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Effectiveness of gluteal and hamstring muscles strengthening exercises on low back pain of mechanical origin

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Abstract

Background and Purpose: The purpose of the study is to find and compare the effects of gluteal and hamstring muscles strengthening exercises along with interferential therapy and conventional physiotherapy exercises along with interferential therapy on low back pain of mechanical origin.

Materials and Methods: In the study 40 mechanical low back pain subjects were selected based on the criteria and randomly divided into two groups, group A and group B, each group consist 20 subjects. Group A subjects were treated with gluteal and hamstring muscles strengthening exercises and group B conventional physiotherapy exercises and both the group subjects received interferential therapy. Low back pain was measured before and after interventions by visual analogue scale.

Data Analysis & Results: The calculated paired 't' test values shows significance within groups and the unpaired 't' test value shows between group significance.

Conclusion: Low back pain is significantly reduced in both the groups but when comparing both pain is more reduced in gluteal and hamstring muscles strengthening exercises group than conventional physiotherapy exercises group.

Keywords: Low back pain, hamstring strengthening exercises, conventional physiotherapy exercises, visual analogue scale

Introductions

Non-specific or mechanical low back pain is the general term that refers to any type of back pain in the lumbar region that is not related to serious pathology and does not have a specific cause [1]. Non-specific low back pain is usually categorized in 3 subtypes: acute, sub-acute and chronic low back pain. This subdivision is based on the duration of the back pain. Acute low back pain is an episode of low back pain for less than 6 weeks, sub-acute low back pain between 6 and 12 weeks and chronic low back pain for 12 weeks or more [2].

Low back pain is highly prevalent and the main cause of years lived with disability (YLDs). We present the most up-to-date global, regional, and national data on prevalence and YLDs for low back pain from the Global Burden of Diseases, Injuries, and Risk Factors Study 2021. In 2020, low back pain affected 619 million (95% uncertainty interval 554–694) people globally, with a projection of 843 million (759–933) prevalent cases by 2050. In 2020, the global age-standardized rate of YLDs was 832 per 100 000 (578–1070). Between 1990 and 2020, age-standardized rates of prevalence and YLDs decreased by 10.4% (10.9–10.0) and 10.5% (11.1–10.0), respectively. A total of 38.8% (28.7–47.0) of YLDs were attributed to occupational factors, smoking, and high BMI [3].

Mechanical low back pain results from the muscles strength imbalances in the lower segment. These imbalances can occur when muscles are constantly shortened or strengthened in relation to each other. A specific patterns of muscle weakness and tightness that cross between the dorsal and ventral sides of the body. Along with this there is under activity and weakness of deep abdominal muscles on the ventral side and of the gluteus maximus and medius. The hamstrings are frequently found to be tight in this syndrome as well. This imbalance results in an anterior tilt of the pelvis, increased flexion of the hips, and a compensatory hyper lordosis in the lumbar spine [4].

The study aims to find and compare the effects of gluteal and hamstring muscles strengthening exercises along with interferential therapy and conventional physiotherapy exercises along with interferential therapy on low back pain of mechanical origin.

Materials and Methods

Review Board of AKG Cooperative Institute of Health Sciences, Kannur, Kerala has approved this two group pre and post-test experimental study and a written consent was obtained from the participants after giving clear instructions regarding the treatment procedure and its implications. The study was conducted in outpatient department, department of Physiotherapy, AKG Cooperative Institute of Health Sciences, Mavilayi, Kannur, Kerala, India.

Forty mechanical low back pain patients age from 20 to 40 of both sex were selected for the study and randomly assigned into anyone of the study groups. Other forms of low back pain, subjects contraindicated to perform exercises and electrotherapy modalities are meticulously identified and not included in the study. Group A twenty subjects received gluteal and hamstring muscles strengthening exercises it includes glute bridge, glute kickback and hamstring curl exercises. Group B twenty subjects received conventional physiotherapy exercises, it includes lumbar flexion exercises, lumbar extension exercises and straight leg raise exercise and both the group subjects received interferential therapy.



All the exercises were performed 10 times like that of 3 sets daily, the same was continued form two weeks in the study setting and one week unsupervised in their home. All the subjects received interferential therapy during the first two weeks of the study period. Mechanical low back pain was measured zero level and at the end of third week by visual analogue scale.

Data Analysis and Results

The study aims to compare and find the effects gluteal and hamstring muscles strengthening exercises with conventional physiotherapy exercises on low back pain of mechanical origin. The collected data's were analyzed by paired and unpaired 't' test for significance.

Table 1: Mean value, mean difference, standard deviation and paired 't' values of group A and B

Group	Variable Pain	Mean	Mean Difference	Standard Deviation	Paired 't' Value
A	Pre-test	8.5	2.9	0.65	18.37*
	Post-test	5.6			
B	Pre-test	8.4	1.4	0.50	12.45*
	Post-test	7			

*0.005 level of significance

The calculated paired 't' value for low back pain of group A and B are 18.37 and 12.45 respectively and the 't' table value is 3.250 at 0.005 level. Since the calculated 't' values are more than the 't' table value, there is significant

difference in low back pain following gluteal and hamstring muscles strengthening exercises along with interferential therapy and conventional physiotherapy exercises along with interferential therapy on mechanical low back pain patients.

Table 2: Mean value, mean difference, standard deviation, and unpaired 't' value of group A and Group B

Groups	Improvement		Standard deviation	Unpaired 't' value
	Mean	Mean Difference		
Group-A	2.9	1.5	2.04	6.3*
Group-B	1.4			

*0.005 level of significance

The calculated unpaired 't' value is 6.3 and the 't' table value is 2.878 at 0.005 level. Since the calculated 't' value is more than the 't' table value, there is significant difference between gluteal and hamstring muscles strengthening exercises along with interferential therapy and conventional physiotherapy exercises along with interferential therapy in the management of mechanical low back pain patients.

Discussion

The aim of the study was to assess the effectiveness of gluteal and hamstring muscles strengthening exercises along with interferential therapy and conventional physiotherapy exercises along with interferential therapy among mechanical low back pain subjects. The results of the present study shows that pain is significantly reduced in both the groups. Gluteal and hamstring muscles strengthening exercises increased the activity of the muscles and enhanced the role of joint mobility, leading to changes in the muscle activity of the buttocks and spine and reducing excessive tension around the waist and pelvis, thereby reduced pain [5].

Conclusion

In the study 40 mechanical low back pain subjects were included and randomly divided into two groups, group A and group B, each group consist 20 subjects. Group A subjects were treated with gluteal and hamstring muscles strengthening exercises and group B conventional physiotherapy exercises and both the group subjects received interferential therapy. Low back pain was measured before and after interventions by visual analogue scale. Low back pain is significantly reduced in both the groups but when comparing both, pain is more reduced in gluteal and hamstring muscles strengthening exercises than conventional physiotherapy exercises group.

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