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Pallabi Nandi

Lecturer, JSS College of
Physiotherapy, Mysuru,
Karnataka, India

Minnu Alphons Santy

Department of Physiotherapy,
JSS Hospital, Mysuru,
Karnataka, India

Corresponding Author:

Pallabi Nandi

Lecturer, JSS College of
Physiotherapy, Mysuru,
Karnataka, India

Impact of rectus abdominis training on pelvic floor strength in post-partum women

Pallabi Nandi and Minnu Alphons Santy

Abstract

Diastasis recti occur most commonly during pregnancy and post pregnancy and the incidence reported is 36% post natally (up to 12 months). Presence of diastasis recti lead to weak pelvic floor muscles leading to multiple health issues. Therefore the aim of the study is to know the impact of rectus abdominis training on pelvic floor muscle strength in post-partum women.

Methodology: 39 participants fulfilling the inclusion criteria were included in the study. Abdominal ultrasound was the outcome measure used to measure the inter recti distance, thickness and width of rectus abdominis and thickness of Levator ani.

Result: Independent sample t test was performed to compare the mean differences between the post intervention values between the experimental group and control group using the SPSS software version 22 (SPSS, USA). Inter recti distance at supra umbilical level and levator ani strength was found to be significant.

Conclusion: The study concludes that the time frame of training program should be increased and specific exercises meant for improving the thickness and strength of rectus abdominis should be advised.

Keywords: diastasis recti, rectus abdominis pelvic floor strength, ultrasound

1. Introduction

Diastasis recti abdominis (DRA) is defined as a separation of the rectus abdominis along the midline of linea alba^[1]. The prevalence of DRA has been reported to be 60% at six weeks and 32.5% at 12 months postpartum^[2]. Although the prevalence of DRA is high, the exact etiology and pathogenesis of the condition is unknown^[3] and there is no accord whether age, delivery mode and parity are risk factors for DRA^[4-7]. Some studies explained diastasis recti abdominis (DRA) as the expansion of the uterus to accommodate the growing fetus^[8]. The expanding uterus causes the rectus abdominis muscles to elongate while altering their angle of attachment, which in conjunction with hormonal elastic changes of connective tissue^[3], leads to the stretching of the linea alba (LA) resulting in an increased inter recti distance (IRD), displacement of the abdominal organs, and a bulging of the abdominal wall. In addition to this, other suggested consequences are impaired abdominal strength, low back pain and pelvic girdle pain and pelvic floor disorders^[9-10].

Pelvic floor dysfunction is one of most common issue affecting women of all ages. A survey conducted by Nygaard *et al.* at the National Health and Nutrition Examination Survey (NHNES) of United States for the year 2005-2006 and 2005-2010 reported that the prevalence of at least one pelvic floor dysfunction in women to be 23.7% with 15.7% of the women experiencing urinary incontinence, 9% having fecal incontinence and 2.9% of the women having pelvic organ prolapse^[11]. In a study conducted in India, at Udupi district, the prevalence of pelvic floor dysfunction among women was found to be 21%^[12].

There exist an association between diastasis recti and weak pelvic floor muscles which says that imbalance between strength and length of the abdominal muscles give rise to altered fascial tension, which may be associated with altered movement patterns resulting in pain and pelvic dysfunction. The work of pelvic floor muscles is to brace the pelvic organs with activities like sneezing, coughing, lifting during when the intra-abdominal pressure increases, and the pelvic floor muscles are no longer in a state to support the pelvic organs. This leads to pelvic floor dysfunction and therefore leads to various degrees of organ prolapse.

A weak abdominal muscle leads to various musculoskeletal issues like pain and dysfunction. Identifying the abdominal strength to eliminate pain and dysfunction through a valid tool is an important component of rehabilitation. Determining strength prior to any strengthening program helps in formulating a structured treatment plan. Recti muscle diastasis is usually identified clinically, or even by patient auto-evaluation through oxford classification. However, clinical assessment can be difficult when the subcutaneous layer is particularly thick. So, accurate and objective measurement of the separation is mandatory to plan the appropriate treatment. Ultrasound is commonly used tool in the assessment of the anterior abdominal wall dysfunctions. Ultrasound is a non-invasive and valid tool used in medicine today. Ultrasound is the first modality of choice in the initial assessment of recti muscle diastasis^[13].

The relationship between the abdominal and pelvic musculature has been established in literature but the effect of training of abdominal muscles with diastasis recti on pelvic floor muscle strength is not clear. Therefore the aim of the study is to know the impact of rectus abdominis training on pelvic floor muscle strength in post-partum women.

2. Material and Method

2.1 Trial design

The study is 2 armed RCT in which the aim was to evaluate effect of rectus abdominis training on pelvic floor strength and to find out effect of rectus abdominis training on diastasis recti. The study was conducted in J.S.S hospital, Mysore, from March 2020 to August 2021. The present study evaluated the effect of 12 weeks postpartum exercise program on the rectus abdominis and pelvic floor muscle strength after the cessation of physiotherapy intervention.

2.2 Participants

Participants were recruited from OBG ward, J.S.S hospital conjunction with the routine medical visit for follow up after delivery. Women aged between 20-40 years with or without pelvic floor dysfunction were included in the study and women presenting with any acute illness, preexisting neurological disorders, Women who underwent any pelvic or abdominal surgeries other than LSCS, 3rd degree prolapse and those who were not willing to participate were excluded from the study. By signing informed consent forms, all the participants agreed to take part in the study and to be included in the publication of the result.

2.3 Randomization

The participants were randomized in blocks of four and each block consisting of ten participants and these participants were assigned to experimental and a control group. The randomization sequence was done by computer generated method. The junior research fellow was blinded to the group randomization. The principle investigator acknowledged the treatment protocol and applied it to all participants. At 12 week follow up two participants did not turn up due to health issues.

2.4 The postpartum training program

The institutional ethical committee of JSS Medical College had approved the study on 31/10/19. Thirty eight women fulfilling the inclusion criteria was randomized into two groups-Experimental Groups A and Control Group B using block randomization. At baseline, for both groups inter rectus

distance in diastasis recti was measured through abdominal ultrasound at supra umbical, umbical and infra umbical level. Thickness of recti abdominis was measured at supra umbical, umbical and infra umbical level and thickness of levator ani was measured by using Ultrasonography. Following the ultrasonic measurements the grade of abdominal muscle was also assessed and recorded. Both groups underwent a training program of 12 weeks. And after 12 weeks the inter recti distance, thickness of recti abdominis and thickness of levator ani was measured using ultrasound to note the difference. Experimental group A was trained with deep core stability-strengthening program which involved the use of abdominal bracing, diaphragmatic breathing, pelvic floor contraction, plank, and isometric abdominal contraction as well as the traditional abdominal exercise program exercise. Experimental group A was supervised for three days for one week. All exercise were advised as per current guidelines to reduce the inter recti distance, strengthened abdominal muscles and pelvic floor muscles. The participants in group A underwent the training programme for 3 times a week for a total duration of 12 weeks. The participants in group A were asked to perform three sets of 20 repetitions for each exercise, holding a contraction for 5 seconds, followed by 10 seconds of relaxation for each repetition. The participants were advised to maintain an exercise log book for 12 weeks. The participants were instructed to follow up with the physiotherapist at 6 weeks of intervention to assess the grade of abdominal muscle. The participants were also advised to repeat the same exercise program daily as a home routine program^[14]. Every week a telephonic conversation was made to ensure the regularity with exercise protocol. The participants in Group B were taught pelvic floor contraction for 3 times a week for 12 weeks. All the participants in this group were asked to perform three sets of 20 repetitions for each exercise, holding a contraction for 5 seconds, followed by 10 seconds of relaxation, for each repetition. The same daily exercise program was suggested to all the participants as a home routine program. All participants were followed up after 12 weeks to repeat the outcome measures and to ascertain the effect of exercise on pelvic floor musculature.

2.5 Outcome Measures

Ultrasonography

3. Results

The data were normally distributed as assessed by the Shapiro Wilk's test. Hence independent sample t test was performed to compare the mean differences between the post intervention values between the experimental group and control group using the SPSS software version 22 (SPSS, USA). Table 1 shows the distribution of participants into groups with number of normal vaginal delivery (NVD), lower segment cesarean section (LSCS) and episiotomy in each group. Table 2 shows the mean and standard deviation between pre and post intervention in between groups. According to the results, there was decrease in the inter-recti distance at supra umbical level in between groups. Furthermore the strength of levator ani muscle in between the groups was significant. The results revealed that there was a non-significant difference in the Inter-recti separation at umbical and infra umbical level, the result also revealed no significant difference in thickness and width of rectus abdominis in between groups.

Table 1: Demographic characteristics of participants

Characteristic	Control group	Experimental group	Overall
Mean age±SD	24.89±3.37	26.58±4.43	25.71±3.37
Normal vaginal delivery (n)	5	2	7
Lower segment cesarean section(n)	14	17	31
Episiotomy (n)	5	2	7

SD: Standard deviation; n: Number of participants

Table 2: Comparison of measurements (post intervention) between the control group and experimental group

Variable	Side	Mean ± SD		Mean difference (95% CI)	p value	
		Control	Experimental			
Inter-recti distance	Supra umbilical	4.22±0.34	3.85±0.82	0.36 (-0.05,0.78)	0.038	
	Umbilical	4.74 ±0.66	4.2±0.94	0.54 (0,1.07)	0.58	
	Infra umbilical	4.17±0.54	3.80±0.97	0.37 (-0.15,0.88)	0.155	
Rectus abdominis thickness	Supra umbilical	Right	1.94±1.01	2.19±1.03	-0.25 (-0.92,0.42)	0.452
		Left	1.73±0.81	1.98±0.84	-0.24 (-0.79, 2.99)	0.365
	Umbilical	Right	1.81±0.62	2.08±0.63	-0.26 (-0.67, 015)	0.205
		Left	1.38±0.64	1.74±0.71	-0.35 (-0.80, 0.09)	0.114
	Infra umbilical	Right	1.97±0.54	2.12±0.59	-0.15 (-0.52, 0.22)	0.413
		Left	1.73±0.58	2.01±0.60	-0.27 (-0.66, 0.11)	0.167
Rectus Abdominis width	Supra umbilical	Right	1.94±1.01	2.19±1.03	-0.25 (-0.92,0.42)	0.452
		Left	1.73±0.81	1.98±0.84	-0.24 (-0.79, 2.99)	0.365
	Umbilical	Right	1.81±0.62	2.08±0.63	-0.26 (-0.67, 015)	0.205
		Left	1.38±0.64	1.74±0.71	-0.35 (-0.80, 0.09)	0.114
	Infra umbilical	Right	1.97±0.54	2.12±0.59	-0.15 (-0.52, 0.22)	0.413
		Left	1.73±0.58	2.01±0.60	-0.27 (-0.66, 0.11)	0.167
Levator ani muscle	Right	1.19±0.10	1.51±0.23	-0.32(-0.46,-1.77)	<0.001	
	Left	1.25±0.11	1.50±0.52	-0.25 (-0.37,-1.3)	<0.001	

SD: Standard deviation; CI: Confidence Interval

4. Discussion

Diastasis rectus abdominis (DRA) is a common problem encountered during postpartum periods, and could leads to any number of health complications. The objective of the study was to know the impact of rectus abdominis training on pelvic floor muscle strength in post-partum women as measured by ultrasound. The results of this study revealed that, there was decrease in the inter-recti distance at supra umbilical level in between groups which was significant. Furthermore the strength of levator ani muscle in between the groups was significant. The results revealed that there was a non-significant difference in the Inter-recti separation at umbilical and infra umbilical level, the result also revealed no significant difference in thickness and width of rectus abdominis in between groups. The adaptive changes in the inter recti distance and strength of levator ani in between groups determined by the exercise can account for the results of the study. Exercises prescribed to experimental group may helped in activating both slow twitch (ST) and fast twitch (FT) fibres of the skeletal muscles, with increased fiber thickness and width, thus there is improvement in levator ani muscle strength.¹⁴ Advising core exercise routine along with abdominal bracing during exercise, could prove effective for treating DRA and useful in reducing the inter recti distance. The results of the study correlate with the other studies which found out the importance of core strengthening exercises for any postpartum patient during the first 6 weeks. In addition, there is evidence of the synergistic action of the abdominal and pelvic floor muscles, suggesting that the pelvic floor muscle is connected to the abdominal muscle activity which is a normal response to a pelvic floor muscle contraction. This might have attributed to increase in levator ani strength. However, the non-significance in thickness and width of rectus abdominis and inter recti distance at umbilical and infra umbilical level in between groups can be because of three

month duration of exercises and not intervening with specific muscle exercise, as per literature says closure of inter recti distance takes place even after 12 months and there is no specific muscle exercises to improve the thickness and width of rectus abdominis. Also the participants were recruited during the time of pandemic so participants in experimental group were not able to follow up at 6 week for further implementation of exercises. The regularity of exercise was assured through telephonic call which does not give a clear clarity whether the exercises were performed in the instructed pattern. At last, the sample size of this study was relatively small which may have an impact the results.

5. Conclusion

Taking into account the result of the study the conclusion that can be drawn is that the time frame of training program should be increased and specific exercises meant for improving the thickness and strength of rectus abdominis should be advised.

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