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# Effect of Combined Treatment of Massage, Exercise and KIASTM with That of Only Exercise in Patients with Diastasis Recti

**Pooja Pandey Tripathi***

Department of Physiotherapy, RGUHS University, Bangalore, India

***Address for Correspondence:** Dr. Pooja Pandey Tripathi, Department of Physiotherapy, RGUHS University, Bangalore, India
**E-mail:** drpoojapandey@gmail.com

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## ABSTRACT

**Background:** Diastasis rectus abdominis (DRA) is a common problem in pregnant and post-partum women caused by hormonal stress. It affects pelvic stability and posture. Non-surgical interventions like abdominal exercises, mild aerobic exercises, and the Cyriax1 cross-friction massage technique improve muscle strength, reduce back pain, and decrease abdominal separation. Kinesio Instrument Assisted Soft Tissue Mobilization (KIASTM) can also help reduce pain and improve compliance. To analyze the efficacy of Kinesio Instrument Assisted Soft Tissue Mobilization as a part of physiotherapy in patients with diastasis recti.

**Methods:** A retrospective study analyzed patient data from November 2022 to April 2023, focusing on diastasis recti. Initial measurements and assessments were conducted on two groups: Study group (n=41) received massage, exercises, and Kinesio Instrument Assisted Soft Tissue Mobilization (KIASTM), while the Control group (n=39) received exercise and massage only. Measurements were taken before and after treatment, and the significance of KIASTM was statistically analyzed. Patients with chronic systemic conditions were excluded.

**Results:** The study showed significant differences ($p<0.05$) between the two groups in most parameters assessed, except for "Finger Measurements Vertical (Before)" and "Inch measurements before treatment (above umbilicus)" ($p>0.05$). Parameters like "Finger Measurements Vertical (After),""Inch measurements before and after treatment", "Days of treatment," and "Depth before (in cm)" showed significant differences ($p<0.05$) between the two groups.

**Conclusion:** The study has concluded that KIASTM significantly reduces the diastasis recti and achieves other desirable outcomes.

**Key-words:** Massage, Diastasis Recti, Rectus abdominis, Physiotherapy, Soft Tissue Mobilization

## INTRODUCTION

Diastasis rectus abdominis (DRA) is a common health problem in both post-partum and pregnant women [1,2]. Determination of DRA is accomplished by using a separation criterion of more than 2 cm at points of linea alba [2-4]. DRA is frequent and negatively affects women's health during pregnancy and after [5,6]. It develops during the second trimester. 66% to 100% experience DRA in their third trimester, and 53% suffer just after giving birth [7-10].

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Hormones, including relaxin, progesterone, and estrogen, exert mechanical stress over the abdominal wall during gestation. Displacement in abdominal organs causes elastic changes in connective tissue, ultimately causing DRA [11,12]. Multiple pregnancies, polyhydramnios, flaccid abdominal muscles, microsomia and obesity are some predisposing factors [13-17]. These changes affect the stretches and lengthen the rectus abdominis of women during [2,3,18]. Ultimately, functional strength and mechanical control of the abdominal wall decreases, resulting in diastasis recti [10,19]. DR cause impaired pelvic stability and alteration in posture, making the pelvis and lumbar spine vulnerable to injury [20-22]. It can also result in defecting trunk side bending, rotation, parturition, elimination, and respiration [21,23]. Moreover, DR may cause post-partum women severe health complications in the lower back and cosmetic defects [24,25]. These women suffer acute pain in the abdomen and pelvic

 

region. In several cases, DR is unresolved but can last for many years [26].

Abdominal and aerobic exercises can be preferred as non-surgical interventions for treating women with DRA [27-29]. The change in the muscles after exercising strengthens its contractile tissue. Therapeutic exercises lead to the activation of Slow Twitch (ST) as well as Fast Twitch (FT) fibres in skeletal muscles, thereby improving muscular strength [30]. A core exercising routine can be proven helpful in treating DRA as it reduces back pain [31,32]. Strengthening the lower abdomen's core muscles helps develop a muscular corset in the postnatal period. This periodic physical movement alleviates muscle toning, reducing abdominal separation [33]. Moreover, therapeutic exercises help in reducing DRA by 2 cm because of routine stabilization exercises and abdominal bracing [34,35].

The Cyriax1 cross-friction massage is the ancestor of instrument-assisted soft tissue mobilization (KIASTM), which uses hard tools to manipulate soft tissue [36]. It has recently gained popularity as an alternative to conventional manual therapy methods. The same studies that revealed KIASTM improves the healing process through enhanced fibroblast proliferation [3,14] and higher collagen synthesis, maturation, and alignment apply to all of these techniques and businesses, as well as others [35,36], despite instrument and protocol variations. KIASTM may be therapeutically beneficial in treating non-specific thoracic discomfort in adults and groups with tendinopathy. Furthermore, pain negatively impacts patient compliance; as a result, using KIASTM to reduce pain may increase treatment compliance.

## MATERIALS AND METHODS

**Research Design-** The study was conducted retrospectively by extracting the data of the patients who visited the author from November 2022 to April 2023. The details of the patients were considered. At initial visit before the treatment was started, the patients underwent series of measurements including horizontal and vertical finger measurements of the diastasis recti, measurement of the same in inches, depth of the diastasis recti and presence of hernia. The patients were randomized into either of 2 groups the Study group (n=41) or Control group (n=39). The Study group received massage, scheduled exercises and KIASTM.

**Interventions-** Core activation exercises, abdominal and diaphragmatic breathing exercises were given. But the patients were never given back extension exercises and were told not to bend forwards (bend your knees and go down). The patients were given massage, including abdominal massage and taping, in case of a few cases or asked to wear an umbilical belt during treatment. KIASTM is a manual therapy technique that utilizes specially designed instruments to mobilize soft tissue. The treatment is usually administered by a trained healthcare professional, such as a physical therapist, chiropractor, or sports medicine physician. During the treatment, the practitioner uses the instruments to apply pressure and scrape the skin in a specific pattern over the affected area. This helps to break up scar tissue and adhesions, increase blood flow, and improve range of motion. The treatment is typically performed for 5-10 minutes, with multiple sessions often required for optimal results. The exact technique and duration of treatment may vary depending on the patient's condition and the practitioner's assessment. The Control group received only exercise and massage. Each patient received treatment based on the severity and requirement. The measurements which were conducted before the treatments, were also being determined after the treatment in both groups. The measurements were statistically analyzed to find out the significance of KIASTM.

**Inclusion and Exclusion Criteria-** The diastasis recti patients who visited the author's clinic were only included in this study. The patients who continued and followed-up with the treatment had shared all the required information that were only included. The patients with underlying chronic systemic conditions did not continue or visit the author for follow-up measurements, did not share all the required information, were excluded from the study.

**Statistical Analysis-** The study used SPSS 25 for effective analysis. The continuous data were expressed as mean ± standard deviation, while the discrete data were expressed as frequency and its respective percentage. The study employed one-way ANOVA as a statistical tool for analyzing the measurements between the two groups. The level of significance considered was $p<0.05$.

 

**Ethical Approval-** The author obtained consent from all the patients during their treatment schedules. The study used the patients' data, maintaining the privacy of the patient's details.

## RESULTS

Table 1 shows the baseline characteristics of patients in the study group (n=41) and control group (n=39).

The characteristics include age, BMI, baby weight, twin delivery, education level, ability to lift heavy, Beighton test results for hypermobility, physical activity level, and type of delivery. The mean age was similar between the groups, and both groups had a similar distribution of Education, Physical Activity, and kind of delivery. The study group had a slightly higher BMI and a higher percentage of hypermobility and ability to lift heavy compared to the control group.

**Table 1:** Baseline characteristics of the patients in each group

| Characteristic | Study Group N = 41 | Control Group N = 39 |
|---|---|---|
| Age | 38.39±6.26 | 37.87±4.38 |
| BMI | 25.62±3.2 | 25.12±3.6 |
| Weight of the baby | 2.9±0.4 | 2.8±0.5 |
| Twin Delivery, n (%) | 1 (2.43) | 0 |
| Education | | |
| Higher Education and below, n (%) | 4 (9.75) | 5 (12.8) |
| Graduate and above, n (%) | 37 (90.24) | 34 (87.17) |
| Ability to lift heavy | | |
| Yes, n (%) | 15 (36.58) | 12 (30.76) |
| No, n (%) | 26 (63.41) | 27 (69.23) |
| Beighton Test (Hypermobility) | | |
| Not hypermobile, n (%) | 8 (19.51) | 9 (23.08) |
| Hypermobility, n (%) | 33 (80.49) | 30 (76.92) |
| Physical Activity (≥ 30 minutes) | | |
| Regular, n (%) | 4 (9.76) | 3 (7.69) |
| Irregular, n (%) | 16 (39.02) | 14 (35.9) |
| No activity, n (%) | 21(51.22) | 22 (56.41) |
| Type of Delivery | | |
| Vaginal, n (%) | 7 (17.07) | 5 (12.82) |
| Cesarean, n (%) | 34 (82.93) | 34 (87.18) |

Table 2 displays the pre-treatment measures of the study group, revealing that their finger and inch measurements were comparatively smaller than those of the control group. Following the intervention, there was a notable decrease in the measurements of the study group. Again, the control group exhibited an increase in their respective values. The study group exhibited a shorter treatment time, decreased depths before and during treatment and marginally less severe hernia severity than the control group.

**Table 2:** Mean values of each parameter of the patients in both the groups

| Parameter | Study Group | Control Group |
|---|---|---|
| Finger Measurements Horizontal (Before) | 5.26±1.88 | 8.54±2.39 |
| Finger Measurements Vertical (Before) | 8.83±2.26 | 8.87±1.47 |
| Finger Measurements Horizontal (After) | 1.67±1.08 | 1.5±0.79 |

 

| | | |
|---|---|---|
| Finger Measurements Vertical (After) | 2.1±0.86 | 3.97±0.84 |
| Inch measurements before treatment (at umbilicus) | 36.93±4.01 | 38.66±2.39 |
| Inch measurements before treatment (above the umbilicus) | 35.99±4.21 | 36.75±2.61 |
| Inch measurements before treatment (below the umbilicus) | 38.32±4.22 | 40.8±2.37 |
| Inch measurements after treatment (at umbilicus) | 33.63±3.65 | 37.29±2.44 |
| Inch measurements after treatment (above the umbilicus) | 33.09±3.52 | 35.41±2.59 |
| Inch measurements after treatment (below umbilicus) | 35.05±3.99 | 39.53±2.35 |
| Days of treatment | 7.73±2.25 | 13.74±4.15 |
| Depth before (cm) | 6.55±2.03 | 8.15±1.99 |
| Depth after (cm) | 2.01±0.8 | 6.3±1.58 |
| Hernia | 1.88±0.33 | 1.97±0.16 |

Table 3 displays the results of a significance test conducted on various parameters between two groups. The study also found that there is a significant difference ($p<0.05$) between the two groups in most of the parameters assessed, except for the "Finger Measurements Vertical (Before)" and "Inch measurements before treatment (above the umbilicus)" ($p>0.05$). Again, the study found that parameters like "Finger Measurements Vertical (After), Inch measurements before treatment (at umbilicus), Inch measurements before treatment (below umbilicus), Inch measurements after treatment (at umbilicus), Inch measurements after treatment (above umbilicus), Inch measurements after treatment (below umbilicus), Days of treatment," and "Depth before (in cm)" have significant differences between the two groups ($p<0.05$). Therefore, the study assessed that there is a significant difference between the two groups for most of the parameters assessed, except for "Finger Measurements Vertical (Before)" and "Inch measurements before treatment (above the umbilicus)."

**Table 3:** Significance Test findings of each parameter assessed between the two groups

| | | Sum of Squares | df | Mean Square | F | p-value |
|---|---|---|---|---|---|---|
| Finger Measurements Vertical (Before) | Between Groups | 0.03 | 1 | 0.03 | 0.01 | 0.921 |
| | Within Groups | 286.16 | 78 | 3.66 | | |
| | Total | 286.20 | 79 | | | |
| Finger Measurements Vertical (After) | Between Groups | 70.40 | 1 | 70.40 | 97.05 | <.001 |
| | Within Groups | 56.58 | 78 | 0.72 | | |
| | Total | 126.98 | 79 | | | |
| Inch measurements before treatment (at umbilicus) | Between Groups | 67.32 | 1 | 67.32 | 6.19 | 0.01 |
| | Within Groups | 869.93 | 80 | 10.87 | | |
| | Total | 937.26 | 81 | | | |
| Inch measurements before treatment (above the umbilicus) | Between Groups | 10.90 | 1 | 10.90 | 0.90 | 0.34 |
| | Within Groups | 968.28 | 80 | 12.10 | | |
| | Total | 979.18 | 81 | | | |
| Inch measurements before treatment (below the umbilicus) | Between Groups | 125.14 | 1 | 125.14 | 10.74 | 0.002 |
| | Within Groups | 931.48 | 80 | 11.64 | | |
| | Total | 1056.62 | 81 | | | |
| Inch measurements | Between Groups | 285.17 | 1 | 285.17 | 29.74 | <.001 |

 

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| | | | | | | |
|---|---|---|---|---|---|---|
| after treatment (at umbilicus) | Within Groups | 766.93 | 80 | 9.58 | | |
| | Total | 1052.11 | 81 | | | |
| Inch measurements after treatment (above the umbilicus) | Between Groups | 108.44 | 1 | 108.44 | 11.55 | 0.001 |
| | Within Groups | 750.60 | 80 | 9.38 | | |
| | Total | 859.05 | 81 | | | |
| Inch measurements after treatment (below the umbilicus) | Between Groups | 407.86 | 1 | 407.86 | 38.36 | <.001 |
| | Within Groups | 850.50 | 80 | 10.63 | | |
| | Total | 1258.37 | 81 | | | |
| Days of treatment | Between Groups | 772.63 | 1 | 772.63 | 69.23 | <.001 |
| | Within Groups | 881.58 | 79 | 11.15 | | |
| | Total | 1654.22 | 80 | | | |
| Depth before (cm) | Between Groups | 60.26 | 1 | 60.26 | 14.46 | <.001 |
| | Within Groups | 333.41 | 80 | 4.16 | | |
| | Total | 393.68 | 81 | | | <.001 |
| Depth after (cm) | Between Groups | 398.42 | 1 | 398.42 | 228.62 | |
| | Within Groups | 139.41 | 80 | 1.74 | | |
| | Total | 537.83 | 81 | | | |

**DISCUSSION**

One of the frequent problems experienced by post-partum women is DRA. DRA can be challenging to treat. Due to the past lack of knowledge about this condition, many patients could not receive prompt and efficient diagnosis and treatment, which caused the parturients' DRA symptoms to worsen continuously and impacted their quality of life [37-40]. The occurrence and progressive aggravation of complications and the requirement for surgical treatment can be prevented by early diagnosis and detection of DRA. In China, medical clinics are frequently the initial contact points for diagnosing and caring for DRA in post-partum women.

Because of its early symptoms' mildness, maternal post-partum DRA received less attention in the past. Yet, as more research and studies have been conducted, more excellent knowledge of DRA has emerged. One of the frequent issues during pregnancy and the post-partum period is DRA [37,38]. It may start around week 14 of pregnancy and worsen during the next few weeks until birth. Although the illness has grown apparent, there is still debate on DRA diagnosis and course of action [39,40]. Long-term post-partum DRA may result in health issues, such as enduring low back pain and abdominal and pelvic discomfort. This has been clearly shown in prior investigations. In the first six months after giving birth, 40% of women statistically report having ongoing pelvic and lower back pain [31,32].

DRA is not a health issue that can be resolved for many post-partum women and may worsen over time. The symptoms of DRA and whether they may be treated directly or indirectly determine whether to intervene or provide treatment. According to the study's findings, the DRA separation was greatly enhanced and mended above the umbilicus' centre and below its 4.5 cm border, not just partially recovered.

The key to treating DRA separation early on and normalizing it is relieving patient symptoms. Another efficient option to treat DRA is by non-surgical treatment and early active intervention techniques [29]. At the same time, corsets, acupuncture treatment, pelvic floor muscle exercise, posture and back care, frequent abdominal workouts, and other non-surgical procedures have all been suggested as effective non-surgical interventions for DRA treatment.

Exercise can significantly reduce DRA symptoms and is a successful non-surgical treatment, according to a prior study that showed the effectiveness of abdominal exercises with bracing in lowering DRA in the early post-partum period. This suggests that workouts may be pretty useful in the early post-natal period, suggesting a non-surgical treatment option for DRA [33].

For a resistant and bulging abdominal wall, static abdominal contractions, pelvic rocking, sit-ups, and leg slides are also advised [39]. According to some reports, the

 

ribs, linea alba, and thoracolumbar fascia can all be stabilized by bilateral activation of the transversus abdominis. The gap at the linea alba is closed by contracting the transversus abdominis, shortening the rectus abdominis muscles. Also, it has been demonstrated that therapeutic activities effectively treat several particular disorders in women. According to a recent study, closed kinetic chain workouts in postmenopausal women with osteoporosis significantly improved bone mineral density and decreased fall risk. Based on this information, therapeutic exercises, such as ones that enhance core stability, may be helpful for DRA patients [40].

## CONCLUSIONS

The study has concluded that KIASTM significantly reduces the diastasis recti and achieves other desirable outcomes. The variables measured in this study showed KIASTM, if applied with massage and exercise, can bring significant positive results within less time. The study, however, is single-centred, and findings cannot be considered conclusive. The author suggests conducting similar studies in other settings and centres to bring out the findings from varied populations. Overall, this study has highlighted an essential point of physiotherapy dealing with diastasis recti patients, which is quite common in lactating mothers.

The study further highlighted that the group receiving KIASTM needed fewer days to achieve the desired goal.

## CONTRIBUTION OF AUTHORS

One author is only contributed to this article.

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