

## Original Article

# A STUDY TO ANALYSE THE EFFICACY OF MODIFIED PILATES BASED EXERCISES AND THERAPEUTIC EXERCISES IN INDIVIDUALS WITH CHRONIC NON SPECIFIC LOW BACK PAIN: A RANDOMIZED CONTROLLED TRIAL

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## ABSTRACT

**Background:** Chronic low back pain is an expensive and difficult condition to treat. Low back pain is the most common musculoskeletal symptoms seen in 85 % of individuals in their life time. One of the interventions widely used by physiotherapists in the treatment of chronic non-specific low back pain (CNLBP) is exercise therapy based upon the Pilates principles.

**Objective:** The purpose of the study was to find out the effect of Modified Pilates based exercises for patients with Chronic Non Specific Low Back Pain.

**Design:** A randomized controlled trial, pre test-post test design

**Setting:** The study was conducted in Out Patient Department of physiotherapy, K.G Hospital, Coimbatore, India.

**Patients:** Fifty– two physically active subjects between 18 – 60 years old with Chronic Non specific Low Specific Pain of more than 12 weeks' duration were randomly assigned into 2 groups.

**Interventions:** Group A subjects underwent a Modified specific Pilates based exercises with Flexibility Exercises & Group B Subjects underwent a Therapeutic Exercises with Flexibility Exercises were conducted over of 8 weeks.

**Measurements:** Back specific Functional Status outcome were measured with the Oswestry Disability Index and pain intensity were measured with Visual analogue scale.

**Conclusion:** The study concluded that the Modified specific Pilates based exercises helps in reducing the pain, improve the back specific function, improve general health, personal Care, Social Life and flexibility in individuals with non specific chronic low back pain than the therapeutic exercise group.

**KEYWORDS:** Modified Pilates Based Exercises, Therapeutic Exercises, Low Back Pain.

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## INTRODUCTION

Low back pain is a major health and socioeconomic problem and is associated with high costs in care, work absenteeism, and disability worldwide.<sup>1,2,3</sup> Low back pain (LBP) represents the most common cause of disability in persons less than 45 years of age.<sup>4</sup>

Prevalence rate of low back pain is 7% to 33%

and the life time prevalence is nearly 85% <sup>5</sup>. Researchers found that about 70% — 80% of individuals experienced once in a life time <sup>6</sup>. In India, occurrence of low back pain is also alarming; nearly 60 per cent of the people in India have significant back pain at some time or the other in lives.<sup>7</sup>

The etiology of low back pain is still unknown,

but it is believed to be multifactorial. Therefore, degenerative, mechanical and postural conditions can be associated with low back pain.<sup>7,8,9</sup> Exercise therapy designed to target key areas of back pain to increase individuals confidence in the use of their spine and to overcome the fear of physical activity has become an evidence-based treatment.<sup>10,11</sup> Exercise therapy has been considered by the current clinical practice guidelines<sup>12,13</sup> as an effective treatment for chronic low back pain.

Exercise based upon the Pilates principles have been extensively used as an intervention for patients with chronic low back pain<sup>7,8,13</sup>. These exercises can be performed with specific apparatus (Equipment-based Pilates) or without them (Mat Pilates)<sup>15</sup>. Eight basic principles are considered to be essential while performing this intervention: diaphragmatic breathing, control, concentration, centering, precision, flowing movements, strength, and relaxation<sup>16</sup>.

The effectiveness of therapeutic exercise in the treatment of chronic LBP is currently under review.<sup>17,18,19,20,21</sup> General conditioning programs to train strength and endurance of the spine musculature have been shown to reduce pain intensity and disability<sup>17</sup> and to be useful in the treatment of nonspecific chronic LBP<sup>17,19</sup>, and "activity-related spinal disorders."<sup>18</sup>

The exercise-training programs directed generally at muscle strength, endurance, and reconditioning are appropriate. However, physical reconditioning may not be the limiting factor to recovery for many patients seeking treatment for chronic low back disorders; it is now accepted that muscle dysfunction in chronic LBP may not simply be a problem of muscle strength or endurance. Instead, the problem may be one of altered neuromuscular control mechanisms affecting muscular stability of the trunk and movement efficiency.<sup>22,23,24</sup>

The Pilates Method<sup>25</sup> is an exercise method popular for decades in dance training and the dance medicine community. The Pilates Method is a unique approach to training in mind-body awareness and control of movement and posture. Pilates techniques aim to specifically train the "core muscles" sub-maximally to increase the tone and strength of these muscles,

to lengthen and stretch the lumbar spine thus decreasing compression of the joints, and cause an alteration in the tilt of the pelvis.<sup>26</sup>

However, there is lack of evidence concerning the effectiveness of Modified Pilates based exercises and the Therapeutic exercises. Therefore, the objective of this study is to evaluate the effect of Modified Pilates based exercises on pain, Back Specific Functional Status in Chronic Non Specific low back pain. The study was hypothesized that there is no difference obtained following Modified Pilates based exercises and the Therapeutic exercises in Chronic Non Specific low back pain.

## **METHODOLOGY:**

Randomized control trail, which includes 30 subjects with low back pain more than 12 weeks were selected using a simple random sampling method. The subjects were instructed clearly on the study, the potential benefits and harms of the study was adequately explained to the subjects, they were given 24 hrs to confirm their participation, their willingness to participate was obtained and the subjects had permitted to withdraw from study at any point of time. There was no reimbursement given to the subjects, either in the form of money or treatment. Informed consent was obtained from all the participants and the study was approved by the K.G Hospital and K.G College of Physiotherapy institutional ethical committee. Participants in the study were randomly allocated by sealed envelope method, a total of 30 envelopes will be prepared by the research assistant who is not in the part of the study, 15 containing an identifier for Modified Pilates Based Exercises and 15 contain identifier for Therapeutic exercises, will be shuffled before giving to the participants. The allocation of participants to treatment will be determined by the order of the shuffled envelopes. The study included the subjects with Low back pain not more than 5 in Visual analog scale (Moderate pain level), age group from 18 yrs to 60 yrs, Both sex were included, pain with more than 3 months of duration, patient doing normal ADL activity, working population (since they do their routine activity), BMI within normal limit, Not taking part in any of the research studies and not taking physiotherapy for the past 2 months of duration (to avoid the carry over

effect) and No psychological or yellow flag subjects whereas subjects with Intervertebral disc prolapsed, radiating pain, stenosis, severe spondylosis and spondylolesthesis, cardiovascular problems, Tumors, Infection or fracture, Osteoporosis, Radicular syndrome, Inflammatory disorder, Structural deformity not optimal for exercises and psychologically unstable patients were excluded from the study. The selected subjects were assessed by the medical person followed by two senior therapist assessed and recommended to include in the study. The two therapist (Assessor) role was to assess and reassess the patient; they don't know which patient was recruited in which group. The study was carried out for 8 weeks of duration for an individual subject where as whole study was carried out for 9 months.

Before starting the study all the patients were given with a back care book, in which self explanatory anatomy, causes of back pain, self treatment measures, good posture and bad posture with pictures and what to do and what not to do were given clearly. The explanation was given by one therapist on one to one basis. The queries were clarified at the time of discussion. A computer generated random sampling was used to allocate the patients, either in control group or experimental group. Control group subjects received therapeutic exercises were given for 45 minutes, prior to the therapeutic exercises session, the general flexibility exercises were given for 15 minutes. The back exercises includes pelvic bridging, prone straight leg raise, prone cobra, and prone arm rise (unilateral initially and bilateral later), dynamic strengthening Exercises, Stationary bicycle and Swiss ball Coordination Exercises. Experimental group underwent Modified Pilates based Exercises for 45 minutes, prior to the Modified Pilates based exercises session, the general flexibility exercises were given for 15 minutes. The Modified Pilates Based exercises include Modified side kick, Modified one leg stretch, Modified shoulder bridge, The hundred (base level modification), Swimming (a modification from a four point base), Modified swan dive, Modified roll up, Modified spine twist, Double arm stretch, Modified one leg circle. The flexibility exercises includes the Gluteus, Hip flexors, Quadriceps and Hamstrings stretches were

encouraged. The parameters chosen were pain, Back Specific functional Status which were assessed by using Visual Analog Scale (VAS) & Oswestry Disability Index(ODI).

### **DATA ANALYSIS:**

The dependent variables were Modified Pilates based exercises and Therapeutic Exercises and dependent variable were pain and back Specific functional Status. Analyses were performed using the SPSS statistical software package. Paired 't' test were used for the measurement of pre-test and post-test values of group A and B. Unpaired 't' test were used to compare the post-test values of Group A and B. probability values of less than 0.05 were considered significant.

### **RESULTS**

Pain relieved was found better in Group A (Modified Pilates Based exercises and Flexibility Exercises) which was considered statistically significant with mean of 3.93 and S.D. of 0.92. Group B mean value is 6.53 with S.D. of 0.56. Paired 't' test for Group A and B was 09.54 and 05.53. Unpaired 't' test was 7.73.

Back Specific Functional Status in pre-test and post-test treatments of both the groups showed that functional Status was significantly improved in Group A which was considered statistically significant with mean of 41.36 and S.D. of 2.10. Group B mean value was 64.66 with 3.72. Paired 'T' test for Group A and Group B was 22.22 and 9.73 respectively. Unpaired 'T' test values was 13.44.

### **DISCUSSION**

The purpose of the study was to find out the effect of Pilates based exercises versus therapeutic exercises in individuals with chronic non specific low back pain. Low back pain is a common musculoskeletal disorder affecting 80% of people at some point in their lives. There is a vital need for effective but also affordable treatment for back pain and strategies to prevent it. Back pain has been associated with dysfunction and weakness of deeper abdominal muscles<sup>27</sup>. The deeper abdominal muscles, including the m. transversus abdominis (TA), m. multifidus (MF), pelvic floor muscles and the diaphragm muscle

will be referred to throughout this paper as the "core muscles." Pilates techniques aim to specifically train all the above mentioned "core muscles" submaximally to increase the tone and strength of these muscles, to lengthen and stretch the lumbar spine thus decreasing compression of the joints and cause an alteration in the tilt of the pelvis.

The main aim of the current study was to evaluate the effect of a program of modified Pilates for active individuals with chronic non specific back pain. Modified Pilates techniques were used as they have been adapted and simplified from the traditional Pilates methods and are therefore appropriate for use by the general population. The modified Pilates exercise program used in our study was designed to specifically target the "core muscles" and gradually increase complexity by using dynamic movements. Therapeutic exercise is beneficial for patient with low back pain in improving flexibility trunk strength and can reduce pain and disability, improve quality of the life for low back pain patient.<sup>28</sup> Exercise therapy is more effective than usual care by a practitioner and conventional therapy, exercise may be helpful for patients with chronic low back pain to return to normal daily activities and work.<sup>20</sup> The Oswestry Disability Index has become one of the principal condition specific outcome measures used in the management of spinal disorders.<sup>29</sup>

The Oswestry low back pain disability questionnaire was appropriate for measuring changes in functional and pain in patients with chronic low back pain.<sup>30</sup> The Visual Analogue Scale is an important measurement tool for assessing the low back pain intensity levels and symptoms.<sup>31</sup> The physical therapy treatment have vital role in rehabilitation of patients with low back pain.

## CONCLUSION

The study concluded that the Modified specific Pilates based exercises helps in reducing the pain, improve the back specific function, improve general health, personal Care, Social Life and flexibility in individuals with non specific chronic low back pain than the therapeutic exercise group.

## List of abbreviations:

**LBP:** Low back Pain,  
**RCT:** Randomized Contolled Trial,  
**VAS:** Visual Analog Scale,  
**ODI:** Oswestry Disability Index,  
**SD:** Standard Deviation,  
**SPSS:** Statistical Package of Social Sciences.

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**Conflicts of interest:** None

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