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Effects of mat based Pilates exercises Vs conventional exercises on core muscle strength in postnatal women

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Abstract
Background: There are various physical changes during pregnancy and postpartum. Pregnancy is the common cause for lordotic posture. Due to poor posture adapted musculoskeletal pain occurs after pregnancy and decrease core muscle strength. Because of weak core decreased lumbar stability. There is a relationship between core strength and back pain. There are beneficial effects of regular exercise in post partum period on core strength in postnatal women.
Aim: To compare the effectiveness of Pilates Vs conventional exercises on core muscle strength in postnatal women.
Methodology: Ethical approval from institute was taken. Fifty women were selected according inclusion exclusion criteria, and they were randomly divided into Pilates Group A (n=25) and conventional Group B (n=25). Sphygmomanometer was used to asses core muscle strength, 6 sessions per week and half an hour per session. Treatment was given for 3 weeks.
Results: In within group analysis the muscle strength measurement showed statistically significant improvements in both the training groups. In this study Pilates group core strength improved from with mean (44.72±2.836) to (75.88±5.262) mean percentage in functional ability by 78 %; p=0.0003 as compared to conventional group with mean (44.72±2.475) to (51.60±3.014) and mean percentage in functional ability by 52 %; p =0.0162 over the period of 3 weeks. In this study, the Pilates group showed significantly more increase core strength as compare to conventional in post natal women. Two tail p value is < 0.0001 is Extremely significant.
Conclusion: In this study we concluded that after 3 weeks of training, Pilates exercises are more effective than conventional exercises in improving core muscle strength in postnatal women.

Keywords: pregnancy, post partum period, core muscles, core strength, Pilates exercises, conventional exercises

Introduction

Strong core is very important not only for the cosmetic benefits, but more importantly is live a life free of pain. Pregnancy certainly influences our core strength as our abdominal wall stretches and our pelvis separates during delivery. A strong core is essential to prepare for the anatomical stressors of pregnancy, but to also help us recover too [1].

The postpartum period is a transitional phase that has a decisive effect on a mother's physical and mental health [2]. Core Changes During Pregnancy and Postpartum: First it's important to understand how pregnancy affects the musculoskeletal system. As the uterus expands, the abdominals stretch and the back muscles shorten. The connective tissue in the linea alba thins and separates (see Diastasis Recti sidebar). The ligaments and joints in the pelvis become very unstable. The pelvic floor and abdominal core often weakens under the weight of the fetus. The postpartum recovery period comes with its own set of physical changes. Many women are sedentary for months as they recover from delivery, which creates even more tightness and weakness.

When all of these physical changes combine in pregnancy and beyond, "There's a big change in how the muscles interrelate and how women coordinate all their muscles," explains Julie Wiebe, a physical therapist who specializes in post-pregnancy. "You can have a super strong abdomen and still have poor core stability." Getting back into shape postpartum is not just about strength-the goal should be proper function. Decreased lumbar stability, muscular strength, and altered motor control are thought to be possible causes of low back pain (LBP), which is one of the most common reasons people seek medical care in the United States [3].

During pregnancy, hormonal changes caused by relaxin, progesterone and estrogen combined with uterine growth cause stretching of the abdominal muscles, affecting mainly the rectus abdominis. Further more, as pregnancy progresses and the abdominal muscles stretch, a loss in the force vector and a decrease in contraction strength of rectus abdominis muscles occur [4]. In the situation of lumbar lordosis, weakness of the TrA (abdominal muscle) a weaker than the muscles in the lumbar spine [5, 6]. The deep fibers of the multifidi and TrA are the first muscles to become active when there is postural disturbance from rapid extremity movements [7]. "Core" muscles work independently suggesting that a strong core will prevent low back pain. And shows that there is a relationship between strength of core muscle and back pain [8].

Two Out of three women experience a separation of the rectus abdominis muscles [9]. Separation can occur any time in the last half of pregnancy but is most problematic after pregnancy when the abdominal wall is weak. Abdominal separation or

diastases recti reduce she integrity and functional strength of the abdominal wall [10]. The abdominal muscles usually take some time to regain their tone and strength [11].

It is important to begin postnatal abdominal exercises that are graded to the rate of recovery and the pre-delivery level of fitness, as gradual abdominal muscle strengthening is safe and effective. This not only helps with the physical appearance; but it also keeps the back healthy as strong abdominals create a stable core to support the lower back during daily activities [12].

Pilates is an exercise technique that is currently being used to treat patients with weak core muscle strength. Pilates exercises, introduced by Joseph Pilates in the early 20th century, are considered a good method for accelerating convalescence after pregnancy [13]. It involves 6 basic principles: breathing, centering, concentration, control, precision, and fluidity [14]. Centering consists of isometric muscle contractions known as "powerhouse" combined with the exercises [15, 16].

The Pilates method of exercise uses the concept of maintenance of the normal lumbar lordotic curve, called the neutral spine, coupled with movement of the lower and upper extremities to simultaneously enhance mobility through improved flexibility and proximal stability. However, only a few studies with dancers have been performed that demonstrate a positive impact of Pilates style exercises on function and posture [17, 18]. Pilates-based exercises have been used for low back pain prevention or rehabilitation as this kind of conditioning exercise may activate the deep trunk muscles, providing greater spine stability [15].

The current literature supports the notion that after Pilates-based exercises may be obtained through improvements in postural control due to an increased muscular endurance strength and flexibility [19]. A systematic review suggests that the mat -based exercises are safer and easier to learn and can provide a better stability to the body [20].

Pilate's exercises could have a potential role in women's body restoration in post partum, and it will be useful for health provider at health centers to apply this exercise to help women in post- partum recovery [21]. Pilates training is intended to improve general body flexibility and health by emphasizing "core" (truncal) strength, posture, and coordination of breathing with movement. Joseph Pilates noted that mobilizing early in rehabilitation resulted in a reduced convalescence period after musculoskeletal injuries. Advocates report that the exercises can be adapted to provide either gentle strength training for rehabilitation or challenge skilled athletes with a vigorous workout [22].

Pilates training, focusing on back extensors and the abdominal musculature, in particular the transversus abdominus, is referred to as core strengthening [23]. Pilates approach focuses on core body exercise and breath control, it facilitates activation of transversus abdominis, diaphragm, multifidus and pelvic floor muscles [24].

This method is a comprehensive body-mind conditioning, which coordinates core stabilizing exercise with mind and breath control challenging by flowing movement of the whole body [15, 25].

Some commonly used conventional exercises provide substantial compressive loads on the spine that would serve only to ensure the patient would remain a patient [26].

In B group, women were treated Conventional exercise include the abdominal drawing in manuar, supine lower extremity extender, and left and right horizontal side-support. In this study we only analyzed the right-sided horizontal side-support [27, 28]. There are beneficial effects of a regular exercise in post partum period on core muscle strength in postnatal women [28].

The recent literature shows disagreement with regard to the evidence for Pilates in the treatment of patients with weak core muscle strength, and there are no studies to date comparing mat Pilates with conventional PT. Therefore, the objective of this study was to compare the effectiveness of mat Pilates and conventional exercises in order to assist physical therapists in relation to the evidence of the method and clinical decision making.

So, in this study we examine the effect of mat based Pilates exercises vs conventional exercises on restoring abdominal core strength on vaginal delivery.

Material and methodology

Inclusion criteria

1. Subjects to be between the ages of 18 to 35 years.
2. Subjects with full term normal delivery
3. Subjects who is primi gravida with weak core strength

Exclusion criteria

1. Any pain cause of pathological disease in lumbar spine.
2. Medical: systemic illness, neurological or muscular degenerative disorders.

This investigation was done in kamala Neharu hospital, from 6th August to 22nd November 2017.

Then core muscle assessment is evaluate. Spigmomanometer is use to check the core muscle strength [29].

Core Muscle Strength Evaluation: All the subjects were asked to empty bladder before the test. Subjects were positioned supine crook lying with hip flexed at 45°. Subject were given proper instructions about how to activate transverses abdominis muscle. The activation of transverses abdominis was confirmed with palpation. The inflatable cuff was placed under the hollow of the lumbar spine (between L1 and S1). The cuff was inflated to the baseline pressure of 40mmHg. The subjects were then asked to take a relaxed breath and while expiration to draw in the abdominal wall towards the spine so as to contract the deep abdominal muscles, raising the pressure up to 10mmHg and 15mmHg in without low back pain and with low back pain women respectively. And recommence the breathing and hold up to 10 sec. The Aneroid sphygmomanometer used in the abdominal drawing in maneuver with palpation has been shown to be reliable method in measuring the transverses recruitment. The test was repeated three times and the maximum pressure only was recorded. 3 minutes rest was given after each test [29]. Data was documented and analysed.

Fifty women were selected according inclusion exclusion criteria, and they were randomly divided into two groups: Pilates Group A (n=25) and conventional Group B (n=25).6 sessions per week and half an hour per session. The data was sequentially and interimly analyzed the effect of 3 weeks

intervention with equal size of participants in each group.
In Pilates exercises include 12 movements: Bridging, Roll Up, Pilates Hundred, One Leg Circle (both ways), Single Straight Leg Stretch, Double Leg Stretch**,** Spine Stretch Forward Single Leg Kick, Side Kick up and down**,** Side Kick circles**,** Curling**,** Rest position. Before and after exercise, warming up and cooling down movements performed [30].
The exercises were stretching movements that focused on deep breathing, and included whole-body stretching and core strengthening. The suitability of these exercises for women during the postpartum period was approved by a gynecologist. The exercises were performed six days a week for half an hour each day, in accordance with the recommendations of the American College of Obstetricians and Gynecologists [31].
Subject performed each exercise 3 sets of 6 Repetitions for developing maximum strength gains. (1-6 repetitions for developing maximum strength) which is slow and controlled. A 2-5- second rest period provided between sets of work [32].
In Conventional exercise include: Abdominal drawing in maneuver**,** Supine lower extremity extender, Right and left horizontal side-support.
Subjects performed each exercise 5 repetitions, for a maximum of a 10-second count. A 30-second rest was provided between repetitions of the same exercise, and a 1-minute rest was provided between each of the different exercises [27, 28]. Then to compare the mean numbers, paired and sample t-test was used, Statistical significance was set at P & less; 05. The data were analyzed with the use of the instat.

Result

Table 1: Age distribution among post natal females.

Age group	18-21	22-25	26-29
Total	16	29	5

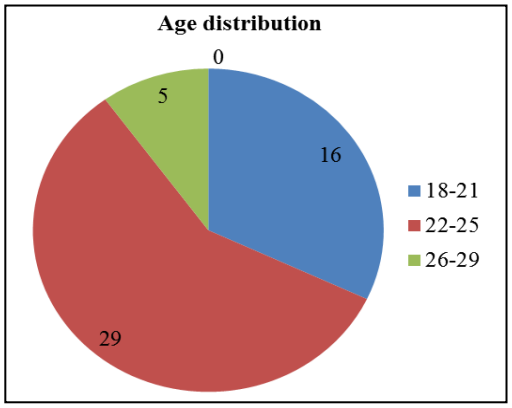

Fig 1: Age distribution among post natal females.

Interpretation: Post natal females were among the age group of 18-29 with mean age of 22.68 ± 2.133.

Table 2: Comparison between Pre- core muscle strength in Pilates and conventional group.

	Mean ± S.D.	P value
Pilates	44.72 ± 2.836	0.5100
Conventional	44.72 ± 2.475	

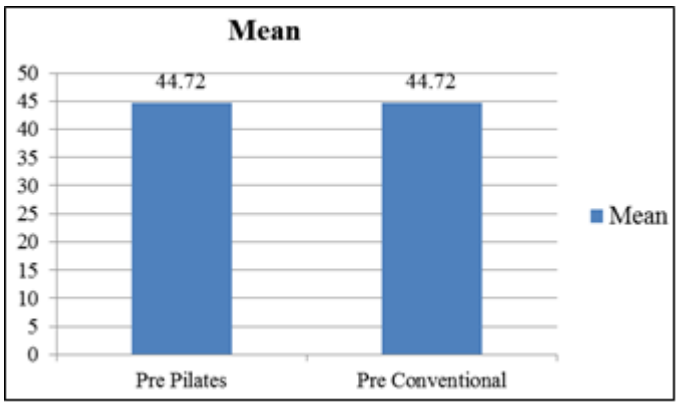

Fig 2: Comparison between Pre- core muscle strength in Pilates and conventional group.

Interpretation: Fig 2 shows before Pilates and conventional exercises there were baseline of core strength of both groups is with mean 44.72 with p=0.5100 that was statistically not significant.

Table 3: Comparison between pre- and post- core muscle strength in Pilates and conventional group in post natal women.

	Pilates	Conventional
Pre	44.72 ± 2.836	44.72 ± 2.475
Post	75.88 ± 5.262	51.06 ± 3.014
P value	P= 0.0003	P=0.0162

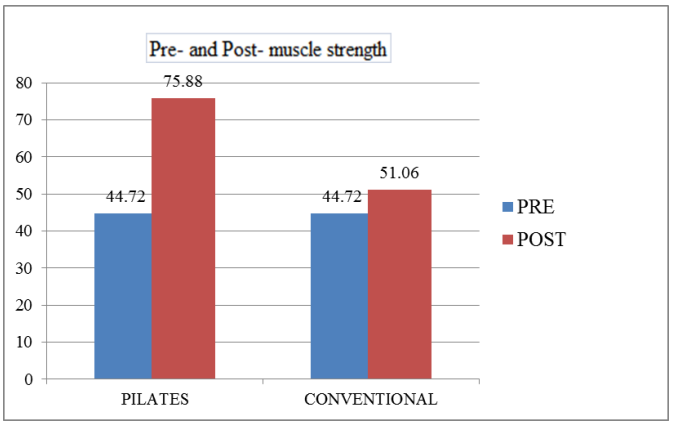

Fig 3: Comparison between pre- and post- core muscle strength in Pilates and conventional group in post natal women.

Interpretation: Fig 3 shows that after Pilates exercise core strength increases by 32 and after conventional exercises core strength increases by 6. With p < 0.0001 which shows extremely significant.

Discussion

The purpose of the present study was to determine the comparison in the effectiveness of Pilates exercises Vs conventional exercises on core muscle strength in postnatal women.
A Bilson's review suggests that the mat -based exercises are safer and easier to learn and can provide a better stability and strength to the body [33]. In one article say that floor exercises primarily strengthen the hip flexors and only minimally affect

the core abdominal muscles [34]. Pilates is a type of exercise introduced by Joseph Pilates in the early 20th century, are considered a good method for accelerating convalescence after pregnancy [13]. This concepts focus on abdominal core strength and flowing movement throughout the whole body [35]. Postnatal abdominal conventional exercises keeps the back healthy as strong abdominals create a stable core to support the lower back during daily activitie [12].

The results of the present study showed that activation of the transvers abdominals and multifidus muscle was influenced by the Pilates principles. Some authors have documented the potential of Pilates principles for specific muscular recruitment patterns [36]. In some literature proved that Pilates is a type of exercise which has recently drawn exercise and health experts' attention. And it can help strengthen the muscles and improve the post natal mother's body restoration in post-partum [21].

In one another litreture of MahdavineJad R *et al* (2015) [21] conducted a study on **"**Pilates selected exercises effects on muscles strength, trunk joints range of motion and flexibility of women with hyperlordosis in immediate post- partum." He concluded that the Pilate's exercises could have a potential role in women's body restoration in post partum, and it will be useful for health provider at health centers to apply this exercise to help women in post- partum recovery. Pilates method is a combination of static and dynamic stretching exercises which are proper and safe to provide an increasing flexibility. The Pilate's exercise can help strengthen the muscles and improve the post natal mother's body restoration in post-partum. However, research to support this clime is limited [21]. According to Koumantakis *et al* 2001, the decrement in pain perception may be related to the increase in strength performance, the patients during the programmer, as such improvement have been related to a positive strength performance before. In the study conducted by Stuge *et al* in 2004 [4], specific Pilates exercises to women after pregnancy to improve LBP pain for 3 weeks showed effective in reducing pain, improving functional status and health related quality of life.[37] Based on the results of the statistical analyses and within the limitations of the study, it can be concluded that Pilates mat exercises may increase abdominal core muscle strength in postnatal females. In our study, pain relief was also found at the end 3 weeks in Pilates exercises was due to the addition of Pilates mat exercises. This can be linked to increased trunk muscle strength.

In one literature showed that conventional exercises include supine lower extremity extender, opposite left and right horizontal side-support. This exercise can activate the deep abdominal muscles while also maintaining a neutral spine and helps to increase muscle strength [27, 28]. But in our study we concluded that there is less increase in core muscle strength than the Pilates exercise.

The present study acknowledges that future studies are required to enable better understanding of the effects of the conventional and Pilates principles among different exercises, in different populations and ages.[36] There have been contradictory results of these studies. In this study, participants received Pilates and conventional mat exercises based on core muscle strength. This might be due to the less time period of intervention as seen in literature that other studies conducted were of more duration as compared with the present study and might be due to overtraining.

In between group analysis depicts significant differences among the groups when the scores measured before and after the intervention. Increasing the functional performance of patients with poor strength is a desirable and tangible outcome to researchers but most importantly to patients. This agree with author who reported that the specific Pilates training of core muscles of lumbar spine and abdominal and integration of this training into functional disability in patients suffering from low back pain. Also functional disability improved was in association with the study of Stuge and Laraeum (2004) [37].

In within group analysis the muscle strength measurement showed statistically significant improvements in both the training groups. In this study Pilates group core strength improved from with mean (44.72$\pm$2.836) to (75.88$\pm$5.262) mean percentage in functional ability by 78 %; p=0.0003 as compared to conventional group with mean (44.72$\pm$2.475) to (51.60$\pm$3.014) and mean percentage in functional ability by 52 %; p =0.0162 over the period of 3 weeks.

According to the result of this study, the Pilates exercises group showed significantly more increase core muscle strength as compare to conventional exercises in post natal women.

Two tail p value is < 0.0001 is Extremely significant.

Conclusion

In this study we concluded that after 3 weeks of training, Pilates exercises are more effective than conventional exercises in improving core

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