IOSR Journal of Nursing and Health Science (IOSR-JNHS)
e- ISSN: 2320–1959.p- ISSN: 2320–1940 Volume 7, Issue 3 Ver. II (May-June .2018), PP 67-74
www.iosrjournals.org

Kinesiotaping Therapy Techniques for Treating Postpartum Rectus Diastases: A Comparative Study.

Maha Mohamed Mady[1], Women's Health PT.PHD
[1]*Department of Physical Therapy for Women Health, Teaching Hospital, Shebin El-Kom, Egypt*
Corresponding Author: Maha Mohamed Mady

Abstract: *Background: Rectus Diastasis (RD) is a commonly occurring problem during pregnancy and immediate puerperium. It causes an increase in abdominal circumferences ,low back pain together with dissatisfaction about body shape, altered self-esteem, and disadvantage in interpersonal relationships. Purpose: The study was designed to compare the efficacy of different techniques of kinesiotaping (KT) in treating postpartum RD. Subjects & Methods: 45 women suffering from RD, their age ranged from 24 and 40 years, their BMI between 26 and 44 kg/m2. Patients were randomized equally into 3 groups : Group A (15women received KT-I technique),Group B (15 women received KT-X technique) in addition to group C (15women received KT-I-X techniques) for 4 consecutive weeks. Evaluation of waist circumferences and the distance between 2 Recti was done before the start of the study and after 4 weeks. Results: A highly significant improvement was noticed in all measuring variables for the 3 KT techniques but the IX-technique was the best one, followed by the X- technique, and the I- technique was the least one. Conclusions: Abdominal KT in the form of IX-technique is the most effective technique in reducing abdominal circumferences and the treatment of postpartum rectus diastasis.*

Keywords: *Kinesiotaping; Abdominal circumferences; Diastasis; Rectus abdominis*

Date of Submission: 26-04-2018 Date of acceptance: 16-05-2018

I. Introduction

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 [1].

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) [3.]

It has been claimed that RD has many long-term consequences for women health. It may change posture as it causes an increase in abdominal circumferences and give more back strain due to reduced strength and function, leading to low back pain together with dissatisfaction about body shape, altered self-esteem, and disadvantage in interpersonal relationships [4].

Laparoscopic and open Abdominoplasty are the most commonly employed techniques by which RD are corrected but those surgical correction of RD remains a controversial subject. There are many complications associated with those procedures, including haematoma, seroma formation, wound infection, necrosis of the skin flaps, and hypertrophic scarring. Additionally, subsequent to plication of the rectus sheath, intra-abdominal pressure increases, decreasing venous return and increasing the risk of deep vein thrombosis (DVT)formation. Despite appropriate and effective plication, recurrences may occur in 40 % of cases in addition to patient dissatisfaction[5].

As, RD is often not considered a pathological entity. Physiotherapy is the only available treatment that has the potential to give relief from symptoms related to RD without complications[6].

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 [7.]

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 [8.]

Accordingly, This study was designed to compare the efficacy of different kinesiotaping techniques in the treatment of Postpartum Rectus Diastasis**.**

II. Materials and Methods

2.1. Subjects:

45 women aged 24 to 40 years old with mean value (31.6±4.6) years, body mass index of 26 to 44 kg/m^2 with mean value of (33.2±4.1) kg/m^2, diagnosed with rectus diastasis (RD) after 8 weeks postpartum (either normal labor or cesarean section),were referred the outpatient reproductive clinic of Shibeen El kom teaching Hospital, and participated in the current study.

Exclusion criteria were pregnancy, obesity, less than 8 weeks postpartum, vaginal bleeding, skin diseases, vascular insufficiency, sensory and neurological defects, neoplastic or systemic diseases including hypertension or diabetes mellitus.

2.2 Evaluative procedures:

1. Detailed medical and gynecological history was taken from each woman regarding parity (primiparous or multiparous), type of delivery (Normal labor, Cesarean section), and previous abdominal surgeries.

2. Anthropometric indices were taken while subjects were in a fasted state, in a standing position, dressed in light clothing and barefoot, with arms on side, legs straight, and knees together, with feet flat pointed outward. Weight and height were measured for each woman using weight-height scale to calculate the body mass index (BMI) by dividing reported weight in kilograms by reported height squared in meters and classified into overweight (25–29.99 kg/m^2), and obese ($\geq$ 30 kg/m^2) .

- Manual assessment for the distance between 2 Recti was done by asking every woman to rest in crook lying position, feet supported and arms extended over the body and asked to perform a forward trunk flexion until the inferior angle of the scapula is off the bed. Then, the evaluator placed fingers perpendicularly between the medial edges of the rectus abdominis muscles then turned clock wisely .

  The reference points for RD measurement were three finger breadths (4.5 cm) above and below the umbilicus.RD was graded by the number of fingerbreadths between the medial edges of the bellies of the rectus abdominis muscle at the reference points. Each finger breadth represented 1.5 cm, as found in the literature.The RD was considered present and relevant if the separation is greater than 2 finger widths between the medial edges of rectus abdominis muscles [9.]
- Waist circumference was measured using a non-elastic measuring tape that was perpendicular to the long axis of the body and horizontal to the floor, at the end of a normal expiration at different anatomic landmarks including: 1) Just below the lowest rib (Minimum WC); 2) Midpoint between the lowest rib and the iliac crest(WC) and; 3) Just above the iliac crest (Widest WC). WC measurements were performed before the start of the study and after 4 weeks of Kinesiotaping.

2.3.Treatment procedures:

A total of 45 women complaining from post partum RD were randomly rolled in 3 equal treatment groups: Group A (15 women received kinsiotaping in the form of I-technique) and Group B (15 women received kinsiotaping in the form of X-technique) in addition to Group C (15 patients received kinsiotaping in the abdomen in the form of both I- and X-techniques).

- ARES KINESIOLOGY tape used in this study is latex free, not allergic, breathable, and water permeable with 5 cm diameter, is designed to the same thickness and elasticity of the epidermis of skin with longitudinal stretch of 30~40% of its resting length.
- All patients in group (A, B & C) were integrated to receive taping of rectus abdominis muscles and changed every week for 4 consecutive weeks. The total period of treatment was one month for all treatment groups.
- The tape was measured and cut according to patient's area to be treated, and then cut the corners at the tape ends into a rounded form.
- Each woman was instructed to lie in a relaxed crook lying position on the treatment table with small cushions under neck, back and knees to accommodate her body curves.
- Group (A), received KT in the form of (I-technique/Origin-Insertion technique) that included the use of 4 KT strips: 2 strips of KT was applied over recti abdominis bellies. As the base was affixed to the origin of 2 recti at symphysis pubis in resting, with very light to light tension (15-25% of available tension) over the right and left rectus abdominis bellies up to the insertion at xiphoid process. When the tail of the tape was approximately one to two inches from the end, stopped tension and lay the end down with no tension. Then

the applied tape strip was rubbed to initiate glue adhesion with the muscle in its current stretched position [10].

- After affixing the first pair of tape strips, a second pair of KT was applied at a 90 degree angle to the first KT pair, over the reference points for DRAM (4.5cm) above and below the umbilicus centered on the site of rectus diastasis and directed towards the midpoint between the lowest rib and the iliac crest with maximum tension in the middle and no tension in both ends.
- Group (B), received KT in the form of (X- technique/Cris-cross technique) that included the use of 8 strips of KT extending from lower border of thoracic cage downwards and laterally towards the other side in a cross manner above and below the umbilicus, towards the symphysis pubis with light to moderate tension 25-50% of available tension.
- Group (C), received KT in the form of (Combined I-technique and X- technique) in the same manner as done with group A & B .

2.4.Statistical Analysis:-

Data was entered and analyzed by using SPSS (Statistical Package for Social Science) statistical package version 22. Graphics were done using Excel program. Quantitative data were presented by mean (X) and standard deviation (SD). It was analyzed using student t- test for comparison between two means, or ANOVA test (F test) for comparison between more than two means. Qualitative data were presented in the form of frequency distribution, tables, number and percentage. It was analyzed by chi-square ($\chi 2$) test. It was analyzed by chi-square ($\chi 2$) test. However, if an expected value of any cell in the table was less than 5, Fisher Exact test was used (if the table was 4 cells), or Likelihood Ratio (LR) test (if the table was more than 4 cells). Level of significance was set as P value <0.05 for all significant tests.

III. Results

Table (1) demonstrates that the majority of studied mothers were in age group 30-40 years (68.9%).The highest percentage was among IX technique group with a percentage of 80%, however, the difference was not significant statistically (P=0.47).

Concerning anthropometric measures, more than half of studied mothers had a body weight of 81-121Kgs , and of height of 156-165 cm (62.2%), however, the difference was not significant statistically (P=0.3, and P=0.5 respectively).

Regarding BMI, the table highlighted that unfortunately, less than 3% of studied mothers were of normal BMI (2.2%), while the remaining majority (97.8%) were either overweight (15.6%), obese class I (35.6%), obese class II (42.2%), and obese class III (4.4%). Also the difference between the three intervention groups regarding BMI were not significant statistically (P=0.06).

The table (2) showed that approximately one half of studied mothers were have a parity of 3 -5 times, majority had delivered through normal vaginal delivery (46.7%), while approximately 40% were delivered through CS, only 13.3% were delivered previously through both vaginal normal delivery and CS. The majority were using IUD as a preferred method of contraception (53.3%).

The high efficacy of the intervention kinesiotaping techniques among the three groups was highlighted in the results that showed a highly significant decrease in the minimum waist ,waist and maximum waist circumferences in the 3 intervention groups, (Fig. 1,2,3) respectively.

Also, results showed a highly significant decrease in the interrecti distances above and below umbilicus in the 3 intervention groups, (Fig.,4).

However, it seems that the third group (IX-technique) was the best one, followed by the second group (X- technique), and the first group (I- technique) was the least one regarding waist circumferences and the distance between two recti either above or below umbilicus.

But, results demonstrated a non significant difference between women who were delivered through normal vaginal delivery and those who were delivered through CS, among the three groups in each of technique categories (Min W, waist, etc) pre and post intervention (P>0.05 for each).

IV. Discussion

This study was designed to compare the efficacy of different kinesiotaping techniques in treating Postpartum Rectus Diastasis.

The results of this study demonstrated that the majority of studied mothers were in age group 30-40 years (68.9%), multiparous, had more than 2 babies, delivered either vaginally or through cesarean section with a non significant difference regarding the studied variables (Min W, waist, etc) pre and post intervention between women who were delivered through normal vaginal delivery and those who were delivered through CS, among the three groups.

This can be explained by parity itself and the multiple pregnancies, which may contribute to cumulative mechanical stress on the connective tissue of the abdominal wall. As the pregnancy progresses, the uterus weight and size increases, influencing the musculoskeletal morphology of the trunk, increasing the distance between the muscle insertions and producing muscle stretching [11].

Concerning anthropometric measures, more than half of studied mothers had a body weight of 81-121 Kgs, and of height of 156-165 cm (62.2%), however, the difference was not significant statistically (P=0.3, and P=0.5 respectively).Regarding BMI, results showed that the majority of mothers (97.8%) were either overweight (15.6%), obese class I (35.6%), obese class II (42.2%), and obese class III (4.4%). Also, the difference between the three intervention groups regarding BMI were not significant statistically (P=0.06).

The results of the current study are in agreement with Lo, et al, (1999)[12], Artal et al, (2003)[1] and Akram & Matzen ,(2014)[13] who reported a relation between development of RD and increased age of mother, larger weight gain with pregnancy, high birth weight, carrying multiples and multiparty.

But, the results of the current study were deviated from those demonstrated by Boissonnault & Blaschak, (1988)[6], Rett et al, (2009)[3] and Barbosa et al, (2012)[14], as women undergoing cesarean delivery had higher levels of RD compared those who had vaginal delivery due to the possible change in anatomical morphology of the abdominal wall after caesarean section.

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 [15,16].

It has been hypothesized that KT may exert its effects by (1) increasing local circulation, (2) reducing local edema by decreasing exudative substances, (3) improving circulation of blood by facilitating muscle, (4) providing a positional stimulus to the skin, muscle, or facial structures, and (5) providing proper afferent input to the central nervous system [17].

According to Williams et al.,(2012)[18] and Kouhzad et al, (2014)[19], 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.

Lumbroso et al.(2014)[20], evaluated the effects of KT application on the hamstring and gastrocnemius muscles and found a significant increase in the peak force of both muscles but they react differently to the KT application. And added that the increase in muscle force could be due to a placebo effect. Therefore, the method of KT application should be designed specific to each muscle, because maximum muscle strength dependent on muscle morphology and muscle activation type [11].

Results post treatment revealed a statistically significant decrease (P< 0.001) in minimum WC, WC, widest WC and interrecti distance before and after the study in all groups .however, it seems that the third group (IX-technique) was the best one, followed by the second group (X- technique), and the first group (I-technique) was the least one.

Although, the physiological explanation behind KT application is scarce. The improvement noticed with I-technique/Origin-Insertion technique can be explained by the theory that emphasized on the aptitude of Kinesiotaping to lift the skin from the underlying fascia, increasing blood and lymphatic flow, which might result in increased oxygen allotment to the muscle, and improved anaerobic muscle function [4].

Besides, the ability of KT to enhance proprioception through sensory stimulation of the mechanoreceptors in ligaments and tendons to encourage movement while relying on the stretched tape for corrective posture [21].

More to the point, it is proposed that applying KT from the muscle origin to insertion produces a concentric pull on the fascia as well as activation of ã-motor neurons in skeletal muscles under the skin which leads to continuous muscle contraction [22.]

Moreover, KT can facilitate and stimulate muscle function if its application starts at the origin of the muscle and ends at its insertion. It is suggested that this form of application could stimulate muscle function because of the elastic properties of the KT. Theoretically; the elastic fibers of the KT would shorten toward the first site it is applied to, in this case, the origin of the muscle. Therefore, the elastic fibers of the KT could stimulate the muscle in the direction of muscle contraction, improving movement [23,].

Another mechanism of taping therapy for muscle strengthening is the irradiation phenomenon that intensity of response is increased and spread, once intensity and frequency of stimulation is increased. The increase of contraction force can be resulted from the response of muscle by improving the intensity of stimulation to muscles through taping therapy [17].

While, Kinesio tapes when applied in the form of "X" tape, usually used to bring better tension transferred to both ends. The theory of the influence of KT on fascial tissue gains great importance. As, the direct contact between the fascia and muscular structures suggests that it can take part in transmitting the relative tensioning (evoked by stretched KT tape) to proper receptors and thus elicit the muscle response [23,24].

Accordingly, KT allows the fascia and muscle to return to normal function by relieving the buildup of abnormal muscle tension[25].

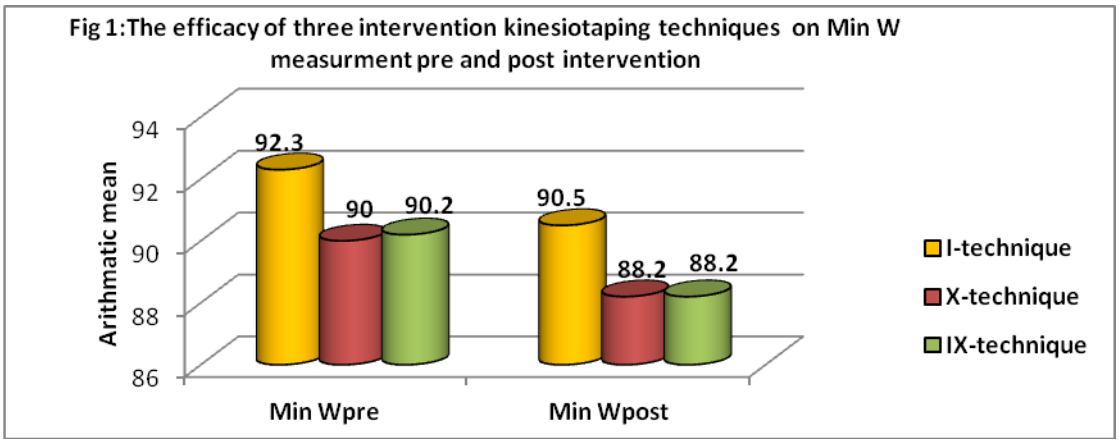
Consequently, the reasons for improvement with X- technique/Cris-cross technique may be related to different physiological mechanisms by which KT is presumed to have a therapeutic benefit including: 1) Mechanical correction that uses inward pressure to provide for positional stimuli through the skin in order to assist with postural alignment, 2) Fascial correction involves creating or gathering fascia in order to align tissue in a desired position [26].

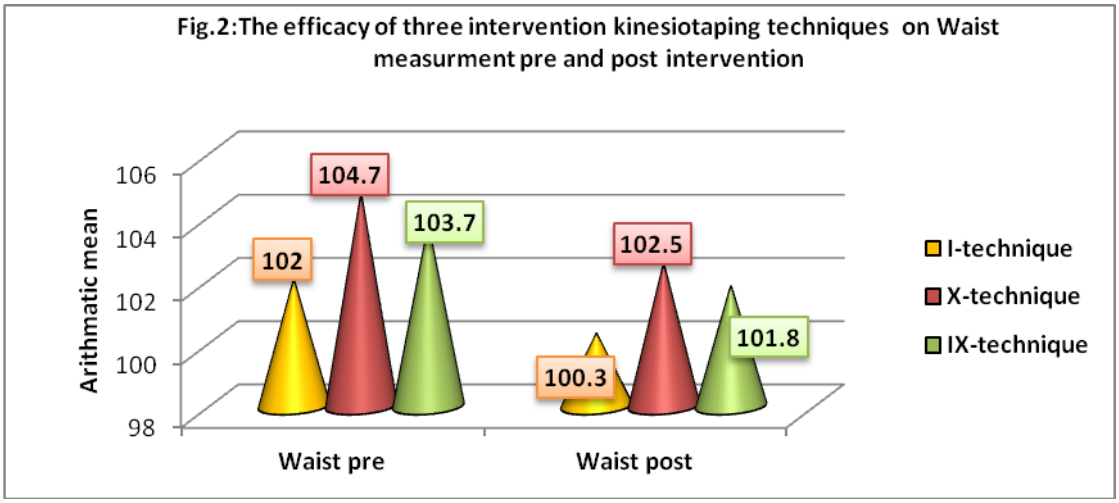
This work was supported by Krajczy et al, (2012)[27] who examined the effect of KT on post-cholecystectomy patients and showed faster abdomen circumference reduction, increasing exercise tolerance, and shorter post-operative intestine atony period.

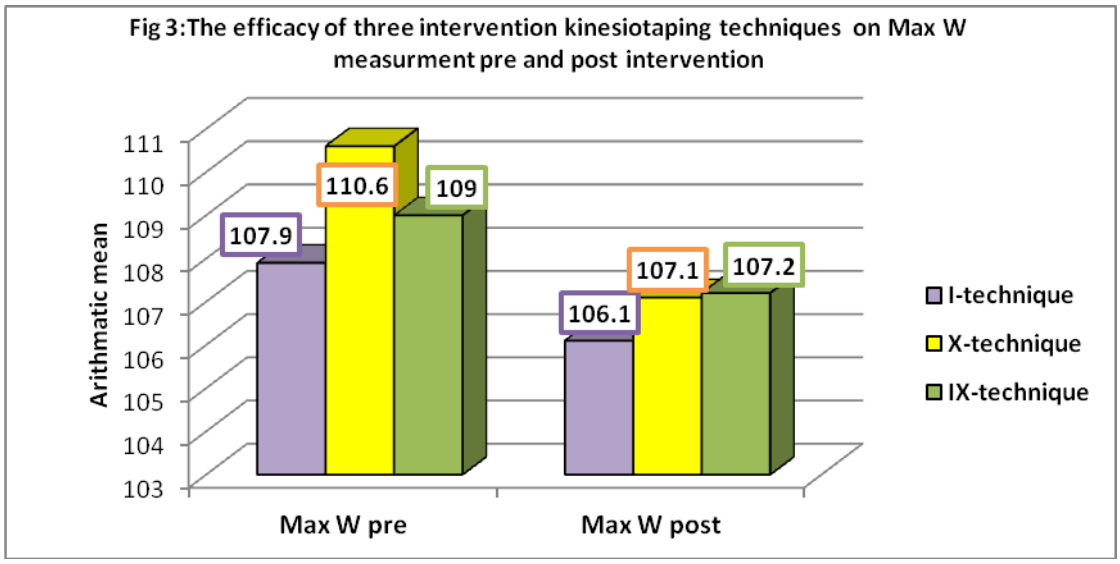
Along with the work of Awad et al,(2017)[28] who treated Rectus diastasis by kinesio tape application on abdomen in a criss-cross design, for three continuous days and one day off for one month.Their results showed a significant decrease in the inter-recti distance above and below the umbilicus in both treatment groups.

Whereas, Tobin and Robinson, (2000)[29] reported that taping the muscle in a crossing pattern results in a noticeable reduction in muscle activity.

V. Figures and Tables







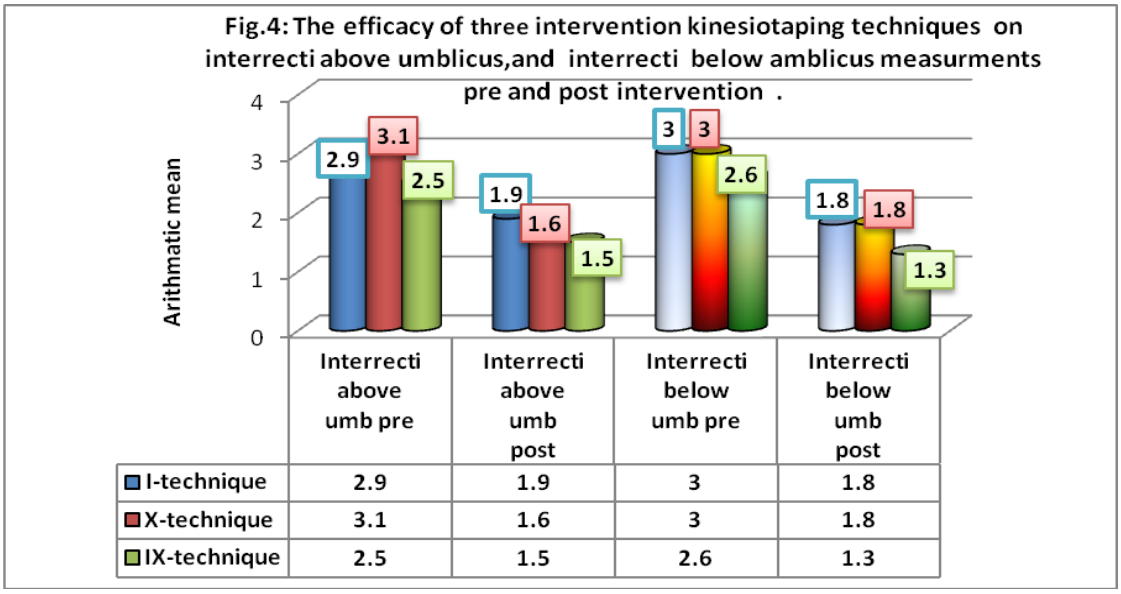


Table (1): Age and Anthropometric measures of the studied mothers distributed by the 3 intervention groups:

Variables	Groups			Total	P value
	I-technique N0. %	X-technique N0. %	IX- technique N0. %	N0. %	
Age groups					
20 - <30 years	6 40 %	5 3.3%	3 20.0%	14 31.1%	LR=1.5,=0.47 NS
30 – 40 years	9 60.0%	10 66.7	12 80	31 68.9	
x ±SD	31.5±4.8	31.1±4.6	32.1±4.8	31.6±4.6	F=0.14,P=0.8 NS
Weight groups					
60 - 80 Kg	5 3.3%	8 53.3%	9 60%	22 48.9%	X2=2.3,P=0.31 NS
81 – 121Kg	10 66.7%	7 6.7%	6 40%	23 51.1%	
x ±SD	84±7.6	80.9±10.1	83.1±16.4	82.6±11.8	F=0.2,P=0.7 NS
Height groups					
145 - 155 cm	4 26.7%	6 40%	7 46.7%	17 37.8%	
156-165 cm	11 73.3%	9 60%	8 53.3%	28 62.2%	X2=1.3,P=0.5 NS
x ±SD	157.6±4.1	157.1±5.1	158.6±5.3	157.7±4.8	F=0.3,P=0.7 NS
BMI groups					
18.5 - 24.9	0 0	0 0	1 6.7%	1 2.2%	

Normal BMI					
25 -29.9 Overweight	2 13.3%	1 6.7%	4 26.7%	7 15.6%	LR=11.2,P=0.06 NS
30 -34.9 Obese class I	3 20%	9 60%	4 26.7%	16 35.6%	
35 -39.9 obese class II	10 66.7%	5 33.3%	4 26.7%	19 42.2%	
=40 Obese class III	0 0	0 0	2 13.3%	2 4.4%	
x ±SD	33.9±3.6	32.6±2.9	33±5.6	33.2±4.1	F=0.35,P=0.7 NS
Total	15 100%	15 100%	15 100%	45 100%	

LR=Likelihood Ratio

Table (2): Obstetric history of the studied mothers (N=45)

Obstetric history	**Groups**			**Total**	**P value**
	I-technique N0. %	**X- technique N0. %**	**IX-technique N0. %**	**N0. %**	
Parity					
0 - 2	7 46.7 %	6 40%	7 46.7%	20 44.4%	LR=3.5, P=0.47 NS
3 – 5	6 40%	9 60%	7 46.7	22 48.9	
6-7	2 13.3%	0 0	1 6.7	3 6.7	
Type of delivery					
No previous delivery	1 6.7%	0 0	0 0	1 2.2%	LR=6.2, P=0.3 NS
Normal vaginal	4 26.7%	9 60%	8 53.3%	21 46.7%	
CS	7 46.6%	4 26.7%	6 40%	17 37.8%	
vaginal & CS	3 20%	2 13.3%	1 6.7%	6 13.3%	
Contraceptive method					
Not use	1 6.7%	0 0%	0 0%	1 2.2%	LR=9.6, P=0.09 NS
IUD	4 26.7%	9 60%	11 73.3%	24 53.3%	
Oral pills	7 46.7	5 33.3	4 26.7	16 35.6	
Others	3 20	1 6.7	0 0	4 8.9	
Total	**15 100%**	**15 100%**	**15 100%**	**45 100 %**	

VI. Conclusion

The results of this study testified that kinesiotaping in the abdomen is an effective method in reducing abdominal circumferences and interrecti distance in postpartum women complaining from diastasis of rectus abdominis muscles (DRAM) especially when applied in IX-technique than I- or X –technique alone**.**

Recommendations

Additional research is recommended to investigate the effect of kinesiotaping on EMG activity as an indicator of proprioception of abdominal muscles in cases of rectus abdominis diastasis.

References

[1]. Artal R, O'Toole M. and White S. Guidelines of the American College of Obstetricians and Gynecologists for exercise during pregnancy and the postpartum period, Br J Sports Med.,37(1),2003, 6-12.

[2]. Liaw L., Hsu M., Liao C., Liu M. and Hsu A.The relationships between inter-recti distance measured by ultrasound imaging and abdominal muscle function in postpartum women: a 6-month follow-up study, J Orthop Sports Phys Ther., 41(6),2011,435-43.

[3]. Rett M, Braga M, Bernardes N. and Andrade S. Prevalence of diastasis of the rectus abdominis muscles immediately postpartum: comparison between primiparae and multiparae. Rev Bras Fisioter.,13(4),2009,275-80.

[4]. Sperstad J., Tennfjord M., HildenG., Ellström-Engh M. and Kari Bø K. Diastasis recti abdominis during pregnancy and 12 months after childbirth: prevalence, risk factors and report of lumbopelvic pain, Br J Sports Med., 50(17),2016,1092–1096.

[5]. Huang G, Bajaj A, Gupta S, Petersen F. and Miles D. Increased intraabdominal pressure in abdominoplasty: delineation of risk factors. Plast Reconstr Surg., 119(4), 2007,1319–1325.

[6]. Boissonault A. and Blaschak M. Incidence of diastasis .recti abdominis during the childbearing year. Physical Therapy, 68,1988,1082-1086.

[7]. Mostafavifar M, Wertz J. and Borchers J. A systematic review of the effectiveness of kinesio taping for musculoskeletal injury. Phys Sportsmed,40,2012,33–40.

[8]. Pyšnýa L, Pyšnáa J. and Petrůa D. Kinesio Taping Use in Prevention of Sports Injuries During Teaching of Physical Education and Sport. Procedia-Social and Behavioral Sciences, 186 ,2015,618- 623.
[9]. Chang C. Assessment of videoendoscopy-assisted abdominoplasty for diastasis recti patients. Biomedical Journal., 36(5),2013,252-256.
[10]. Kase K., Martin P. and Yasukawa A. KinesioTaping in Pediatrics.Tokyo: Kinesio USA, LLC,2006.
[11]. Chiarello C, Falzone L., McCaslin K, Patel M and Ulery K.The effects of an exercise program on diastasis recti abdominis in pregnant women. J Women's Health Phys Ther., 29(1),2005,11.
[12]. Lo T., Candido G and Janssen P . Diastasis of the recti abdominis in pregnancy: risk factors and treatment . Physiother Can,51,1999,32.
[13]. Akram J. and Matzen S.Rectus abdominis diastasis, J Plast Surg Hand Surg ,48,2014,63–9.
[14]. Barbosa D, Cavalcanti A, Guendler J, Brito V. and Oliveira B . Frequência da Diástase Abdominal em Puérperas e Fatores de Risco Associados. Rev Fisioter S Fun. Fortaleza, 1(2),2012,10-17 (Abst.)
[15]. Added M, Costa L, Fukuda T. and et al. Efficacy of adding the Kinesio Taping method to guideline-endorsed conventional physiotherapy in patients with chronic nonspecific low back pain: a randomised controlled trial. BMC Musculoskelet Disord,14,2013,301.
[16]. Lemos T, Pereira K, Protássio C and et al.The effect of Kinesio Taping on handgrip strength. J Phys Ther Sci, 27,2015,567–570.
[17]. Kim J. and Kim S. Effects of kinesio tape compared with non-elastic tape on hand grip strength. J Phys Ther Sci.,28(5),2016,1565–1568.
[18]. Williams S, Whatman C, Hume P. and et al. Kinesio taping in treatment and prevention of sports injuries: a meta-analysis of the evidence for its effectiveness. Sports Med, 42,2012,153–164.
[19]. Kouhzad H, Khademi K, Naeimi S. and et al. Immediate and delayed effects of forearm kinesio taping on grip strength. Iran Red Crescent Med J, 2014, 16: e19797.
[20]. Lumbroso D, Ziv E, Vered E. and et al.The effect of kinesio tape application on hamstring and gastrocnemius muscles in healthy young adults. J Bodyw Mov Ther, 18,2014,130–138.
[21]. Elshemy S. and Battecha K. Kinesio Taping Versus Proprioceptive Training on Dynamic Position Sense of the Ankle and Eversion to Inversion Strength Ratios in Children with Functional Ankle Instability. Med. J. Cairo Univ., 81,2,2013,61-68.
[22]. Johansson H., Sjölander P.and Sojka P. Fusimotor reflex profiles of individual triceps surae primary muscle spindle afferents assessed with multi-afferent recording technique. Journal de Physiologie, 85(1),1990, 6-19(Abst.)
[23]. Vithoulka I., Beneka A., Malliou P., Aggelousis N., Karatsolis K. and Diamantopoulos K. The effects of Kinesio-taping on quadriceps strength during isokinetic exercise in healthy non athlete women. Isokinetics Exerc Sci. 18,2010,1–6.
[24]. Gusella A. ,Bettuolo M., Contiero F. and Volpe G. Kinesiologic taping and muscular activity: A myofascial hypothesis and a randomised, blinded trial on healthy individuals, Journal of Bodywork and Movement Therapies, 18, 3,2014,405–411.
[25]. Merino-Marban R., Mayorga-Vega D. and Fernandez-Rodriguez E. Effect of Kinesio Tape Application on Calf Pain and Ankle Range of Motion in Duathletes. Journal of Human Kinetics, 37, 2013,129-135.
[26]. Halseth T., McChesney J. and DeBeliso M.The effect of kinesio taping on ankle proprioception. J. of sport. scie. & med.; 3,2004,1-7.
[27]. Krajczy M., Bogacz K, Luniewski J. and Szczegielniak J.The Influence of Kinesio Taping on the Effects of Physiotherapy in Patients after Laparoscopic Cholecystectomy. Scientific World Journal,1,2012,948282.
[28]. Awad M., Mahmoud A., El-Ghazaly H. and Tawfeek, R. Effect of Kinesio Taping on Diastasis Recti., Med. J. Cairo Univ.,85 (6),2017, 2289-2296.
[29]. Tobin S. and Robinson G. The effect of McConnell's vastus lateralis inhibition taping technique on vastus lateralis and vastus medialis obliqus activity. Physiotherapy, 86(4),2000,173–183.

Maha Mohamed Mady "Kinesiotaping Therapy Techniques for Treating Postpartum Rectus Diastases: A Comparative Study."." IOSR Journal of Nursing and Health Science (IOSR-JNHS) , vol. 7, no.3 , 2018, pp. 67-74.