Comparison of McKenzie Extension v/s William’s Flexion Exercises in Mechanical Back Pain among Medical Students

Ms. Khadija
Physical Therapist, Jinnah Postgraduate Medical Centre
khadijau90@gmail.com

Mr. Amir Malik
Senior Physical Therapist, Jinnah Postgraduate Medical Centre
physioamirmalik@gmail.com

Mr. Hassaan Nasir
Physical Therapist, Agha Khan Hospital
hassaan.nasir@aku.edu

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Abstract

Background
This study compared the effects of McKenzie's Extension exercises versus William’s Flexion exercises on mechanical back pain in medical students aged 18-25. The high incidence of low back pain among medical students is attributed to stress, long hours of studying and working in a clinical setting, poor posture, and physical inactivity.

Methods
In a six-month randomized controlled trial, 30 participants were assigned to Group A (McKenzie Extension exercises) and Group B (William’s Flexion exercises). Pain levels were measured using the Numeric Pain Rating Scale before and after the study. Paired sample t-tests and independent t-tests were used for within-group and between-group analysis, respectively.

Results
The study demonstrated that both exercise groups experienced a reduction in pain levels after 3 weeks of home exercise. However, the McKenzie Extension group exhibited a more significant (p<0.05) decrease than William’s Flexion group.

Conclusion
McKenzie’s Extension exercises were deemed more effective than William’s Flexion exercises in reducing mechanical back pain among medical students.

Keywords
Activities of Daily Living, Exercises, Low Back Pain, Medical students.
Introduction

Mechanical low back pain refers to back pain that arises intrinsically from the spine, intervertebral discs, or surrounding soft tissues. Back pain considers an expensive disease in modern society. Most people experience low back pain (LBP) throughout their life span. The LBP prevalence has been reported from 6% to 19% for the first episode, and recurrence achieved up to 50% over a five years stage. Low back pain is often associated with poor sitting posture, weak abdominals, sports activities, inactivity, and anthropometric factors. Low back pain is prevalent among medical students. Studies have shown that the prevalence of low back pain among medical students ranges from 35% to 70%. The high level of stress and long hours of studying and working in a clinical setting, poor posture, and physical inactivity contribute to the high incidence of low back pain among medical students. A study conducted by Ganesan et al. in 2017 revealed that there are number of factors associated with LBP in young adults such as marital status, previous history of spine problems, strenuous exercise, job satisfaction, monotony, stress, the daily number of study hours, and family history of spine problems (p<0.05). However, age, sex, smoking, alcoholism, coffee intake, mode and duration of travel, diet, frequency of weightlifting, wearing heels, studying posture, and frequency and type of sports activities were not associated with LBP. There are several causes of low back pain among students like medical students often spend long hours studying and sitting, which can lead to poor posture and strain on the back muscles, lack of exercise and physical activity that can lead to weak back muscles and increase the risk of low back pain. In addition to it, the high levels of stress and pressure associated with medical school can lead to muscle tension and increase the risk of low back pain. Further, medical students often have heavy loads, including textbooks, laptops, and other materials, which can cause strain on the back and contribute to low back pain, poor posture: Slouching, hunching over a desk, or leaning over a computer for long periods can cause strain on the back muscles and lead to low back pain. There are multiple treatment modalities for mechanical low back pain, but strong evidence of benefit is often lacking. Moderate evidence supports non-steroidal anti-inflammatory drugs, opioids, and topiramate in the short-term treatment of mechanical low back pain. There is little or no evidence of benefit for acetaminophen, antidepressants (except duloxetine), skeletal muscle relaxants, lidocaine patches,
and transcutaneous electrical nerve stimulation in the treatment of chronic low back pain. There is strong evidence for short-term effectiveness and moderate-quality evidence for yoga’s long-term effectiveness in treating chronic low back pain. Various spinal manipulative techniques (osteopathic and spinal manipulative therapy) have shown mixed benefits in acute and chronic settings. Physical therapy modalities such as the McKenzie method may decrease the recurrence of low back pain and the use of health care. Educating patients on prognosis and incorporating psychosocial components of care, such as identifying comorbid psychological problems and barriers to treatment, are essential components of long-term management. Hence, the current study aimed to determine the effects of McKenzie Extension v/s William’s Flexion exercises in mechanical back pain among medical students.

**Methodology**

This 6-month randomized controlled trial aimed to assess the effectiveness of McKenzie Extension Exercises and William’s Flexion Exercises in reducing mechanical back pain among male and female students aged 18-25 years at a tertiary care hospital in Karachi, Pakistan.

**Inclusion and Exclusion Criteria**

The study included male and female students aged 18-25 who met the inclusion criteria of having mechanical low back pain (muscular spasm, strain) for over 1 month and ≤6 months. Low back pain was determined using a preliminary questionnaire and the Numeric Pain Rating Scale (NPRS). Participants were not using analgesics or alternative therapies during the study.

Exclusion criteria consisted of individuals with recent spinal surgery or medication use, those unable to attend the required visits, individuals with low back pain duration outside the specified range, any renal diseases, and specific spinal conditions such as PIVD (Prolapsed Intervertebral Disc), tumours, spondylolisthesis, infection, or spinal fractures.
Sample and Sampling Procedure

A total of 30 participants were recruited for the study using the envelope method of simple random sampling technique. They were then randomly assigned to two groups, with each group consisting of 15 participants.

Data Collection Tool

The NPRS is a commonly used subjective measure to assess the level of pain experienced by an individual. It is a simple and quick method that involves the patient rating their pain level on an 11-point numerical scale, with 0 representing no pain and 10 representing the worst possible pain.

Interventions

The study recruited 30 patients randomly assigned to either Group A or B, with 15 participants in each group. The participants received an introductory training session that included a detailed description of the exercises and a booklet of home exercise programs. Pain readings were taken before the training session and after three weeks of home exercise.

Group A received McKenzie Extension Exercises, which included seven exercises:

- Prone lying (5-10 minutes)
- Prone lying on elbows (5-10 minutes)
- Prone press-ups (10 repetitions)
- Standing extension (20 seconds)
- Flexion in lying, standing, and sitting.

Group B received William’s Flexion Exercises, which included six exercises:

- Pelvic tilt (5-10 seconds)
- Single knee to chest (5-10 seconds)
- Double knee to chest (5-10 seconds)
- Partial sit-up
• Hamstring stretch
• Hip flexor stretch

If any exercise caused pain, participants were advised to repeat the previous exercise until the pain subsided. If there was no response to any exercises, participants were instructed to move the hips away from the pain side or add some pressure.

**Statistical Strategy**
The data were analyzed using Statistical Package for Social Sciences Version 21.0 (SPSS 21.0). The skewness and kurtosis tests were applied to check the normality of the data. Paired sample t-test was used for within-group comparisons, and an independent t-test was used for between-group comparisons.

**Ethical Considerations**
The oral and written consent was obtained from each participant. The participants were informed about the study’s purpose, intervention protocols, and data collection procedures, and they were assured of confidentiality and anonymity. The Institutional Review Board of tertiary care hospital, Karachi, Pakistan, approved the study.

**Results**
A total of 30 participants had mean age of 21.76±2.25 with 17 females and 13 males. Paired sample t-test was run for within-group analysis with MD of 3.73±0.88 and 3.13±0.99 and a significant difference (p-value <0.05) was noticed for pain among both the groups. NPRS score improved by 49.07% in Group A and 39.47% in Group B after 3 weeks of intervention. However, the Group A showed significantly higher improvement compared with Group B after intervention between the groups. The detailed description is shown in Table-1.
For between group analysis, independent t-test was applied in which significant mean difference 0.93±0.48 (p-value<0.05) was observed for pain in McKenzie’s group as compared to William flexion exercise group. The detailed description is shown in Table-2, Figure-1.

### Table-1 Within group analysis of pain after 3 weeks of intervention

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Group</th>
<th>Pre Mean± SD</th>
<th>Post Mean± SD</th>
<th>MD± SD</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>15</td>
<td>A</td>
<td>7.6±1.2</td>
<td>3.8±1.64</td>
<td>3.73±0.88</td>
<td>3.24 to 4.22</td>
<td>p&lt; 0.005</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>B</td>
<td>7.93±0.88</td>
<td>4.80±0.94</td>
<td>3.13±0.99</td>
<td>2.58 to 3.68</td>
<td>p&lt; 0.005</td>
</tr>
</tbody>
</table>

*n: sample size
Group A: McKenzie Ex’s
Group B: William Ex’s
SD: Standard Deviation
MD: Mean Difference
CI: Confidence Interval

### Table-2 Between group analysis of Pain after 3 weeks of intervention

<table>
<thead>
<tr>
<th>Variables</th>
<th>n</th>
<th>Groups</th>
<th>MD± SD</th>
<th>95% CI of mean</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>30</td>
<td>A</td>
<td>-0.93±0.48</td>
<td>-1.93 to -0.067</td>
<td>p&lt; 0.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td>B</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*n: sample size
Group A: McKenzie Ex’s
Group B: William Ex’s
SD: Standard Deviation
MD: Mean Difference
Discussion

LBP is a common problem that affects millions of people around the world. There are various treatment approaches available to manage LBP, including exercise-based therapy. Among these approaches, the McKenzie method and Williams’s flexion exercises have been widely used. This study aimed to compare the effectiveness of these two methods in reducing LBP in physiotherapy students. The results showed that both groups obtained significant reductions in NPRS scores over a 4 week period. However, the McKenzie Extension Exercise group was found to be more effective in reducing LBP in physiotherapy students as compared to the William’s Flexion Exercises group.

Figure-1 Within-group difference between groups
These findings are consistent with previous studies that have suggested the superiority of the McKenzie method over the Williams program. For instance, Mircea\textsuperscript{13} found that the McKenzie protocol was superior to the Williams program in terms of pain relief, with a 67\% reduction in pain occurring. Similarly, Ponte et al.\textsuperscript{14} found that the McKenzie protocol was more effective in reducing pain than the William’s group, and these changes came about in a significantly shorter period of time. Furthermore, Cherkin et al.\textsuperscript{15} concluded that McKenzie back exercises provide slightly greater pain relief than a placebo. The benefits of the McKenzie method lie in its more passive form of spinal manipulation, where the subject produces the motion, position, and forces that improve LBP. This approach may reduce edema and nuclear migration in an annular tear or may realign a facet joint in such a way as to reduce inflammation and painful stimuli. In addition, cyclic range of motion exercises (usually in passive extension) is the cornerstone of the McKenzie program. These repetitive exercises "centralize" pain, and certain postures, thus prevent end range stress. Lumbar flexion exercises may be added later, when the patient has full spinal range of motion. In contrast, Williams flexion exercises have been discredited by Nachemson\textsuperscript{16}, whose study showed that these exercises may significantly increase the pressure within intervertebral discs of the lumbar spine, possibly aggravating herniated or bulging discs.

It is important to note that the study has some limitations, including a small sample size, short data collection period, and the possibility of bias in subjects performing the home exercise program. Moreover, the outcome measures were taken after the 6 week of the exercise program, and long-term benefits and follow-up were not checked.

**Conclusion**

The McKenzie Extension Exercises should be used in students with LBP as it is more effective than William’s Flexion Exercises. The findings of this study have clinical applications and can be used to guide physiotherapists in selecting the most effective exercise-based therapy for LBP management. Further studies with larger sample sizes and longer follow-up periods are needed to confirm the effectiveness of these exercises in managing LBP.
Authors Contribution

K: Conception and design.
Malik A: Data acquisition and analysis.
Nasir H: Writing and revising the draft.

Declaration of Interest

None.

Funding Sources

None.

References


