International Journal of Medical and Health Research
ISSN: 2454-9142
Received: 12-08-2018; Accepted: 15-09-2018
www.medicalsciencejournal.com
Volume 4; Issue 10; October 2018; Page No. 95-99

Effect of trunk extensors endurance protocol (TEEP) versus Pilates technique on chronic low back pain related disability in motorcycle riders

Dr. Priyal Bhisikar[1], Dr. Asmita Moharkar[2], Dr. Mahendra Shende[3]

[1] BPT, Maharashtra University of Health Science, P.E.S Modern College of Physiotherapy, Pune, Maharashtra India

[2] BPT, MPT (Neuroscience), Associate professor, P.E.S Modern College of Physiotherapy, Pune, Maharashtra, India

[3] BPT, MPT, Principal, P.E.S Modern College of Physiotherapy, India

Abstract
The purpose of the study was to find out the effect of trunk extensor endurance protocol versus Pilates techniques in chronic low back pain related disability in motor cycle riders for duration of 6 weeks. 100 participants (only males) were divided into two groups, 50 in each group, ranging from 20-40 years old, along with inclusion criteria were randomly selected. Trunk extensor endurance protocol was given for 24 sessions over 6 weeks, i.e. 4 times weekly[4]. Pilates were given 12 sessions 2 times weekly[8]. The subjects were evaluated before and after the 6 weeks. Oswestery low back pain disability questionnaire was to assess the effect of trunk extensor endurance protocol and Pilates technique. Statistical analysis of the data was done and significant improvement in the Oswestery low back pain disability questionnaire Test Scores ($p<0.05$) was noted. Hence, these results suggest that after 6 weeks, Pilates Technique proved more effective on chronic low back pain related disability in motorcycle riders than trunk extensor endurance protocol.

Keywords: Pilates, trunk extensor endurance protocol, pain related disability, Oswestry pain disability questionnaire

Introduction

Low back pain is one of the principal complaints by the workers in various occupations. It is a major health problem affecting not only the workforce but also the general populace.[1]Low back pain may come from many of the following structures in the back including: musculature /skeletal, vascular, nerve. The prevalence of low back pain is related to the type of occupation such as driving, riding, manual handling and occupations that involve a lot of improper body movement. Low back pain is reported to have lifetime prevalence upto 75% and is the most common condition for which individual seeks medical care. Modifiable risk factors of low back pain include sedentary lifestyle, obesity, poor posture, prolonged sitting, stooping, lifting heavy objects. The Expert Group on the Global Burden of disease Study showed that low back pain is among the top ten high burden diseases and the injuries with disability adjusted life years (DALYs) higher than that of Human Immunodeficiency Syndrome (HIV), road injuries, tuberculosis, lung cancer, COPD and preterm birth complications [1].

Motorcycle riders are exposed to a variety of hazards like ergonomic hazards (inappropriate posture during riding). Study identified a high prevalence of low back pain in motorcycle riders.

In motorcycle riders, leaned forward posture can wreak havoc on your spine. It can shorten your hamstrings, abdominals and chest muscles and lengthen your upper back, lower back and quadriceps muscles. All those little disruptions add up to bad posture resulting in low backpain [6]. Duration of 2hrs of riding in a whole day can initiate and can cause increase in low back pain in motorcycle riders [9].

Prevalence of low back pain in motorcycle riders world wide were: 60% experienced low back pain at least once in a week, 19% within 4 weeks and 9% at least once in a month while 30% had it daily so same was experienced in India [1].

According to a clinical survey, almost 70 per cent people suffer from lower back pain of varying intensity. There is a sharp increase in the number of youngsters with complaints of back pain, and the age group varies from 20 to 40 years. The survey was conducted between June 2007 and January 2012 at Mission Health spine clinics. The spine is the worst affected due to potholes and speed breakers created without specifications. The spine has 33 vertebrae and between any two vertebrae is a disc, which gives flexibility to the spine. Whenever the body is subjected to a jerk, the disc suffers. The impact of shock and chance of serious damage is higher in two-wheelers, as the jerk is divided only between two wheels. The survey reveals poor shock absorbers in two-wheelers, zooming over the potholes, improper posture hurt the lower back [2].

The most commonly affected body regions (>50%) among the motorcyclists are lower back, neck, shoulder, upper back and hips/thighs/buttocks. Low back pain (LBP) was the most reported symptom with a 12-month prevalence [3].

Trunk extensor endurance protocol (TEEP)

The muscles of the trunk are active whether one is sitting, standing, lifting or rolling over in a bed. Adequate endurance of muscles is necessary to good health and is something taken

for granted until first episode of low back pain occurs. Lack of endurance of trunk muscles has been identified as the predictor of first time occurrence of low back trouble, and a discriminating factor between those who have had a history of low back pain and those who have not. Muscles have been identified as a potential source of low back pain (LBP) as their failure to protect passive structures from excessive loads may result in damage to these pain sensitive structures and produce pain. Poor endurance of the trunk muscles may induce strain on the passive structures of the lumbar spine and eventually result in LBP. Muscle endurance has been found to be lower in people with LBP than those not suffering from it. Hence, trunk muscle endurance training has been recommended as a means of increasing fatigue threshold and improving performance and subsequently reducing disability [4].

Pilates

The Pilates method started to be developed by Joseph H. Pilates during World War 1. It was Pilates lifetime. The professionals were the first to describe the method as rehabilitation technique that led to recovery from their sports related injuries. Currently, the Pilates method is popular in all areas of fitness and rehabilitation.

Pilates exercise follows six basic principles: centering concentration, control, precision, flow and breathing. The modified Pilates Method was designed with the intent to improve posture and control of movement via neuromuscular control techniques believed to improve lumbar spine stability through targeting the local stabilizer muscles of the lumbar-pelvic region or "core muscles."

Despite the limited number of randomized controlled trials investigating this exercise approach, proponents have claimed improved torso or core strength, with mentions of greater range of motion, muscle symmetry, flexibility, spinal and joint mobility, and proprioception, balance, and coordination [8].

Methodology

a. **Purposd** The purpose of this study was to find the effect of Trunk extensor endurance protocol versus Pilates technique on chronic low back pain related disability in motor cycle riders for 6 weeks using Oswestery low back pain disability questionnaire.
b. **Selection of the subjects:** 100 participants (only males) were divided into two groups, 50 in each group, ranging from 20-40 years old, along with inclusion criteria were randomly selected.
c. **Procedure:** Subjects were divided into two groups: Group A receive trunk extensor endurance protocol and Group B receive Pilates Technique .Treatment was given for 6 weeks.

Group A

Trunk extensor endurance protocol: Protocol consists of five exercises

The starting position for all exercises was prone with pillow support for the pelvis/upper thigh and the legs.

The following were the five exercise progressions

1. Subject lying in prone position with both arms by the sides of the body and lifting the head and trunk off the plinth from neutral to extension.
2. Subject lying in prone position with the hands interlocked at the occiput so that shoulders are abducted to 90and the elbows flexed, and lifting the head and trunk off the plinth from neutral to extension
3. Subject lying in prone position with both arms elevated forwards, and lifting the head, trunk and elevated arms off the plinth from neutral to extension.
4. Subject lying in prone position and lifting the head, trunk and contralateral arm and leg off the plinth from neutral to extension.
5. Subject lying in prone position with both shoulders abducted and elbows flexed to 90, and lifting the head, trunk and both legs (with knees extended) off the plinth.[4]

Group B

Pilates technique

1. Pelvic Tilt to Pelvic Curl:

Starting position: Lie on back with knees bent and feet flat on the floor. feet, ankles and knees are aligned and hip-distance apart.

Curl: Inhale.

Exhale: Do a pelvic tilt by engaging abdominal muscles, pulling them in so that belly button moves down toward spine. Let that action continue so that the spine lengthens and the abs press the lower spine into the floor. Back to the floor, or go on to pelvic curl

Inhale: Press down through feet allowing the tailbone to begin to curl up toward the ceiling. The hips raise, then the lower spine, and, finally, the middle spine.

Come to rest on shoulders at the level of shoulder blades, with a nice straight line from hips to shoulders. Do not arch beyond this point. Support this movement with abdominals and hamstrings.

Exhale: As you let breath go, use abdominal control to roll spine back down to the floor. Begin with the upper back and work way down, vertebrae by vertebrae, until the lower spine settles to the floor.

Inhale: Release to neutral spine. Repeat this exercise 3 to 5 times.

2. Pilates chest lift

Starting position: Lie on back with knees bent, feet flat on the floor. Legs and feet are parallel lined up so that hip, knee and ankle are in one line and the toes are pointing directly away. In neutral spine position with the natural curve of the lower spine creating a slight lift off the mat. Keep shoulders down as bring hands behind head with the finger tips touching. hands will give light support the base of skull, but elbows will stay open throughout the exercise.

Inhale

Exhale: Slowly pull belly button down toward spine and keep going, allowing spine to lengthen out along the mat. Simultaneously, tilt chin slightly down and slowly lift the upper spine off the mat until the base of the scapula is just brushing the mat. There is a deepening feeling under the bottom ribs lift. Pause at the top and inhale. Draw the abdominals in deeper.

Exhale: Keep the abdominals drawn slowly lower back to the mat.

Inhale: Repeat 6 - 8 time.

3. Pilates swan prep

Starting Position: Lie on the mat face down. Keep arms close to body as bend the elbows to bring hands under the shoulders. Shoulders should be away from the ears. The legs are usually together, but it is acceptable to do this exercise with the legs shoulder-width apart. Engage abdominal muscles, lifting the belly button up away from the mat. The abdominals remain lifted throughout the exercise.

Inhale: Lengthen spine, sending energy through the top of the head as press the forearms and hands into the mat to support a long upward arc the upper body. Might come up just few inches. Keep neck long. Don't make a crease by tilting head back. Protect low back by sending tail bone down toward the mat.

Exhale: Keep abdominals lifted as releasing the arc, lengthening spine as torso returns to the mat in a sequential way: low-belly, mid-belly, low-ribs and so on.

4. Pilates kneeling arm and leg reach

Starting position: Start on hands and knees. The hands are directly under the shoulders and knees are directly under hips. Make legs and feet parallel and hip distance apart. Back is in a neutral spine position, and supported by abdominal muscles which are pulled in. Don't let back sag or arch up. Neck is treated as a long extension of the spine. So face is parallel to the floor, gaze down. This exercise requires shoulder stability. Take a moment to slide the scapula (wing bones) down back so that the shoulders are away from the ears, chest is open, and scapula are settled on back, not poking up.

Inhale: Extend right arm straight in front of the left leg straight behind the subject at the same time. The arm and leg will be parallel to the floor. Balance. Hold one to three breaths.

Exhale: Return to hands and knees.

Inhale: Extend left arm straight in front of the subject and right leg straight behind at the same time.

5. Pilates swimming

Starting position: Lie on stomach with the legs straight and together. Keeping the shoulder blades settled in back and shoulders away from ears, stretch arms straight overhead. Pull abs into lift the bellybutton up away from the floor. Reaching out from centre, extend arms and legs so far in opposite directions .That they naturally come up off the floor. At the same time, get so much length in your spine that head moves up off the mat as an extension of the reach the spine. Keep face down toward the mat - don't crease the neck. Protect lower back by anchoring pubic bone to the floor. Continue to reach arms and legs out very long from centre to alternate lifting right arm/left leg, then left arm/right leg, pumping them up and down in small pulses.

6. Pilates Saw

Starting Position: Do this gently -Sit up straight legs are extended in front of shoulder width apart. Having tight hamstrings may need to prop the hips up on small lift, like a folded towel. Keep shoulders down and stretch arms out to the sides, even with shoulders.

Inhale: Get taller on turn to whole torso, but use abs and keep the hips even with each other. gaze goes with spine.

Exhale: Let gaze follow the back hand as the subject stretch forward and reach the finger of y front hand across the outside of the opposite foot. This can be a small move. It is most important to keep the hips down and even. Once on reaching extends to its furthest point, maintain the turned position as the subject inhale and return to sitting [6].

d) Findings

Table 1: Agewise Distribution of the subjects

Age (years)	Group A	Group B
20-30	32	29
30-40	18	21

Pre and Post data was analyzed with the help of figure Pad Instats ®.

Table 2: Pre and post analysis of Oswestry score done using paired t-test for group A (TEEP).

Group A (TEEP)	Pretreatment mean ± SD	Post treatment Mean ± SD	t value	p value	Result
	35.72 ± 3.546	20.68 ± 1.878	35.096	<0.0001	Extremely significant.

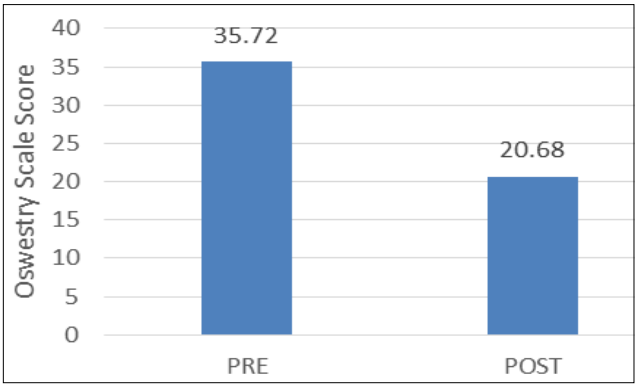

Fig 1: Group A (TEEP) pre and post data analysis

Table 3: Pre and post analysis of Oswestry score done using paired t-test for group B (Pilates)

Group B (Pilates)	Pretreatment mean ± SD	Post treatment Mean ± SD	t value	p value	Result
	35.76 ± 3.583	12.52 ± 2.613	53.453	<0.0001	Extremely significant.

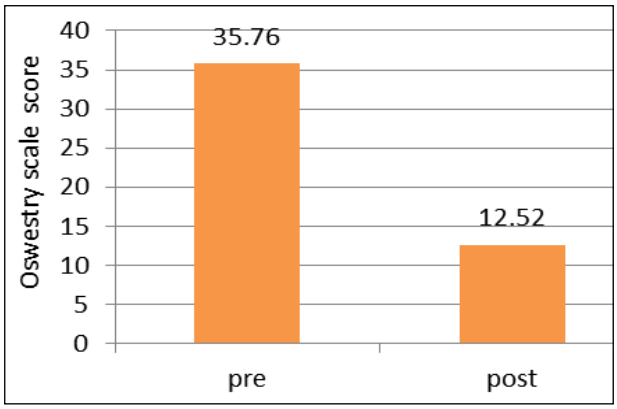

Fig 2: Group B (Pilates) pre and post data analysis

Table 4: Group A (TEEP) and Group B (Pilates) post treatment data analysed using unpaired t test.

Group	Post treatment Mean ± SD	t value	p value	Result
A (TEEP)	15.04 ± 3.030	13.432	<0.0001	Significant
B (Pilates)	23.24 ± 3.074			

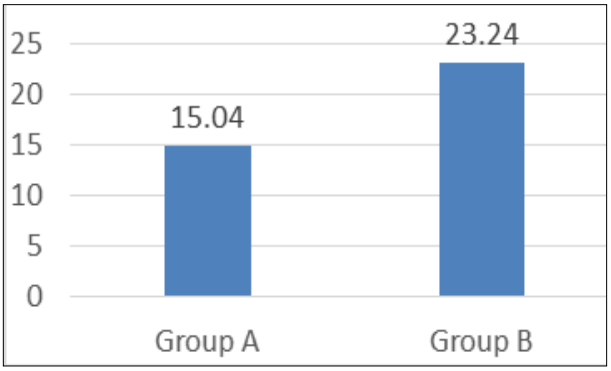

Fig 3: Comparison between Group A (TEEP) and Group B (Pilates

Results

Post data analysis shows that that the p-value < 0.0001 which is extremely significant and hence Pilates Technique is more effective on chronic low back Pain related disability in motorcycle riders than trunk extensor endurance protocol. (Table 4 Figure 3).

Discussion

The aim of this study was to compare the effectiveness of Trunk Extensor Endurance Protocol (TEEP) and Pilates technique on chronic low back pain and disability in motorcycle riders using Oswestry Low Back Pain Disability Questionnaire.

For the study, 100 subjects were selected based on the inclusion and exclusion criteria and were divided in 2 groups (50 each). Group A recieved Trunk Extensor Endurance Protocol (TEEP) and Group B received Pilates technique. The study was conducted for 6 weeks. Pre and post treatment data was collected using Oswestry Low Back Pain Disability Questionnaire as the outcome measure. Later the Data was statistically analysed using Paired t test for outcome within the groups and unpaired t test for outcome between the 2 groups.

Group B (Pilates) has shown significant improvement in chronic low back pain and disability in motorcycle riders on Oswestry Low Back Pain Disability Questionnaire as compared with Group A (Trunk Extensor Endurance Protocol).

Pilates aims to develop better body awareness and improved posture. Benefits of Pilates exercises include improvements in strength, range of motion, coordination, balance, muscle symmetry, flexibility, proprioception, body definition and general health. The biological rationale for how Pilates exercises might work is based upon the idea that stability and control of spinal muscles are altered in people with low-back pain. The exercises advocated by the Pilates approach aim to improve the stability of the spine by improving the motor control of the deep muscles and to reduce the activity of superficial muscles as well as improve posture and body awareness. These factors have the potential to improve pain, disability and quality of life of patients with low-back pain. According to study done by Edwin Choon Wyn Lim *et al*. (2010), Pilates-based exercises are superior to minimal intervention for pain relief. Existing evidence establish superiority of Pilates-based exercise to other forms of exercise to reduce pain and disability. This supports the study of Pilates is being affective in reducing chronic low back pain and disability in motorcycle riders [9].

In this study, Trunk Extensor Endurance Protocol proved to be effective in improving the chronic low back pain and disability in motorcycle riders significantly though less than that of Pilates. Babatunde O.A worked with subject having chonic low back pain and disability with two treatment group. TEEP was found to be more effective. Hultman *et al*. study showed that the risk of chronic low back increases if the isometric endurance decreases in comparison to the healthy subjects. TEEP having ability of an isolated muscles group to perform repeated contraction over a period of time. It is component of muscular performance. Back extensors are responsible for proper posture maintainence of spine in lordosis, controlling the rate and magnitude of flexion an altenuating ground reaction force [4].

Marcelo *et al*. concluded that imbalance among trunk agonist and antagonist muscles and the ineffective activation of the transversus abdominis are also risk factors for onset of low back pain that can be mitigated with the practice of Pilates based exercises. This supports my study since Trunk Extensor Endurance Protocol is specific to the trunk extensors and thus it proved to be less effective than Pilates technique [10].

Conclusion

In this study Pilates techniques proved to be more effective on chronic low back pain related disability in motorcycle riders using Oswestry low back pain disability questionnaire than trunk extensor endurance protocol.

References

1. Science journal of public health. Prevalance of management Practice of low back pain among motorcyclist in illesa southwest Nigeria; Olorunfemi. Akinbode Ogundele1 Olusegun Temitope Afolabi2, Fummito, Omolola, Fehintola3, Abimbol, Olorunsola4, Alex Adelosoye4
2. Road bumps are a pain in the back Complaints of backache in age group 20 to 40 rising due to speed

breakers built without any specifications, reveals study. Worst affected are two-wheel riders Kuldeep. Tiwari @timesgroup.com
3. Prevalence and risk factors of musculoskeletal disorders of motorcyclists Mohd Hafzi, Md Isa; Rohayu, Sarani; Noor Faradila, Paiman; Wong, S.V.
4. Babatunde OA, Adegoke Folarin O. Babatunde. BSc: Effect of an Exercise Protocol on the Endurance of Trunk Extensor Muscles-A Randomized Control Trial.
5. Sitting up straight is by Far the Best Motorcycle Riding Position: Alfonso Moretti, Photography by Brian J. Nelson, 2009.
6. Philip Bayliss St. Albans Osteopathy: core stability - A Pilates workout.
7. Fairbank JCT, Pynsent PB. The Oswestry Disability Index. Spine. 2000; 25(22):2940-2953. Davidson M & Keating J. A comparison of five low back disability questionnaires: reliability and responsiveness. Physical Therapy. 2001-2002; 82:8-24.
8. Edwin Choon Wyn Lim, PT1 • Ruby Li Choo Poh, PT, M Clin Phty (Manip)2 • Ai Ying Low, PT2 • WAI PONG WONG,PT, MPH, PhD3
9. Effects of Pilates-Based Exercises on Pain and Disability in Individuals with Persistent Nonspecific Low Back Pain: A Systematic Review with Meta-analysis.
10. Anais da Academis Brasileria de ciencias: Evaluation of motorcyclists discomfort during prolonged riding process, Karmegam Karuppiah, Mohd. S. Salit, Mohd. Y. Ismail, Napsiah Ismail, Shamsul B.M. Tamrin.
11. Marcelo Henrique Oliveira de Vasconcellos [a] Ramon Diego Santana da Silva [b] Sheila Maria Bispo dos Santos [c] José Reynaldo de Carvalho Merlo [d] Tatiana Maíta Alves Conceição [e]