



## REVIEW ARTICLE

### RECTUS DIASTASIS DEVELOPMENT IN RESPONSE TO THE MODE OF DELIVERY: A PROSPECTIVE STUDY

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#### ABSTRACT

**Background:** Multiple physiological changes happen in the body during pregnancy resulting in musculoskeletal problems. Separation of the abdominal muscles which is called diastasis of rectus abdominis (DRA) is one of the common occurrences during pregnancy and after child birth. Growing uterus increases the abdominal pressure which may lead to the rectus abdominis muscles separation along linea alba. **Purpose:** The purpose of this study was to determine the impact of the delivery mode either normal delivery or cesarean section on abdominal rectus diastasis. **Materials and methods:** 284 pregnant women were enrolled in this study, ranged in age from 25 – 35 years with body mass index (BMI) between 25 – 29.9 kg/m<sup>2</sup> and they were assigned randomly into two groups of equal number (A and B). Group (A) consisted of 142 pregnant women who delivered after normal delivery while group (B) consisted of 142 pregnant women who delivered after cesarean. Both groups were assessed regarding the strength of abdominal rectus muscles in terms of diastasis. The participated women in this study were assessed by Waist circumferences, Digital caliper, and Oswestry disability index (ODI). They were evaluated after 6 weeks postnatal and again after another 6 weeks of the 1st assessment i.e. 12 weeks from the delivery. **Results:** The obtained results revealed significant differences of all measured variables in the two groups. Statistically significant difference was also found of all measured variables when compared between the two groups. There is Significant effect on Rectus Abdominis Muscle. In Cesarean Group more than normal delivery group. **Conclusion:** The impact of the cesarean section was more significant than normal delivery on abdominal rectus diastasis.

#### INTRODUCTION

Hormones like relaxin, progesterone and estrogen together with the displaced organs in the abdominal cavity promote the changes of the connective tissue, which may lead to DRA. It also has a connection to pelvic floor muscle weakness, low back and pelvic region pain (Thabet and Alshehri, 2019). It was proposed that an augmented intra rectus diastasis (IRD) could decrease the abdominal integrity and functional strength, contributing to pelvic instability and back pain. Also, DRA has been associated with pelvic floor dysfunction (Mota *et al.*, 2015). The DRA is not a direct cause of discomfort or pain, but excessive distension may interfere with the abdominal muscles' ability to stabilize the trunk, generating greater predisposition to lumbar pain development (Chiarello *et al.*, 2005).

The DRAM is more prevalent in obese, multiparous women, in cases of fetal macrosomia, flaccid abdominal muscles, multiple pregnancies and polyhydramnios. Women who have greater predisposition to suffer DRAM are those with multiple births, the multiparous and those with narrow pelvis, because during pregnancy, the baby will be located more anteriorly. The dysfunction may extend both above and below the navel, only occur below the navel or even include most of the LA (Rett *et al.*, 2019).

**Subjects, materials and methods:** 284 pregnant women were enrolled in this study; they were recruited from different facilities such as the out-patient clinic of faculty of physical therapy, Cairo University, from out-patient clinics of Al kasr Al-Aini Hospitals, Cairo University and from General Ain-Shams hospital. All women assessed by 1- Tape measurement - 2- Digital caliper - 3- Oswestry disability index (ODI) (Arabic version).

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**Evaluation**

**Tape measurement:** it was used to measure and detect waist and hip circumferences

**Digital caliper:** This digital caliper can be used to measure inside and outside diameter, depth and step with two sets of jaws and a probe. Powered by battery, comes with a pre-installed battery and a spare battery.

**Oswestry disability index (ODI) (Arabic version):** This test is administered questionnaire. For each section of six statements, the total score is 5, if the first statement is marked the score is 0, if the last statement is marked; it is 5 intervening statements are scored according to the rank, If more than one box is marked in each section, take the highest score. If all 10 sections are completed the score is

$$\text{Calculated as Follows: } \frac{\text{Total Score}}{\text{Total possible score}} \times 100.$$

Scoring 0 % to 20% minimum disability, 21 % to 40 % moderate, 41 % to 60 % severe, 61% to 80 % crippling back pain and 80 % to 100 % these patient (women) is bad bound or have and exaggeration of her symptoms

**RESULTS**

The results of the current study were represented in tables (1)

**Table 1. Demographic data of subjects of both groups**

Demographic data	Group (A) Mean ±SD	Group (B) Mean ±SD	t-value	p-value
Age (years)	29±3.1	29.4±2.9	-0.966	0.335
Waist circumference (cm)	103.9±12	101.4±11.3	1.84	0.066
BMI (kg/m <sup>2</sup> )	28.4±1.2	28.1±1.3	1.83	0.068

**Table 2. Data is expressed as mean ± standard deviation**

Variables	Group (A)	Group (B)	χ <sup>2</sup> -value	p-value
Occupation				
Don't work	103 (72.5%)	118 (83%)	9.41	0.308
Housekeeper	8 (5.6%)	7 (4.9%)		
Administrative works	8 (5.6%)	8 (5.6%)		
Baby sitter	2 (1.4)	2 (1.4%)		
Worker	5 (3.5%)	1 (0.7%)		
Nurse	3 (2.1)	1 (0.7%)		
Teacher	10 (7%)	5 (3.5%)		
Cleaner	2 (1.4%)	0		
Student	1 (0.7%)	0		
Number of pregnancy				
1	29 (20.5%)	35 (24.6%)	4.84	0.184
2	64 (45%)	46 (32.4%)		
3	48 (33.8%)	60 (42.3%)		
4	1 (0.7)	1 (0.7%)		

χ<sup>2</sup>: Chi squared value. P-value: Probability value

**DISCUSSION**

There was statistical significant difference in the mean values of rectus diastasis after 6 and 12 weeks postnatal between both groups (A and B). In the study of Luna *et al.* (2012) numerically greater diastase is were presented in umbilical and infra umbilical levels.

The supra-umbilical DRA is the most significant and most frequent during pregnancy, due to stretching of the abdominal muscles, which is necessary to allow uterine growth, therefore, occurring the separation of the beams of the abdominis rectus muscles (Borges and Valentin, 2012).

**Table 3. Mean ±SD of rectus diastasis after 6 and 12 weeks postnatal of both groups**

Measured variables	Group (A) Mean ±SD	Group (B) Mean ±SD	P-value (between groups)
Rectus diastasis (mm)			
After 6 weeks postnatal	39.67± 1.87	47.3 ± 2.15	0.001
After 12 weeks postnatal	31.3 ± 2.22	42.9 ± 1.93	0.001
% of change	-21.1%	-9.3%	
P-value (paired test)	0.001	0.001	

It is believed that women with DRA have a greater number of pregnancies and deliveries. However the DRA above the umbilicus has similar prevalence in primiparae and multiparae. This may be due to abdominal muscle weakness resulting from the last pregnancy (Spitznagle *et al.*, 2017). In previous studies, the criteria used to measure the DRA were subjective. Physiotherapists need a reliable tool to give reliability to the measurement of such measures in their clinical practice and verify the reduction in DRA objectively (Demartini *et al.*, 2016). In this study, waist circumferences, Digital caliper, Peritron manometer, ODI and PFDI Questionnaire - Short Form 20 were originally employed for this purpose and calipers are used most often used to measure the IRD. Though ultrasonography is highly sensitive to changes in IRD, and is recommended as a valid measurement tool, this could not be used because therapists were not trained in using ultrasonography (Mahalakshmi *et al.*, 2016). However, Mota *et al.*, (2013) showed that palpation of DRA width has sufficient reliability to be used in clinical practice; this study has correlated BMI of the pregnant women and weight of the new born with the DRA and has included primiparous and multiparous women. Further studies could be done by comparing the size of DRA between the primiparous and multiparous women (Pascoal and Dionisio, 2014). The physical therapy assessment and treatment of DRA are critical to the health and biomechanics of the woman's body. It can be considered damaging a DRA above 2.5 cm (Spitznagle *et al.*, 2017) from that value, the abdominal functions as posture, defecation, parturition, trunk movements and lumbar stabilization (Sapsford, 2014). The physical therapy will be favoring the improvement of abdominal muscle tone and trophism, the reduction of diastasis in a shorter period than physiological (Borges and Valentin, 2012).

**Strengths of the current study**

This study based on more than one method of measurement so that give us more reliable and validated results.

**CONCLUSION**

The impact of the cesarean section was more significant than normal delivery on abdominal rectus diastasis

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## REFERENCES

- Thabet A. A. and Alshehri M. A. 2019. "Efficacy of deep core stability exercise program in postpartum women with diastasis recti abdominis: a randomized controlled trial". *J. Musculoskelet. Neuronal. Interact.*; 19 (1): 62 – 68.
- Mota P., Pascoal A. G., Carita A. I. and Bo K., (2018): "Normal width of the inter-recti distance in pregnant and postpartum primiparous women". *Musculoskelet. Sci. Prac.*; 35 (1): 34 – 37.
- Chiarello C. M., Falzone L. A., McCaslin K. E., Patel M. N. and Ulery K. R., (2015): "The effects of an exercise program on diastasis recti abdominis in pregnant women". *J. Women's Heal. Phys. Ther.*; 29 (1): 11 – 16.
- Batista E. M., Conde D. M., Do Amaral W. N. and Martinez E. Z., (2011): "Comparison of pelvic floor muscle strength between women undergoing vaginal delivery, cesarean section, and nulliparae using a perineometer and digital palpation". *Gynecol. Endocrinol.*; 27 (11): 910 – 914.
- Luna D. C., Cavalcanti A. L., Guendler J. A., Brito V. C. and Oliveira B. D., (2012): "Frequency of Abdominal Diastasis in Postpartum women and associated risk factors". *Rev. Bras. Fisioter. Derm-Func.*; 1 (2): 10 – 17.
- Borges F. S. and Valentin C. E., (2012): "Treatment of laxity and diastasis of the rectus abdominis in the postpartum period normal with the use of muscle electrostimulation with medium frequency current – Case study". *Rev. Bras. Fisioter. Derm-Func.*; 1 (1): 343 – 351.
- Spitznagle T. M., Leong F. C. and Van Dillen L. R., (2017): "Prevalence of diastasis recti abdominis in a urogynecological patient population". *Int. Urogynecol. J. Pelvic Floor Dysfunct.*; 18 (3): 321 – 328.
- Demartini E., Deon K. C., Fonseca E. G. and Portela B. S., (2016): "Diastasis of the rectus abdominis muscle prevalence in postpartum". *Rev. Bras. Fisioter. Derm-Func.*; 29 (2): 279 – 286.
- Mahalakshmi V., Sumathi G., Chitra T. V. and Ramamoorthy V., (2016): "Effect of exercise on diastasis recti abdominis among the primiparous women: a quasi-experimental study". *Int. J. Reprod. Contracept. Obstet. Gynecol.*; 5 (12): 4441 – 4446.
- Mota P., Pascoal A. G., Sancho F., Carita A. I. and Bo K., (2013): "Reliability of the inter-rectus distance measured by palpation. Comparison of palpation and ultrasound measurements". *Man. Ther.*; 18 (4): 294 – 298.
- Pascoal A. G. Dionisio S., Cordeiro F. and Mota P., (2014): "Inter-rectus distance in postpartum women can be reduced by isometric contraction of the abdominal muscles: a preliminary case-control study". *Physiotherapy*; 100 (4): 344 – 348.

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