

CLINICAL EFFICACY OF 6 WEEKS PILATES PROGRAM IN WOMEN WITH POSTPARTUM LOW BACK PAIN : A PILOT STUDY

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Received: August 03, 2020; Revised: September 05, 2021; Accepted: September 06, 2021

Abstract

Low back pain is considered to be the most salient feature during the postpartum period. The incidence of post-partum symptoms peculiarly back pain varies from women to women with vanishing of symptoms in almost around 60% within 2 days post-partum to peak of 82% within 18 months. Pilates is a group of exercises focussing on the controlled movement and breathing pattern. There is lacuna in clinical evidence on Pilates for boosting women's health during and post pregnancy. Objectives- To Evaluate the clinical efficacy of 6 Week Pilates Program in Postpartum females on Low Back Pain, Muscle Strength and Inter-rectus distance after 6-12 months of postpartum. Methods- 10 postpartum females diagnosed with postpartum back pain and Diastasis Recti were selected from Obstetrics and Gynaecology OPD of xxx and randomly allocated into two groups-Group A (Experimental) and Group B (Control Group) by closed envelope method. The Group A received a 6 week Pilates Program and the Group B received only the conventional treatment. Result- One way Anova and Independent t test for within group analysis and between group analysis of Group A and B. Statistical significant improvements were detected in Pain after intervention of 6 weeks with t value 0.004 and P value <0.05. Abdominal Muscle Strength and Inter Recti Distance also showed significant increase following 6 weeks Pilates program. Conclusion- The results indicated that 6 weeks Pilates protocol is an effective program in females with post-partum back pain.

Keywords: Pilates, Postpartum low back pain, Inter rectus distance, Digital nylon calliper, Pressure biofeedback.

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Introduction

World Health Organization (WHO) defines the postnatal period as the most important but still neglected phase both for mothers and babies in their life (World Health Organization, 2010). Postpartum Low Back Pain in relation to pregnancy is a notable health problem which affects a larger number of women globally (Gutke *et al.*, 2018).

Low back pain is defined as the pain in the lower part of the spine and it usually starts at 18th weeks of pregnancy and may persist in the postpartum period (Terzi *et al.*, 2015; Kumar *et al.*, 2017).

It is considered to be a frequent complaint amongst women during and after pregnancy making it a leading cause for disability (Global Burden of Disease study 2013; Collaborators., 2015; Mahishale, A and Borkar, 2016). It has also been documented by many researchers that low back pain can alter quality of life of patients affecting their psychosocial behaviour and also is considered to be a cause for disability (Bastiaanssen *et al.*, 2005; Kumar and Narkeesh., 2017). Various physiological aspects have been reported to contribute to postpartum back pain like stress and fatigue in the Sacroiliac joint, Lumbosacral spine either by laxity observed in ligaments, gaining of the weight or lordosis (Salzberg, 2012). Post-Partum period a changing phase that has a conclusive effect on the physical and mental health of a mother (Ko *et al.*, 2008) with an incidence of 30% to 45% has been reported. The reported incidence is also found to be fluctuating in the supporting literature from disappearance of symptoms specially the pain in more than 60% in 2 days postpartum to an approximation of 37% at 12 months of postpartum and reaching up to 82% at 18 months postpartum for women with recurrent back pain from previous histories (To and Wong, 2003). Ostgaard and Andersson reported that 67% of women were found to report back pain directly after delivery and 37% experienced back pain 18 months postpartum. It was also documented that the prevalence of back pain would come back to before pregnancy level in up to 2 years after the delivery (Ostgaard *et al.*, 1991). Although researchers have documented that many of the women consider low back pain to be an unavoidable and unpreventable part of pregnancy and therefore do not seek for any

kind of medical help turning it into the chronic pain (Mogren and Pohjanen, 2005). Approximately 4 out of 10 women complaints of low back pain in six months after delivery and recurrence of symptoms is primarily observed in this duration (Mogren, 2006). Multiple approaches are being used Globally by the Physiotherapists for the management of Postpartum Low Back Pain and Pilates is one of the such approach used by physiotherapists which is gaining acceptance as being one of the emerging new approach. It is a group of exercises imparting focus on the controlled movement, breathing pattern, stretching, improving flexibility and health by highlighting core with movement (Brynes *et al.*, 2018). The Pilates approach facilitates pelvic floor muscles, abdominals, spinal extensors and this conditions the body and mind which further coordinates the stabilization exercises (Phrompaet *et al.*, 2011). Recent studies documented the effectiveness of Pilates in improving muscle function, improving quality of life, enhanced sleep quality after the delivery (Mazzarino *et al.*, 2015; Giacomini, 2016; Dastenaee *et al.*, 2020). Although Pilates is defined to be successful among females with Nonspecific back pain but still there is dearth of evidence for a defined protocol in postpartum females which leads to prevailing of clinical symptoms for longer period of time. There has been dearth of studies depicting long term follow up in postpartum care whereas short term follow up have little evidence regarding the persistence of back pain and other issues associated with it. Numerous studies have been done globally in women with postpartum low back pain reporting impairments in their daily activities but still they found it difficult to take out time for any kind of medical assistance or treatment (Lumley, 2000; Brown *et al.*, 2002; Iwata *et al.*, 2018). Although the benefits of Pilates and the recommendations by American College of Obstetricians and Gynaecologists (ACOG's) in correspondence to this regard are reported but the advantageous effect is still of Pilates is under discussion and appropriate treatment plans are very rare in this regard (Mazzarino *et al.*, 2015). Therefore, the present study targeted at designing a 6 week Pilates program in women with postpartum back pain. It is hypothesized through this study that Pilates 6week protocol could play a major role in improving Pain, Abdominal Muscle Strength and Inter Recti Distance among women with postpartum low back pain.

Methods

Ethics

The present study was approved by Institutional Ethical Committee (IEC) (SGTU/FOP/2019/72), Faculty of Physiotherapy, Shri Guru Gobind Singh Tricentenary University, Gurugram, Haryana, India. All the procedures used in the present study were in accordance with the guidelines provided by Helsinki's Declaration, 1964 and its later amendments.

Sample

A sample of 10 participants after screening based on presence of Diastasis recti, ability to perform exercises for a minimum of 30 minutes, absence of postpartum depression ruled out by Postpartum Edinburgh Depression Scale and physical assessment were recruited for the present study. Prior to the commencement of study, all the participants were explained the need and procedures and were made to sign a written informed consent in the patients language.

Eligibility Criteria

The present study was conducted in the Obstetrics and Gynaecology Out Patient Department of Shri Guru Gobind Singh Tricentenary Hospital (SGT) and Physiotherapy Out Patient Department, SGT Hospital, Gurugram, Haryana. Postpartum Low Back Pain females with age group of 20-35 years and 6-12 months of postpartum were recruited from SGT (Shri Guru Gobind Singh Tricentenary) Medical Hospital and Research Institute, Gurugram, Haryana. SGT Hospital and Research Institute is located in Gurgaon officially Gurugram, is a city located in the northern Indian state of Haryana. It is situated near the Delhi - Haryana - border, about 30 kilometres (19 mi) southwest of the national capital New Delhi and 268 km (167 mi) south of Chandigarh, the state capital with a total Estimated population as per the provisional data of the 2011 census, Gurgaon had a population of 876,969 out of which the male population was 4,75,032 and the female population was 4,01,937. The inclusion criteria included having an understanding of basic English language to complete the questionnaire and to respond to the treatment. Also, the participants complaining of pain from last 3 months and having normal single vaginal delivery were included. Exclusion criteria included any history of previous back surgeries, unable to perform exercises, presence of any vertebral anaemia or postpartum anaemia and presence of Postpartum depression were also exclude

Procédure

Before the actual testing of protocol height and weight of the participants were recorded following which BMI was calculated using their height and weight values. Based on the eligibility criteria the participants were allocated into two groups- Group A (Experimental Group) and Group B (Control group). The Experimental Group (Group A) received the Self Designed Pilates Protocol which had 3 phases - Phase 1 Warm up, Phase 2 Pilates Exercises and Phase 3 Cool Down. All the exercises started and ended with inhaling slowly for 7 seconds with a pause for 3 seconds and then exhaling for 7 seconds with 5 repetitions. Figure No 1 shows the protocol as described. The Control Group (Group B) received conventional treatment for the postpartum back pain which is the TENS and exercises. The randomization was done using envelope method where one researcher made the envelope and the second researcher was asked to open the envelope to avoid any biasedness. For application of TENS, the subjects were positioned prone and following which electrical stimulation through TENS, a low frequency device with a duration of 250 μ s and frequency of 7Hz. Electrodes were placed 1 cm away from the spinous processes of L1 and L5 for 10 minutes on both the sides depending on the tolerance level of patients. (Keskin *et al.*, 2012). Exercises included Kegel Exercise and Abdominal drawing-in manoeuvre with Bridging for 5 minutes. After completion of the interventions Data was collected for Pain (Roland Morris Disability Questionnaire), Muscle strength (Pressure Biofeedback) and Inter Recti Distance (Digital Nylon Calliper) at the Pre-Intervention (0 Day), 21st day of Intervention (After Last day of 3rd Week) and Post-Intervention (Last day of 6th Week) (EL-Mekawy *et al.*, 2013).

Results and Discussions

The present study aimed at exploring the Clinical Efficacy of the 6 week Pilates program in women with Post-Partum Back Pain. The main findings include the improvement in the pain, increase in the abdominal muscle strength and reduction in the Inter recti distance. In accordance to our study (Mazzarino *et al.*, 2015) reported very few evidences stating the effective effect of pilates on the health of females in the postpartum period or in musculoskeletal conditions during and after the pregnancy Therefore this led to the conclusion that more of the clinical trials are the need of hour for determining its clinical efficacy on various maternal parameters like pain, muscle strength, incontinence, quality of life to improve the health outcomes (Mazzarino *et al.*, 2015).

WEEK 1 & 2		PILATES PROTOCOL	
MONDAY, WEDNESDAY AND FRIDAY	WARMUP (5Min)	1. Marching- 60 seconds- 2 repetitions 2. Side toe touch and Arm raise-60 seconds- 2 repetitions 3. High knee lift-60 seconds- 2 repetition	
	PILATES EXERCISE (30 Min)	1. Diaphragmatic breathing 2. Pelvic tilt 3. Abdominal correction 4. One Hundred 5. Single Leg Circles 6. Shoulder Bridge 7. Swimming 8. Plank 9. Spine Stretch 10. Side Kick 11. Roll Up and Down 12. Swan Drive	
	COOLDOWN (5 Min)	1. Side hip stretch 2. Shoulder stretch- 30 sec per arm 3. Triceps stretch-30 sec per arm	
WEEK 3 & 4		PILATES PROTOCOL	
MONDAY, WEDNESDAY AND FRIDAY	WARMUP (5Min)	1. Marching- 60 seconds- 2 repetitions 2. Side toe touch and Arm raise-60 seconds- 2 repetitions 4. High knee lift-60 seconds- 2 repetition	
	PILATES EXERCISE (30 Min)	1. Diaphragmatic breathing 2. Pelvic tilt 3. Abdominal correction 4. One Hundred 5. Single Leg Circles 6. Shoulder Bridge 7. Swimming 8. Plank 9. Spine Stretch 10. Side Kick 11. Roll Up and Down 13. Swan Drive	

	COOLDOWN (5 Min)	1. Side hip stretch 2. Shoulder Stretch- 30 sec per arm 4. Triceps Stretch-30 sec per arm
WEEK 5 & 6		PILATES PROTOCOL
MONDAY, WEDNESDAY AND FRIDAY	WARMUP (5Min)	1. Marching- 60 seconds- 2 repetitions 2. Side toe touch and Arm raise-60 seconds- 2 repetitions 5. High knee lift-60 seconds- 2 repetition
	PILATES EXERCISE (30 Min)	1. Diaphragmatic breathing 2. Pelvic tilt 3. Abdominal correction 4. One Hundred 5. Single Leg Circles 6. Shoulder Bridge 7. Swimming 8. Plank 9. Spine Stretch 10. Side Kick 11. Roll Up and Down 14. Swan Drive
	COOLDOWN (5 Min)	1. Side hip stretch 2. Shoulder stretch- 30 sec per arm 5. Triceps stretch-30 sec per arm

Figure 1. 6 Week Pilates Protocol

Table 1. Shows1 Mean and SD of Age (in Years) and BMI of the subjects included in the study in the different interventional group of the subjects of Group A and Group B.

Demographic Detail	Group A		Group B		Total	
	Mean	SD	Mean	SD	Mean	SD
Age	25.2	1.92	26.6	2.50	25.9	2.23
BMI	21.92	1.89	20.8	2.70	21.36	2.28

Table 2. Shows Mean and SD of Pain scores at Pre-intervention, 21st day of Intervention (After Last day of 3rd Week) and Post-Intervention (Last day of 6th Week) of the subjects of Group A and Group B.

Demographic Detail	Group A		Group B		Total	
	Mean	SD	Mean	SD	Mean	SD
Age	25.2	1.92	26.6	2.50	25.9	2.23
BMI	21.92	1.89	20.8	2.70	21.36	2.28

Table 3. Shows Comparison of pain evaluation Mean value at Pre-intervention, 21st day of Intervention (After Last day of 3rd Week) and Post-Intervention (Last day of 6th Week) between Group A and Group B

Pain Evaluation	Group A Vs Group B	
	t Value	P Value
Pre Intervention	0.279	P > 0.05
21 st day of Intervention	0.126	P > 0.05
Post- Intervention	0.004*	P < 0.05

Table 4. Shows Comparison of mean value of PAIN between inter group at Pre, 21st day of Intervention and Post-Intervention (Last day of 6th Week) within Group A and Group B

Pain Evaluation	Group A		Group B	
	F Value	P Value	F Value	P Value
Pre Vs 21 st Day Vs Post Intervention	55.650	P<0.05	5.213	P>0.05

Table 5. Shows Mean and SD of Abdominal Muscle Strength at Pre-intervention, 21st day of Intervention (After Last day of 3rd Week) and Post-Intervention (Last day of 6th Week) of the subjects of Group A and Group B.

Abdominal Muscle Strength Evaluation	Group A		Group B	
	Mean	SD	Mean	SD
Pre Intervention	230.4	13.83	231.6	13.35
21 st day of Intervention	219	13.92	227.2	13.00
Post- Intervention	198.4	11.99	222.6	12.66

Table 6. Shows Comparison of Abdominal Muscle Strength Mean value at Pre-intervention, 21st day of Intervention (After Last day of 3rd Week) and Post-Intervention (Last day of 6th Week) between Group A and Group B

Abdominal Muscle Strength Evaluation	Group A Vs Group B	
	t Value	P Value
Pre Intervention	0.892	P > 0.05
21 st day of Intervention	0.364	P > 0.05
Post- Intervention	0.014*	P < 0.05

Table 7. Shows Comparison of mean value of Abdominal Muscle strength between inter group at Pre, 21st day of Intervention and Post-Intervention (Last day of 6th Week) within Group A and Group B

Abdominal Muscle Strength Evaluation	Group A		Group B	
	F Value	P Value	F Value	P Value
Pre Vs 21 st Day Vs Post Intervention	7.457*	P<0.05	0.598	P>0.05

Table 8. Shows Mean and SD of Inter Recti Distance (IRD) at Pre-intervention, 21st day of Intervention (After Last day of 3rd Week) and Post-Intervention (Last day of 6th Week) of the subjects of Group A and Group B

IRDEvaluation	Group A		Group B	
	Mean	SD	Mean	SD
Pre Intervention	28.40	0.80	28.95	0.72
21 st day of Intervention	26.24	0.63	28.34	0.58
Post- Intervention	24.01	0.45	28.08	0.52

Table 9. Shows Comparison of Inter Recti Distance (IRD) Mean value at Pre-intervention, 21st day of Intervention (After Last day of 3rd Week) and Post-Intervention (Last day of 6th Week) between Group A and Group B

IRD Evaluation	Group A Vs Group B	
	t Value	P Value
Pre Intervention	0.291	P > 0.05
21 st day of Intervention	0.001	P < 0.05
Post- Intervention	0.0001*	P < 0.05

*P<0.05= Significant

Table 10. Shows Comparison of mean value of Inter recti distance (IRD) between inter group at Pre, 21st day of Intervention and Post-Intervention (Last day of 6th Week) within Group A and Group B

IRD Evaluation	Group A		Group B	
	F Value	P Value	F Value	P Value
Pre Vs 21 st Day Vs Post Intervention	57.533*	P<0.05	2.586	P>0.05

*P<0.05= Significant

The present study also showed improvement in the pain which can be related to a study conducted in relation to our result it was documented by Hanan *et al* that specific Pilates exercises provided to the women in the postpartum phase improved low back pain, improved functional status and quality of life (Hanfy *et al.*, 2011; EL-Mekawy *et al.*, 2013). Mahdavine Jad R *et al* in an another literature review on “Pilates Selected

exercises effect on Muscle strength, Trunk joints range of motion and flexibility of women with hyper lordosis in immediate post - partum “The review emphasized that Pilates could play a major role in restoration of the women’s body during the postpartum phase and it may also prove to be useful among the health care practioners in improving the women’s recovery during the postpartum phase, although there is dearth of studies to support this conformity (Rezaei *et al.*, 2015). Many studies show that exercises are very much effective in treating low back pain (Mahishale and Borkar, 2016; Kumar and Narkeesh., 2017) Keira Brynes, Ping -Jung *et al* carried out a systematic review on whether Pilates is an effective rehabilitation tool. They emphasized that Pilates is effective in reducing pain and disability in non-specific back pain and recommended that future studies are required to show the effect of Pilates in other health conditions (Byrnes *et al.*, 2018). Mahdavine Jad *et al* in a n an another literature review on “Pilates Selected exercises effect on Muscle strength, Trunk joints range of motion and flexibility of women with hyper lordosis in immediate post - partum “The review emphasized that Pilates could play a major role in restoration of the women’s body during the postpartum phase and it may also prove to be useful among the health care practioners in improving the women’s recovery during the postpartum phase, although there is dearth of studies to support this conformity (Rezaei *et al.*, 2015). Jessica Keeler (2014) in a research report on Diastasis Recti Abdominis: A survey of women’s health specialists for current physical therapy clinical practice for Postpartum women emphasized the focus on the need for future studies to explore the interventions for reducing the inter recti on the basis of evidence (Keeler *et al.*, 2012). This results were found to be consistent with the literatures previously done which stated that females with postpartum low back pain and dysfunction may have presence of increased Inter recti distance leading to Diastasis Recti (Parker *et al.*, 2009). In the present study Experimental group performing Pilates protocol led to the significant improvement in the parameters. Many mechanisms are suggested to explain the effect of Pilates. Pilates introduced by Joseph comprises exercises that are considered good for rehabilitation after pregnancy (Gutke *et al.*, 2018). The results observed in the present study showed that principles of the Pilates lead to the activation of the transverse abdominis and multifidus muscle. In some literature reports it has been suggested the potential of Pilates principles for recruitment patterns of specific muscles (Leticia Souza Andrade *et al.*, 2015). In an another literature review,

Dominika Gruszczynska, (Aleksandra *et al.*, 2018) revealed that there is no gold standard method for treating diastasis recti (Gruszczynska and Truszczynska baszak 2018) .In an another literature review it emphasized that women should opt for isometric contraction of the transverse abdominis as it acts like as internal corset which helps in bringing back the rectus abdominis in and back along with the pelvic floor exercises Mesquita *et al.*, 1999; Collie and Harris, 2004).

Conclusions

In conclusion, our study provides the clinical efficacy of a 6week Pilates program in women with postpartum back pain. Therefore, it can be used in clinical practice by health care providers to improve pain, abdominal muscle strength, and inter recti distance in women with postpartum low back pain.

Acknowledgement

The authors would like to extend gratefulness towards all the participants who participated in the study and the Institutional Committee of the Faculty of Physiotherapy, SGT University.

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