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Effect of back extensors muscle strengthening on pain and lumbar extension rom in competitive exam appearing students with non-specific low back pain-an experimental study

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Abstract
Purpose: Non-specific low back pain is defined as low back pain without certain pathology (infection, tumor, osteoporosis, fractures, inflammatory disorder and cauda equina syndrome). The important characteristics of non- specific low back pain consist of back pain for more than 3 months, pain between the 12th rib and the top folds gluteal with or without leg pain, and abnormal stability and coordination due to spinal muscles imbalance. Sedentary lifestyle leads to greater risk of non-specific low back pain. Sedentary behavior has been defined as "any behavior characterized by an energy expenditure of ≤1.5 METs while in a sitting or reclining posture". Coaching institutes offer coaching for students appearing in competitive exams like entrance exams for chartered accountancy, public service commission, banking, etc. Physical stress imposed on the body during coaching includes poor study posture and sitting improperly on chair for long duration.
Aim and Objective: To study the effect of back extensors muscle strengthening on pain and lumbar extension rom in competitive exam appearing students with non-specific low back pain using visual analog scale and modified- modified schober test.
Methods and Materials: Various Study rooms were visited in and around Pune. Participants (Total n=30) were selected according to the Inclusion and Exclusion criteria. Informed consent was taken. Participants with non-specific low back pain were assessed using VAS, Modified- Modified Schober test and Sorensen Lumbar Spine Extension test pre intervention data was noted. Intervention was demonstrated in 1st week and then was gradually progressed till 4th week. Post intervention based assessment was done.
Results: Total 12 males and 18 females were evaluated with mean age (24.8). Data analysis was done using paired t-test. Post intervention pain ($p<0.0001$), ROM ($p<0.0001$) and strength (<0.0001) was statistically significant.
Conclusion: The study shows that back extensors muscle strengthening was effective in reducing pain, increasing ROM and strength in competitive exam appearing students with Non-specific low back pain. Keywords: Non-specific low back pain, back extensor muscle strengthening exercises, Modified-Modified Schober test.

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Introduction

Low back pain is one of the most common problems of public health system in the world. It has been estimated that 8 out of 10 people will suffer from low back pain at one time or another in their lives. Low back pain is experienced in 60%-80% of adults at some point in their lifetime. (1) Although there is no obvious cause of low back pain, 90% of patients have been experiencing back pain without certain pathology, referred to as non- specific low back pain. (2,3) The important characteristics of non- specific low back pain consist of back pain for more than 3 months, pain between the 12th rib and the top folds gluteal with or without leg pain, and abnormal stability and coordination due to spinal muscles imbalance. (3-5) Insufficient strength in the lumbar musculature appears to be a factor related to the development of low back pain. These coaching institutes offer coaching for students appearing in competitive exams like entrance exams for chartered accountancy, public service commission, banking, etc. Students undergo physical stress imposed on body during study duration due to poor study postures and sitting improperly on chairs for long duration. (6) This produces muscle strain, joint imbalance, and soft-tissue stresses. The muscles must hold the body in a single position for a long time, leading to prolonged immobility with a subsequent reduction in blood flow that results in muscle tension and susceptibility to musculoskeletal injury. Over time, this becomes habitual, leading to more chronic, recurring pain and episodes of pain. Students tend to change their posture according to habits, such as slouching, crossing the legs and they maintain the incorrect posture for hours. Prevalence of low back pain is 18.6% in these students. (6) Sedentary lifestyle leads to greater risk of non-specific low back pain reposted in a dutch population- based study. Sedentary behaviour has been defined as "any behaviour characterized by an energy expenditure of ≤1.5 METs while in a sitting or reclining posture". The activities like long time sitting, forward bending, lifting heavy weights are susceptible to cause develop low back pain. That is the reason it is necessary to find some useful and easy treatment for the low back pain which is not caused due to any underlying pathology. Exercise therapy focuses on the prescription of muscular contraction and body movement to

improve overall health. Therefore, exercise may protect and improve mobility and function, which help maintain the body functions. Strength training is a systematic procedure of a muscle or muscle group lifting, lowering, or controlling heavy loads for a relatively low number of repetitions or over a short period of time. The most common adaptation to heavy resistance exercise is an increase in the maximum force- producing capacity of muscle- that is increase in muscle strength, primarily as the result of neural adaptations and an increase in muscle fiber size. The target muscles for lumbar extensor strengthening programs are the lumbar erector spinae and multifidus. The erector spinae group comprises the iliocostalis lumborum and longissimus thoracis, and is positioned lateral to the multifidus. The erector spinae consists of several multi segmental fascicles, allowing for sagittal rotation (lumbar extension) and posterior translation when the muscles contract bilaterally.

Materials

- **Study design:** experimental study
- **Sample size:** 50
- **Sampling method**: purposive
- **Study population:** students **(**both males and females between 20-30 years old)
- **Study setting:** opd
- **Treatment duration:** 3 days a week for 4 weeks
- **Study duration:** 6 months

Material: Pen, Paper, Measuring tape, Visual analog scale (VAS), Consent form.

Outcome measures: Visual analog scale (VAS), Modified – Modified Schober test, Sorensen Lumbar Spine Extension Test.

Method

30 subjects were selected who had non-specific low back pain. Detailed instructions were given to the subjects regarding the study and consent was taken from the subjects who were willing to participate. Subjects were selected according to the inclusion and exclusion criteria. Pre-intervention assessment was done using VAS, Modified- Modified Schober test and Sorensen Lumbar Spine Extension test and data was recorded. Intervention was demonstrated and taught to the subjects in 1st week and then was gradually progressed till 4th week. Post -intervention assessment was done using VAS, Modified- Modified Schober test and Sorensen Lumbar Spine Extension test. Data was collected and was analysed. Results were recorded.

Data Analysis

The statistical analysis for this study was done using the Microsoft excel sheet.

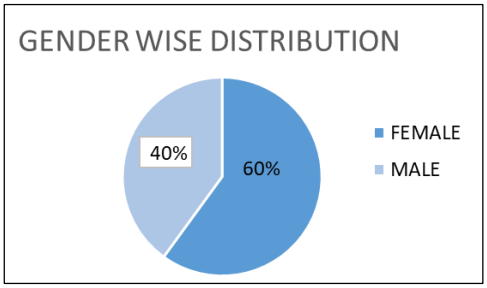

Fig 1

Statistical analysis

Table 1: Visual Analog Scale (VAS)

Outcome Measure (VAS)	Mean	T Value	P Value	Significance
PRE	6.03	20.67	<0.0001	Extremely significant
POST	3.98			

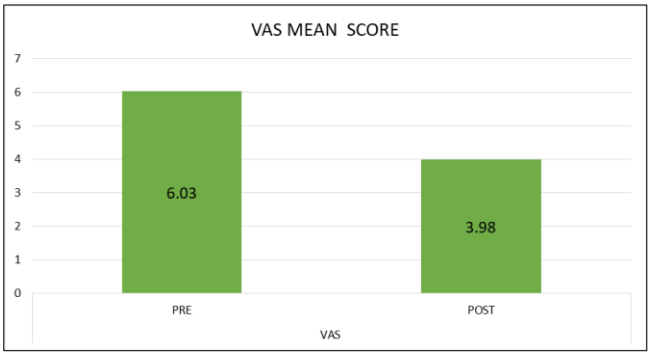

Fig 2

Table 2: Modified–Modified Schober Test

Outcome Measure	Mean	T Value	P Value	Significane
PRE	1.337	17.87	<0.0001	Significant
POST	1.840			

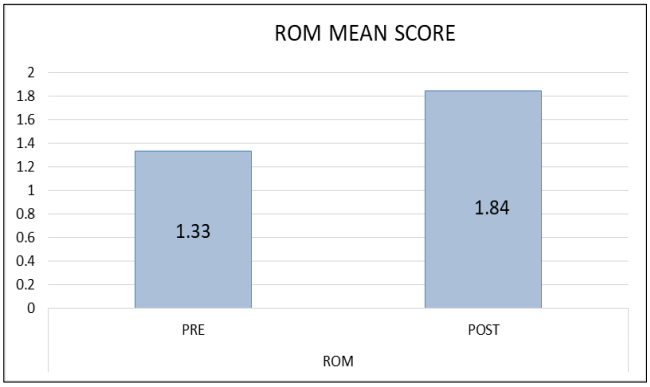

Fig 3

Table 3: Sorensen Lumbar Spine Extension Test

Outcome Measure	Mean	T Value	P Value	Significance
PRE	22.3	22.41	<0.0001	Extremely significant
POST	27.9			

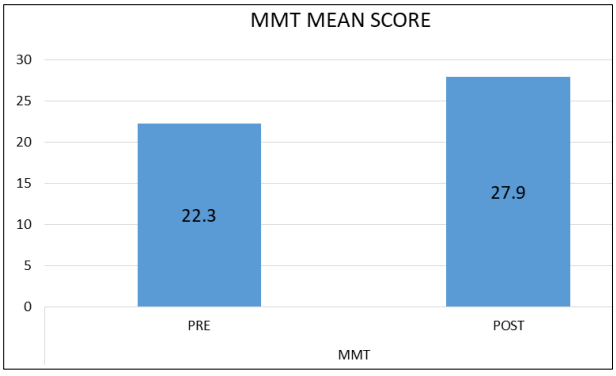

Fig 4

Results

This study evaluated 30 subjects out of which 12 were males and 18 were females with mean age 24.8. Paired t-test was done to compare the pre and post VAS of non-specific low back which showed p value <0.0001 which is considered extremely significant. Paired t- test was done to compare the pre and post ROM of non-specific low back which showed p value <0.0001 which is considered significant. Also, when compare the pre and post strength of non-specific low back which showed p value <0.0001 which is considered highly significant.

Discussion

The objective of the current study was to find out whether back extensors muscle strengthening is effective in reducing pain, increasing ROM and strength in competitive exam appearing students with Non-specific low back pain. In this study, total 30 individuals both males and females participated. The result showed that back extensor muscle strengthening have significant effect on reducing pain, increasing ROM and strength. Strengthening exercise is important for stabilizing the joints and preventing future injuries. This exercises help in maintaining proper posture and balance and reduces the risk of injuries that could lead to more pain. As there is significant reduction in pain associated with increase in strength thus, decreased pain sensitivity may be mechanism by which strength training promotes increase in back extension ROM. An improved agonist-antagonist coactivation also promoting increase in back extension ROM. John Santoshi, et al. described in this study that there is prevalence of Musculoskeletal pain in competitive exam aspirants, in which non- specific low back pain was most prevalent. Sudhir Ganesan, et al. revealed that the number of daily hours spent studying had a significant association with LBP. LBP precipitated by studying for ≥5 hrs on an average (p,0.05) daily. Some studies indicated that back muscle strength training increases muscle strength, muscle endurance and spine ROM in patients with chronic low back pain. The back extensor muscles, especially the erector spinae group, provide posterior stability for the vertebral column and according to several studies there was a significant relationship between decreasing strength and endurance of these muscles and back pain. And also back pain was prevented by strengthening of these muscles. In the current study there was decreased lower back muscle strength in students which decreased lumbar ROM through its effect on back pain. On lumbar extensor strengthening there was significant increase in lumbar extension strength and ROM and reduced back pain. Graves et al. Reported 37% to 41% increases in strength in 12 weeks of lumbar extension strength training three times per week with the lumbar extension device. In this study there is significant increase in lumbar extension strength in 4 weeks of training. Lindström et al. Also reported significant increase in back muscle strength and spine ROM after progressive exercise in patients with acute low back pain. The results of the current study was similarly there was increase in lumbar extension strength and lumbar extension ROM after 4 weeks of lumbar extension strength training.

Conclusion

It shows that back extensors muscle strengthening was effective in reducing pain, increasing ROM and strength in competitive exam appearing students with Non-specific low back pain.

Hence, our null hypothesis is rejected and alternate hypothesis is accepted.

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