International Journal of Science and Research (IJSR)
ISSN: 2319-7064
SJIF (2019): 7.583

To Study the Effects of Pilates on Lumbopelvic Stability and Flexibility in Young Adults: An Experimental Study

Dr. Jeni Shah PT[1], Dr. T. Kanna Amarnath PT[2], Dr. Kairavi Trivedi[3]

[1]Physiotherapist, SDH Viramgam, India
jenishah.birdlover[at]gmail.com

[2]Principal, Ahmedabad Instittute of Medical Sciences, AIMS campus, Nr. S.P. Ring Road, Ognaj Circle, Gota Kalol Highway, Lapkaman, Ahmedabad.-380060, India
ruthracha[at]gmail.com

[3]Assistant Professor,Apolllo Institute of Physiotherapy, Enasan, Naroda- Dahegam Road, Naroda, Ahmedabad 382330, India
kairavitrivedi[at]gmail.com

Abstract: ***Introduction: Segmental stability and mobility control of the core body as well as flexibility of the body parts accentuate peak performance and prevent musculoskeletal injury. Pilates is an exercise program as a core stability approach to augment the neuromuscular system to control and protect the core body or spine. Since a Pilates approach focuses on core body exercise and breathe control, it facilitates activation of core muscles. Incorporation of these muscles contributes to stability of the lumbopelvic region. Methodology: 56 study participants were advised to continue their normal routine activities and divided in to two groups. One group received Pilates exercises 45 min per sessions for 5 days in a week for 4 weeks. And second group received only SHAM exercises Outcome measures lumbopelvic stability tests and lumbopelvic flexibility were taken at 0 day, after 2 weeks and after 4 weeks. Overall stability assessed before and after the intervention. Results: For within group analysis ANOVA test has been used. According to it, there is a statistical significant difference in Lumbopelvic stability test 1 (KLAT) and lumbopelvic flexibility in both the group and for lumbopelvic stability test 2 (BKFOT) group A is statistically significant but group B is not statistically significant and for post hoc test in group A, all 3 tests are significant at all levels and for group B, lumbopelvic stability test 1 and lumbopelvic flexibility is significant in pre and post level and not significant for lumbopelvic stability test 2.For between group analyses independent t test is used. According to it, group A is statistical significant than group B (P<0.05). Conclusion: In this study the null hypothesis was rejected, hence experimental hypothesis was accepted.***

Keywords: Lumbopelvic stability and flexibility, Pilates, KLAT, BKFOT

1. Introduction

Lumbo pelvic stability is defined as the ability to control motion of the lumbar spine and pelvis relative to an arbitrarily defined neutral position [1]. Without the dynamic stabilizing activity from the trunk muscles, the spine would collapse in the upright position. [2].

Flexibility is a crucial element of fitness to gain optimal musculosleletal function enhancing peak performance. Forward bending is the combination of flexion and pelvic tilting. Tightness of hamstring may restrict the pelvic tilt due to its attachment on ischial tuberosity on pelvic bone. Hamstring tightness and low back flexibility are also associated with low back pain. [1].

Good lumbo pelvic stability helps an individual perform better and effectively, as a good core provides a more stable base for arm and leg movements, improving the control and quality of movements. It will improve the muscular co-ordination during movement. It will provide more support for the back and may reduce the risk of back injuries. [2].

Pilates is an exercise program as a core stability approach to augment the neuromuscular system to control and protect the core body or spine. This method is a comprehensive body mind conditioning which coordinates core stability exercises with mind and breathe control challenging by flowing movements of whole body. [1].

So to avoid future back pain, stability and flexibility of lumbo pelvic is essential. In order to prevention and rehabilitation of back injuries, it is essential to find the effects of new techniques, so here is a **need of study** for pilates exercises.

2. Material and Methodology

- Source of collection of data: Various colleges of Ahmedabad.
- Method of collection of data: 56 healthy individuals voluntarily are selected for study based on inclusion and exclusion criteria.
- Study design: An experimental study
- Sample size: 53 (19 Boys, 34 Girls)
- Age group: 18-25 years
- Sampling: Simple random sampling

- Material used : Consent form, Pressure biofeedback unit by Chattanooga, Australia, Apparatus for sit and reach test, Mat, stadiometer, weighing machine, Pen, Paper, Data collection sheet, SPSS software

Selection criteria:

Inclusion criteria:

- Young adult having normal BMI. (according to Asian grading 18.5-24.9) [3]
- Both male and female with the age group of 18-25 years. [4]
- Person who is not engaged in sports activity more than twice in a week for 20 minutes.
- Base line: Lumbopelvic stability level between 1 to 3 ,Knee Lift Abdominal Test (KLAT) and Bent Knee Fall Out Test (BNFOT) difference more than 14mm Hg, Lumbopelvic flexibility less than 35cm

Exclusion criteria:

- Person having any kind of musculoskeletal low back pain in last 3 months
- Engaged with regular sports activity more than twice a week and for longer duration
- Doing regular gym work
- Any associated health related problems
- Pregnancy
- Any resent surgery of lower limb or back
- Involved in high intensity exercise
- BMI less than 18 and more than 24

3. Procedure

Assessment:

Healthy individuals from various colleges of Ahmedabad were assessed as per the inclusion and exclusion criteria. They were briefly stated the nature of the study and intervention and written consent was taken from them. Demographic data and baseline values of study were taken prior to starting the study. Prior to the sessions both lumbo pelvic stability as well as flexibility were measured. Pilot study was conducted with taking 10 in each group.

For Lumbopelvic stability:

Method 1. Grading

Grades were assessed based on the last successful level achieved by that individual.

The effect of training on LPS was evaluated using a stabilizer Pressure Biofeedback Unit (Chattanooga, Australia) prior the training program. With the participant lying supine on a plinth, the cushion was inflated underneath the participant's lumbar spine to 40 mmHg. Changes in pressure during subsequent testing reflected uncontrolled movement of the lumbar spine. Prior to testing, all participants were instructed in the Abdominal hollowing maneuvers and told to perform this during subsequent LPS testing while attempting to minimize contraction of rectus abdominus. Scores were recorded as the highest level completed (0-5) with a pressure change no greater than 10 mmHg. The highest level attained in three trials was used for statistical analyses. There were five progressions of the test exercise. Progressing from level one to five, the torque produced by movement of the legs and acting on the lumbo-pelvic region, was increased. If there was a change in pressure greater than 10 mmHg during testing the trial was stopped and the participant's LPS was scored as the last level successfully completed. The degrees of difficulty of the test exercise were as follows:

Level 1: In a crook lying position an abdominal hollowing maneuver preset the abdominal muscles and the participant slowly raised one leg to a position of 100º of hip flexion with 90º knee flexion. The other leg was then slowly raised to a similar position.

This position was the start position for the following four levels.

Level 2: From the start position, the participant slowly lowered one leg and, with the heel down on the plinth, slides the leg to straighten the knee then slide it back up to starting position.

Level 3: From the start position, the participant slowly lowered one leg and, with the heel maintained at approximately 12 cm off the plinth, fully extended the leg then moved it back up to starting position.

Level 4: From the start position, the participant lowered both the legs together and with the heels down on the plinth, slid the legs out to straighten the knees and slid them back and raised them to the starting position.

Level 5: From the start position, the participant simultaneously extended both the legs keeping the heels approximately 12 cm off the plinth and then flexed the legs back to starting position.

Method 2:

Stability of lumbo–pelvic region was assessed by the Stabilizer PBU, Chattanooga, Australia (Franca et al., 2010). Monitoring of lumbopelvic motion was performed by recording the pressure changes during Knee Lift Abdominal Test (KLAT) and Bent Knee Fall Out Test (BNFOT) (Franca et al., 2010). The baseline pressure was set to 40 mmHg (Roussel et al., 2009). The pressure values were recorded at

the end of the maneuvers. Inter observer reliability correlations for KLAT and BNFOT were 0.85 and 0.87, respectively (Roussel et al., 2009).

For Lumbopelvic flexibility:

- This test involves sitting on the floor with legs stretched out straight ahead.
- Shoes should be removed.
- The soles of the feet are placed flat against the box.
- Both knees should be locked and pressed flat to the floor by holding them down.
- With the palms facing downwards, and the hands on top of each other or side by side, the subject reaches forward along the measuring line as far as possible.
- Ensure that the hands remain at the same level, not one reaching further forward than the other, hold that position for at one-two seconds while the distance is recorded.
- It should be without jerky movements.

Intervention

All the study participants were advised to continue their normal routine activities. Playing and gym activity should not be done more than 2 days per week as mentioned in criteria.

All the participants are divided in to two groups via block randomization method of randomization technique. As per the number of block the participants were included in either of the two groups:

GROUP A [Experimental group] and GROUP B [Control group]

GROUP A (Experimental Group):

This group received Pilates exercises 45 min per sessions for 5 days in a week for 4 weeks. Outcome measures were taken at 0 day, after 2 weeks and after 4 weeks.

GROUP B (Control Group):
This group received only SHAM exercises. Outcome measures were taken at 0 day, after 2 weeks and after 4 weeks.

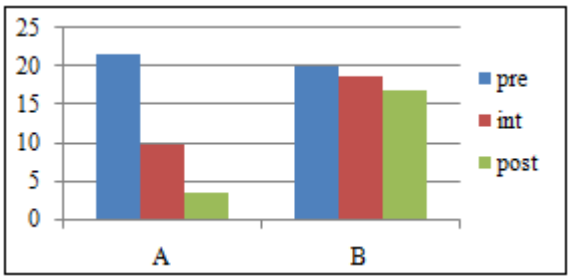
4. Result

Data analysis is done with the use of SPSS 20 software. 53 subjects (details are in table 1) are analysed in within group (according to nonparametric test) and between group results.

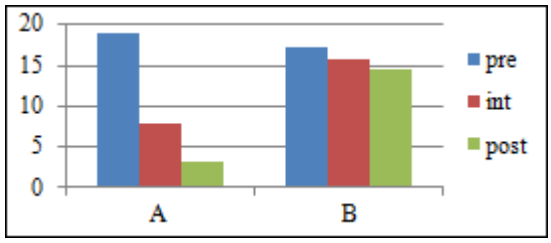
Table 1

Groups	No. Of Subjects	Mean BMI (years)	SD
GROUP A	27	21.12	±1.50
GROUP B	26	20.78	±1.53

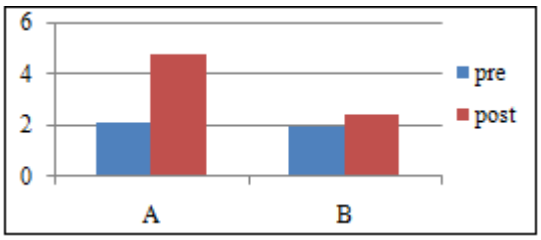
Within group analysis:
Non parametric related Friedman's ANOVA test is used for KLAT, BKFOT for lumbopelvic stability and Sit and reach test. for lumbopelvic level Wilcoxen test has been done. There is significant improvement in lumbopelvic stability test 1 (KLAT), test 2(BKFOT), stability level and flexibility for group A and lumbopelvic test 2(BKFOT), stability level and flexibility for group B p value is less than 0.05, but for test 1 (KLAT) for group B is not significant as p value is more than 0.05. (Graph 1 to 4)



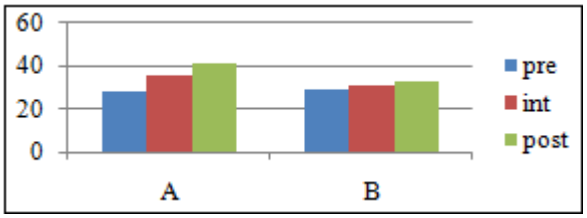
Graph 1: (KLAT)



Graph 2: (BKFOT)



Graph 3: (Lumbopelvic stability level)



Graph 4: Flexibility

Between group analysis:
Non parametric Mann whitney U test is used in this analysis. It shows in the result that group A is significantly better than group B in all tests. (Table 2 to 6).

Table 2

Difference in LPS Test 1	Group A	Group B	Z value	p value
Mean	17.88	3.19	-6.26	0.001
SD	±5.08	±2.17		

Table 3

Difference in LPS Test 2	Group A	Group B	Z value	P' value
Mean	15.7	2.76		
SD	±3.08	±1.81	-6.26	0.001

Table 4

Difference in LPS level	Group A	Group B	Z value	p value
Mean	2.66	0.46	6.25	0.001
SD	±0.67	±0.58		

Table 5

Difference in Lumbopelvic flexibility	Group A	Group B	Z value	p value
Mean	12.76	4.42	-6.10	0.001
SD	±3.83	±1.9		

Table 6

Difference in LPS Level	Group A	Group B
PASS	22(81.48%)	0 (0%)
FAIL	5(18.51%)	26 (100%)

5. Discussion

An experimental trail was conducted on 53 individuals (34 females and 19 males) with the mean age of 20.48±1.122 years in group A and 20.42±0.902 years in group B to investigate the effects of pilates on lumbopelvic stability and flexibility in young adults.

This study is supported by Angela E. Hibbs, which said that speed; direction and order of limb movement during exercise are seen as critical factor when training. For example at which the exercise is performed will affect the gravitational and mechanical resistance experienced on the body. This is due to fast movements recruiting the fast motor units in the muscles when performing a movement optimally. Slow motor units of the muscles are utilized during low threshold recruitment in postural sway and movements involved with unloaded limbs. It is important for optimal motor control to train both motor units which is seen in Pilates training. [5].

The improvement in lumbopelvic stability in pilates group can be confirmed on the basis of pilates principals which suggest that due to incorporation of scooping and basic moves of pilates constantly stimulates the core muscles and that helps to improve stability which is the combination of neuromuscular control, active and passive system. [6]

Sureeporn Phrompaet in (2010) supported this study by his study on lumbopelvic flexibility by pilates for mid age group.[1] Neil A segal supports this study. He suggests that a community-based Pilates program may improve truncal flexibility in healthy subjects by his observational study on pilates exercises. [7].

The improvement in lumbopelvic flexibility in pilates group can be confirmed on the basis of principals of pilates which suggest that due to basic moves it constantly stimulates the core muscles and during dynamic movements, it helps core muscles to stretch and that will improve muscle length that helps to improve flexibility.

However, Ligia Pereiva et al (2011) did study on systemic review and meta analysis on comparing pilates with no exercise or lumbar stabilization for pain and functionality in patients having chronic back pain found that from 5 study pilates did not improve in functionality or pain in compare to control group. And in studies with lumbar stabilization, both groups were equally effective. [8].

This negative controversial result can be due to the small number of study as a systemic review and meta analysis. More precise and large number of studies should be there to stamp it.

6. Conclusion

In this study the null hypothesis was rejected, hence experimental hypothesis was accepted. So it has concluded that: “pilates exercises are helpful and effective to increase the lumbopelvic stability and lumbopelvic flexibility in young asymptomatic individuals.”

Reference

[1] Prompaet S. et al. Effects of pilates training on lumbopelvic stability and flexibility. Asian journal of sports medicine vol 2(num 1) march 2011, pages 16-22.
[2] Kisner C, Colby N; therapeutic exercises, 6th edition 2014; FA Davis phladelphia.
[3] WHO expert consultation, Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies, public health.
[4] What is a young adults? Church of the Nazarene(internet), (place unknown); (cited 2015 aug) available from : http://nazarene.org/files
[5] Hibbs A. development and evaluation of a core training evaluation of a core training programme in highly trained swimmers, Teesside uni 2011.
[6] Akuthota v., Ferreiro A, Moore T and Fredericson M. Core stability exercise principles. American college of sports medicine 2007.
[7] Segal N. et al. The effects of pilates training on flexibility and body composition : an observational study. Arch phys med rehabil vol 85, dec 2004
[8] Pereira LM et al. Comparing the pilates method with no exercise or lumbar stabilization for pain and functionality in patients with chronic low back pain : systemic review and meta analysis. Clinical rehabilitation 26(1) 10-20, revised 11 oct 2010.