

## Effect of Core Stability Exercise in Preventing Diastasis Recti Abdominis among Normal Birth Delivery of Postpartum Mothers: Meta-Analysis

Feny Oktaviyani<sup>1)</sup>, Eti Poncorini Pamungkasari<sup>2)</sup>, Bhisma Murti<sup>1)</sup>

<sup>1)</sup>Masters Program in Public Health, Universitas Sebelas Maret

<sup>2)</sup>Faculty of Medicine, Universitas Sebelas Maret

### ABSTRACT

**Background:** Diastasis Recti Abdominis (DRA) is a separation that occurs in the abdominal muscles, namely between the two rectus abdominis muscles. This separation is precisely in the linea alba which is the midline of the abdomen. DRA is characterized by two things, namely the widening of the inter-recti distance (IRD) and the appearance of a bulge in the abdomen. This is due to stretching and weakness of the linea alba. This study aims to analyze the effect of core stability exercise on reducing diastasis recti abdominis in normal postpartum mothers based on the results of a number of previous primary studies.

**Subjects and Method:** This study uses a meta-analysis method with articles searched using the search keywords "Core stability exercise" AND "diastasis recti abdominis" OR "normal post partum" OR "caliper" OR "ultrasonography" OR "Randomized Controlled Trial" OR "RCT" from PubMed, Google Scholar and Scopus and processed using RevMan 5.3.

**Results:** 9 RCT articles that fit into the inclusion criteria, with a total of 319 samples. Normal postpartum mothers with diastasis recti abdominis who received core stability exercise had an average caliper score of 4.71 units lower than those without core stability exercise, and the effect was statistically significant (SMD= -4.71; 95% CI -8.05 to -1.37; p= 0.060). Normal postpartum mothers with diastasis recti abdominis who received core stability exercise had an average ultrasound score of 0.80 units lower than those without core stability exercise, and the effect was statistically significant (SMD= -0.80; 95% CI -1.62 to 0.02; p= 0.060). In other words, core stability exercise is effective in reducing diastasis recti abdominis in normal postpartum mothers.

**Conclusion:** Core stability exercise has an effect on reducing diastasis recti abdominis in mothers after normal delivery.

**Keywords:** post partum, diastasis recti abdominis, core stability exercise, calipers, ultrasound

### Correspondence:

Feny Oktaviyani. Masters Program in Public Health, Universitas Sebelas Maret. Jl. Ir. Sutami 36A, Surakarta 57126, Central Java, Indonesia. Email: fenyokta89@gmail.com. Mobile: +6281312500575.

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### BACKGROUND

The most visible physical changes during pregnancy are an increase in the weight and size of the uterus which can change the musculoskeletal morphology of the core area (Yalfani, 2021). The impact of the develop-

ment of the baby in the stomach during pregnancy will make the abdominal muscles and ligaments stretch to adjust to the condition and size of the baby (Ramesh and Hande, 2016). Occurs due to the influence of the hormones progesterone and relaxin

making the linea alba ligament stretch and become a separator in the rectus abdominis muscle during pregnancy. The separation condition in the two rectus abdominis muscles is known as diastasis recti abdominis (DRA) (Nahabedian, 2018).

The state of diastasis recti abdominis can be a problem in the abdominal muscles after giving birth in the form of psychological problems, and physical problems such as back pain, weakness in the abdominal wall and decreased abdominal muscle strength (Ramesh and Hande, 2016).

Research in Indonesia diastasis recti abdominis is often found in pregnant and postpartum women. The prevalence of diastasis recti abdominis varies at each gestational age. At 21 weeks of pregnancy it was 33.1% and at 6 weeks postpartum it was 60%, at 6 months postpartum it was 45.4% and at 12 months postpartum it was 32.6% (Rustanti and Zuhri, 2020).

Diastasis recti abdominis can be measured using digital calipers and ultrasonography to evaluate the reduction in the distance between the rectus abdominis (Triyulianti et al., 2021) Stretching of the abdominal muscles is the cause of diastasis recti which is influenced by age and nutritional status (weight) (Gruszczynska and Truszczynska-Baszak, 2018). During pregnancy, with increasing uterine size, the shape of the abdomen and the position of the lumbar spine will increasingly affect, resulting in an increase in the distance between the abdominal muscles and changes in the angle of the abdominal muscles (Iqbal et al., 2020). Functionally, it reduces strength, and mainly occurs in the rectus abdominis muscles. As a result, there is stretching and flaccidity of the linea alba, resulting in an enlargement of the distance between the medial boundaries of the muscles and a diastasis recti abdominis muscle occurs (Michalska et al., 2018).

Diastasis recti abdominis that has not closed after delivery, affects the emergence of various cases such as low back pain, pelvic instability, urinary incontinence and fecal incontinence, vulvar vestibulitis syndrome, interstitial, cystitis or disc herniation (Gruszczynska and Truszczynska-Baszak, 2018). Based on the risks described above, diastasis recti abdominis should be treated immediately. Handling of diastasis recti abdominis is generally carried out by physiotherapy, if the problem has not been resolved, it is usually followed up with surgical treatment (Jessen et al., 2019).

Interventions that can be given to patients with diastasis recti abdominis are by providing exercise therapy which is carried out with the aim of improving the value of the abdominal muscles, increasing abdominal muscle strength, and reducing the distance of diastasis recti abdominis in normal postpartum mothers (Michalska et al., 2018). Core stability exercise is one type of physical exercise that can be performed on diastasis recti abdominis and this exercise is isometric (Gluppe et al., 2021). Core stability exercise performed routinely has been shown to be effective in treating diastasis recti abdominis and is effective in reducing the distance between diastasis recti abdominis and has the potential to reduce back pain caused by diastasis recti abdominis (Yalfani, 2021).

Considering that core stability exercise is very useful to do with the aim of increasing the maximum strength of the abdominal muscles and reducing diastasis recti abdominis in postpartum mothers, this research needs to be done to see how the effect of core stability exercise on diastasis recti abdominis. Core stability exercise can be given to individuals and groups, both for pregnant women and for mothers after normal delivery. Which later this intervention can be given to the community, so that

it can improve the quality of life of a woman (Thabet and Alshehri, 2019).

Based on this background, researchers are interested in examining the effect of core stability exercise on diastasis recti abdominis in normal postpartum mothers. This study uses a meta-analysis method, which combines several previously published primary studies. So that the results can be used as a guide for the treatment method for diastasis recti abdominis.

## SUBJECTS AND METHOD

### 1. Study Design

This research is a systematic review and meta-analysis that uses secondary data from the results of previous studies. The approach used in the meta-analysis is a deductive approach (top-down approach) using Preferred Reporting Items for Systematic Review and Meta Analysis (PRISMA) (Mikolajewicz and Komarova, 2019a). The article search was conducted in March 2022. For data searches, all searchable articles published before March 2022 were examined. The databases used in this search are Google scholar, Pubmed, and Scopus. Search articles using the term Mesh with the search keywords “Core stability exercise” AND “diastasis recti abdominis” OR “normal postpartum” OR “caliper” OR “Ultrasound” OR “Randomized Controlled Trial” OR “RCT”.

### 2. Inclusion Criteria

Inclusion criteria 1) full paper article using a Randomized Control Trial (RCT) study design, 2) The relationship size used is Mean SD, 3) The research subjects are patients with diastasis recti abdominis, 4) The intervention given is core stability exercise, 5) The comparison was without therapy or other therapy, 6) The outcome of the study was a decrease in diastasis recti abdominis as measured using calipers and ultrasonography.

### 3. Exclusion Criteria

The exclusion criteria for this study were: 1) articles published in languages other than English and Indonesian, 2) articles before 2011.

### 4. Study Variables

The independent variable is Core stability exercise and the dependent variable is Diastasis Recti Abdominis.

### 5. Operational Definition of Variables

All research characteristics are used to decide whether a study is eligible to be included in a systematic review selected based on the PICO (Population, Intervention, Comparison, Outcome) framework. The study population was normal postpartum mothers with ages between 18 – 45 years. The intervention given is core stability exercise. As a comparison (Comparison) is not core stability exercise or other therapy. Outcome used to measure the decrease in diastasis recti abdominis in normal postpartum mothers using calipers and ultrasound.

**Core stability exercise** or also core strengthening is an exercise performed by activating the abdominal and paraspinal muscles as a unit of motion (Wowiling et al., 2016).

**Diastasis Recti Abdominis** is a pathological condition characterized by the separation of the two rectus abdominis muscles along the linea alba. This separation is followed by extension of the linea alba and protrusion of the abdominal wall (Michalska et al., 2018). Assessment for diastasis recti abdominis using calipers and ultrasonography).

### 6. Steps of Meta-Analysis

Meta analysis is done through 5 steps:

- a. Formulate research questions in the PICO format (population, intervention, comparison, outcome).

- b. Search for primary study articles from various databases (Google Scholar, PubMed, etc.).
- c. Perform a critical assessment (critical appraisal).
- d. Extracting data and synthesizing effect sizes using the Revman application.
- e. Interpret results and draw conclusions.

The critical assessment was carried out by 2 independent raters. By using a check list consisting of 11 questions developed by CEBM.

### 7. Data Analysis

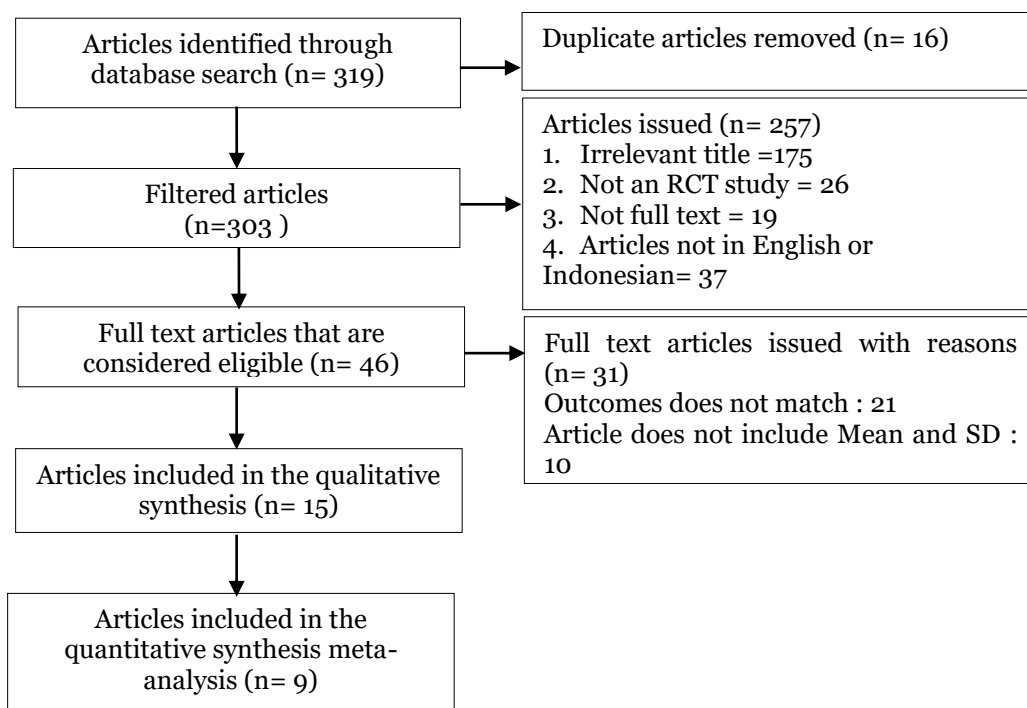
The data in this study were analyzed using the RevMan 5.3 application, to calculate the effect size and heterogeneity of the study. The results of data processing are presented in the form of forest plots and funnel plots.

## RESULTS

The article selection process uses the PRISMA flow chart. A total of 319 articles consisting of 315 articles were obtained from Google scholar, 2 from Pubmed and 2 from

Scopus. A total of 16 articles were deleted because they were duplicate articles, leaving 303 articles. Then as many as 257 articles were issued on the grounds that the title was irrelevant, the article was not full text, was not an RCT study, and was not in English and Indonesian. Full text articles that were declared eligible were 46 articles. There were 15 articles eligible to be included in the qualitative synthesis, with 21 articles excluded because the outcome was not suitable. Finally, 9 articles were included in the meta-analysis (Figure 1).

Primary research on the effect of core stability exercise on diastasis recti abdominis in normal postpartum mothers with a total of 9 studies located in Pakistan, Iran, United States of America, Saudi Arabia, Egypt, Canada and Spain. Assessment of article quality using CASP for RCTs (Table 1). The average subject of the study was diastasis recti abdominis in normal postpartum mothers aged between 18-45 weeks, given core stability exercise (Table 2).



**Figure 1. PRISMA flow diagram**

**Table 1. Assessment of research quality using the Critical Appraisal Skills Program (CASP) standard for Randomized Controlled Trials (RTC) from CEBM Oxford**

No	List of Questions	Yalfani, et al. (2021)	Saleem, et al. (2021)	Kamel and Yousif (2017)	Thabet and Alshehri (2018)	Walton, et al. (2016)	Tuttle, et al. (2018)	Keshwani, et al. (2019)	Awad et al. (2021)	Bobowik and Dabek (2018)
1	Does the experiment clearly address the clinical problem?	1	1	1	1	1	1	1	1	1
2	Was the intervention given to the patient randomized?	1	1	1	1	1	1	1	1	1
3	Were all patients included in the study properly accounted for in the conclusions?	1	1	1	1	1	1	1	1	1
4	Are patients, health workers, and researchers blinded?	1	0	1	1	1	0	1	1	1
5	Were the study groups similar at the start of the study?	1	1	1	1	1	1	1	1	1
6	Outside of the intervention studied, were the study groups treated equally?	1	1	1	1	1	1	1	1	1
7	Is the effect of the intervention large enough?	1	1	1	1	1	1	1	1	1
8	How precise is the estimation of the effect of the intervention?	1	1	1	1	1	1	1	1	1
9	Do the benefits provided by the intervention outweigh the costs and disadvantages?	1	1	1	1	1	1	1	0	1
10	Are the results applicable to the context of practice or local populations?	1	1	1	1	1	1	1	1	1
11	Are all other clinically important outcomes considered in this article?	1	1	1	1	1	1	1	1	1
<b>Total of Score</b>		<b>11</b>	<b>10</b>	<b>11</b>	<b>11</b>	<b>11</b>	<b>10</b>	<b>11</b>	<b>11</b>	<b>11</b>

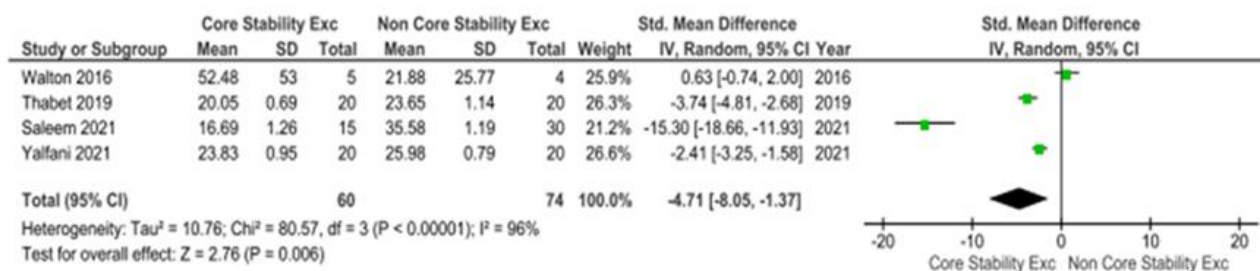
Answer: 1=Yes, 0=No

**Table 2. Description of primary studies included in the meta-analysis of the effect of core stability exercise on reducing diastasis recti abdominis in normal postpartum mothers**

Author (year)	Place	Study Design/ Sample Size	Population	Intervention	Comparison	Outcome
Yalfani (2021)	Iran	RCT Experiment: 15 Control : 30	Pregnant Woman with Sacro Iliac Joint Pain	The ISOM-ISOT intervention was carried out for 8 weeks on even days.	The TRX-DRA intervention was given for 8 weeks on odd days.	Caliper index results: p<0.01 statistically significant. TRX exercise has an effect on DRA women and ISOM ISOT exercise can be used to treat DRA.
Bobowik and Dabek (2018)	Poland	RCT Experiment: 20 Control : 20	Postpartum mothers have 2 cm DRAM with an age range of 20-45 years,	Given a core stability exc physiotherapy exercise program for 6 weeks	No exercise, only observation of natural diastasis recti inolution for 6 weeks	Results of physiotherapy exercise: p<0.01 significantly reduced diastasis recti abdominis.
Thabet and Alshehri (2019)	Arab Saudi	RCT Experiment: 20 Control: 20	Mothers after giving birth with diastasis recti abdominis and age range 23-33 years	Core stability in strengthening program (+ traditional exercises) (n = 20) group A Abdominal crunch exercise for 6 weeks	Use of abdominal binding, breathing maneuvers, PFM exercises, planks and traditional abdominal isometric contraction exercises (n = 20) Group B DSLR training for 6 weeks	Result : p<0.01 significantly Reduced diastasis recti in postpartum mothers.
Saleem et al. (2021)	Pakistan	RCT Experiment: 20 Control: 20	Postpartum maternal patient with diastasis recti abdominis	Abdominal crunch exercise for 6 weeks	DSLR training for 6 weeks	Abdominal crunch exercise is effective in reducing diastasis recti abdominis
Kamel and Yousif (2018)	Egypt	RCT Experiment: 30 Control : 30	Woman 2 months after delivery with diastasis recti abdominis	Given NMES intervention and core stability exercise for 8 weeks	Core stability training only for 8 weeks	Core stability training only for 8 weeks



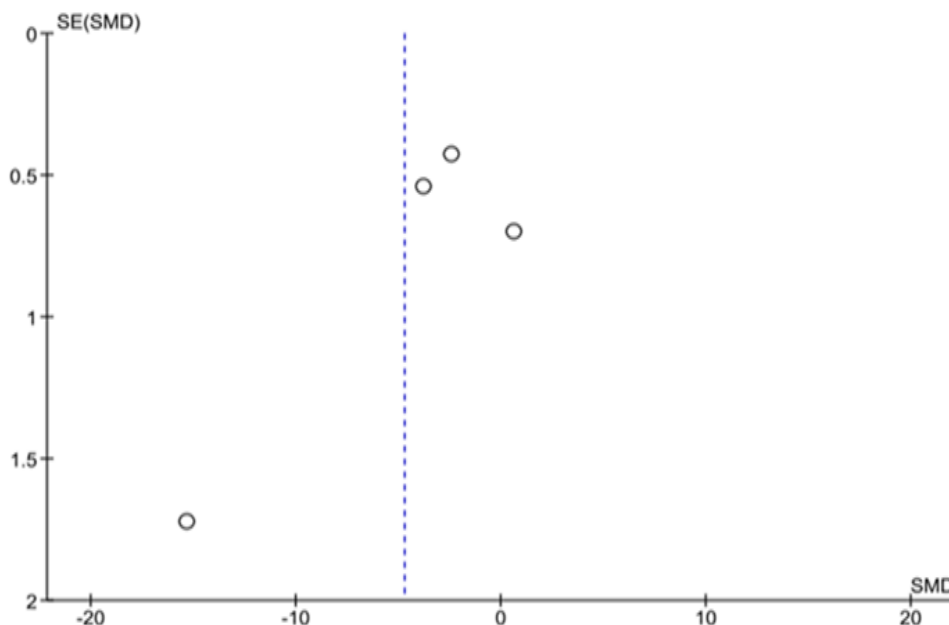
<b>Author (year)</b>	<b>Place</b>	<b>Study Design/ Sample Size</b>	<b>Population</b>	<b>Intervention</b>	<b>Comparison</b>	<b>Outcome</b>
Walton et al. (2016)	USA	RCT Experiment: 5 Control: 4	Mothers after giving birth 3 months to 3 years with an age range of 18-45 years	10 second plank on knees or toes	Traditional exercises using abdominal binders during training	Planks and traditional exercises are effective for reducing diastasis recti abdominis
Tuttle et al. (2018)	California	RCT Experiment: 15 Control :15	Primi and multiparous, vaginal delivery with diastasis recti abdominis	TRA exercise intervention	TRA exercise and kinesiotapping g	There is a significant difference between TRA exc + kinesiotapping compared to TRA alone in reducing diastasis recti abdominis
Keshwani et al. (2019)	Canada	RCT Experiment: 16 Control : 16	Primipara Vaginal delivery with diastasis recti abdominis age range 18-35 years	Abdominal exercise, abdominal binding for 12 weeks	Women do not receive education and intervention	Abdominal exc is effective in reducing diastasis recti abdominis.
Awad et al. (2021)	2021/ Spainl	RCT Experiment: 30 Control : 30	Normal postpartum mother with diastasis recti abdominis	Prone plank exc and abdominal binder	Abdominal binder and get advice from intervention group	Ultrasound: p<0.05 in the intervention group significantly reduced diastasis recti abdominis



**Figure 2. Forest Plot Kaliper**

The forest plot in Figure 2 shows that normal postpartum mothers have the effect of core stability exercise on diastasis recti abdominis. Those who received core stability exercise using digital calipers had an average score of 4.71 units lower than those without core stability exercise, and the effect was statistically significant (SMD= -4.71; 95% CI -8.05 to -1.37; p = 0.006). In other words, core stability exercise is effective in reducing

diastasis recti abdominis in normal postpartum mothers. The forest plot also showed a high heterogeneity of effect estimates between studies in this meta-analysis (I<sup>2</sup> = 96%; p<0.001). Thus, the average calculation of the estimated effect of core stability exercise from all studies in this meta-analysis uses the random effects model (REM) approach.

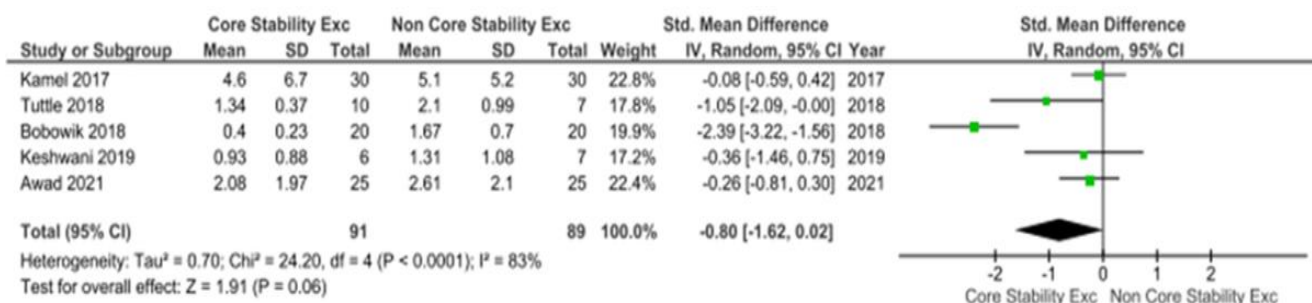


**Figure 3. Funnel Plot Kaliper**

The funnel plot in Figure 3 shows an asymmetric distribution of effect estimates to the right and left of the mean vertical line of effect estimates. The estimated effect is more visible to the right of the vertical line than to the left. So the funnel plot indicates that there is publication bias. Because the trend of the distribution of effect estimates

to the right of the estimated mean vertical line is opposite to that of the average effect estimate diamond to the left of the null hypothesis vertical line on the funnel plot, the publication bias indicates a tendency to reduce the true core stability exercise effect (underestimates).

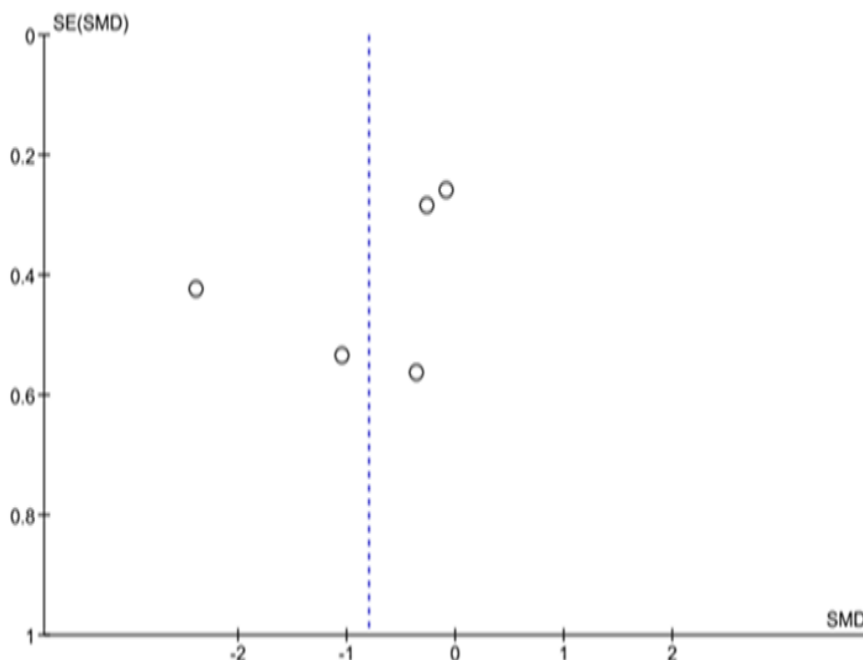




**Figure 4. Forest Plot Ultrasound**

The forest plot in Figure 4 shows that normal postpartum mothers have an effect of core stability exercise on diastasis recti abdominis, but statistically close to significant. The measuring instrument used was ultrasound. The mean score of diastasis recti abdominis was 0.80 units lower than without core stability exercise, but the effect was statistically close to significant (SMD= -0.80; 95% CI= -1.62 to 0.02; p= 0.060). In

other words, core stability exercise is effective in reducing diastasis recti abdominis in normal postpartum mothers. The forest plot also showed a high heterogeneity of effect estimates between studies in this meta-analysis (I<sup>2</sup> = 83%; p<0.001). Thus, the average calculation of the estimated effect of core stability exercise from all studies in this meta-analysis uses the random effects model (REM) approach.



**Figure 5. Funnel Plot Ultrasound**

The funnel plot in Figure 5 shows a more or less symmetrical distribution of effect estimates to the right and left of the mean

vertical line of the effect estimates. The estimated effect is more or less symmetrical more visible to the right of the vertical line

than to the left. So the funnel plot does not indicate any publication bias.

## DISCUSSION

These results are in accordance with the meta-analysis of Kamel and Yousif (2017) that abdominal muscle training is a very important factor in helping to decrease DRAM. The research subjects were divided into two groups where the first group was given treatment in the form of abdominal muscle training plus neuromuscular electrical stimulation, while the second group was only given abdominal muscle training. Their results showed that both study groups experienced a significant decrease in DRAM. Kamel and Yousif (2017) provide treatment for abdominal muscle exercises involving the transversus abdominis, internal oblique and rectus abdominis muscles. However, this study only involved training the transversus abdominis muscle.

The research by Thabet and Alshehri (2019) which compared core stability exercise combined with abdominal muscle training with abdominal muscle training in reducing DRAM in postpartum mothers by involving two intervention groups and a control group, each group consisting of 20 people. The results showed that the treatment group that was given abdominal muscle training plus core stability exercise was better than the control group who was only given abdominal muscle training.

Another study which showed that core stability exercise had an effect on decreasing diastasis recti abdominis was according to which compared core stability exercise combined with abdominal muscle training with abdominal muscle training in reducing DRAM in postpartum mothers by involving two intervention groups and a control group, each group amounting to 20 people. The results showed that the treatment group that was given abdominal muscle training plus

core stability exercise was better than the control group who was only given abdominal muscle training.

Core stability exercise or also core strengthening is an exercise performed by activating the abdominal and paraspinal muscles as a unit of motion (Wowiling et al., 2016). One of the core stability exercises is to strengthen the muscles. The core stability exercise was given for 6 weeks, performed 3 times with the prescribed exercise dose. According to several studies, efforts to overcome various complaints caused by diastasis recti abdominis such as reducing the widening of the linea alba by doing sports or physical exercise on the abdominal muscles after giving birth, namely there is a decrease in the distance of the diastasis recti abdominis after being given static exercise for abdominal muscle contractions (Thabet and Alshehri, 2019).

This meta-analysis shows that core stability exercise has an effect on reducing diastasis recti abdominis in normal postpartum. Normal postpartum mothers with diastasis recti abdominis who received core stability exercise intervention experienced a decrease in diastasis recti abdominis as measured using Caliper scale and Ultrasonography.

## AUTHORS CONTRIBUTION

Feny Oktaviyani is the main researcher who selects the topic, searches for, and collects research data. Eti Poncorini Pamungkasari and Bhisma Murti analyzed and reviewed the research data.

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### CONFLICT OF INTEREST

The research was conducted without any commercial or financial relationship which could be construed as a potential conflict of interest.

### REFERENCE

- Awad E, Mobark A, Zidan AA, Hamada HA, Shousha TM (2021). Effect of progressive prone plank exercise program on diastasis of rectus abdominis muscle in postpartum women: A randomized controlled trial. *J. Hum. Sport and Exerc.* 16(2proc): S395-S403. doi: 10.14198/jhse.2021.16.Proc-2.24.
- Bobowik PŻ, Dąbek A (2018). Physiotherapy in women with diastasis of the rectus abdominis muscles. *Adv Rehab.* 32(3): 11–17. doi: 10.5114/areh.2018.80964.
- Gluppe S, Engh ME, Bø K (2021). What is the evidence for abdominal and pelvic floor muscle training to treat diastasis recti abdominis postpartum? A systematic review with meta-analysis. *Braz J Phys Ther.* 25(6): 664-675. doi: 10.1016/j.bjpt.2021.06.006.
- Gruszczynska D, Truszczynska-Baszak A (2018). Exercises for pregnant and postpartum women with diastasis recti abdominis - Literature review. *Adv Rehab.* 32(3): 27–35. doi: 10.5114/areh.2018.80967.
- Iqbal MH, Hussain T, Khalid F, Ali MM, Ashraf I, Nazir T (2020). Diastasis Recti Abdominis and Its Associated Risk Factors in Postpartum Women. *PAFMJ.* 70(5): 1535–1538.
- Jessen ML, Öberg S, Rosenberg J (2019). Treatment Options for Abdominal Rectus Diastasis. *Front Surg.* 6: 65. doi: 10.3389/fsurg.2019.00065.
- Kamel DM, Yousif AM (2017). Neuromuscular electrical stimulation and strength recovery of postnatal diastasis recti abdominis muscles. *Ann. Phys. Rehabil. Med.* 41(3): 465–474. doi: 10.5535/arm.2017.41.3.465.
- Keshwani N, Mathur S, McLean L (2021). The impact of exercise therapy and abdominal binding in the management of diastasis recti abdominis in the early post-partum period: a pilot randomized controlled trial. *Physiother Theory Pract.* 37(9): 1018–1033. doi: 10.1080/09593985.2019.1675207.
- Michalska A, Rokita W, Wolder D, Pogorzelska J, Kaczmarczyk K (2018). Diastasis recti abdominis - a review of treatment methods. *Ginekol Pol.* 89(2): 97-101. doi: 10.5603/GP.a2018.0016.
- Mikolajewicz N, Komarova SV (2019). Meta-Analytic Methodology for Basic Research: A Practical Guide. *Front Physiol.* 10: 203. doi: 10.3389/fphys.2019.00203.
- Nahabedian MY (2018). Management Strategies for Diastasis Recti. *Semin Plast Surg.* 32(3): 147–153. doi: 10.1055/s-0038-1661380.
- Ramesh KS, Hande D (2016). Effects of Abdominal Exercises on Reduction of Diastasis Recti in Postnatal Women. *IJHSR.* 6(6): 182.
- Rustanti M, Zuhri S (2020). Pengaruh Latihan Otot Perut terhadap Diastasis Recti Abdominalis Muscle pada Ibu Pasca Melahirkan Normal (The Effect of Abdominal Muscle Exercise on Diastasis Recti Abdominal Muscle in Normal Postpartum Mothers). *JKMSaw.* 13(1): 20. doi: 10.26630/jkm.v13i1.2200.
- Saleem Z, Khan AA, Farooqui SI, Yasmeen

- R, Rizvi J (2021). Effect of Exercise on Inter-Recti Distance and Associated Low Back Pain Among Post-Partum Females; A Randomized Controlled Trial. *J Family Reprod Health*. 15(3): 202–209. doi: 10.18502/jfrh.v15i3.71-39.
- Thabet AA, Alshehri MA (2019). Efficacy of deep core stability exercise program in postpartum women with diastasis recti abdominis: A randomised controlled trial. *J Musculoskelet Neuro-nal Interact*. 19(1): 62–68.
- Triyulianti S, Permata A, Marianda AI, Fisioterapi PSD, Abdurrab U (2021). *Jurnal Ilmiah Fisioterapi (JIF)* Volume 4 Nomor 02 Agustus 2021 Studi Kasus Pengaruh Terapi Latihan Terhadap Pengurangan Jarak Intra Recti Pada Kondisi Diastasis Recti. 4: 41–44.
- Tuttle LJ, Fasching J, Keller A, Patel M, Saville C, Schlaff R, Walker A, Mason M, Gombatto SP (2018). Noninvasive Treatment of Postpartum Diastasis Recti Abdominis: A Pilot Study. *JWHPT*. 42(2): 65-75. doi: 10.1097/-JWH.000000000000101
- Walton LM, Costa A, LaVanture D, McIlrath S and Stebbins B (2016). The effects of a 6 week dynamic core stability plank exercise program compared to a traditional supine core stability strengthening program on diastasis recti abdominis closure, pain, oswestry disability index (ODI) and pelvic floor disability index scores (PFDI). *Phys Ther Rehabil*. 3: 3. doi: 10.7243/2055-2386-3-3.
- Wowiling PE, Sengkey LS, Lolombulan JH (2016). Pengaruh latihan core-strengthening terhadap stabilitas trunkus dan keseimbangan pasien pasca stroke (Effect of core-strengthening exercise on trunk stability and balance in post-stroke patients). *JBM*. 8(1). doi: 10.35790/-jbm.8.1.2016.12334.
- Yalfani A, Bigdeli N, Gandomi F (2020). The Effect of Isometric-Isotonic Exercises of Core Stability in Women with Postpartum Diastasis Recti and Its Secondary Disorders (Randomized Controlled Clinical Trial). *J. Health Care Mark*. 22(2): 132–137.
- Yalfani A (2021). The effects of Suspension (TRX) versus core stabilization training on postural stability, lumbopelvic control and proprioception in women with DiastasisRecti Abdominis: A Randomized Controlled Trial. *Res. Square*. 1–21.