International Journal of Yoga, Physiotherapy and Physical Education
ISSN: 2456-5067
Impact Factor: RJIF 5.24
www.sportsjournal.in
Volume 3; Issue 3; May 2018; Page No. 54-57

Effect of Pilates on chronic low back pain: A single case study

Dr. Smruti Swagatika Dash
Assistant Professor, Narayana Hrudayalaya Institute of Physiotherapy, Bangalore, Karnataka, India

Abstract
Objective: To examine the effectiveness of Pilate's exercises on chronic low back pain.
Design: A single case study.
Setting: Outpatient clinic.
Participant: A 38 years old female, BMI 31.2 who is a school teacher by profession.
Intervention: Pilates exercises.
Main Outcome Measure: The Oswestry Disability Index, Numerical pain rating scale (NPRS)
Results: Pilates exercises remarkably reduced pain in the subject suffering from chronic low back pain.
Conclusions: Pilates exercise is effective in decreasing pain, and functional ability in people with chronic low back pain.

Keywords: chronic low back pain, the Oswestry disability index, numerical pain rating scale (NPRS)

Introduction

Low back pain can be defined as pain between the lower rib cage and gluteal folds. It is one of the most prevalent musculoskeletal conditions and a common cause of disability in developing nations [1]. Low back pain affects the strength and endurance of the trunk [2]. In India the incidence of low back pain is alarming, as nearly 60% of the people have significant back pain at some time or the other in lives [3]. Chronic low back pain is defined as pain for more than twelve weeks in the posterior lumbar region between the twelfth ribs and inferior gluteal folds [4]. The Pilates exercise technique is among a group of exercises available in physical therapy practice for treatment for people with chronic low back pain. This method was first originated by German born Joseph H. Pilates in 1920s to encourage physical and mental conditioning. In 1990s it became popular in the rehabilitation field [5]. Pilates is a therapeutic approach that focuses on the structural imbalances that can result in low back pain and it also focuses on core stability, posture, breathing, flexibility, strength and muscle control [6].

Method

Participant

The participant is a 38 year school teacher whose chief complaint was pain in the low back since past 14 weeks. She complained of dull aching pain in her lower back, which worsened after prolonged sitting or standing. While on taking rest or off work she felt better. She is obese with a BMI of 31.2.

On palpation of the lower back I found muscle spasm and tenderness. Extremes of lumbar flexion caused pain. Prolong sitting and standing produced symptoms. There was no radiating pain. Reflexes were normal.

Subject was advised for an AP x-ray. This did not show any significant degenerative changes.

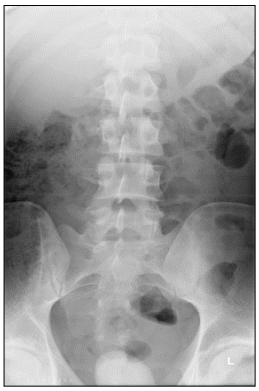

Fig 1

Study Measures

The Oswestry Disability Index (also known as the Oswestry Low Back Pain Disability Questionnaire) is an extremely important tool that researchers and disability evaluators use to measure a patient's permanent functional disability. The test is considered the 'gold standard' of low back functional outcome tools. So I have used this for my study[7].

For each section the total possible score is 5: if the first statement is marked the section score = 0; if the last statement is marked, it = 5. If all 10 sections are completed the score is calculated as follows:

Example: 16 (total scored) 50 (total possible score) x 100 = 32% If one section is missed or not applicable the score is calculated: 16 (total scored) 45 (total possible score) x 100 = 35.5% Minimum detectable change (90% confidence): 10% points (change of less than this may be attributable to error in the measurement).

Scoring for the Oswestry Disability Index

0 to 20: Minimal disability

21-40: Moderate disability
41-60: Severe disability
61-80: Crippling back pain
81-100: These patients are either bed-bound or have an exaggeration of their symptoms

Numerical pain rating scale (NPRS)

The NPRS is used for patient perception of pain intensity using a scale of 0 ("no pain") to 10 ("worst pain imaginable"). The NPRS has been found reliable and responsive.

Procedures

Pilates Exercises are done by 2 Means

1. Mat based Pilates: Performed in mat. It is performed in standing, supine, prone or side lying and use movements of the limbs to vary torque on trunk muscles. Particular emphasis is placed on posture control and strengthening of the trunk and back muscles.
2. Equipment based Pilates: The use of specialized Pilates exercise equipment with spring resistance such as a Reformer, has also been recommended for people with chronic low back pain[4]. It is safe, low impact, deep muscle conditioning method that strengthens, stretches and balances the entire body. Examples: spring resistant, barrels, Cadillac, universal reformer, wunda chair, electric chair, combo chair, magic circle, foam rolls, swivel disc.

The purpose of physical training using the Pilates method is to achieve better functioning of the body based on the strengthening of the 'powerhouse'. Pilates exercise aim to retrain poor motor control and dysfunction of the deep stabilizing muscles such as transverse abdominals the pelvic floor and multifidus which are associated with low back pain[8]. All exercises can be performed at three levels of difficulty

- Basic (week1-2),
- Intermediate (week3-4)
- Advanced (week 5-6)

Table 1

Mat based Pilates exercise (Week 1 –2)	Mat based Pilates exercise (Week 3 – 4)	Mat based Pilates exercise (Week 5 – 6)
Finding neutral spine Breathing practice ▪ Engaging pelvic floor and the transverse abdominals ▪ Inhale through nose Exhale through mouth ▪ Elongating exhalation, and using this to encourage relaxation of areas of tension in the body 1. Bent knee fall out 2. Pelvic tilting 3. Bridging ½, ¾ full 4. Supine hamstring stretch(with resistance band) 5. Clams 6. Magic circle squeeze 7. Dead bugs/single knee float 8. Side to side(hip rolls)with feet on the floor 9. Prone breathing 10. Prone thoracic extension 11. Child pose/rest position 12. Kneeling hip flexor and adductor stretch 13. Cat stretch 14. Side lying single leg lift 15. Prone leg lifts 16. Quadruped position 17. Single arm lift 18. Single leg lift 19. Standing roll down	Finding neutral spine Breathing practice (same as Stage 1) 1. Bent knee fall out 2. Pelvic tilting 3. Bridging full 4. Supine hamstrings stretch (with resistance band) 5. Clams 6. Side lying leg kick 7. Magic circle squeeze 8. Stretching gluteal's supine lying(figure stretch) 9. Chest lift (curl ups) arms Reaching 10. Legs at table top(100s leg at table tops) 11. Dead bugs/single knee float 12. Single double dead bug (up, up, down, down) 13. Side to side(hip rolls)with feet on the floor 14. Side to side with knees and hips bent at 90° (legs at table top) 15. Prone with knees and hips bent at 90° (legs at tabletop) 16. Prone breathing 17. Prone thoracic extension 18. Child pose/rest position 19. Kneeling hip flexor and Adductor stretch 20. Cat stretch 21. Assisted roll up 22. Prone single leg lift 23. Single arm lift 24. Single leg lift 25. Opposite arm and leg lift 26. Standing roll down 27. Book openings/side lying rotation	1. Pelvic tilting 2. Bridging full 3. Supine hamstring stretch(with resistance band) 4. Clams 5. Side lying 6. leg kick 7. Magic circle squeeze 8. Stretching gluteal's supine (figure stretch) 9. Chest lift with arms reaching and arms behind head 10. 100s leg at table top 11. Dead bugs/single knee float 12. Side to side(hip rolls)with feet on the floor & legs at table top(90°) 13. Prone thoracic extension-(dart) 14. Prone quadriceps stretch 15. Child pose/rest position 16. Kneeling hip flexor and adductor stretch 17. Cat stretch 18. Assisted roll up 19. Side lying single or double leg lift. 20. Quadruped position 21. Single arm lift 22. Single leg lift 23. Opposite arm and leg lift 24. Knee hug (supine rest position) 25. Kneeling hamstring stretch 26. Book openings/side lying rotation 27. Chest lift legs in table top (90°) 28. Single leg stretch Progression: Increase in repetitions.

As per the study done by Antonioni *et al*. [9] also reported that Pilates exercise improves pain and Posturography in patients with chronic nonspecific low back pain. The Pilates program used in this study was directed toward both physical and mental elements, focusing on the "core"; with specific strengthening and control of abdominal, gluteal and paraspinal muscles. The subjects in Pilates group completed a 14 week program of Pilates exercises, performed thrice per week under the supervision of an exercise specialist.

Data analysis

Results of the clinical evaluation are presented. The scores of The Oswestry Disability Index was calculated at baseline B_0 and then at every 2 week interval till 14th week end. The NRS scale was also calculated at the same interval as the The Oswestry Disability Index.

Table 2: The Oswestry Disability Index Scores

Weeks	0th week	2nd week	4th week	6th week	8th week	10th week	12th week	14th week
Scores	30	29	26	25	24	20	15	07
Percentage	60%	58%	52%	50%	48%	40%	30%	20%

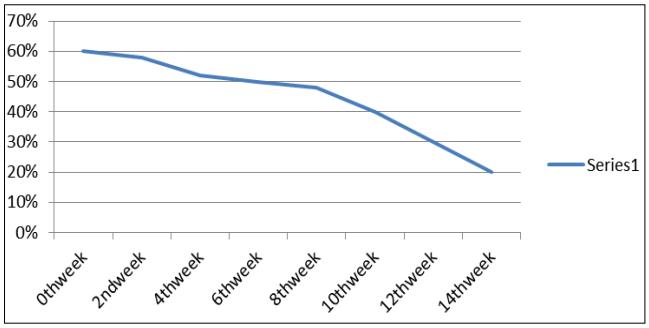

Fig 2

Table 2: Numeric Pain Rating Scale (NPRS)

Weeks	0th week	2nd week	4th week	6th week	8th week	10th week	12th week	14th week
Scores	8	8	7	7	5	4	3	1

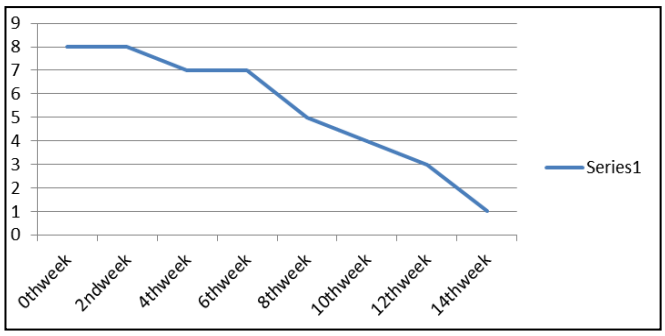

Fig 3

Discussion

The baseline measurements were calculated and it was found to be 60%, which means we can categorise the subject to be suffering from “severe disability” as per Oswestry Disability Index scores. Whereas the NRS scores at baseline before the subject started Pilates exercises was 8 out of 10.

It was found that with performing of mat type of Pilates exercises 3 times per week for a period of 14 weeks, there was a remarkable decrease in Oswestry Disability Index and NRS scores. After the end of 14th week, the subject was scored again and the Oswestry Disability Index scores was 20% (0-20%- minimal disability) and NRS had come down to 1.

Pilates exercises was effective in remarkably decreasing the pain and also it did strengthened the core muscles. ROM of back also increased. It also improved flexibility in my subject.

The decrease in pain score and decrease in oswestry Disability Index all indicate that with regular exercises, specifically those which focuses on core stability and core strength work best for chronic low back pain.

Study limitation

The study could have been followed up for a longer duration. Other scoring parameters can be considered. If possible the study can be conducted as an experimental study for a larger sample size.

Conclusion

Pilates exercise is effective in decreasing pain, and functional ability in people with chronic low back pain. The common reason for low back pain includes variety of factors like obesity, faulty posture, improper lifting and many more. Patient's with low back pain suffer a motor control disorder which weakened the core muscle, proprioception and muscular co-ordination that leads to the abnormal movements of spine.

Pilates exercise increase the endurance of the core muscles, trunk sensorimotor and limbs motion control. It enhance the function of the core stabilizer muscles by increasing neuromuscular coordination of agonist and antagonist.

References

1. Jamil Natour. Luciana De Araujo Cazotti, Luiza Helena Riberio, Andreia Saluador Baptista and Anamaria Jones.

Pilates improves pain, function and quality of life in patients with chronic low back pain. A Randomized Controlled Trial, 2014.
2. Chae-Woo Lee. PT, MS1, Ju hyun, PT, MS1, Seong giL Kim, PT, MS1) Influence of Pilates mat and apparatus exercises on pain and balance of businesswomen with chronic low back pain. RCT, 2014.
3. Albert Anand U, Mariet Caroline P, Arun B, Lakshmi Gomathi G. A study to analyze the efficacy of modified Pilates based exercises and therapeutic exercises in individuals with chronic nonspecific low back pain: RCT, 2014.
4. Cherie Wells, Gregory S. Kolt, Paul Marshall. The effectiveness of Pilates exercise in people with chronic low back pain.
5. Brent D. Anderson. Introduction to Pilates based rehabilitation.
6. Brent Brotzman S. Clinical orthopaedic Rehabilitation.
7. Fairbank JC, Pynsent PB. The Oswestry Disability Index. Spine. 2000; 25(22):2940-52; discussion 52.
8. Quinn K, Barry S and Barry L. Do patients with chronic low back pain benefit from attending Pilates classes after completing conventional physiotherapy treatment? RCT, 2011.
9. Antonino patti, Msc, Antonino Bianco, Phd, Antoniopaoli, MD, Giuseppe Messina, MD, Maria Alessandra Montalto, MD, Marianna Bellafiore, BSc, Giuseppe Battaglia, PhD. Angelo Lovane, MD, and Antonio Palma, MD. Pain Perception and Stabilometric Parameters in People with Chronic low back pain after a Pilates Exercise Program. A Randomized Controlled Trial, 2015.