**INTRODUCTION**

Back pain is one of the most commonly seen health-related problems. Back pain has been associated with dysfunction and weakness of deeper abdominal muscles. There are some stabilizer and mobilizer muscles which causes low back pain. The stabilizer muscles are multifidus, gluteus maximus, transversus abdominis, internal oblique, gluteus medius, vastus medialis, serratus anterior, lower trapezius, quadrates lumborum, deep neck flexors, etc.

Mobilizer muscles are iliopsoas, rectus femoris, hamstring, tensor fasciae lata, hip adductors, piriformis, rectus abdominis, external oblique, quadrates lumborum, erector spinae, levator scapulae, scalenes, rhomboids, pectoralis major and minor etc. Patients with low back pain use strategies to attenuate the amount of force imposed on their body.[1]

The low back pain which is not due to a serious disease or serious back problem and exact cause of pain is not clear, is known as the non specific low back pain. In most of the cases, the pain disappears within six weeks but may come back from time to time.

A very popular type of exercise used for the treatment of patients with low back pain is the Pilates method. The Pilates method has 6 basic principles: centering, concentration, control, precision, flow and breathing.[2] Pilates techniques aim to specifically train all the core
muscles sub maximally to increase the tone and strength of the muscles, to lengthen and stretch the lumbar spine thus decreasing compression of the joints and cause an alteration in the pelvic tilt.[2]

Pilates is a mind-body exercise that focuses on strength, core stability, flexibility, muscle control, posture and breathing. These exercises can be mat-based or involve use of specified equipments.[3] Electromyography showed that the multifidus and transverse abdominis could be activated using a maneuver, which is described as a gentle drawing toward the spine and maintaining a low level contraction. This is a maneuver used in Pilates.

The electromyography activity of iliocostalis, lumborum, internal oblique, and multifidus and the antagonist co contraction seen in Pilates method.[3] Studies have shown the effectiveness of a few weekly Pilates sessions as helping to reduce LBP. However, any patients fear that physical activity can actually make the pain and disability worse.[4]

The main aim of the current study is to evaluate the efficacy of the addition of modified Pilates exercises to a minimal intervention in patients with chronic non-specific low back pain.

MATERIALS AND METHODS

The data reported here is a part of research project in which 15 subjects from Group B underwent pilates exercises.

Source of data: By interaction with patients in Acharya physiotherapy clinic and rehabilitation center, Bangalore and physiotherapy OPD in and around Bangalore.

METHOD OF COLLECTION OF DATA

- **Study design:** Exploratory research study
- **Sample size:** 30 patients
  - Group A-15 patients
  - Group B- 15 patients
- **Sample design:** Random sampling method.
- **Material used:**
  - Pen
  - Paper
  - Roland- Morris Low Back Pain and Disability Questionnaire
  - Oswestry Low Back Pain Disability Questionnaire

INCLUSION CRITERIA

- Patients with chronic non specific low back pain with duration of at least 3 months.
- Age between 18 to 35 years.
- Gender-both

EXCLUSION CRITERIA

- Previous regular pilates method training.
- Pregnancy.
- Serious spinal pathologies.
- Previous or scheduled spinal surgery.
- Low back pain due to nerve root compromise
- Physical therapy exercise for chronic low back pain.
- Patient is unable to walk without a walking aid.
- Contra indication to exercise.

PROCEDURE

30 patients with chronic non specific low back pain who fulfilled the inclusion and exclusion criteria were included for the study. Written informed consent form has been signed from everyone.

GROUP-A

15 patients were randomly selected in this group. The participants allocated to this booklet group were given an educational booklet containing information about anatomy of spine, pelvis, low back pain and recommendation regarding posture and movements involved in daily living.

The participants in this group did not receive additional exercises and they were instructed not to undergo treatment elsewhere during the period of study. They were given a call twice weekly for clarification regarding the booklet instructions for 6 weeks.

GROUP-B

Another 15 patients were randomly selected in this group. The participants allocated in this pilates group were received the same educational booklet. In addition to the educational booklet, they received a supervised treatment using modified pilates method. They received one hour session twice a week over 6 weeks.

All exercises aim at improving breathing, core stability, motor control, posture, flexibility and mobility with spine in neutral position. In the beginning of all treatment sessions, warm up exercises were performed which included active movements of upper limb, lower limb, neck, back and marching on place. Then participants received modified pilates protocol.
The modified side kicks: Side lying, both legs straight, one hand in front to support. Move top leg forward and back then to centre. Progression: remove support hand, lift legs, move top leg forward and back to centre.

The modified one leg stretch: Crook lying, lift one leg as far as possible and then return to start position. Support it with both hands.

The modified shoulder bridge: Crook lying, both hands at side, lift back lifting shoulders. Progression: Increase the range of movement (more of the spine away from the mat)

The hundred (base level modification): Crook lying, lift both legs in air so that your knees and hip forms 90degree angle. Try to hold this position for 100 beats.

Swimming (a modification from a four point base): prone lying, slide one foot along the floor behind, return to the start position. Repeat on other leg.

Modified swan dive: Prone position, keep hands and forearms in contact with the floor. Lift your abdomen from floor. Release your arms, extending them straight alongside your ears. Your body will rock forward and because your legs will come up.
All participants were instructed not to hold breath in any condition. Number of repetitions for each exercise was individualized for each patient and ranging from 5 to 10 repetitions. All participants were progressed at same rate; however participants were advised not to exceed a comfortable range of movement.

The participants were advised not to work through any pain or discomfort and they were advised to inform me if they experienced any pain during exercise. If necessary selected exercises were modified by decreasing level of difficulty for any individual participants who found the particular exercise too challenging to enable participants to maintain neutral spine.

RESULTS

The study included 30 participants with chronic non specific low back pain and divided into the booklet group and the Pilates group. The participants in group A have mean age = 25.26 years and group B have mean age = 23.86. Both groups i.e. group A and group B have 9 females and 6 males.

No adverse effects were observed. All participants completed all the session of pilates exercises in group B. I observe improvements in pain intensity by taking Oswestry low back pain scale as questionnaire for both groups (Group A mean difference- 3.2 and group B mean difference- 4.4).

Improvement in disability due to chronic non specific low back pain by taking Roland Morris low back pain and disability questionnaire for both groups (group A mean difference-1.06 and group B mean difference-2)
Table 1: Age distribution of participants

<table>
<thead>
<tr>
<th>GROUP A</th>
<th>GROUP B</th>
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<tbody>
<tr>
<td>Age in years</td>
<td>%</td>
</tr>
<tr>
<td>No of participants (18 to 26 years)</td>
<td>9</td>
</tr>
<tr>
<td>No of participants (27 to 35 years)</td>
<td>6</td>
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</tbody>
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Graph 1: Age distribution of participants

Graph 2: Pie diagram of gender distribution in participants

Table 2: Gender distribution of participants

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group A</th>
<th>%</th>
<th>Group B</th>
<th>%</th>
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<tbody>
<tr>
<td>Female</td>
<td>9</td>
<td>60</td>
<td>9</td>
<td>60</td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>40</td>
<td>6</td>
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Graph 3: Oswestry low back pain scale for group A

Graph 4: Roland-Morris disability scale

Table 3: Oswestry Low back pain scale for Group A

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<thead>
<tr>
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<th>Mean</th>
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<tbody>
<tr>
<td>Pre</td>
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<tr>
<td>Post</td>
<td>20.93</td>
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<td>Difference</td>
<td>3.2</td>
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<td>P value</td>
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Table 4: Roland Morris Disability scale for Group A

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<td>Pre</td>
<td>11.06</td>
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<tr>
<td>Post</td>
<td>10</td>
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<tr>
<td>Difference</td>
<td>1.06</td>
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<td>P value</td>
<td>0.355</td>
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Table 5: Oswestry Low Back Scale for Group B

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<tr>
<td>Pre</td>
<td>28.26</td>
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<tr>
<td>Post</td>
<td>23.86</td>
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<tr>
<td>Difference</td>
<td>4.4</td>
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<tr>
<td>P value</td>
<td>0.053</td>
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DISCUSSION

This randomized controlled trial showed small to moderate short-term improvements in pain intensity, disability in participants who received modified Pilates exercises in addition to a minimum education intervention (Pilates group) compared with participants who received education alone (booklet group).

These results demonstrate that the exercises based on the modified Pilates method can be useful in the treatment of participants with chronic low back pain. This trial was performed in an outpatient physical therapy department and the results from this study are generalizable for patients with similar characteristics i.e. patients recruited from the community with a long duration of symptoms and with moderate levels of pain and disability.

My interpretation of the results of the present study with regard to the clinical importance of the group mean differences is that the addition of exercises based on the modified Pilates method produced a clinically important improvement in pain intensity and a moderate improvement in disability was not large enough to be considered clinically significant for the population with non-specific chronic low back pain compared to patients who received minimal interpretation only.

The patient’s perception of improvement due to treatment and the patient’s specific disability are important tools to assess perception of pain in this population.

One possible explanation for the larger effect found in...
Efficacy of the Addition of Modified Pilates Exercises to a Minimal Intervention

the participants allocated to the Pilates group may be the much larger difference in dosage in that group compared with participants allocated to the booklet group. I tried to counterbalance this difference in treatment dosage by calling all participants in the booklet group twice a week to respond to any questions as well as to provide enough attention to these patients. [7-8]

As motor control deficits are common in patients with chronic low back pain, we believe that the addition of specific exercises might have contributed to better outcomes in terms of pain and disability in the Pilates group compared with the group that received education only. [9-10]

CONCLUSION

The addition of modified pilates exercises to an educational booklet provides small benefits compared with education alone in patients with chronic non-specific low back pain. However, no evidence of these effects sustainability over time.

ACKNOWLEDGEMENT

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CONFLICT OF INTEREST:

The authors declared no conflict of interest

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REFERENCES