

Systematic review

Effects of exercise on diastasis of the rectus abdominis muscle in the antenatal and postnatal periods: a systematic review[☆]D.R. Benjamin^{a,*}, A.T.M. van de Water^b, C.L. Peiris^{a,b}^a *Physiotherapy Department, Angliss Hospital, Eastern Health, Australia*^b *Department of Physiotherapy, School of Allied Health, La Trobe University, Victoria, Australia*

Abstract

Background Diastasis of the rectus abdominis muscle (DRAM) is common during and after pregnancy, and has been related to lumbopelvic instability and pelvic floor weakness. Women with DRAM are commonly referred to physiotherapists for conservative management, but little is known about the effectiveness of such strategies.

Objectives To determine if non-surgical interventions (such as exercise) prevent or reduce DRAM.

Data sources EMBASE, Medline, CINAHL, PUBMED, AMED and PEDro were searched.

Study selection/eligibility Studies of all designs that included any non-surgical interventions to manage DRAM during the ante- and postnatal periods were included.

Study appraisal and synthesis methods Methodological quality was assessed using a modified Downs and Black checklist. Meta-analysis was performed using a fixed effects model to calculate risk ratios (RR) and 95% confidence intervals (CI) where appropriate.

Results Eight studies totalling 336 women during the ante- and/or postnatal period were included. The study design ranged from case study to randomised controlled trial. All interventions included some form of exercise, mainly targeted abdominal/core strengthening. The available evidence showed that exercise during the antenatal period reduced the presence of DRAM by 35% (RR 0.65, 95% CI 0.46 to 0.92), and suggested that DRAM width may be reduced by exercising during the ante- and postnatal periods.

Limitations The papers reviewed were of poor quality as there is very little high-quality literature on the subject.

Conclusion and implications Based on the available evidence and quality of this evidence, non-specific exercise may or may not help to prevent or reduce DRAM during the ante- and postnatal periods.

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Keywords: Diastasis recti and weakness of the linea alba; Exercise; Abdominal muscles; Pregnant women; Postnatal care

Introduction

During and after pregnancy, many women experience an increase in the inter-recti abdominal muscle distance due to stretching and thinning of the linea alba [1]. A widening of >2.7 cm at the level of the umbilicus is considered a pathological diastasis of the rectus abdominis muscle (DRAM) [2]. Other studies have defined DRAM as an inter-recti distance of >2 cm at one or more assessment points (at the

level of the umbilicus or 4.5 cm above or below the umbilicus) [3,4]. DRAM occurs due to hormonal elastic changes of the connective tissue, mechanical stresses placed on the abdominal wall by the growing fetus, and displacement of the abdominal organs [4–7]. DRAM usually appears in the second trimester of pregnancy and is found most frequently in the third trimester [6]. Studies have demonstrated that the inter-recti distance increases at approximately 14 weeks of gestation and continues to increase until delivery [7]. Natural resolution and greatest recovery of DRAM occurs between 1 day and 8 weeks after delivery, after which time recovery plateaus [8].

DRAM is relatively common and can have negative health consequences for women during and after pregnancy (ante- and postnatal periods). Varying estimates of incidence of

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DRAM have been reported ranging from 66% to 100% during the third trimester of pregnancy [6,9], and up to 53% immediately after delivery [10]. The abdominal wall has important functions in posture, trunk and pelvic stability, respiration, trunk movement and support of the abdominal viscera. An increase in the inter-recti distance puts these functions in jeopardy [11–13], and can weaken abdominal muscles and influence their functions [14,15]. This may result in altered trunk mechanics, impaired pelvic stability and changed posture, which leave the lumbar spine and pelvis more vulnerable to injury [4,7,13].

Despite DRAM being a common and significant clinical problem, little is known about its prevention or management. Risk factors such as multiparity, maternal age and childcare responsibilities have been associated with DRAM. There is conflicting evidence linking DRAM with weight gain and higher body mass index [4,10,16]. Surgical correction of DRAM has been demonstrated to reduce some of the effects of a wide diastasis such as back pain [17]. Anecdotally, regular exercise prior to pregnancy and during the antenatal period seems to reduce the risk of developing DRAM and reduce the size of DRAM, respectively [6]. Abdominal exercises are also frequently prescribed to postnatal women who have DRAM. Other regularly used non-surgical interventions in women with DRAM include postural and back care education, external support (e.g. tubigrip or corset) and aerobic exercises [18–21]. However, it is unclear what types of non-surgical interventions, including exercise, are effective to prevent and/or reduce DRAM.

Therefore, the aims of this review were to determine whether non-surgical interventions can prevent or reduce DRAM in the antenatal period, and reduce DRAM and health-related negative effects of DRAM in the postnatal period.

Methods

This systematic review was registered in the PROSPERO database (CRD42012002944).

Data sources

A search strategy was developed to search the electronic databases of Medline, EMBASE, CINAHL, PEDro, PubMed and AMED to look for published studies involving non-surgical interventions to prevent and/or reduce DRAM during the ante- and postnatal periods (Appendix A, see online supplementary material). These electronic databases were searched from the earliest date available to 31 July 2012. Manual searching of the reference lists of included studies and citation tracking were conducted to ensure that all relevant studies were found. No study design or language restrictions were applied.

Study selection

Two reviewers (DB and CP) applied the inclusion criteria independently (Table A, see online supplementary material) to the titles and abstracts of all studies retrieved. Reviews, editorials, opinions and theses were excluded. Full-text articles were retrieved and reviewed by re-application of the criteria for potentially eligible studies. Any disagreements were resolved by discussion between the two reviewers. If consensus could not be reached, a third reviewer was consulted.

Data extraction

A data extraction form was developed *a priori* based on the Cochrane Consumers and Communication Review Group data extraction template [22], which was revised to suit this review. The form was pilot tested on a selection of studies and subsequently refined. One reviewer (DB) extracted the data, and a second reviewer (CP) checked the accuracy of the data extracted. Where there were discrepancies, the reviewers referred back to the original study. Where there were missing data, attempts were made to contact the authors of the trial for clarification. Data were extracted from each study on participant characteristics (age, parity, mode of delivery), intervention (type, duration, frequency, delivery, setting), outcomes (primary and secondary, method and timing of assessment), results and adverse events.

Outcomes

The primary outcomes of interest were the presence/absence of DRAM and DRAM width (cm). Secondary outcomes were back pain, abdominal strength, ability to complete activities of daily living and quality of life. Ultrasound may be considered the gold standard for clinical measurement of DRAM width with a low standard error of measurement (SEM) of 0.05 to 0.20 cm [3,15]. Other methods such as calipers (SEM 0.01 to 0.41 cm) or palpation/finger width have been found to be reliable for the measurement of DRAM, but may be less valid to measure the exact inter-recti distance [3,23].

Quality assessment

All studies were appraised independently by two reviewers (DB and CP) for methodological quality using the modified Downs and Black checklist for randomised and non-randomised studies of healthcare interventions (Appendix B, see online supplementary material) [24–26]. Total scores ranged from 0 to 28 points. Studies were rated as excellent if they scored 26 to 28, good if they scored 20 to 25, fair if they scored 15 to 19, and poor if the total score was 14 or less [26]. Any disagreements were resolved by discussion between the two reviewers, and a third reviewer was consulted if consensus could not be reached. Trials were not excluded on the

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