane, Science Direct and ResearchGate database. Articles then were screened with PEDro scale hence, included in qualitative synthesis. **Result:** Total 213 published articles were selected out of which 45 articles were used to extract the data and eight randomized control trial were screened according to PEDro scale and rest were excluded. **Conclusion:** Over the period of time there is change in exercise protocols for Diastasis Recti, varies from use of abdominal binder along with core strength, strengthening of transversus abdominis and pelvic floor muscle, NEMS along with abdominal exercise and acupuncture.*

**Keywords:** Diastasis recti, Linea alba, Transversus abdominis (TrA), physiotherapy, rehabilitation.

## 1. Introduction

Reproduction is essential for continuation of the human species. The cycle is result of hormones from hypothalamus, anterior pituitary glands and ovary<sup>1</sup>. In pregnancy, women undergo many physiological changes, which are entirely normal. The first sign of pregnancy is amenorrhea followed by fertilization of ovum. As pregnancy progresses, uterus grows, its muscle fibres undergo lengthening and thickening<sup>2</sup>.

Pregnancy is governed and controlled by hormones (progesterone, oestrogen and relaxin) which affects various systems. Some are of particular relevance to the physiotherapist. Among these hormones relaxin replaces the collagen in target areas with a modified form, it has a softening effect on connective tissues which increases extensibility in those structures.

Rectus abdominis is a long muscles strap interrupted by three or more fibrous bands called the tendinous intersection and plays a big role in stabilization and moving of the spine. There are dramatic changes in anterolateral wall as the pregnancy progress, especially in third trimester. Long lasting intra - abdominal stress exerted by growing foetus and expanding uterus in combine with hormonal changes on the connective tissues creates a physiological widening of inter - rectal distance.

Abdominal recti diastasis is a condition in which the recti muscles get separated due to stretching and laxity of Linea alba but no fascia defect.

Women experience an increase in inter recti abdominal muscles distance during and after pregnancy due the thinning and stretching of Linea alba. At the level of umbilicus, if more than 2.7 cm is considered as pathological. Diastasis is most frequently seen in third trimester but usually appears in second trimester of pregnancy. Natural resolution of diastasis occurs day one to eight week after deliver, after which time recovery plateaus.

Abdominal wall plays an important role in trunk, posture and stability of pelvic, in trunk movement, respiration and supports abdominal viscera. An increase in distance between inter recti muscles puts these functions in danger, which can weaken abdominal muscles and influence their functions. Consequences of these alter trunk mechanism, weak pelvis more prone to injury<sup>3</sup>.

Diastasis can be resolve conservatively by giving physiotherapy exercises. Therapeutic exercises have a great effect on reducing DRA by two centimetres and increasing abdominal strength and endurance as a consequence to follow a regimen of stabilization exercises and using abdominal bracing<sup>4</sup>. Therapeutic exercises recruit more motor units within muscle fibres that activates both fast twitch [FT] and slow twitch [ST] fibres of the skeletal muscles, as the high content of FT fibres improves muscle strength. Exercise programs consist of posterior pelvic tilts, transverse abdominis contraction head lifts with kegels, military press, lateral raises, chest press, shoulder external rotations, bicep curls, scapular retractions, triceps extension, forward pull, overhead pull siting, hip flexion, abduction and adduction all with exercise bands<sup>8</sup>.

Diastasis recti is the commonly occurring impairment in postnatal women. There are many consequences if the diastasis recti are not resolved which may hamper the body posture and body stability of the women. There are many researches done on the exercises for diastasis recti. This study will summarise and discuss for recent guidelines available in literature.

**Objective**

To explore and summarizes available literature on physiotherapy management and diastasis recti.

**2. Method**

**Eligibility Criteria**

The study included randomized controlled trial studies that were published between 2015 and 2022, which described the data indicating the PHYSIOTHERAPY EXERCISES IN DIASTASIS RECTI. Articles which were published in last 8 years in English, full text, Experimental study,

Publishedarticles. With the score of more than 6 out of 10 according to PEDro scale were included. Articles with only abstracts, duplicate articles, case reports and review articles were excluded.

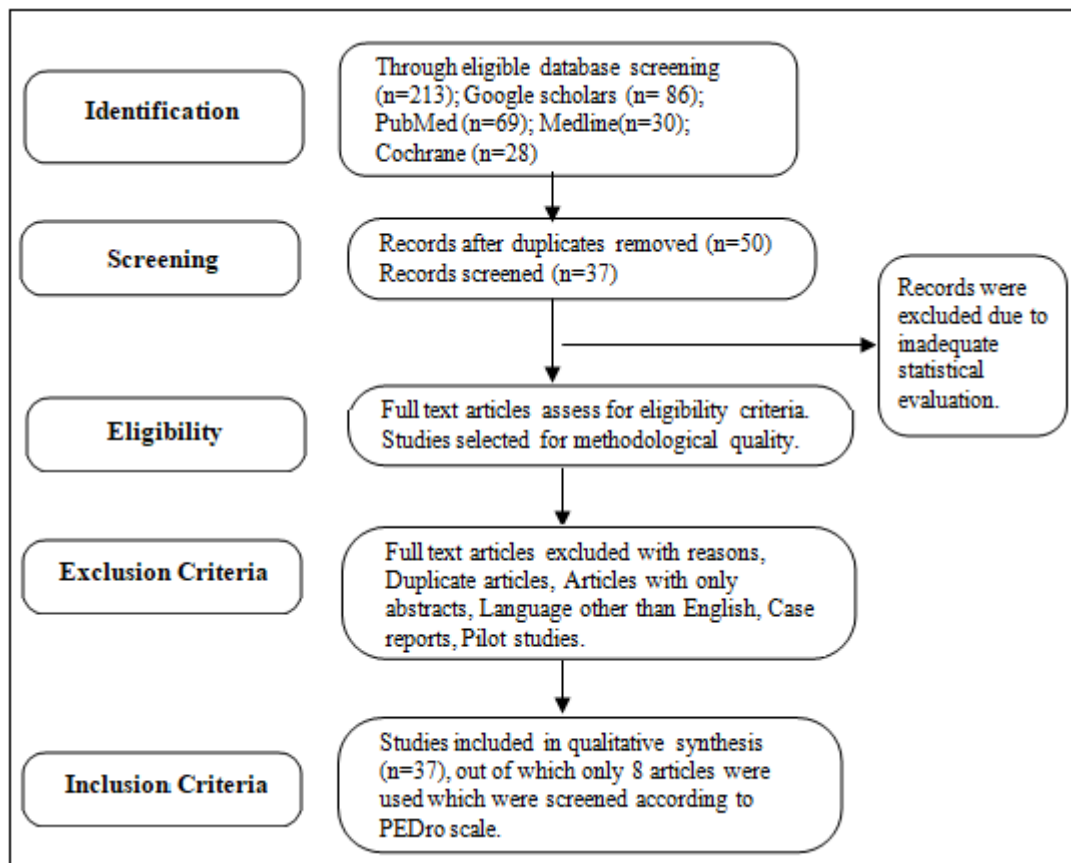
**Information Sources**

The search for information is taken in accordance with articles and studies that have been conducted in last 8 years. There is no geographical restriction for collecting information. data is extracted from selected internet site such as PubMed, Google Scholars, Medline, Cochrane, Science Direct and ResearchGate database.

**Search Strategies**

Articles were selected by searching database, using keywords: Diastasis recti, postpartum exercises, pregnancy, core strengthening, TrA, Linea alba. Cross references of published paper were searched.

**3. Selection Process**



**4. Data Collection Process**

The following information was extracted, author’s name, publication year, sample size, description of data

collection methods, prevalence rate, response rate, outcome.

**Data Items**

S no.	Author’s name / year of publication	Type of study	Aim / Objectives	Outcome measures	Conclusion
1	Eman Awad, Ali mobrak (2021)	RCT	To evaluate the influence of progressive prone plank exercises on decreasing the inter - recti distance in postpartum females present with diastasis recti.	Changes in inter - recti distance is measured in mm by USI at rest and during contraction of rectus abdominis 4.5 cm above and below umbilicus.	The exercise is effective in decreasing the diastasis recti in post - partum period.

2	Nadia Keshwani, Sunita Mathur and Linda McLean (2018)	Pilot RCT	To evaluate the influence of 16 week supervised post - partum exercise program on PFM training.	Data was collected through the electronic questionnaires.	Weekly comprehensive exercise program was focus on strength training of the PFM which was not effective in reduction of Diastasis recti.
3	Carlos romero morales and others (2019)	RCT	To establish the efficacy of deep core stability exercise program on the closure of diastasis recti and improvement of women's quality life.	Digital nylon calipers the physical functioning scale (PF10)	Using deep core stability exercise program, shows a relevant improvement in inter - rectal distance.
4	Ali Yalfani Nahid Bigdeli Farzaneh Gandomi (2021)	RCT	Study was to compare the effectiveness of suspension training program (TRX - DRA) with that of isometric - isotonic core stabilization exercises in the treatment of DRA, impairment in lumbopelvic proprioception, low back pain and the disability thereof, and postural instability.	Digital caliper, goniometer a lateral step - down test, a Biodex balance system, VAS, and Oswestry questionnaire.	TRX exercise had a positive effect on women with DRA and like the ISOM - ISOT exercises can be used to treat this disorder.
5	Yan Liu, Ying Zhu, Liyuan and the others (2017)	RCT	To evaluate the effectiveness and safety of acupuncture in post - partum with diastasis recti.	LA tension evaluation, SF 36 SF - MP Q - 2, BMI WHR.	Acupuncture - based intervention to replace single physical training may DRA in the future.
6	Dalia M. Kalam, Amel M. Yousif (2017)	RCT	The study was to determine if a six - week experimental plank exercise program as compared to traditional supine exercise program was effective in the closure of diastasis recti.	BMI, waist hip ratio, inter recti distance, and abdominal muscle strength in terms of peak torque, maximum repetition total work and average power.	NMES helps reduce DRAM in postnatal women; if combined with abdominal exercises, it can augment the effects.
7	Lori Maria Walton, Adislen Costa and the others. (2016)	RCT	Determine if a six - week experimental plank exercise program, as compared to a tradition supine exercise program prescribed by a licensed physical therapist was effective in the closure of Diastasis.	Ultrasound and imaging machine, Digital nylon calipers, Oswestry disability index, pelvic floor distress index.	Both the traditional and experimental group showed significant reduction in Diastasis recti measurement from pre to post test, with the traditional program exhibiting a slightly greater decline from pre to post diastasis recti measurement than the experimental group.
8	Nadia Keshwani, Sunita Mathur and Linda McLean (2019)	RCT	To explore the feasibility of two physiotherapy interventions for the management of diastasis recti abdominis: abdominal binding and targeting trunk exercise.	Inter - recti distance measured by ultrasound body image, pain urogynecological symptom, questionnaires and trunk flexion strength and endurance measured using clinical tests.	The intervention has positive impact on body image and the trunk flexion.

**Study Risk of Bias Assessment**

There were two reviewers assessed each study and they have word independently. AMSTAR 2 tool were used to rule out the risk of bias.

**Outcome Measures**

Physiotherapy Evidence Database (PEDro) scale is 10 components scale to assess the methodological quality of

clinical trial. It is also used to rate systematic reviews. The PEDro scale was developed from Delphi list. As per author's suggestion the scores are: <4 is 'fair', 6 - 8 is 'good' and 9 - 10 is 'excellent'. The inter - rater reliability of this PEDro scale is ICC = 0.53 to 0.91 for clinical trial of physiotherapy related intervention.

**PEDro Scale Analysis**

S. No.	PEDro Scale Item	Eman Awad	Sandar L. Gluppe	A. A. Thabet M. A. Alshehri	Ali Yalfini	Yan Liu Ying Zhu	Dalia M. Kamel and Amel M. Yousi	Lori Maria Walton	Nadia Keshwani Sunita Mathur
1.	Eligibility criteria specified	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2.	Random allocation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
3.	Concealed allocation	Yes	Yes	Yes	Yes	Yes	No	Yes	No
4.	Groups similar at baseline	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
5.	Subject blinding	No	No	Yes	Yes	Yes	No	Yes	No
6.	Therapist blinding	No	Yes	No	No	Yes	No	No	Yes
7.	Assessor blinding	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
8.	Less than 15% dropouts	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

9.	Intentions to treat analysis	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
10.	Between group statistical comparisons	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
11.	Points measures and variability data	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Scores	8/10	9/10	9/10	9/10	10/10	6/10	8/10	8/10
	Quality	Good	Excellent	Excellent	Excellent	Excellent	Good	Good	Good

## 5. Discussion

This systematic review included eight RCTs mentioning effects of plank exercises deep core stability exercises suspension, acupuncture, NMES, and impact of exercise therapy in combinations with abdominal binding in management of diastasis recti.

The methodological quality of the RCTs varies between six to nine on the PEDro scale. The main goal of this study is to review the effective exercises and physiotherapy management for diastasis recti. Exercises before the pregnancy reduces high risk of developing diastasis recti. Therapeutic exercises help to main the muscle tone, strength and control of the abdominal muscles and reduces stress on the Linea alba. Diastasis recti is more common in multiparous as compared to primiparous.

Frequently prescribed exercises for diastasis recti are abdominal strengthening exercises. Non - surgical interventions include posture and back care education external supports like corset and aerobic exercises.

The research has found that following either exercise program for six weeks resulted in a significant difference at the level of the umbilicus, as no significant closure was seen below and above the umbilicus. It emphasized on core exercise program in addition to abdominal bracing during exercise, could be a successful option for diastasis recti treatment<sup>8</sup>. Core stability and strengthening exercise proves beneficial for people suffering from diastasis recti.

Drawing - in exercise mostly activates transversus abdominis and internal oblique muscles, tends to widen instead of narrowing the inter - recti distance<sup>5</sup>. Another study investigated the immediate effect of the drawing - in exercise compared to traditional crunch exercise on inter - recti distance, where the distance was increased by drawing - in exercise<sup>10</sup>.

Abdominal binding in combination with exercise therapy shows positive and clinically meaningful effect on the abdominal strength. Rigid binders cause increase in abdominal pressure as compared to elastic binders. Using binder while doing core strengthening exercise could prove effective in treating diastasis recti and is also useful in its closure. In early postpartum, exercise therapy promotes collagen formation at the Linea alba, providing a stronger fixation point for the muscle at the lateral abdominal wall enhances stability, meanwhile abdominal binder provides protection to newly formed collagen<sup>9</sup>.

Transversus abdominis training (TrA) and pelvic floor muscle (PFM) exercises have been the most common exercises in the treatment for diastasis recti. TrA training is considered to be the logical training. Contraction of PFM with co - activation of TrA tightens the Linea alba. TrA

shortens the rectus abdominis muscle and brings the gaps closure at the Linea Alba<sup>5</sup>.

Exercises which cause bulging of the abdominal wall, such as abdominal sit ups and crunches, are advised to avoid for females presented with diastasis recti<sup>4</sup>.

Isometrics planks are efficiently prescribed exercise for core stability. Back pain caused by diastasis recti can be reduce by adding core exercises, proves positive effects in closing and treating the diastasis recti. Plank exercise making the base of support unstable, efficiently trains the core muscles also improves and restores balance and proprioception at the same time<sup>4</sup>.

The study was conducted for eight weeks by Kamel et al., on the effect of Neuromuscular Electrical stimulation (NMES) combine with abdominal exercises. It was performed in two groups: in group one it was NMES and abdominal exercise and in another only exercise therapy was given. NMES with abdominal exercise showed a positive effect of exercise on diastasis recti along with the improvement in abdominal muscle strength. This augmented improvement may be achieved by higher intensities of muscle overload leading to greater strength gain by combining the NMES and abdominal muscle exercise. NMES activates the large (type2) nerve fibres at relatively low level of stimulation and also influences the motor cortex excitability. It can recruit deep muscle fibres a low training intensity as the nerves stimulated by the NMES are distributed throughout the muscle. Then muscle contractions induced by electrical stimulation activates a large proportion of type 2 muscle fibres which does voluntary exercises at a comparable intensity, because typically type 2 fibres are activated only when high intensity voluntary contractions take place. Some study founded that strength is increased in healthy muscle when combined treatment is given<sup>7</sup>.

Another study suggested that acupuncture combined with physical training can significantly improve tissue excitability, that help in improving blood circulation and also systolic muscle function. It adjusts the mechanical balance of the postpartum abdominal muscle group. In the abdominal training, increased abdominal pressure makes the PFM prone to adverse effect and cause pelvic floor dysfunction. Acupuncture can cause the synergism of pelvic floor muscles by activating the TrA. Acupuncture based interventions will replace every single physical training to improve diastasis recti in future. In this the study aimed to evaluate the effectiveness and safety of acupuncture in women with diastasis recti.

## 6. Recommendation and Limitations

Only one assessor evaluated the articles. Study explored only RCTs, further other types of studies can be evaluated for review.



## 7. Conclusion

Eventually, over the period of time there are changes in the treatment plan of diastasis recti. Many professionals and researchers are stressing on the importance of adding new therapeutic exercises on core strengthening and management of diastasis recti. Majority of the studies focused on strengthening of transversus abdominis muscle and pelvic floor muscle using activation of transversus abdominis, core muscles.

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