



RESEARCH ARTICLE

A STUDY ON EFFICACY OF KINESIOTAPE VERSUS POSTPARTUM BELT ALONG WITH CORE STRENGTHENING EXERCISE IN POSTPARTUM WOMEN WITH DIASTASIS RECTI

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ABSTRACT

Introduction and Aim: Diastasis recti has been defined as impairment characterized by separation of two rectus abdominis muscles along the linea alba common during and after pregnancy. Due to increased stretch of rectus abdominis induced by expanding uterus that leads to lumbo pelvic instability and pelvic floor muscle weakness. It causes an increase in abdominal circumferences, low back pain together with dissatisfaction about body shape altered self-esteem and disadvantage in inter personal relationship. The study focuses on reducing the intra recti distance and improving the core muscle stability in postpartum women. To find the effectiveness of kinesiotaping on diastasis recti in postpartum women. **Materials and methods:** Thirty postpartum women were selected, based on selection criteria among them fifteen women were group A and another fifteen were group B and with the knowledge of the subjects, Vernier caliper and waist circumference and intra recti distance was done to assess the diastasis recti. Group A undergone kinesiotaping with core strengthening exercises and group B undergone post-partum belt with core strengthening exercises. Post test was done after eight weeks using Vernier caliper and intra recti distance. **Results:** There was significant difference between two groups was improving the core stability. In group A (kinesiotaping and core strengthening exercises) were more effective than group B (post-partum belt with core strengthening exercises). This implies that kinesiotaping is most beneficial in improving core stability.

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 [Hsia, 2004] 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 (Lo, 1999). Studies have demonstrated that the inter-recti distance increases at approximately 14 weeks of gestation and continues to increase until delivery, This may result in altered trunk mechanics, impaired pelvic stability and changed posture, which leave the lumbar spine and pelvis more vulnerable to injury (Gilleard, 1996). The abdominal muscles usually take some time to regain their tone and strength. As after delivery, although the uterus immediately begins to shrink back to its pre-pregnancy size, the abdominal muscles remain in their over lengthened state. This often makes the belly feel 'soft and flabby' from muscle weakness, making it look 'enlarged' with the pressure of the intestines and abdominal organs distending the flexible muscles. In 66 % of women, the vertical abdominal muscles have separated and take at least six weeks to heal.

Post-natal support belts and belly binding have been used for many centuries as methods of supporting a woman's abdomen. It may give the abdomen a slimmer appearance by holding the skin that is stretched during pregnancy. Wearing the belt can allow to fit into pre pregnancy clothes sooner and help in returning to normal activities as early as possible. Regular use of a postpartum support belt may relieve back pain and strain on muscles and ligaments by transferring the weight of the abdomen to the spine where it can be carried naturally and also assist in maintaining proper posture during breastfeeding(4). Abdominal belts were introduced and is being used for many centuries in abroad and use of abdominal belt post-delivery also has gained its popularity in India for past few decades. The use of abdominal belt post delivery gained its importance as it was thought to make the abdomen reduce and also it allow to fit in pre-pregnancy clothes4. Regular use of a postpartum support belt may relieve back pain and strain on muscles and ligaments by transferring the weight of the abdomen to the spine where it can be carried naturally and also assist in maintaining proper posture during breastfeeding, The myth is that it helps in providing a support and reduce the size of abdomen. And again so far only a very few studies have evaluated the effects of abdominal belt in post-partum period (Ponmathi, 2018). Postnatal physiotherapy should be given importance and physical therapist should give more importance to strengthening of abdominals as it helps and aids in correction and prevent worsening of diastasis recti

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(Chiarello, 2005). Rectus Diastasis (RD) is a commonly occurring problem during pregnancy and immediate puerperium, affecting up to 70 %, 60 % of women respectively, and may extend up to eight weeks postpartum in approximately 30 % of women and may be evident in about 10 % of women 1 year post-partum due to obesity, multiparity, fetal macrosomia, flaccid abdominal muscles, polyhydramnios and multiple pregnancies 2. Some authors consider RD any separation or spread of the muscle bundles along the linea alba, others consider only a distance greater than 1 cm or 2 finger breadths (3 cm), Kinesiotaping (KT) is a relatively new form of elastic therapeutic tape becomes increasingly common over the last decade. It is currently regarded by physiotherapists as a method for supporting, rehabilitating and modulating some physiological processes, There are five different corrective applications of KT which include the following: Mechanical correction; Fascia correction; Space correction; Ligament/tendon correction; and Functional correction, that provide several potential effects of KT, depending on the techniques used and degree of tape stretch, providing sensory stimulation, aligning fascial tissues, repositioning of subluxed joints, minimizing pain/inflammation, assisting in the reduction of edema in addition to support or inhibit muscle function (Maha Mohamed Mady, 2018). Women after childbirth face physiological and structural alterations in their appearance and shape that may require repair in order to restore their physical and psychological well-being. One of these alterations, the increase in abdominal girth during pregnancy that causes stretching and thinning of the midline abdominal fascia, thus aggravating preexisting diastasis of the rectus muscle that can result in herniation or protrusion of abdominal contents (Artal, 2013).

Results post treatment revealed the high efficacy of the intervention kinesiotaping techniques among the three groups, regarding waist circumferences and the distance between two recti either above or below umbilicus. This can be explained by the pulling force of the stretch applied by the tape on the skin that creates more space by lifting the fascia and soft tissue, which improves communication with mechanoreceptors and increases the number of motor units recruited which can facilitate muscle contraction, and ultimately improve muscle strength (Added, 2013). KT application results in a small immediate increase in muscle strength by producing a concentric pull on fascia, which may stimulate increased muscle contraction, and an additional hypothesis suggests that the facilitated muscle activity and improved muscle alignment may contribute to increases in muscle strength (Williams, 2012). The transversus abdominis, pelvic floor, deep multifidus and diaphragm or the deep core stabilizing muscles form a muscular cylinder, which supports the spine and the pelvis; these muscles work together as a unit to ensure and maintain trunk stability (Akuthota, 2008). 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 (Sheppard, 1996). There is no adverse effects rather than for sensitive skins.

METHODOLOGY

30 subjects were selected based on selection criteria with the age group of 21 to 30 years who are diagnosed with diastasis recti for 6 Months. Subjects having skin over sensitivity. caesarean section delivery, severe DRA, skin diseases were excluded.

The purpose of the study is to compare the effectiveness of kinesio taping and postpartum belt along with core strengthening exercise in patients with diastasis recti. The subjects are selected by convenient random sampling method according to the inclusion and exclusion criteria. The subjects are between age group of 21 to 30 years, 30 subjects are selected (postpartum women) are randomly allocated in two groups (Group A and Group B). Patient consent was obtained by explaining the project procedure and the effect of kinesio taping, postpartum belt and core exercise. The project undergone in Dr. MGR Educational and Research institute, Chennai. The intrarecti distance is measured, two types of measurements were taken for each group: resting (rectus abdominis using Vernier caliper and also tested by finger palpation method. FINGERPALPATION at rest) and active (rectus abdominis contracted during a curl up). Subjects were positioned crook lying on a portable floor mat with a pillow under their head and their knees flexed to 90 degrees the measurements were taken at 3 levels in the following order; at the superior border of the umbilicus; 45 mm above the umbilicus; and 45 mm below the umbilicus. A 9 cm long tape was used with the central point placed at the superior border of the umbilicus. Skin marking were made with the pen at the two ends of the tape for resting measurements, subjects were instructed to lift their heads up gently palpated the medial recti borders with the fingers. With the fingers in situ, the subjects were asked to lower the head and relax and the measurement was taken by using Vernier calipers for active measurement, the subjects was instructed to keep the chin to chest and perform a partial cur ups until the inferior angle of scapulae were just off the mat as palpated. Subjects maintained the curl ups for three seconds while the measurement taken. Completion of the resting and the active measurements was considered has one trail. Three trails were taken at the umbilical level initially then repeated at 45 mm above and 45 mm below the umbilicus a rest period of 1mintue allowed between each trail, to avoid muscle fatigue. Patient with two fingertips are included and proceed with next level of examination. Pre-test was done using Vernier caliper and intra-recti distance by Inch tape, proceed with treatment protocol. Group A received kinesiotape with core exercise for a period of 8 weeks (5 days/week) for 30 minutes. Group B received postpartum belt with core exercise for a period of 8 weeks (5 days/week) for 30 Minutes. After the cessation of the treatment protocol post-test was done using the same outcome measure.

Precautions for kinesiology tape: Do not apply kinesiology tape on any skin surface is damaged or broken.

Skin patch test: The kinesiology tape is applied to any body surface, and subject are advised to be with the taping for two hours before a full taping and asked to remove immediately, if there is any skin irritation present.

Kinesiotaping Techniques: Preparation step: The women lay in supine position and sterilization of abdominal area. Apply 2-inch width tape with I strip, first strip begins from the seventh cartilage, crossing the xiphoid process. Second strip from the coastal margin to pubic crest.

Postpartum Abdominal Belt: It was used from the 2nd day after delivery each participant in group (B) was instructed to wear it on the abdominal area from morning till go to sleep at (night); remove it during sleep and bathing, till the end of puerperium (for 8weeks). The participants were instructed to wear the belt according to the following steps:

- The belt was placed underneath the participant while she was lying down, as it was easier to get a more secure fit. The belt can be applied next to the skin or over a thin shirt.
- The side of the belt without the Velcro or fasteners was pulled over the participants' stomach with one hand and held firmly.
- The other side of the belt was stretched across the participants' stomach, over the first side and pulled, so the fit was snug but not too tight.
- Then, it was easily adjusted by straps according to the waist circumference of the participant.

The mother was instructed to avoid over-tightening the belt as it can produce discomfort and itches and inspect the skin for any redness or any signs of sensitivity.

CORE STRENGTHENING EXERCISES

Abdominal tuck in exercises: When the patient is in a crook lying position, ask her to contract the abdomen tightly. The procedure should contract the lower abdominal muscles and hold it for 10 seconds and relaxes, this procedure is done for 10 times.

Partial curls: The patient is in a crook lying position and raises the head along with the shoulder with the head supported on the hand and does partial abdominal hold it for 10 seconds and repeat 10 times.

Single leg raise: The subject is in a supine lying position and raises the leg and hold it for 10 seconds and relaxes it is done for 10 times alternatively.

Pelvic Bridging: The subject is positioned in a crook lying position and ask her to lift pelvis by flexing the knee, hold it for 10 counts and relaxes this is done for 10 times which helps in increase the stability of the pelvis.

Squat against wall: The subject should do this exercise in standing position and stand with your back against wall, placing your feet about two feet out in front of you. Feet should be hip distance apart. Bending your knees sliding your back down the wall until your knees are at 90-degree angles. The repetition of 10 times is given to the patient and the relaxation period is also given, while squatting the patient should follow the breathing pattern.

Cat And camel: Ask the subject to start in a stable position on all fours and relaxes your head and take a deep inhale and lift your lower rib cage, round your back and relaxes your neck, maintain firm abdominals, exhale and lower your chest towards the floor. Look up slightly and repeat it for 10 times.

Plank: The subject is asked to lie facing down, legs straight out behind you, knees and feet together. Bend your elbows with your forearms facing each other. Support your weight on your forearms. Contract your abdominals and lift your body away from the Mat, forming a straight line from your head to your heels. Hold it for 15-20 seconds and repeat for 5 times.

Lying palm to knee press technique: The subject is in a supine lying position and hip, knee flex 90 degree and abdominals are tucked in and press your knees against your palm and hold it for 10 seconds and repeated for 5 times.

Bird and Dog: Ask the subjects to start in a stable position on all fours, while your hands and feet are equally apart and parallel to the floor. Now extend your right arm and simultaneously extend your left leg behind your body. Repeat it in alternate arm and leg. Repeat it for 10 times.

DATA ANALYSIS

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find statistical difference between the groups. The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom(df) and p-value between (Group A) & (Group B) in pretest and posttest weeks. This table shows that there is no significant difference in pretest values between Group A & Group B (*P > 0.05). This table shows that statistically significant difference in posttest values between Group A & Group B (**P ≤ 0.05) (Graph -I) The above table reveals the Mean, Standard Deviation (S.D), t-test, degree of freedom(df) and p-value between (Group A) & (Group B) in pre test and post test weeks. This table shows that there is no significant difference in pre test values between Group A & Group B (*P > 0.05). This table shows that statistically highly significant difference in post test values between Group A & Group B (***- P ≤ 0.001) (Graph - II). The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group - A & Group - B. There is a statistically highly significant difference between the pre test and post test values within Group A and Group B (***- P ≤ 0.001). (Graph-III). The above table reveals the Mean, Standard Deviation (S.D), t-value and p-value between pre-test and post-test within Group - A & Group - B. There is a statistically highly significant difference between the pre test and post test values within Group A and Group B (***- P ≤ 0.001). (Graph-IV)

RESULTS

On comparing the Mean values of Group, A & Group B on Waist Circumference, it shows significant decrease in the post test Mean values but Group A - (K tape with Core Exercise) shows 92.66 which has the Lower Mean value is more effective than (Group B - Postpartum Belt with Core Exercise) 99.53 at P ≤ 0.05. Hence Null Hypothesis is rejected. On comparing the Mean values of Group A & Group B on Intra Recti distance, it shows significant decrease in the post test Mean values but Group A - (K tape with Core Exercise) shows 2.97 which has the Lower Mean value is more effective than (Group B - Postpartum Belt with core exercise) 3.76 at P ≤ 0.001 Hence Null Hypothesis is rejected. On comparing Pretest and Posttest within Group A & Group B on Waist Circumference & Intra Recti distance shows highly significant difference in Mean values at P ≤ 0.001

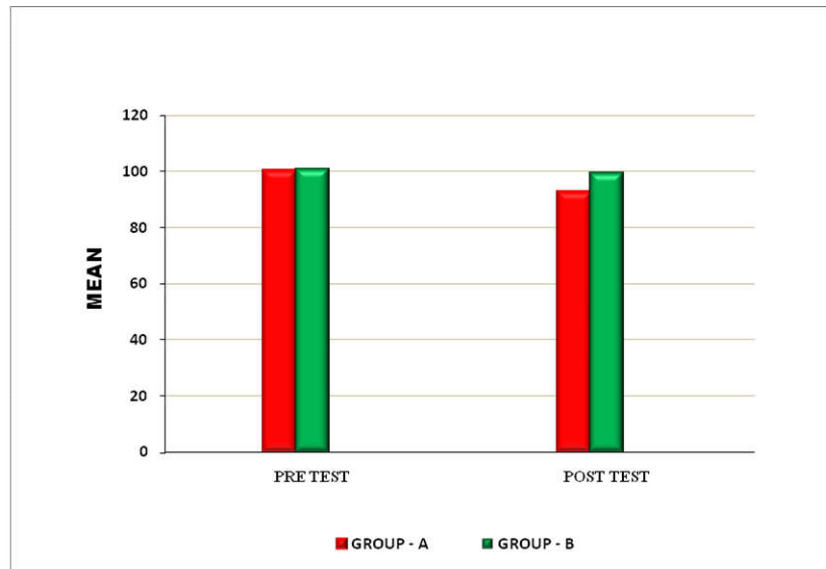
DISCUSSION

Diastasis recti is separation of the rectus abdominis muscle which involves widening of the linea alba with the gap greater than normal distance between the rectus bellies 2 cm or 2 fingers above umbilicus palpated above, below or at the level of umbilicus.

Table 1. comparison of waist circumference between group – a and group - b in pre and post test

#WC	#GROUP - A		#GROUP - B		t - TEST	Df	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D			
PRE-TEST	100.26	8.93	101.00	8.34	-.232	28	.818*
POST TEST	92.66	9.30	99.53	8.11	-2.15	28	.040**

#GROUP A – K TAPE WITH CORE EXERCISE, # GROUP B – POSTPARTUM BELT WITH EXERCISE (*- P > 0.05), (**-P ≤ 0.05)

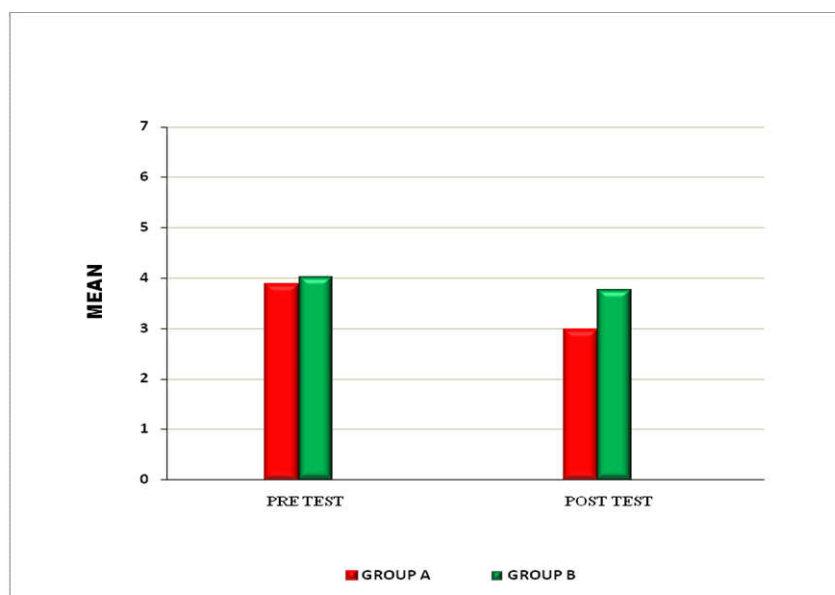


Graph I. Comparison of waist circumference between group – a and group - b in pre and post test

Table 2. Comparison of intra recti distance between group – a and group - b in pre and post test

#IRD	#GROUP - A		#GROUP - B		t - TEST	Df	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D			
PRE-TEST	3.86	.289	4.02	.551	-.953	28	.349*
POST TEST	2.97	.421	3.76	.499	-4.66	28	.000***

#GROUP A – K TAPE WITH CORE EXERCISE, # GROUP B – POSTPARTUM BELT WITH EXERCISE (*- P > 0.05), (***- P ≤ 0.001)

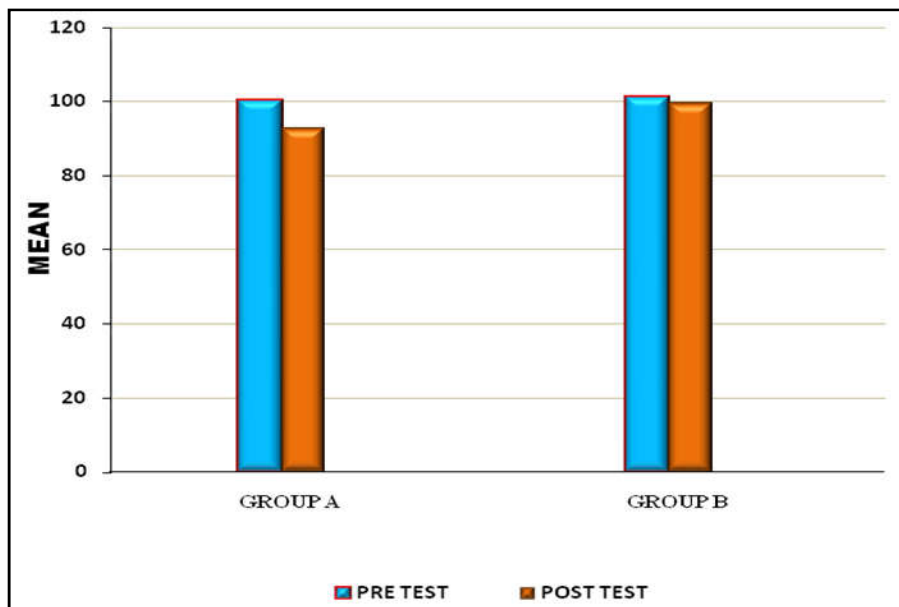


Graph II. Comparison of intra recti distance between group – a and group - b in pre and post test

Table 3. comparison of waist circumference within group – a & group – b between pre & post test values

#WC	PRE-TEST		POST TEST		t – TEST	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D		
GROUP- A	100.26	8.93	92.66	9.30	29.86	.000***
GROUP- B	101.00	8.34	99.53	8.11	11.00	.000***

(***- P ≤ 0.001)

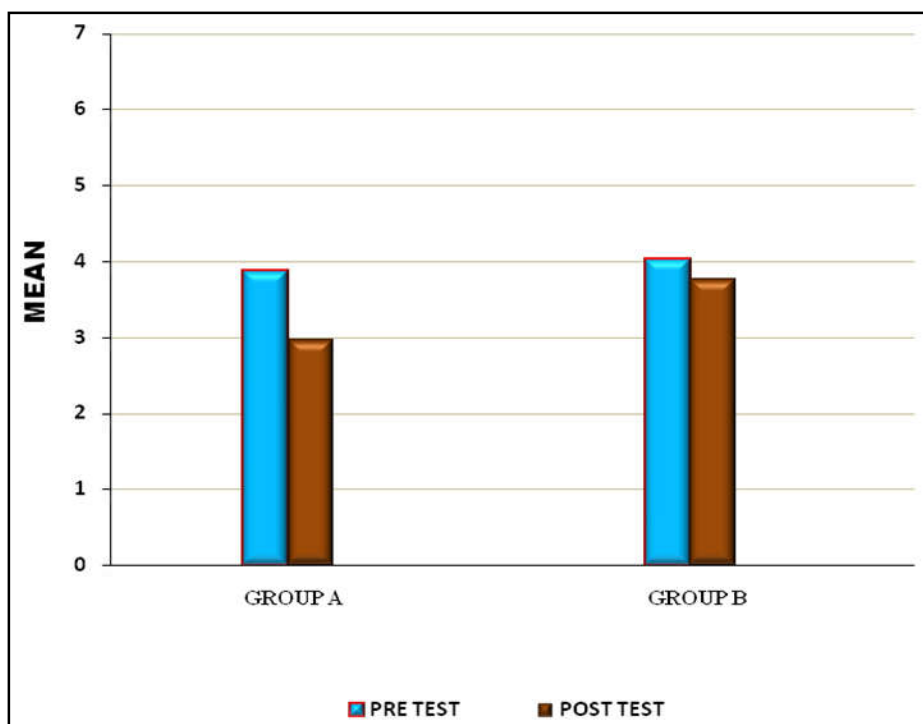


Graph - III. Comparison of Waist Circumference Within Group – A & Group – B Between Pre & Post Test Values

Table 4. Comparison of intra recti distance within group – a & group – b between pre & post test values

#IRD	PRE-TEST		POST TEST		t – TEST	SIGNIFICANCE
	MEAN	S. D	MEAN	S. D		
GROUP- A	3.86	.289	2.97	.421	7.72	.000***
GROUP- B	4.02	.551	3.76	.499	6.14	.000***

(***- P ≤ 0.001)



Graph IV. Comparison of intra recti distance within group – a & group – b between pre & post test values

It occurs in pregnancy due to hormonal effect on connective tissues, may produce LBA, herniation of abdominal viscera through separation in the abdominal wall. D.R. Benjamin *et al.*, concluded that Due to the poor quality of the current literature, current evidence suggests that non-specific exercise may or may not help to prevent or reduce DRAM during the ante- and postnatal periods (13). Mahalakshmi V.*et al.*, concluded that DRA corrective exercises performed by the primiparous women with DRA in their postpartum period immediately following ND or a month after the LSCS for 6 weeks were found to be effective in reducing DRA. The postnatal mothers need to be made aware of the importance of DRA corrective exercises in preventing further complications like altered posture, umbilical hernia and low back pain(14). Nisha Achary *et al.*, concluded that abdominal exercise with bracing was very effective in reducing diastasis recti in early post partal females. This indicates that in early post partial female, exercises seem to very effective, so this can be a non surgical solution for the Diastasis Recti Abdominis muscle. The palpation examination for diastasis recti can be performed for other cases where physical therapy would be a non surgical solution. For further studies on diastasis recti many other regime of exercises can be incorporated any effectiveness can be measured (Nisha Achary, 2015). Sanjivani Ramesh Khandale *et al.*, concluded that abdominal exercises are very effective in reducing diastasis recti in early postpartum women. It helps to increase the abdominal muscle strength and restoring postpartum abdominal efficiency. This exercises could be effective in narrowing the inter recti distance, supporting the prescription of an exercise programme for prevention or reduction of diastasis recti in postnatal women and useful in reducing complications of diastasis recti (Sanjivani Ramesh Khandale, 2016).

Undoubtedly, DRA may be treated as a cosmetic defect, and its presence may cause mental discomfort. Separation of the linea alba with the accompa-nying weakening of the anterior abdominal wall may lead to epigastric and umbilical hernias. In the light of studies results mentioned above, however, one cannot definitely confirm the link between DRA and such conditions as the pelvic floor dysfunction or lumbo-pelvic pain. Taking into account still unsatisfactory knowledge regarding risk factors, possible consequences and effective methods of preven-tive treatment there is still a need of conducting further research in this field. Undoubtedly, DRA may be treated as a cosmetic defect, and its presence may cause mental discomfort. Separation of the linea alba with the accompa-nying weakening of the anterior abdominal wall may lead to epigastric and umbilical hernias. In the light of studies results mentioned above, however, one cannot definitely confirm the link between DRA and such conditions as the pelvic floor dysfunction or lumbo-pelvic pain. Taking into account still unsatisfactory knowledge regarding risk factors, possible consequences and effective methods of preven-tive treatment there is still a need of conducting further research in this field. DRA may play an important role in the development, persistence and recurrence of conditions relates to impairments affecting the supported related function pelvic floor muscles. Regular use of postpartum belt may relieves back pain and strain on muscles and ligaments by transferring the weight of abdomen to spine. kinesiotaping techniques aimed at improving circulation, muscles activation, proprioception, function and decrease pain. Exercises are known to offering many physical and psychological benefits on body such as

improve mental well beings, increased self-esteem and enhance body image sense of central. The pre- test mean value of waist circumference between Group A (100.26) and Group B (101.00) does not showed a significant difference. However, the post- test mean value showed a significant difference between Group A (92.66) and Group B (99.53). The pretest mean value of Intra recti distance between Group A (3.86) and group B (4.02) does not showed a significant difference. At the end of the treatment session the post -test mean value of intra recti distance between Group A (2.97) and group B (3.76) showed a significant difference.

Conclusion

The study concluded that the core strengthening exercises with kinesiotaping has considerable effects in reducing diastasis recti distance. It helps to increase the abdominal muscle strength and restoring postpartum abdominal efficiency. The exercises could be effective in narrowing the inter recti distance, supporting prescription of an exercise programed for prevention or reduction of diastasis recti in postpartum women and useful in reducing complication of diastasis recti. However, the other group formed the postpartum belt with core strengthening exercise as a lesser improvement in reducing diastasis recti distance and management of muscles than the kinesiotape group. Hence the kinesiotaping along with the core strengthening exercises is more effective in reducing diastasis recti among postpartum females. Alternative hypotheses is accepted and null hypotheses is rejected.

Authors Contribution

Dr V. Pavithralochani participated in the design of the study and performed the statistical analysis, where Priyanka B ,Abirami Kcontributed to draft the manuscript and data collection work.

Conflict of Interest

The authors declare they have no conflict of interest and no funding has been obtained from any source.

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