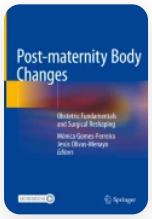
Alterations of the Abdominal Wall During Pregnancy

| Chapter | First Online: 20 October 2023

| pp 355–365 | Cite this chapter



Post-maternity Body Changes

Patrícia Mota

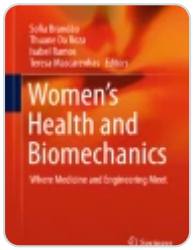
Abstract

Pregnancy and becoming a mother is one of the most exciting times in a women's life. Besides all the hormonal and physiological changes affecting women during this period, probably the most obvious morphological alteration during pregnancy is the increasing weight and dimensions of the uterus, influencing maternal trunk musculoskeletal morphology, particularly the abdominal musculature. Diastasis recti abdominis (DRA), or increased inter rectus distance (IRD), is characterized by the separation of the rectus abdominis muscles. It has its onset during pregnancy and the first weeks following childbirth. The lack of evidence for the consequences of this condition and the effect of

abdominal strengthening exercises in the reduction of DRA indicates a need for identification of prevalence and risk factors of DRA.

This chapter will cover the anatomy and reliability of the methods for the assessment of the morphology of the abdominal wall, describe DRA prevalence, risk factors and provide an overview of the response on the IRD induced by two typical strengthening exercises: the drawing in and abdominal crunch exercises.

Similar content being viewed by others

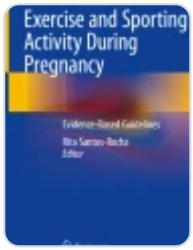


Diastasis Recti During Pregnancy and Postpartum

Chapter | © 2018

Specific Musculoskeletal Adaptations in Pregnancy: Pelvic Floo...

Chapter | © 2022



Specific Musculoskeletal Adaptations in Pregnancy: Pelvic Floo...

Chapter | © 2019

References

1. Ellis H. Gray's anatomy. 37th ed. P. L. Williams, R. Warwick, M. Dyson, L. H. Bannister. 305 × 235mm. pp. 1598. Illustrated. 1989. Edinburgh: Churchill Livingstone. £70.00. Br J Surg. 1989;76:1359.

Article Google Scholar

2. Beer GM, Schuster A, Seifert B, Manestar M, Mihic-Probst D, Weber SA. The normal width of the linea alba in nulliparous women. Clin Anat. 2009;22:706–11.

Article PubMed Google Scholar

3. Axer H, Keyserlingk D, Prescher A. Collagen fibers in linea alba and rectus sheaths. I. General scheme and morphological aspects. J Surg Res. 2001;96:127–34.

Article CAS PubMed Google Scholar

4. Gräβel D, Prescher A, Fitzek S, Keyserlingk DGV, Axer H. Anisotropy of human linea alba: a biomechanical study. J Surg Res. 2005;124:118–25.

Article Google Scholar

5. Hernández-Gascón B, Mena A, Peña E, Pascual G, Bellón J, Calvo B. Understanding the passive mechanical behavior of the human abdominal wall. Ann Biomed Eng. 2012;41:433–44.

Article PubMed Google Scholar

6. Rath A, Attali P, Dumas J, Goldlust D, Zhang J, Chevrel J. The abdominal linea alba: an anatomo-radiologic and biomechanical study. Surg Radiol Anat. 1996;18:281–8.

Article CAS PubMed Google Scholar

7. Lovering RM, Anderson LD. Architecture and fiber type of the pyramidalis muscle. Anat Sci Int. 2008;83:294–7.

Article PubMed PubMed Central Google Scholar

8. Boissonnault J, Blaschak M. Incidence of diastasis recti abdominis during the childbearing year. Phys Ther. 1988;68:1082–6.

Article CAS PubMed Google Scholar

9. Akram J, Matzen S. Rectus abdominis diastasis. J Plast Surg Hand Surg. 2014;48:163–9.

Article PubMed Google Scholar

10. Coldron Y, Stokes MJ, Newham DJ, Cook K. Postpartum characteristics of rectus abdominis on ultrasound imaging. Man Ther. 2008;13:112–21.

Article PubMed Google Scholar

11. Benjamin D, van de Water A, Peiris C. Effects of exercise on diastasis of the rectus abdominis muscle in the antenatal and postnatal periods: a systematic review. Physiotherapy. 2014;100:1–8.

Article CAS PubMed Google Scholar

12. Turatti R, de Moura V, Cabral R, Simionato-Netto D, Sevillano M, Leme P. Sonographic aspects and anatomy of the aponeurosis of transversus abdominis muscle. Arq Bras Cir Dig. 2013;26:184–9.

Article PubMed Google Scholar

13. Mazaki-Tovi S, Vaisbuch E, Tarca AL, Kusanovic J, Than N, Chaiworapongsa T, et al. Characterization of visceral and subcutaneous adipose tissue transcriptome and biological pathways in pregnant and non-pregnant women: evidence for pregnancy-related regional-specific differences in adipose tissue. PLoS One. 2015;10:e0143779.

Article PubMed PubMed Central Google Scholar

14. Farahnik B, Park K, Kroumpouzos G, Murase J. Striae gravidarum: risk factors, prevention, and management. Int J Womens Dermatol. 2016;3:77–85.

Article PubMed PubMed Central Google Scholar

15. Kim J, Lim H, Lee S, Kim Y. Thickness of rectus abdominis muscle and abdominal subcutaneous fat tissue in adult women: correlation with age, pregnancy, laparotomy, and body mass index. Arch Plast Surg. 2012;39:528–33.

Article PubMed PubMed Central Google Scholar

16. Foti T, Davids J, Bagley A. A biomechanical analysis of gait during pregnancy. J Bone Joint Surg Am. 2000;82:625–32.

Article CAS PubMed Google Scholar

17. Cunningham GF, Gant NF, Leveno KJ, Larry C. Williams obstetrics, 21st edition. J Midwifery Women's Health. 2003;48:369.

Article Google Scholar

18. Davies GA, Wolfe LA, Mottola MF, MacKinnon C, Arsenault M-Y, Bartellas E, et al. Exercise in pregnancy and the postpartum period. J Obstet Gynaecol Canada. 2003;25:516–29.

Article Google Scholar

19. Fast A, Weiss L, Ducommun E, Medina E, Butler J. Low-back pain in pregnancy. Abdominal muscles, sit-up performance, and back pain. Spine. 1990;15:28–30.

Article CAS PubMed Google Scholar

20. Gilleard WL, Crosbie J, Richard S. Effect of pregnancy on trunk range of motion when sitting and standing. Acta Obstet Gynecol Scand. 2002;81:1011–20.

Article PubMed Google Scholar

21. da Mota P, Pascoal A, Carita A, Bø K. Prevalence and risk factors of diastasis recti abdominis from late pregnancy to 6 months postpartum, and relationship with lumbo-pelvic pain. Man Ther. 2015;20:200–5.

Article Google Scholar

22. Dumas G, Reid J, Wolfe L, Griffin M, McGrath M. Exercise, posture, and back pain during pregnancy. Clin Biomech. 1995;10:104–9.

Article CAS Google Scholar

23. Parker MA, Millar LA, Dugan SA. Diastasis rectus abdominis and lumbo-pelvic pain and dysfunction-are they related? J Womens Health Phys Ther. 2009;33:15.

Article Google Scholar

24. Theodorsen N-M, Strand L, Bø K. Effect of pelvic floor and transversus abdominis muscle contraction on inter-rectus distance in postpartum women: a cross-sectional experimental study. Physiotherapy. 2018;105:315.

Article PubMed Google Scholar

25. Bursch S. Interrater reliability of diastasis recti abdominis measurement. Phys Ther. 1987;67:1077–9.

Article CAS PubMed Google Scholar

26. Ranney B. Diastasis recti and umbilical hernia causes, recognition and repair. S D J Med. 1990;43:5–8.

CAS PubMed Google Scholar

27. Candido G, Lo T, Janssen P. Risk factors for diastasis of the recti abdominis. J Assoc Charter Physiotherap Womens Health. 2005.

Google Scholar

28. Spitznagle TM, Leong F, Dillen LR. Prevalence of diastasis recti abdominis in a urogynecological patient population. Int Urogynecol J. 2007;18:321–8.

Article Google Scholar

29. Chiarello CM, Falzone LA, McCaslin KE, Patel MN, Ulery KR. The effects of an exercise program on diastasis recti abdominis in pregnant women. J Womens Health Phys Ther. 2005;29:11.

Article Google Scholar

30. Mota P, Pascoal A, Carita A, Bø K. Normal width of the inter-recti distance in pregnant and postpartum primiparous women. Musculoskelet Sci Pract. 2018;35:34–7.

Article PubMed Google Scholar

31. Mota P, Pascoal A, Sancho F, Bø K. Test-retest and intrarater reliability of 2-dimensional ultrasound measurements of distance between rectus abdominis in women. J Orthop Sports Phys Ther. 2012;42:940–6.

Article PubMed Google Scholar

32. Rett M, Braga, Bernardes N, Andrade S. Prevalência de diástase dos músculos retoabdominais no puerpério imediato: comparação entre primíparas e multíparas. Braz J Phys Ther. 2009;13:275–80.

Article Google Scholar

33. Noble E. Essential exercises for the childbearing year: a guide to health and comfort before and after your baby is born. New Life Images. Harwich. 1995.

Google Scholar

34. Mota P, Pascoal A, Sancho F, Carita A, Bø K. Reliability of the inter-rectus distance measured by palpation. Comparison of palpation and ultrasound measurements. Man Ther. 2013;18:294–8.

Article PubMed Google Scholar

35. Teyhen DS, Miltenberger CE, Deiters H, Del Toro Y, Pulliam JN, Childs JD, et al. The use of ultrasound imaging of the abdominal drawing-in maneuver in subjects with low back pain. J Orthop Sports Phys Ther. 2005;35:346–55.

Article PubMed Google Scholar

36. Hsia M, Jones S. Natural resolution of rectus abdominis diastasis. Two single case studies. Aust J Physiother. 2000;46:301–7.

Article PubMed Google Scholar

37. Brækken I, Majida M, Ellstrøm-Engh M, Dietz H, Umek W, Bø K. Test–retest and intra-observer repeatability of two-, three- and four-dimensional perineal ultrasound of pelvic floor muscle anatomy and function. Int Urogynecol J. 2007;19:227–35.

Article Google Scholar

38. Hides JA, Miokovic T, Belavý DL, Stanton WR, Richardson CA. Ultrasound imaging assessment of abdominal muscle function during drawing-in of the abdominal wall: an intrarater reliability study. J Orthop Sports Phys Ther. 2007;37:480–6.

Article PubMed Google Scholar

39. de Mendes D, Nahas F, Veiga D, Mendes F, Figueiras R, Gomes H, et al. Ultrasonography for measuring rectus abdominis muscles diastasis. Acta Cir Bras. 2007;22:182–6.

Article PubMed Google Scholar

40. Whittaker JL, Warner MB, Stokes MJ. Induced transducer orientation during ultrasound imaging: effects on abdominal muscle thickness and bladder position.

Ultrasound Med Biol. 2009;35:1803–11.

Article PubMed Google Scholar

41. Lee D, Hodges PW. Behavior of the linea alba during a curl-up task in diastasis rectus abdominis: an observational study. J Orthop Sports Phys Ther. 2016;46:580–9.

Article PubMed Google Scholar

42. Beamish N, Green N, Nieuwold E, McLean L. Differences in linea alba stiffness and linea alba distortion between women with and without diastasis recti abdominis: the impact of measurement site and task. J Orthop Sports Phys Ther. 2019;49:656–65.

Article PubMed Google Scholar

43. Liaw L-J, Hsu M-J, Liao C-F, Liu M-F, Hsu A-T. The relationships between inter-recti distance measured by ultrasound imaging and abdominal muscle function in postpartum women: a 6-month follow-up study. J Orthop Sports Phys Ther. 2011;41:435–43.

Article PubMed Google Scholar

44. Stokes IA, Gardner-Morse MG, Henry SM. Intra-abdominal pressure and abdominal wall muscular function: spinal unloading mechanism. Clin Biomech (Bristol, Avon). 2010;25:859–66.

Article PubMed Google Scholar

45. Mannion A, Pulkovski N, Toma V, Sprott H. Abdominal muscle size and symmetry at rest and during abdominal hollowing exercises in healthy control subjects. J Anat. 2008;213:173–82.

Article CAS PubMed PubMed Central Google Scholar

46. Richardson CA, Jull G, Hodges P, Hides JA. Therapeutic exercise for spinal segmental stabilization in low back pain: scientific basis and clinical approach. 1999.

Google Scholar

47. Keeler J, Albrecht M, Eberhardt L, Horn L, Donnelly C, Lowe D. Diastasis recti abdominis: a survey of women's health specialists for current physical therapy clinical practice for postpartum women. J Womens Health Phys Ther. 2012;36:131–42.

Article Google Scholar

48. Mota P, Pascoal A, Carita A, Bø K. The immediate effects on inter-rectus distance of abdominal crunch and drawing-in exercises during pregnancy and the postpartum period. J Orthop Sports Phys Ther. 2015;45:781–8.

Article PubMed Google Scholar

Author information

Authors and Affiliations

H&TRC- Health & Technology Research Center, ESTeSL- Escola Superior de Tecnologia da Saúde, Instituto Politécnico de Lisboa, Lisbon, Portugal
Patrícia Mota

Univ Lisboa, Fac. Motricidade Humana, CIPER, LBMF, P-1499-002, Lisbon, Portugal
Patrícia Mota

Corresponding author

Correspondence to Patrícia Mota .

Editor information

Editors and Affiliations

Department Obstetrics and Gynecology, MS Medical Institutes, Lisbon, Portugal

Mónica Gomes-Ferreira

Department Plastic Reconstructive and Aesthetic Surgery, MS Medical Institutes, Lisbon, Portugal

Jesús Olivas-Menayo

Rights and permissions

Copyright information

About this chapter

Cite this chapter

Mota, P. (2023). Alterations of the Abdominal Wall During Pregnancy. In: Gomes-Ferreira, M., Olivas-Menayo, J. (eds) Post-maternity Body Changes. Springer, Cham. https://doi.org/10.1007/978-3-030-43840-1_21

.RIS .ENW .BIB

DOI	Published	Publisher Name
https://doi.org/10.1007/978-3-030-43840-1_21	20 October 2023	Springer, Cham

Print ISBN	Online ISBN	eBook Packages
978-3-030-43839-5	978-3-030-43840-1	Medicine Medicine (R0)

Publish with us