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Effect of Neck and Upper Trunk Exercises in the Management of Mechanical Low Back Pain

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Abstract

Background: Mechanical low back pain is caused by the overuse of an anatomical or Functional structure (muscle strain), as well as pain caused by trauma or anatomic Structural deformity (herniated nucleus pulpous). Mechanical low back pain is a primary contributor to disability. Mechanical low back pain is associated with neck and trunk musculoskeletal weakness.
Objective: To determine the effectiveness of lower back strengthening exercises combined with neck and upper trunk activities in alleviating low back pain.
Methodology: A total 30 subjects with mechanical low back pain were chosen using convenient sampling technique based on inclusion and exclusion criteria. Patients were split into two groups (Conventional group-15, Intervention group-15). The Conventional group received Interferential therapy (IFT) and strengthening exercise for lower back. The Intervention group received Interferential therapy (IFT) and strengthening exercise for lower back along with the neck and upper trunk exercise. For a period of four weeks, three sets of 15 repetitions were completed during each of the interventions. The Oswestry disability index was used as an outcome measure to assess how much pain and disability each participant was experiencing.
Results: The mean value of pre-test was 44.87 and the post-test was 38.60 for conventional group and the mean value of pretest was 45.60 and the post test was 26.07 for intervention group.
Conclusion: From the study it has been concluded that neck and upper trunk Exercises combined with conventional protocol were shown to be more successful than Conventional protocol alone in the recovery of patients with mechanical low back pain.

Keywords

Mechanical low back pain, Neck and Upper trunk exercises, Low back Pain strengthening exercises, Interferential therapy (IFT)

Introduction

Low back pain is characterized as pain in the back of the body that runs from the bottom edge of the 12th rib to the bottom gluteal creases. Back pain is the main factor in activity restriction and

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professional absence, which has a high medical burden and financial expense (Wu et al.,2020). Low back pain is more likely to be reported by individual with manually challenging occupations, physical and psychological comorbidities, cigarettes, and overweight people. People of all ages suffer from low back discomfort (Hartvigsen et al.,2018). So, it has become one of the world's most critical public health crises.

After the cold or flu, lower lumbar pain is the second commonest ailment. It affects over 70% of people in most developed nations throughout their lives. Low back pain is either vague or mechanical in nature. Mechanical low back pain results from misuse of a normal anatomic structure (muscle strain) or pain that results from trauma or anatomic structural malformation (herniated nucleus pulposus). Repetitive trauma and overuse are the primary etiological factors of mechanical low back pain. The great majority of patients who suffer from back pain have mechanical causes. Mechanical diseases are aggravated by some physical actions and eased by others (for example, a supine position) (Walker et al., 2009). Detection methods for mechanical low back pain include clinical examination, manipulation, tests, and imaging tests like x-rays, MRIs, and Computed tomography (Ahmed et al.,2014).

Chronic low back pain is regarded as a muscle imbalance in the spine flexors and extensors, which results in severe functional disability and requires an extensive rehabilitation regimen (Lemaire et al.,2013). Mechanical LBP is linked to a variety of functional and anatomical abnormalities in the back. When compared to healthy people, LBP patients reported poorer extension and flexion strength, as well as a lower extension to flexion strength ratio. Lower limb muscle strength has also been reduced. In contrast to the muscular power features, the muscular stamina of the trunk extensor muscles has been shown to be reduced (Tarnanen et al.,2008).

Different intervention options are used to manage low back pain. Different forms of exercises like William's flexion exercise and McKenzie extension exercise, interferential therapy, stretching, and strengthening have been used to treat low back pain, (Waqqar et al.,2016). Exercise is a common treatment approach, either alone or in combination with other methods. It has a high degree of proof that it works in treating mechanical low back pain patients. Low back exercises have been shown in randomised controlled studies to decrease ache and enhance role in people with persistent low back pain. Three times as many people with low back pain as those with high muscle strength had inadequate back extensor muscle strength. Similarly, patients with chronic lower back pain have a lower thoracic section of the erector spinae muscles than healthy people who do not have chronic lower back pain. Based on the findings of the EMG study, strengthening workouts in the upper kinetic chain can be considered to have a good impact on the kinetic chain, much like the influence of strengthening workouts in the lower kinetic chain (Atalay et al., 2017).

The feedforward process is emphasized in rehabilitative regimens for enhancing trunk muscle activation by using workouts that stress maintaining static postures (e.g., curl-up, cobra exercise). Workouts to strengthen the trunk muscles are included in these activities (Gatti et al.,2011). New research suggests that low-back extensor endurance training can help people with mechanical LBP reduce discomfort, incapacity, and work loss while also enhancing tiredness threshold and physical performance (Mbada et al.,2013). Patients should be informed about the possible benefits of trunk-strengthening programmes to alleviate low back stiffness (Slade et al.,2006; Vidyapeeth et al.2012).

Therefore, the goal of this study is to determine whether a low back rehab program combined with neck and upper trunk exercises helps individuals with mechanical low back pain experience less ache and function impairment.

Methodology

A total of 30 subjects with mechanical low back pain were chosen using convenient sampling technique included both Male and Female with age group 25 to 45 years of age and excluded the subjects with Arthritis inflammation, Indications of operating intervention, Existence of degenerative diseases. The subjects were given a thorough explanation of the study protocol, and their informed consent was acquired. Patients were split into two groups (Conventional group-15, Intervention group-15). To determine how mechanical low back pain impaired the ability to manage day-to-day activities, all patients were evaluated using the updated Oswestry low back pain disability questionnaires, which was used to calculate pre-test and post-test values.

Conventional group received Interferential therapy (IFT) and strengthening exercise for lower back (Bridging, spinal flexion, spinal extension, lateral leg raises). The intervention group received Interferential therapy (IFT) and strengthening exercise for lower back along with the neck and upper trunk exercise (Neck isometrics, shoulder shrugs, full neck flexion with hunch). All the exercises were performed with 15 repetitions and 3 sets. Interferential therapy (IFT) was given for 15 minutes with 80-100HZ frequency, depending on the patient's sensitivity, intensity was adjusted. Treatment was done for 3 days/week for 4 weeks, totally 12 sessions

Revised Oswestry low back pain disability questionnaire is a widely used scale for evaluating low back pain problems. Questionnaire examines perceived level of disability in 10 everyday activities of daily living. It consists of totally 60 statements divided into 10 subscales that are scored from 0 to 5. Using, a six – point Likert – type scale (0no restriction; 5severe restriction), the total highest possible score is multiplied and presented as a % of the patient's experienced pain-related impairment. The higher score on revised Oswestry disability Index represents greater disability.

Table 1 Demographic data of the participants

Group	Age	Gender	Total Number
Conventional group	30-45	Male	8
		Female	7
Intervention group	25-40	Male	6
		Female	9

Descriptive and inferential statistics were used to tabulate and evaluate the acquired data. Standard deviation and mean were applied to all parameters. To examine the significant differences between pre-test and post-test measures, a paired t-test was applied. A significance level of ($P<0.001$) was regarded as statistically significant when an unpaired t-test was employed to examine significant differences between the two groups.

Results

From statistical analysis made with the quantitative data revealed statistically significant difference between the conventional protocol and neck and Intervention group.

Table 2 Pre-test and post-test value of conventional group

Parameters		Mean	SD	*t*-value	*p*-value
Revised Oswestry Disability Index	Pre- Test	44.87	8.09	25.25	<0.001
	Post- Test	38.60	8.01		

Table 3 Pre-test and post-test values of intervention group

Parameters		Mean	SD	*t*-value	*p*-value
Revised Oswestry Disability Index	Pre-Test	45.60	6.16	12.25	<0.001
	Post-Test	26.07	3.79		

Table 4 Post-test values of conventional and intervention group

Parameters	Post-Test Values					
	Conventional Group		Intervention Group		*t*-value	*p*-value
Revised Oswestry Disability Index	Mean	SD	Mean	SD	5.47	<0.001
	38.60	8.01	26.07	3.79		

According to the revised Oswestry Impairment Questionnaire, the test significantly reduces pain and disability (P< 0.001). There was statistically significant improvement in both groups as well as between the groups. The experimental group had greatly improved over the control group.

Discussion

The purpose of the present study was to investigate about the effectiveness of neck and upper trunk exercises along with conventional protocol in patient with mechanical low back pain. This study was demonstrated in the duration of 4 weeks. The pre-intervention mean of the revised

ODI in the conventional group was 44.87. The mean value after administering the individuals with the standard regimen was 38.60, indicating a statistically significant difference between the groups.

The pre-intervention mean for the revised ODI was 45.60 in the intervention group. After administering the standard regimen along with neck and upper trunk exercises to the subjects, the mean value was 26.07, indicating a statistically significant difference between the groups. Both groups improved on Oswestry index, according to statistical analysis. Intervention group has more statistical difference and beneficial effects than conventional group.

Low back discomfort is linked to a weakness in the spinal muscle kinetic chain. The CE group's findings of 23-25 percent improvement in lumbar strength are similar to those of earlier research (Bronfort, 2011) In the SE group, which included upper body activities in addition to the standard home exercise programme, there was a 34% improvement in lumbar isometric extension strength and a 29% to 32% rise in lumbar isokinetic extension maximum torque strength. Extensor muscle strength increased non-significantly more in the SE group than the CE group. As a result, the study's upper body supported exercises help build low back extensor strength (ErdemAtalay 2017) Hence, as a mechanical low back pain rehabilitation programme, we used neck and upper trunk exercise in the current study in addition to standard protocol.

Ishak NA (2016) identified the effectives of strengthening exercises and reported Strengthening activities may help improve the condition of elderly adults with LBP. Although ageing decreases muscles, muscle strength can be recovered if the elderly are given the necessary exercise. Strengthening exercises can be used with other types of exercises and techniques, such as pain modalities and manual therapies, to improve physical functions and relieve pain. In The current study we are using strengthening exercises along with IFT (pain modality) for both the groups as a conventional intervention. Although many studies have used strengthening exercises and IFT separately for low back pain intervention. We identified the combined effects of both intervention in reducing mechanical low back pain.

Trunk strengthening appears to be more effective when compared to no exercise and trunk strengthening showed no significant advantage as compared to aerobics or McKenzie exercises. It's unclear if the stated advantages are due to tissue loading or repeated movement (Susan C Slade 2006) Our findings reported that upper trunk strengthening along with neck strengthening has a role in management of mechanical low back pain.

Despite the fact that there is numerous research on the treatment of mechanical low back. Exercises for the upper trunk and neck in the treatment of mechanical low back pain have not been studied. According to our study, people who underwent neck and upper trunk exercises in addition to the standard routine experienced a noticeably lower incidence of mechanical low back pain. A large sample size of clinical participants would be helpful in research consideration. Lack of long-term monitoring data on how long strength gains from exercise programmes endure, as well as established perceptions of discomfort and a well-designed patient condition, confound our conclusion.

Conclusion

In light of the findings of the current study, it has been determined that neck and upper trunk exercises combined with conventional protocol were shown to be more successful than conventional protocol alone in the recovery of patients with mechanical low back pain. Our findings suggest that neck and upper trunk exercises along with conventional protocol may be prescribed in clinical settings in treating Mechanical low back pain patients.

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