A Study to Compare the Effect of Interferential Therapy with Ergonomic Changes Versus Core Strengthening Exercise on Low Back Pain Among Desk job workers: An Experimental study

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Abstract

Background: Desk job workers are spending 75% of work hours in high levels of sitting and improper posture causing pain over the low back region.¹ Physical exercise is recommended for reducing low back pain and it promotes a healthy lifestyle and quality of life for the workers.²

Purpose: The aim of the study was to determine the effect of Interferential therapy with ergonomic changes versus core strengthening exercises on low back pain among desk job workers.

Materials and Methods: This was an Experimental study and the subjects were chosen from the KH shoe company, Ranipet. A total of (N=166) subjects participated in this study based on inclusion and exclusion criteria. The level of disability was assessed by using the Oswestry low back disability questionnaire and range of motion by modified Schober test and finger to floor test. The strengthening exercise was received by group B for 30 minutes and rest for 30 seconds. The entire study period was from September 2022 to July 2023.

Result: This study showed clinically significant reduction of low back pain using interferential therapy. Hence, by the conventional criteria, this difference is considered to be statistically significant P<0.0001.

Conclusion: This study concluded that comparatively the interferential therapy with core strengthening exercise was more effective than the Interferential therapy with ergonomic changes.

Key words: Mechanical low back pain, Ergonomic modifications, Core strengthening exercise, Rest breaks.

Introduction

A muscular tension, stiffness, or pain that is localized below the rib edge and above the inferior gluteal folds that may or may not involve the leg is referred to as low back pain.¹ People who have LBP exhibit fear, anxiety, and misinformation about LBP. Individuals should continue daily activities while managing their pain, going back to work as soon

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as possible, and avoiding rest positions in order to prevent disability.\textsuperscript{2} About 70 to 80 percent of adults have low back pain, making it the most prevalent condition in the world. There is a correlation between employee’s socioeconomic positions and musculoskeletal discomfort at distinct anatomical locations of pain and musculoskeletal diseases (MSDs), which are frequently linked to ergonomic risk factors.\textsuperscript{3}

The musculoskeletal diseases most commonly affect the neck, shoulder, and low back region. Desk job workers are spending 75\% of their work hours in a high level of sitting and causing discomfort in the low back region. Constant sitting can change the workers posture due to forward sitting and not being upright.\textsuperscript{4} Changing the position of the posture during the rest break reduces the discomfort of the low back and it also relieves the pressure of the body parts. Usage of computers and phones, participation in meetings and reading are the key components of office work. Many office workers spend their whole workday at their desks, which necessitates prolonged sitting and it has been linked to increasing the musculoskeletal discomfort over time, especially in the low back region.\textsuperscript{5}

Soft tissues may shorten as a result of prolonged sitting, so it reduces the range of motion that is possible for joints. Limiting the joint range of motion can cause musculoskeletal disorders and alter the normal biomechanics of the body.\textsuperscript{6}

In some studies; the occupational factors include sedentary behavior and inactivity associated with LBP, during work time.\textsuperscript{7-8} Long-term static positions and psychological problems are risk factors that can lead to persistent low back pain and disability. The physical exercise is recommended for the low back pain and it promotes healthy lifestyle and quality of life of the workers.\textsuperscript{9} Clinical variables that have been associated to an increased risk of LBP include scoliosis, low back muscular endurance, poor lumbar stability and abnormal trunk movement.\textsuperscript{10}

The IT professionals are exposed to so many risk factors such as musculoskeletal disorders, postural changes.\textsuperscript{11}

**Aim**

To compare the effect of interferential therapy with ergonomic changes versus core strengthening exercise on low back pain and functional ability among desk job workers.

**Methods**

It was an experimental study. A total of (N=166) subjects were selected in the study. Convenient sampling method was used in the study. The subjects were assessed based on the inclusion and exclusion criteria.

**Inclusion criteria:**
- The workers with subacute pain
- Both the male and female
- The age group is between 21 to 45 years.

**Exclusion criteria:**
- The history of any lumbosacral injury
- Underwent recent surgery
- Pregnant women
- open wound

**Outcome measures**

The assessment was done to the subjects before starting the intervention and after the period of 6 weeks.

**Oswestry low back disability questionnaires:**

It is used to assess functional disability. The ten questions on the scale, each with six alternative answers, were given separate scores in addition to the total evaluation. According to the classification, minimum functional restriction is defined as 0–20\%, moderate functional limitation as 20–40\%, severe functional limitation as 40–60\%, disability as 60–80\%, and maximal functional limitation as 80\% or more. **Range of motion (ROM):**

The modified schober technique was used to measure the range of motion in the lumbar. The individual was requested to bend forward and backward while the assessment was being conducted; the junction of the venus’ dimples on the lower back above 10 cm and below 5cm served as
the reference line, and it was noted with a marker. Finger to floor test was used to assess the ROM of lateral flexion. Both sides were instructed to bend laterally, and a measuring tape was used to obtain measurements. These points distinctions are the outcome measurements.

Procedure

The details of the study procedure were explained to the participants and they were asked to give their informed consent form to participate in the study. The total number of subjects (n=166) was randomly divided into two groups. Group A (n=83) and Group B (n=83). For Group A (Experimental group) Interferential therapy with ergonomic modifications such as to avoid the slouched position use the cushion pillow or folded towel to adjust the height of the chair at the level of eyesight to the computer, stay hydrated, set a timing to take a break from work because it gave the chance to stand up and walk around, place the small box or tab under the feet it helps to maintain the thigh parallel to the floor was given for the desk job workers. For Group B (conventional group) Interferential therapy with core strengthening exercises was given. The entire study period was from September 2022 to July 2023.

Interferential therapy:

To reduce the pain level of the patient, interferential therapy was given for both the group A and B. Interferential therapy which has the four leads has been placed over the lower back over the painful area in the diagonal manner. Frequency 20 Hz. Intensity should be raised depending on the patient’s tolerance.

Exercise regime:

Before starting the exercise sessions for group B instruct the subjects to do warm up exercises for 5 to 10 minutes and cool down for 5 minutes after the session. Each exercise should hold for 3 to 5 seconds and 60 seconds relaxation between performing the exercises. The intensity of the exercise increases based on the level of the tolerance of the patient (repetitions and sets).

Bird Dog exercise:

The patient should be in a quadripod position. Asked the patient to contract the core muscles, while contracting asked them to raise their left arm forward and right leg backward. Instruct the patient not arch the low back while performing the exercise. Hold this position for 10 seconds before returning to the starting position and relax. Do the exercise for three sets of 10 repetitions and switch sides.

Pelvic bridge:

The patient should be in a crooked lying position. Ask the patient to contract the core muscle before doing the movement and instruct them to lift the butt off from the floor and continue to squeeze. Hold for 10 seconds and relax. Do the exercise for three sets of 10 repetitions.

Plank:

The patient should be in a prone position. Instruct the patient to lift their body by resting on the forearms and toes. The spine should be in a neutral position. Hold the plank position for 20 seconds and then lower down on the floor slowly and relax. The rest time for thirty seconds in between every repetition. Do this exercise for 5 repetitions.

Curls up:

The patient was asked to lie on the floor on their back with knees bent at a 90 degree angle. Cross the arms over their chest. Slowly contract abdominal muscles and raise shoulder blades off the floor. Keep the head in line with the body. Do this exercise for 10 repetitions and 3 sets.

Spiders pose:

The patient should be prone to lying. Then the patient was asked to lift right arm and left leg simultaneously. Hold this position for 3 to 5 seconds and relax. Do these exercises 10 repetitions and 3 sets.

Data Analysis

Graph 1: Pre and post values of oswestry low back disability questionnaire for group A.
Graph 2: Pre and post values of Oswestry low back disability questionnaire for group B.

Graph 3: Comparing the post values of the Oswestry low back disability questionnaire for group A and B.

Graph 4: Pre and post values of Range of motion for group A.

Graph 5: Pre and post values of Range of motion for group B.

Graph 6: Comparing the post values of range of motion for group A and group B.

Results

Graph: 1 Group A represents the mean values of Oswestry low back disability questionnaire, the mean value of the pre and post was 19.14 and 9.49, t value was 52.6270, (P<0.0001). By conventional criteria, this difference was considered to be extremely statistically significant.

Graph: 2 Group B represents the mean value of pre and post was 19.14 and 10.49, t value was 47.1737, (P<0.0001). By conventional criteria, this difference was considered to be extremely statistically significant.

Graph: 3 represents the comparison of the post value for group A and B, t value was 3.1884, (P<0.0017). By conventional criteria, this difference was considered to be very statistically significant.

Graph: 4 Group A represents the mean value of pre and post for lumbar flexion was 17.84 and 21.49, t value was 22.3022, (P<0.0001). For right lateral flexion pre and post value was 8.04 and 11.83, t value was 27.0962, (P<0.0001). For left lateral flexion pre and post value was 7.41 and 11.95, t value was 24.5698, (P<0.0001). For lumbar extension pre and post value was 1.310 and 1.654, t value was 35.9561, (P<0.000). By conventional criteria, this difference was considered to be extremely statistically significant.

Graph: 5 Group B represents the mean value of pre and post for lumbar flexion was 17.43 and 21.88, t value was 20.3602, (P<0.0001). For right lateral flexion
pre and post value was 7.93 and 12.54, t value was 29.0555, (P<0.0001). For left lateral flexion pre and post value was 7.58 and 12.02, t value was 24.6993, (P< 0.0001). For lumbar extension pre and post value was 1.3 and 1.636, t value was 35.9561, (P<0.0001). By conventional criteria, this difference was considered to be extremely statistically significant.

Graph: 6 Represents the comparison of post values of group A and B. For lumbar flexion the post value of A and B was 21.37 and 21.95, t value was 2.7581, (P <0.0065). For right lateral flexion, the post value of A and B was 11.83 and 12.54, t value was 4.3925, (P<0.0001). For left lateral flexion post value of A and B was 11.90 and 12.29, t value was 1.9858, (P<0.0486). For lumbar extension the post value of A and B was 1.639 and 1.676, t value was 2.3170, (P<0.0217).

By conventional criteria, this difference was considered to be extremely statistically significant. In this study, both the Group A and B showed significant improvement in the reduction of pain but comparatively Group B is more effective than Group A.

Discussion

The study aimed to compare the effects of two interventions for low back pain in computer workers: Group A received interferential therapy with ergonomic changes, while Group B received interferential therapy with core strengthening exercises. Both groups showed significant improvements over the 6-week intervention, with reduced low back pain and discomfort. Group A benefited from ergonomic changes, including chair height adjustments, maintaining a horizontal posture, using back support, and incorporating rest breaks. These modifications likely alleviated strain on the back and improved overall comfort during computer work. Group B core strengthening exercises targeted key lumbar muscles, enhancing flexibility and endurance. This improvement in core strength contributed to reduced pain and improved functional ability during daily activities.

Stefano Gobbo et al. concluded that findings of their systematic analysis demonstrated that office workers who participated in the workplace fitness programme center experienced a reduction in low back pain symptoms as well as improvements in their quality of life and muscle strength and flexibility.2

Rattaporn Shihawong et al. concluded that, the exercise program to stretch the muscle and the endurance training were effective to decrease the incidence of low back pain among office workers.6

Sunyue Ye et al. 2017 concluded that their findings suggest that maintaining a somewhat warm office climate and ensuring adequate horizontal orientation of the computer monitor are crucial for preventing NP and LBP, particularly in female office workers who have suffered neck and/or back injuries and use computers often.8

Conclusion

This study concluded that both the IFT with ergonomic changes and IFT with core strengthening exercise showed some significant improvement in the reduction of the low back pain. But comparatively the interferential therapy with core strengthening exercise was more effective than the Interferential therapy with ergonomic changes.

Ethical clearance: The ISRB committee of a private hospital and institution in Chennai has provided its clearance for the conduct of human research that complies with all applicable national laws, institutional regulations. (ISRB Application Number 03/052/2022/ISRB/SR/SCPT).

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