

The incidence and location of diastasis rectus abdominis during the childbearing year and puerperium at the maternity hospital Ljubljana

Erika Mihelj,¹ Mateja Šerbec Medjimurec,² Darija Ščepanović²

¹ General hospital »Dr. Franca Derganca« Nova Gorica, Šempeter pri Novi Gorici, Slovenia

² Division of Gynaecology, University Medical Centre Ljubljana, Ljubljana, Slovenia

Correspondence:

Darija Ščepanović,
e: darija.scepanovic@kclj.si

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Abstract

Background: The purpose of the research was to determine the prevalence and location of diastasis recti abdominis muscle (DRA) during pregnancy and puerperium in women in the Ljubljana maternity hospital.

Methods: The study sample included sixty randomly selected women; forty-five pregnant and postpartum women were recruited from the Ljubljana Maternity Hospital, and fifteen non-pregnant women from the larger Ljubljana area as a control group. All women were examined for the presence or absence of diastasis recti abdominis muscle along with the most and least likely location along the white lines. The measurements were performed by the finger-width method.

Results: The findings indicate that the diastasis recti abdominis muscle increases with the progression of pregnancy. In the case of non-pregnant women, the diastasis is not present. The presence of DRA was first observed in the second trimester of pregnancy (9.5 %) and was most common in the third trimester (52.4 %). After birth, the incidence decreased (38.1 %). The majority of diastasis recti abdominis cases were observed in the umbilical area (52.6 %) in the third trimester. In the puerperium group three days after childbirth the diastasis below the umbilicus was most common (60.0 %) and slightly less common above the umbilicus (53.8 %).

Conclusion: Diastasis recti abdominis muscle during pregnancy and after childbirth is a common condition. It is therefore recommended that all women should be timely examined for the presence of DRA before and after birth along the linea alba to start timely and adequate physiotherapy treatment. Health professionals as well as sports teachers and coaches who work with pregnant and puerperium women should be educated/trained in the field of testing and treatment of diastasis recti abdominis muscle.

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1. Introduction

Anaemia caused by lack of iron is the only anaemia that affects the wealthy and the poor alike. In the developed world it is more common in women of childbearing age with heavy menstrual bleeding (1). Its prevalence is higher in individuals taking non-steroid antirheumatic drugs and proton pump inhibitors, in the latter most probably because of ulcer disease and decreased gastric juice acidity (2). Inadequate nutrition only rarely causes iron-deficiency anaemia (IDA) in the developed world. However, it may occur in individuals following weird diets (1). The causes of IDA can be most bizarre: e.g. this form of anaemia is encountered in people with Munchausen syndrome (3). In the third-world countries, it affects mostly children, adolescents and pregnant women as a result of inadequate nutrition and parasitic infections (1). In men and menopausal women diagnosed with IDA, the first step should be ruling out gastrointestinal cancer (4). Treating IDA patients with iron supplements is only a symptomatic measure. It is of key importance to discover and eliminate the cause of the disease. The paper reviews the results obtained over a two-year period for patients referred to the outpatient clinic of the Department of Haematology with the diagnosis of IDA and patients diagnosed with IDA on the basis of history, clinical and laboratory findings. The paper focuses on the recognition of IDA, identification of its causes, oral and intravenous iron supplementation and management of patients who fail to respond adequately to iron supplementation.

2. Material and Methods

2.1. Participants

The study was approved by the national Medical Ethics Committee and included 60 randomly selected women, 45 women (30 pregnant and 15 postpartum) from the Ljubljana Maternity Hospital and 15 non-pregnant women from the larger Ljubljana area. They were assigned to four groups of 15 women each: never-pregnant women, women in the second trimester of pregnancy, women in the third trimester of pregnancy and puerperal women three days after childbirth. The age of the women studied was 18 to 35 years. The study involved primiparous women with the foetus in a longitudinal lie who delivered vaginally between 37 and 42 weeks of gestation. Women with abnormal innervation of the chest or abdomen, or with muscle or skeletal anomalies of the chest or abdomen were excluded from the study. Another exclusion criterion was physical activity, i.e. performance of abdominal muscle strengthening exercises, during pregnancy.

2.2. Measurement method and tools

Before the measurement, the women were given detailed instructions for completing a questionnaire which was used for determining inclusion and exclusion criteria and assigning the participants to the right groups. The DRA measurements using the finger-width method were carried out by a single rater. This measurement technique shows good reliability if performed by one rater ($K_w > 0.70$) and moderate reliability if conducted by several investigators ($K_w = 0.53$) (15). The measurement is done with the participant lying on a bed



Figure 1: Measurement of diastasis recti abdominis by the finger-width technique

or pillow and bending the trunk to the lower shoulder blades (Figure 1) (3). The diastasis is measured by palpating three points: at the umbilical level, 4.5 cm above the umbilicus and 4.5 cm below the umbilicus (3). DRA was considered present when the separation of the two muscles exceeded two finger widths (5).

2.3. Statistical methods

Using the quota sampling method the groups were matched for the following significant factors : age of the pregnant woman, healthy pregnancy, first pregnancy, one foetus in the longitudinal lie and vaginal delivery at full term. Thereby a well-balanced sample was obtained comprising three groups, i.e. two groups of pregnant women, one group of puerperal women, and a control group for further comparison. The data were collected by a questionnaire completed by the participant women. The data on the prevalence and location of DRA were analysed using the chi-square test. Analysis of variance with a multiple comparison test was performed (Tukey's post-hoc and Dunnett's tests). Dunnett's test is appropriate for post-hoc comparison of the study group with the control group.

The study was approved by the national Medical Ethics Committee on 22 January 1999 (no.75/01/99).

3. Results

Figure 2 shows initial increase in the DRA prevalence in the study sample, followed by a drop in the puerperal group recorded immediately after childbirth. DRA rate peaked in the group of pregnant women in the third trimester of pregnancy (52.4 %) and slightly decreased in the postpartum women three days after childbirth (38.1%). DRA was found in 9.5 % of the participants in the the second trimester of pregnancy. In the group of never-pregnant women (control group) DRA was not present (Figure 2). The figure sums up 100 % presence (21 women) and absence of DRA (39 women) during different study periods, and indicates the prevalence rate of DRA at different stages of pregnancy and puerperium. Statistically significant differences were found between the women with DRA and the group without DRA. ($\chi^2 = 23.077$; $p < 0.001$). The P value is statistically significant at a risk level of 0.05.

The second part of the study focuses on the participants with DRA : a detailed analysis thus included 21 women. Figure 3 shows that the location with the highest prevalence of DRA was in the umbilical area in pregnant women in the third trimester (52.6 %) and above the umbilicus in the puerperium group three days after childbirth (53.8). The

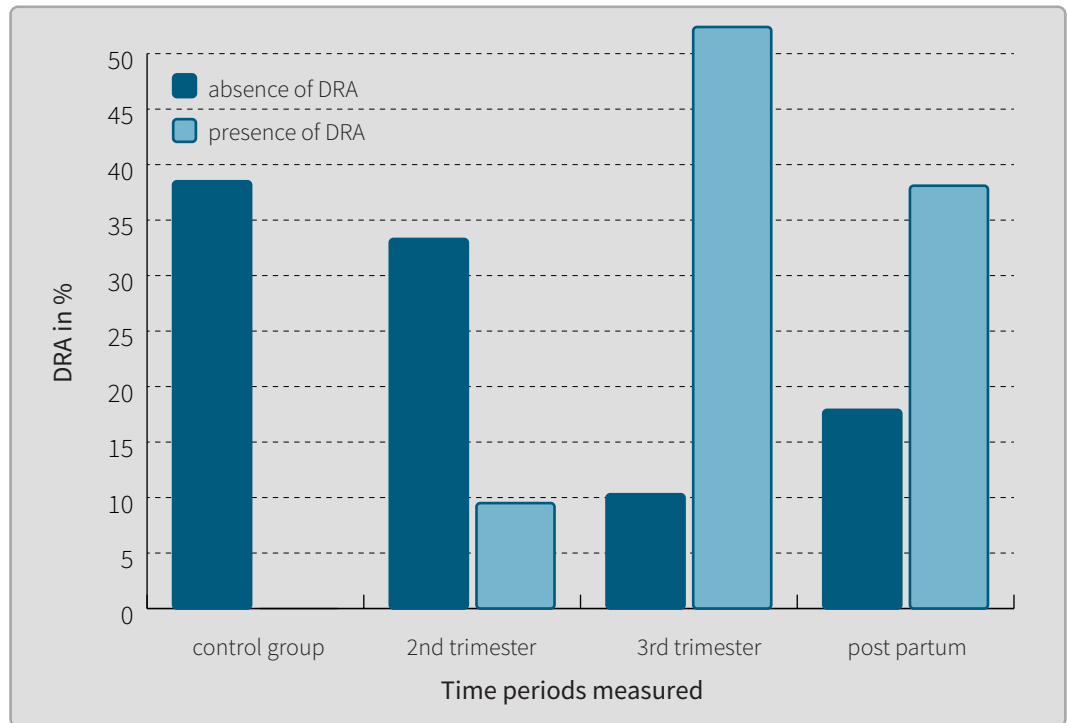


Figure 2: Prevalence of DRA during various periods of pregnancy and the postpartum period

latter group had the highest prevalence of diastasis below the umbilicus (60 %) (Figure 3). Differences in the location of diastasis observed between the three study groups were not statistically significant ($\chi^2 = 1.661$; $p = 0.798$). Figure 3 indicates that in pregnant women diastasis below the umbilicus occurred in the third month of pregnancy, and was invariably associated with a separation located above the umbilicus or at the umbilical level.

The variance analysis revealed statistically significant differences between the groups as concerns the prevalence of DRA ($F = 11.667$; $p < 0.000$). The Dunnett's test was used to compare means of individual test groups against the control group mean: it showed that controls differed significantly both from women in the third trimester of pregnancy ($p < 0.000$) as well as from puerperal women after childbirth ($p = 0.001$).

4. Discussion

The results of the study show a statistically significant positive correlation between the duration of pregnancy and the prevalence of DRA. DRA rate was found to drop after childbirth.

In the literature there is no yet universal agreement about the definition of DRA. Variance in DRA prevalence rates between studies can be explained by the use of different borderline values employed to determine the presence of diastasis (1-5,7) as well as different points of measurement along the linea alba (7,8,15). There are differences in the degree of abdominal muscle activation during measurements and differences in the parity status of the women tested i.e. non-pregnant, primiparous, multiparous and puerperal. Also, various techniques and tools are available for DRA measurements (8,10,15,16,18-21). These factors that may impact the results of measurements make it difficult to com-

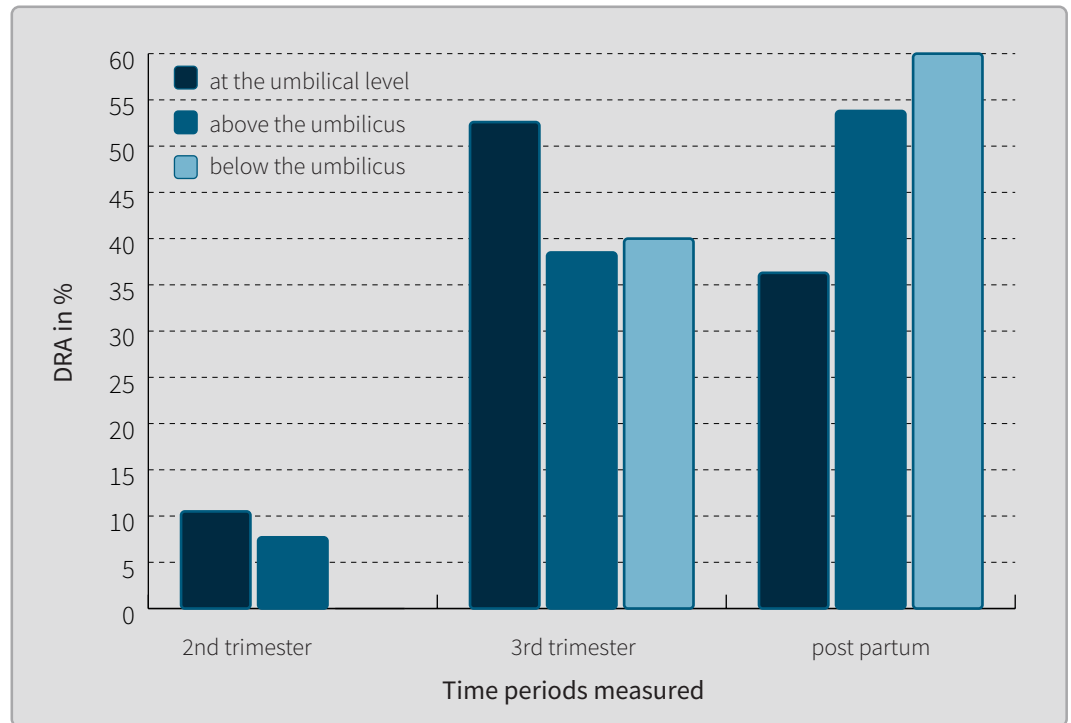


Figure 3: DRA location during various periods of pregnancy and post partum

pare the data from the available studies. According to Noble's criteria, which were used in this study, diastasis of the rectis abdominis muscles is defined as a separation along the linea alba exceeding two cm or two finger widths (5). DRA was assessed by palpation at the following three points: umbilical level, 4.5 cm below the umbilicus and 4.5 cm above it (3). In extant literature we have identified three studies investigating the prevalence of DRA during pregnancy and after childbirth. (3,9,22). Our results are comparable to the data on DRA prevalence reported by Boissonnault and Blaschak (3), who used the same measurement technique (finger-width assessment) and the same location. They found the prevalence rate to be 27 % in the second trimester and 66 % in the third trimester. Similarly, Sperstad et al., who used the same measurement technique, the same values and palpation at the same locations, reported a 33.1 % prevalence of diastasis at gestational week

21. In their study, Mota et al. (9) used ultrasound images to measure DRA two cm below the umbilicus in primiparous women and found the prevalence of diastasis in late pregnancy to be as high as 100 %. In our study, the prevalence of DRA measured a few days after childbirth was lower (38.1 %) than in the investigation by (53 %) (3). Bursch (7), who tested puerperal women less than four days post birth found a higher i.e. 62.5 % prevalence of DRA measuring more than two finger widths (7). Although the differences were not statistically significant, in our study at the umbilical level was the most common location of diastasis in the third trimester of pregnancy. The majority of diastases documented three days after delivery were located above the umbilicus. The location above the umbilicus was slightly less common. Our data on the DRA location are comparable to those reported by Boissonnault and Blaschak. Measuring DRA by the finger-width method proved

reliable if performed by a single rater, like in our study. For tests done by different raters only a moderate reliability was established (15). In clinical practice, measurement by the finger-width method is the most widely used technique because it is inexpensive, simple and requires no special equipment (7,15). Diastasis can be assessed with dial calipers, a reliable instrument for measuring diastasis above the umbilicus and at the umbilical level (16,17). Ultrasound imaging is the most reliable method for measuring DRA (8,10,12,15,17-21). One disadvantage of the method is that it is expensive and therefore not universally available in physiotherapy clinics. In addition, special training is required in order to achieve reliable measurements.

Because of the small sample size the validity of the results is very limited, yet the data obtained provide information on the dynamics of DRA prevalence during pregnancy and after childbirth. Because of the study design used – measurements were not carried out in the same woman at various stages of pregnancy and postpartum period – we can only speculate on the rate of diastasis in this population.

Further longitudinal investigations will be required to elucidate the development and dynamics of abnormal inter-rectus distance during pregnancy and postpartum period. The results obtained may serve as the basis for future guidelines aimed at preventing diastasis in this population.

It is of key importance to gain good knowledge of the associated risk factors, which are currently only a matter of speculation. There is a lack of evidence on the effectiveness of physiotherapy in improving an existing diastasis. In order to reduce the prevalence of DRA and prevent the progression and late consequences of DRA, it is necessary to

employ appropriate intervention measures (23-31).

A woman with DRA should begin with trunk stabilisation exercises followed by exercises for strengthening and toning the rectus abdominis and trunk rotators. Exercises aim at achieving hypertrophy and shortening of the muscle. According to existent literature, exercises that help activate the transverse abdominal muscle are more effective in the treatment of diastasis than exercises targeted at rectus abdominis activation. (31). Activation of transversus abdominis stabilises the linea alba, while activation of rectus abdominis, on the contrary, results in laxity of the linea alba. A flaccid and instable linea alba cannot prevent diastasis from getting worse as a result of the increase in intra-abdominal pressure.

5. Conclusion

DRA is a frequent occurrence during pregnancy and puerperal period. It is experienced by every second pregnant woman in late pregnancy and by every fourth puerperal woman. There is a need for further studies on larger samples, which would use the same measurement sites as well as uniform values for the assessment of presence/absence of diastasis. In addition, investigations to identify risk factors for DRA are warranted, as well as studies determining the effectiveness of physiotherapy programmes in reducing diastasis recti.

All health providers and sports teachers who work with pregnant and puerperal women need to be aware of the fact that DRA affects a large proportion of this population. They must be trained to conduct testing of diastasis recti abdominis, and to determine which women should have further physiotherapeutic management. It is equally important that

women are well informed about the occurrence and management of DRA.

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