International Journal of Physiotherapy and Research,
Int J Physiother Res 2015, Vol 3(2):999-05. ISSN 2321-1822
DOI: http://dx.doi.org/10.16965/ijpr.2015.122

Original Article

# ABDOMINAL EXERCISE WITH BRACING, A THERAPEUTIC EFFICACY IN REDUCING DIASTASIS-RECTI AMONG POSTPARTAL FEMALES

**Nisha Acharry [1], Rahul Krishnan Kutty *[2].**

[1] Clinical Physiotherapist, *[2] Lecturer in Physiotherapy.
Department of Physiotherapy, College of Health sciences, Mekelle University, Ethiopia.

## ABSTRACT

**Background:** Diastasis recti abdominis (DRA) has been defined as an impairment characterized by the separation of the two rectus abdominis muscles along the linea alba , Diastasis of the rectus abdominis muscle (DRAM) is common during and after pregnancy, and has been related to lumbo-pelvic instability and pelvic floor weakness. Women with DRAM are commonly referred to physiotherapists for non surgical management, but very few found to be effective.
**Objectives:** To determine if the effectiveness of Abdominal exercise with bracing in reducing the diastasis recti among postpartum females.
**Methodology:** IP&OPD patients of Godavari hospital, Jalgaon for a period of 4 weeks. For this descriptive study a cross-sectional study design was incorporated. A number of (n=30) female patients within 1 month after delivery with Diastasis recti were selected. Each patient was screened, initially by using simple selection proforma relevant to the inclusion and exclusion criteria.
**Results:** A total (n=30) subjects were included in the study, these 30 subjects all are Females and one month and more after child birth. The subjects included in this study with an age from minimal 23 years to 34 years old. Number of off springs which is another variable used, was listed as 1(Minimum) and 4(Maximum) children's. In this study a 26.6% of female are primiparous and 56.7% of them are multiparous. The collected information (data) was tabulated and analyzed by using appropriate statistical analysis tools. 30 Female subjects having mean age 28.8(SD=3.23) in which both primiparous and multiparous women having diastasis recti within 1 month postpartum. Diastasis recti pretest was found to be 3.5(SD= 0.5085) Diastasis recti posttest was found to be 2.5(SD=0.5074) t value=29.00 and P value found to be less than 0.001 which is highly significant.
**Conclusion:** Based on the available evidence and quality of this evidence, after the exercise regimen and bracing the Diastasis recti muscle separation by finger palpation was found to be reduced. Hence, it can be interpreted that with non-surgical interventions (Physical Therapy) can prevent or reduce DRAM in the postpartum.
**KEY WORDS**: Physiotherapy, Diastasis Recti, Abdominal Exercise and Bracing, Postpartum Female, Rehabilitation Of Diastasis Recti.

**Address for correspondence:** Rahul Krishnan Kutty, PhD,PT. Lecturer Department of Physiotherapy, College of Health sciences, Mekelle University, Ethiopia. **E-Mail:**physioraul@gmail.com

**Access this Article online**

**Quick Response code**

**DOI:** 10.16965/ijpr.2015.122

**International Journal of Physiotherapy and Research**
**ISSN 2321- 1822**
**www.ijmhr.org/ijpr.html**

| | |
|---|---|
| Received: 13-03-2015 | Accepted : 26-03-2015 |
| Peer Review: 13-03-2015 | Published (O): 11-04-2015 |
| Revised: None | Published (P): 11-04-2015 |

## INTRODUCTION

Of All the Creations of Nature, the most beautiful is the evolution of the Women. The ultimate gift that Nature presents to a Woman is the "ability to procreate". "Pregnancy" is considered as the most important phase in a Women's life. In this period, a female has to come up with many changes that may be physically, mentally and socially so as to reproduce a healthy offspring. The changes which she experiences due to pregnancy may have direct affection to her womanhood. After the child birth, a women

has to encounter with many anatomical and physiological changes such as changes in the regulation of hormones( oestrogen and progesterone), blood loss , shrinkage of the uterus etc which may lead to postpartal complication such as Postpartal haemorrhage, postpartum endometritis, depression and Diastasis recti. Diastasis recti are the most common complication after pregnancy.

Diastasis recti abdominis (DRA) has been defined as an impairment characterized by the separation of the two rectus abdominis muscles along the linea alba [1]. This increased inter rectus distance (IRD) may be seen congenitally, but most commonly develops during pregnancy and in the early post pregnancy period [2,3]

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[4]. A widening of >2.7 cm at the level of the umbilicus is considered a pathological diastasis of the rectus abdominis muscle (DRAM) [5]. Other studies have defined DRAM as an inter-recti distance of >2 cm at one or more assessment points (at the level of the umbilicus or 4.5 cm above or below the umbilicus) [6,7].

DRAM (Diastasis of the rectus abdominis muscle ) 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 [2,3,7]. DRAM usually appears in the second trimester of pregnancy and is found most frequently in the third trimester [2]. Studies have demonstrated that the inter-recti distance increases at approximately 14 weeks of gestation and continues to increase until delivery [3]. Natural resolution and greatest recovery of DRAM occurs between 1 day and 8 weeks after delivery, after which time recovery plateaus [8]. DRAM is relatively common and can have negative health consequences for women during and after pregnancy (ante-and postnatal periods). Varying estimates of incidence of DRAM have been reported ranging from 66% to 100% during the third trimester of pregnancy [9], and up to 53% immediately after delivery [10]. The abdominal wall has important functions in posture, trunk and pelvic stability, respiration, trunk movement and support of the abdominal viscera. An increase in the inter-recti distance puts these functions in jeopardy [11–13], and can weaken abdominal muscles and influence their functions [14,15]. This may result in altered trunk mechanics, impaired pelvic stability and changed posture, which leave the lumbar spine and pelvis more vulnerable to injury [3,7,13]. Whether this condition is a true separation or a relaxation of the tissues is currently unknown. The diastasis may be slight or severe, sometimes resulting in herniation of the abdominal viscera. [16, 17] When the condition is severe, the abdominal wall is composed only of a layer of skin, attenuated fascia, and periosteum. We believe that a large diastasis recti abdominis may jeopardize any of the functions of the abdominal wall including its role in posture; trunk stability; respiration; delivery of a fetus; and trunk flexion, rotation, and side bending. Any distortion of the abdominal wall musculature (the internal and external oblique, transverses abdominis, and rectus abdominis muscles) or of the rectus sheath has potential consequences to these activities. To date, no electromyographic studies have been conducted on diastases of greater than 2.0 cm; therefore, no data are available to substantiate theories of the effect of diastasis on the functions of the abdominal musculature. Low back pain may occur as a result of the incorrect posture and biomechanics attributed to abdominal muscle weakness [18,19]. Additionally, cosmetic defects may also result from a diastasis [20]. A diastasis can contribute to lower back pain and strain due to other muscles being overworked or compensating for the lack of integrity of abdominals, unstable core, pelvic and back muscles, poor posture, shallow breathing, uterine prolapsed and/or distension (because the growing uterus is not well supported by the abdominal walls and additional pressure is placed on the supporting ligaments of the uterus. When these ligaments are over stretched and strained, they do not bounce back to their original length and therefore the uterus sags). It also cause weak pelvic floor, difficulty in getting back into a regular exercise routine , affects ability to engage in activities requiring

lifting affects generally activity levels. In many women's Lower 'libido' is seen. (Because of women's sexuality is so tied into body image, feelings, emotions etc.)

Reported prevalence of DRA or increased IRD(inter rectus distance) varies and may be inaccurate due to different cut off points for the diagnosis[2,3,5,6,11,21] and use of different measurement methods. Most prevalence studies are based on palpation [22] or calipers [23] which may be less reliable than ultrasonography [24] .To date there are few studies about the normal width of the IRD in postpartum women and there is scant knowledge about risk factors for DRA [25].

Anecdotally, regular exercise prior to pregnancy and during the antenatal period seems to reduce the risk of developing DRAM and reduce the size of DRAM, respectively [2]. Abdominal exercises are also frequently prescribed to postnatal women who have DRAM. 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 [26–29]. However, it is unclear what types of non-surgical interventions, including exercise, are effective to prevent and/or reduce DRAM. Therefore, the aims of this review were to determine whether non-surgical interventions can prevent or reduce DRAM in the antenatal period, and reduce DRAM and health-related negative effects of DRAM in the postnatal period. Moreover, there are limited studies performed for the treatment of Diastasis recti and also less data is available regarding the multiple roles of the utilization of the abdominal muscles in exercises. The aim of the study was to find the effectiveness of Abdominal exercise with bracing in reducing the diastasis recti among post-partal females. Females in their postnatal phase do suffer with profound deleterious effect of pregnancy causing Diastasis recti ultimately resulting into weakness and altered biomechanical efficiency of abdominals. In this study, the focus is given on facilitation, concentric activation and stabilization training of the abdominal muscles with bracing which is helpful for the female while carrying out the daily activities. So, this study may help female patients to strengthen their abdomen and prevent themselves from the complications so that there is improvement in their functional status, self education and rehabilitation.

## METHOD PARTICIPANTS

For this descriptive study a cross-sectional study design was incorporated. A number of (n=30) female patients within 1 month after delivery with Diastasis recti were selected. Each patient was screened, initially by using simple selection proforma relevant to the inclusion and exclusion criteria. The inclusions criteria include in this study are vaginal delivery with or without Episiotomy, primiparous and multiparous women and Patient's willing to join this research. A commonly accepted test for diastasis recti abdominis was performed on each subject who fulfills the inclusion criteria. Moreover, subjects were not included with Caecarean section, abnormal pregnancy, and Fibroid uterus. History of polyhydraminous during pregnancy, any other abdominal and spinal surgery and other systemic illness were also limited.

**Procedure:** All the procedures involved in this study were illustrated to the subjects and consent forms were taken from the participants. Diastasis recti palpation test was performed to check for Diastasis recti. Subjects were made lying down on her back with her knees bent, feet flat on floor and then asked to slowly raise her head and shoulder off the floor reaching her hands towards her knee. Researcher in stride standing besides the subject place fingers of one hand horizontally across the midline of the abdomen at the umbilicus (belly botton) level. If a separation exists, the finger will sink into the gap. It was then checked 2 inch above the umbilicus and below the umbilicus. The width of the linea alba (inter-recti distance) is measured from its length from the xyphoid to the pubic symphysis. All these 30 females were checked for Diastasis recti by palpatory method and the inter-recti distance was recorded which was marked as pre-test measurement.

Furthermore, subjects were taught a set of abdominal exercise to correct their Diastasis recti. These includes: Static abdominal exercise; subject in supine lying with her arms crossed over the diastasis for support. And subject has

to draw or pull the abdomen inwards so that there elicits an isometric contraction of abdominal muscles and repeated this for 5-7 times. Head lift with bracing: Subject placed in Hook-lying with her hands crossed over midline at the level of the diastasis for support, subject were asked to exhale and lift only her head off the floor or until the point just before a bulge appears. At that time, subjects hands were gently approximate the rectus muscles toward midline and lower her head slowly and relax or use of a sheet or a towel wrapped around the trunk at the level of the separation can also been another alternative to provide support and approximation.

**Head lift and pelvic tilt with bracing:** Subject were placed in hook-lying with her arms crossed over the diastasis for support and slowly her head was lifted off the floor while approximating the rectus muscles and performing a posterior pelvic tilt, then slowly lower her head and relax.

**Pelvic clock exercise:** In this exercise regime, subject was placed in hook-lying, and was asked to visualize the face of a clock on her lower abdomen. Later subject begin with gentle movements from 12 to 6 o'clock, as instructed to move from 3 o'clock to 9 o'clock. Then move in a clockwise manner from 12 to 3 to 6 to 9 and then back to 12 o' clock. These all exercises were asked to perform twice daily with a repetition of 5-7 times for 2 weeks duration. After that a Post test measurement was collected by the Diastasis recti was palpation and measuring the inter-recti distance.

**Data Analysis:**

All data were cleaned and arranged for analyzing, Using SPSS 16.0 for Windows (SPSS Inc, Chicago, IL) at a type I error rate of 0.05 were used for the study. Descriptive statistics were generated for the demographic, Date of delivery, Obstetric history: (GPLA- gravida, Pariety, living, abortion) Number of offsprings , history of polyhydra-minous during pregnancy, weakness or any pain or any other complaint in abdomen, exercise performed or not in Antenatal period, any other complication related to pregnancy. The data were investigated by testing for group-by-time interactions for the incidence of IRD.

The reading for the 1st sitting (pre-test) means and after 1 months of exercises regime duration (post-test) values were analyzed by the help of SPSS using the student 't' test.

## RESULTS

A total (n=30) subjects were included in the study, these 30 subjects all are Females and one month and more after child birth. The subjects included in this study with an age from minimal 23years to 34 years old. Number of off springs which is another variable used, was listed as 1(Minimum) and 4(Maximum) children's. In this study a 26.6% of female are primiparous and 56.7% of them are multiparous. (Table-1).

**Table 1:** Percentage frequency of various parameters related to Diastasis recti abdominis muscle (DRAM).

| S.NO | Variables | | Frequency | Percentage |
|---|---|---|---|---|
| 1. | Age | 23-26 | 9 | 29.9 |
| | | 27-30 | 11 | 36.7 |
| | | 31-34 | 10 | 33.3 |
| 2. | Number of Offspring | 1 | 14 | 46.7 |
| | | 2 | 11 | 36.7 |
| | | 3 | 4 | 13.3 |
| | | 4 | 1 | 3.3 |
| 3. | Primiparous | Yes | 22 | 73.3 |
| | | No | 8 | 26.7 |
| 4. | Multiparous | Yes | 13 | 43.3 |
| | | No | 17 | 56.7 |

After the collection of data, the pretest and the posttest effect of abdominal exercise with bracing on diastasis recti, within the group comparison was done by paired t-test(Table-2).

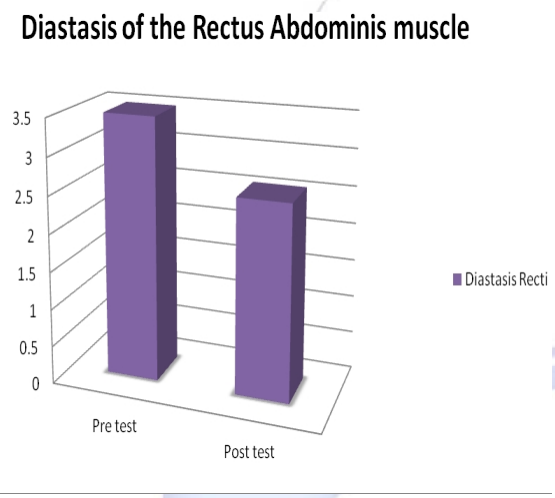
The collected information (data) was tabulated and analyzed by using appropriate statistical analysis tools. 30 Female subjects having mean age 28.8(SD=3.23) in which both primiparous and multiparous women having diastasis recti within 1 month postpartum. Diastasis recti pretest was found to be 3.5(SD= 0.5085) Diastasis recti posttest was found to be 2.5(SD=0.5074) t value=29.00 and P value found to be less than 0.001 which is highly significant.

**Table 2:** Diastasis recti pretest and posttest values.

| Variable | Diastasis recti examination (finger separation) | t value | P value |
|---|---|---|---|
| Pretest | Mean=3.5, (SD=0.5085) | 29 | 0.001 |
| Posttest | Mean=2.5, (SD=0.5074) | | |

In this study 30 females with mean age 28.8, the Diastasis rectii separation by finger palpation before exercise was found to be 3.5 and after exercise training programme, was found to be 2.5.(Graph-1).

**Graph 1:** Comparison within the group PRE-TEST v/s POST-TEST value.




After the exercise regimen and bracing the Diastasis recti muscle separation by finger palpation was found to be reduced. Hence, it can be interpreted that with non-surgical interventions (Physical Therapy) can prevent or reduce DRAM in the postpartum period.

## DISCUSSION

In this study the main focus was to measure the effectiveness of Abdominal exercise with bracing in reducing the diastasis recti among post partal females. The participants were asked to perform Diastasis recti corrective exercise for 2 weeks. Their Diastasis recti separation by finger palpation before abdominal exercise was found to be mean= 3.5 and after the abdominal exercise it was found to be mean=2.55. The exercises which were included are Static abdominal exercise, Head lifts, Head lifts with pelvic tilts and Pelvic clock exercise along with bracing. Bracing is additionally incorporated in the above exercise which works as a harness, so that is there is adequate intra-abdominal force generated which can protect the diastasis from worsening. There is facilitation, concentric activation and stabilization of the abdominals occurring due to the above mentioned exercise.

In a similar study done on Diastasis Recti Abdominis during the Childbearing Year, which concluded that natural restoration of rectus abdominis diastasis takes place in 6 weeks [30], when comparing the result with this study As far as we are unaware this is the second longitudinal study following a cohort with ultrasound assessment of the IRD from late pregnancy till 6 months postpartum. The limitations of the study were the lack of pre-pregnancy assessment of the condition and a prior power size calculation for comparisons between women with and without DRA. Another limitation of the study is the sample size is limited to 30 participants, so in future study more sample size can be incorporated and result can be more validated.

Both primiparous and multiparous females were included; isolation in regard of number of deliveries was not done, effect of severity of diastasis recti on body weight of the female was not considered. Irregularities regarding follow up of exact home exercise programme as prescribed irrespective of training sessions.

The IRD was the only structural parameter measured in this study, which may not reflect all the structural changes that may take place in the fascial and muscular structures of the abdominal wall in primiparous women. Measurements of other structures (muscle length, thickness), comparison with multiparous women, and a longer follow-up than 6 months postpartum could be of value in future studies[30]. This study showed the early reduction of Diastasis recti but also helped in strengthening the abdominal muscles and maintaining the stability and mobility of trunk, hips and pelvis. This exercise also elevated the self confidence in women and many of them were seen to resume their functional activities of daily living with ease and as early after child birth.

## CONCLUSION

The result of this study shows 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.

### List of abbreviations

DRA - Diastasis recti abdominis
IRD- Inter rectus distance
DRAM- Diastasis of the rectus abdominis muscle

### Acknowledgements

The authors would like to thank Dr. Neha Ingale for guidance around the development of the review protocol and suggestions on a draft manuscript.

**Conflicts of interest:** None

## REFERENCES

[1]. Axer H, Keyserlingk DG, Prescher A. Collagen fibers in linea alba and rectus sheaths. I. General scheme and morphological aspects. J Surg Res 2001 Mar;96(1): 127-34.
[2]. Boissonnault JS, Blaschak MJ. Incidence of diastasis recti abdominis during the childbearing year. Phys Ther 1988 Jul;68(7):1082-6.
[3]. Gilleard WL, Brown JMM. Structure and function of the abdominal muscles in primigravid subjects during pregnancy and the immediate postbirth period. Physical therapy. Am Phys Ther Assoc 1996 Jul 1;76(7):750-62
[4]. Hsia M, Jones S. Natural resolution of rectus abdominis diastasis. Twosingle case studies. Aust J Physiother 2000;46:301–7.
[5]. Rath AM, Attali P, Dumas JL, Goldlust D, Zhang J, Chevrel JP. Theabdominal linea alba: an anatomo-radiologic and biomechanical study.Surg Radiol Anat 1996;18:281–8.
[6]. Chiarello CM, Falzone LA, McCaslin KE, Patel MN, Ulery KR.The effects of an exercise program on diastasis recti abdomi-nis in pregnant women. J Womens Health Phys Ther 2005;29:11–6 [corrected, published erratum appears in J Womens Health PhysTher 2005;29:76].
[7]. Lo T, Candido G, Janssen P. Diastasis of the recti abdominis inpregnancy: risk factors and treatment. Physiother Can 1999;51:32–6,44.]
[8]. Coldron Y, Stokes M, Newham D, Cook K. Postpartum characteris-tics of rectus abdominis on ultrasound imaging. Man Ther 2008;13:112–21.
[9]. Hanneford R, Tozer J. An investigation of the incidence, degree andpossible predisposing factors of the rectus diastasis in the immedi-ate post-partum period. J Nat Obstet Gynaecol Special Group. Aust Physiother Assoc 1985;4:29–32.
[10]. Candido G, Lo T, Janssen P. Risk factors for diastasis of therecti abdominis. J Assoc Chart Physiother Womens Health 2005;97:49–54.
[11]. Bursch SG. Interrater reliability of diastasis recti abdominis measure-ment. Phys Ther 1987; 67: 1077–9.
[12].Richardson CA, Jull G, Hodges PW, Hides JA. Backpain and lum-bopelvic stabilisation: the case for the local muscle system. In:Richardson CA, Jull G, Hodges PW, Hides JA, editors. Therapeuticexercise for spinal segmental stabilisation in low back pain: sci-entific basis and clinical approach. London: Churchill Livingstone;1999.
[13]. Lee DG, Lee LJ, McLaughlin L. Stability, continence and breathing:the role of fascia following pregnancy and delivery. J Bodywork MoveTher 2008;12:333–48.
[14]. Fast A, Weiss L, Ducommun EJ, Medina E, Butler JG. Low-back painin pregnancy. Abdominal muscles, sit-up performance, and back pain.Spine (Phila Pa 1976) 1990;15:28–30.
[15]. Liaw L-J, Hsu M-J, Liao C-F, Liu M-F, Hsu A-T. The rela-tionships between inter-recti distance measured by ultrasoundimaging and abdominal muscle function in postpartum women:a 6-month follow-up study. J Orthop Sports Phys Ther 2011;41:435–43.
[16]. Noble E: Essential Exercises for the Childbearing Year, ed 2. Boston, MA, Houghton Mifflin Co, 1982, pp 8, 58-6.
[17].Culbertson C: Surgery of the Female Pelvis: Gynecological and Obstetrical Monographs. New York, NY, Appleton & Co, 1931, p 211.
[18]. Kendall FP, McCreary EK: Muscles: Testing and Function, ed 3. Baltimore, MD, Williams & Wilkins, 1983, p 214.
[19]. Porterfield JA: Dynamic stabilization of the trunk. Journal of Orthopaedic and Sports Physical Therapy 6:271-277, 1985.
[20]. Elbaz JS, Flageul G (translated from French by W. T. Keavy): Plastic Surgery of the Abdomen. New York, NY, Masson Publishing USA Inc,1979, p 6.
[21]. Spitznagle TM, Leong FC, van Dillen LR 2007 Prevalence of diastasis recti abdominis in a urogynecological patient population. Int Urogynecology J 18:3.
[22].Mantle J, Haslam J, Barton S, Cardozo L. Physiotherapy in obstetrics and gynaecology.2004.
[23]. Boxer S, Jones S. Intra-rater reliability of rectus abdominis diastasis measurement using dial calipers. Aust J Physiother 1997;43(2):109-14.
[24]. Mota P, Pascoal AG, Sancho F, Bø K. Testeretest and intrarater reliability of 2- dimensional ultrasound measurements of distance between rectus abdominis in women. J Orthop Sports Phys Ther 2012 Nov;42(11):940-6.
[25]. Benjamin DR, van de Water ATM, Peiris CL. Effects of exercise on diastasis of the rectus abdominis muscle in the antenatal and postnatal periods: a systematic review. Physiotherapy 2014 Mar;100(1):1-8.

[26]. Sapsford R, Bullock-Saxton J, Markwell S. Women's health: a text-book for physiotherapists. 1st ed. London: WB Saunders CompanyLtd; 1998.

[27]. Opala-Berdzik A, Dabrowski S. Physiotherapy in diastasis of the rec-tus muscles of abdomen in women during pregnancy and postpartum. Fizjoterapia 2009;17:67–70 [in Polish].

[28].Keeler J, Albrecht M, Eberhardt L, Horn L, Donnelly C, Lowe D. Dias-tasis recti abdominis: a survey of women's health specialists for currentphysical therapy clinical practice for postpartum women. J Women'sHealth Phys Ther 2012;36:131–42.

[29]. Sheppard S. Case study. The role of transversus abdominus in postpartum correction of gross divarication recti. Man Ther 1996;1:214–6.

[30].Jill Schiff Boissonnault and Mary Jo Blaschak , Childbearing Year Incidence of Diastasis Recti Abdominis During the Childbearing Year, phys ther. 1988; 68:1082-1086.

**How to cite this article**:

Nisha Acharry, Rahul Krishnan Kutty. ABDOMINAL EXERCISE WITH BRACING, A THERAPEUTIC EFFICACY IN REDUCING DIASTASIS-RECTI AMONG POSTPARTAL FEMALES. Int J Physiother Res 2015;3(2):999-1005.
**DOI:** 10.16965/ijpr.2015.122