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A Comparative Study on Abdominal Strengthening Exercise with Interferential Therapy Versus Back Strengthening Exercise With Interferential Therapy In Acute Low Back Pain.

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Abstract*: Acute low back pain is nearly universal human experience, the subsequent development of chronic disability and diminished work capacity occurs in only a limited percentage of individuals. Acute low back pain can be defined as four to six weeks of pain between the coastal angles and gluteal folds that may radiate down to one or both legs.*
Methods and Analysis*: The study is a randomized control trail of subjects 40 to 60 years, studying the effectiveness of strengthening exercise in acute low back pain patients. The study population will comprise 60 subjects are divided into two groups. Group A subjects are given by back strengthening exercise with interferential therapy versus group B subjects are given by abdominal strengthening exercise with interferential therapy.*
Results*:Following 4 weeks of strengthening exercise program with set of back strengthening exercises showed improvement in range of motion, pain and disability questionnaire. Out of 2 groups, group A improved significantly than group B. In group A the VAS score decreased from pre-intervention mean of 7.833 to post intervention mean of 1.466 with P value < 0.005.The modified schober test flexion range improved from pre-intervention mean of 3.583 to post intervention 4.934 with P value 0.005.The Roland Morris disability questionnaire improved from pre-intervention mean of 22.033 to post-intervention 11.93 with P value less than 0.05.In all the two intervention group A subjects showed statistically significant improvement than group B subjects.*
Conclusion*:Following the intervention at the end of 4th week. The results showed clinically and statistically improvement in VAS, Modified schober test and Roland Morris disability questionnaire in group A compared to group B. Therefore the decreased scores of VAS and increase score of Modified schober test and Roland Morris disability questionnaire signify that the subject could be improved after back strengthening exercise with interferential therapy.*

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I. INTRODUCTION:

Acute low back pain is nearly universal human experience, the subsequent development of chronic disability and diminished work capacity occurs in only a limited percentage of individuals.[1]Although most of the acute low back pain patients recover quickly with minimal treatment. Acute low back pain can be defined as four to six weeks of pain between the coastal angles and gluteal folds that may radiate down to one or both legs.[2]

The acute low back pain is characterized by a mechanical pain of musculoskeletal origin, which lasts for 4 to 6 weeks with no definite cause. 41% of acute low back pain patients are recovered by the end of 3months.It is also called as Non-specific low back pain where no specific pathologies can be identified. It is usually caused by strain of paraspinal muscles and ligaments. It is aggravated with activity and relieved by rest without radiating to the lower limbs.[3]

According to the European guidelines the acute low back pain is defined as "Pain and discomfort, which is generally localized below the coastal margin and above the inferior gluteal folds, with or without radiating pain to lower limb.

Causes of acute low back pain:

Muscle strain, ligament sprain, disc bulge, osteoporosis, intervertebral disc, radiculopathy, poor posture, pathological causes (bladder/kidney infection, endometriosis, malignancy or ovarian problems).

Signs and Symptoms of low back pain

Subjects may experience aching, stabbing, sharp or dull, well-defined or vague pain, pain with movement of the spine, muscle spasm, tenderness in the low back. The intensity may range from mild to severe and also pain may radiate into one or both buttocks or even into the thigh and hip area.[4] Limited ROM, disrupted sleep due to pain in lower back, discomfort while bending and lifting. Difficulty in walking for a long distance.

Risk factors for acute low back pain

Occupational, age, family history, gender, level of physical activity, obesity, poor posture and alignment, previous back injury, psychological factors, smoking, sports.

Pathomechanics of lumbar spine

When the normal COG line is altered due to faulty posture, muscle weakness, etc. spine assumes an abnormal posture like flat back where there is a loss of lordosis, then hyper lordotic back which is due to exaggerated lordotic curve which may be due to protruding abdomen.

Management for low back pain[5,6]

Management of low back pain can be done with the following medications, they are;

- Non-steroidal anti-inflammatory drugs(NSAID's) are the first line of therapy
- Muscle relaxants-Non benzodiazepines, Opioids
- Epidural steroid injection

There are various physiotherapy modalities used for treating the acute low back pain patients by physiotherapist, They are Shortwave diathermy, Microwave diathermy, TENS, Moist heat therapy and Interferential therapy out of which the researcher have opted only the interferential therapy for treating the acute low back pain patients along with spinal stabilization exercises and core abdominal strengthening exercises[6].

Interferential therapy:

It is a common treatment modality for musculoskeletal pain and it has been demonstrated by the researchers that it has very good effect for reducing pain in acute low back pain patients. The basic principle of the interferential therapy (IFT) is that it has two medium frequency current interferes and induces the low frequency effect (Beat frequency). The two medium frequency current induced beat frequency will penetrate on muscle and nerve tissues at sufficient depth. The medium frequency currents penetrate the tissues with very little resistance. Whereas the resulting interference current (low frequency) is in the range that allows effective stimulation of the biological tissue[6].

Effect of Strengthening Exercise

The lumbar strengthening exercises are very important for maintaining the spine and increasing the spinal extensor muscle activity. Lumbar stabilization exercises will strengthen the local muscle group located in the trunk around the lumbar vertebrae, which play an important role in providing dynamic stability for spinal segments and relieving functional disability of the spine.

The various research articles also concludes that the Lumbar stabilization exercises have been shown to decrease pain, increase the stability of low back and risk of recurrence of acute low back pain[7]

Back strengthening exercise

The back extensors are essential to lifting and bending activities. These muscles act both to extend the spine and to balance the flexion movement produced by the trunk and weight being lifted. A decrease of the lower back muscles' strength may decrease spine ROM through its effect on back pain or inactivity. Regular strength training of back extensors reduces the risk of low back pain.

Abdominal strengthening exercise

Lumbar pain and leg pain due to compression of the intervertebral foramen nerve root, opening the foramen by flexion exercises reduced pain, And also posterior overflow of nucleus of disc starting compression of the nerve and causing pain and exercise alleviate pain by providing slipping of disc. Flexion exercises reduce increased lordosis and posterior slide loading by enabling the gravity center to slide forward. Abdominal muscles show a protective effect on the spine against torsional stresses. Hyperlordosis is the result of abdominal muscle weakness and dorsolumbar fascia contractures causing anterior pelvic tilt, especially when there is loading on the facet joints. Therefore, the importance of flexion exercises that strengthen the abdominals.

Objectives:

- To assess the effectiveness of interferential therapy along with low back muscle strengthening exercises on acute low back pain subjects.
- To assess the effectiveness of interferential therapy along withabdominal muscle strengthening exercises on acute low back pain subjects.
- To compare the effect of interferential therapy along with low back strengthening exercises versus interferential therapy along with abdominal strengthening exercises in subjects with acute low back pain.

II. Methodology:

It is a two groups of post randomized comparative parallel study and sample size was 60(30 in each group). A random sample method was used to sampling with a study duration of 12 months. Data was collected from KIMS in-patient and out-patient department of orthopedics and outpatient department of physiotherapy.

Materials used in this study is consent form, treatment couch, pillow, Swiss-ball, interferential therapy modality,four rubber pad electrodes, Velcro-strap, electrode-gel, cotton, measuring tape,universal goniometer and data collection or record sheet, RMDQ scale, VAS scale.

Inclusion criteria:

- Patients suffering with acute low back pain from 4 to 12weeks without any injuries.
- Age group between 40 -60 years
- Both male and female subjects
- Subjects who are willing to participate have been explained and signed the written informed consent.

Exclusion criteria:

- Inflammatory and Infectious condition of lumbar spine.
- Any old Fracture of lumbar vertebrae

- Ankylosing Spondylitis
- Any post-surgery to the low back pain region
- Any tumors/malignancy at the lower back region
- Pregnancy and lactating mother
- Radiating Pain to lower limb
- Any post- surgical Implant fixation at the back region

Evaluation Tools:
Visual analog scale, Universal goniometer/inch tape, Ronald Morris disability questionnaire andModified Schober test.

Procedure:

Samplings are selected through simple random sampling by using chit method. First 60 chits were prepared (30 in each group) and placed in a box. Patients are asked to pick one chit. Whichever group selected by the patient, as found on the chit is allocated. Group A received interferential therapy with back strengthening exercise and group B received interferential therapy with abdominal strengthening exercises. Both the groups received 5 days in a week for 4 weeks. Exercise was given for 15 minutes 10*3 sets.

Initially patient will be given informed consent to sign, after obtaining the consent pain status will be measured by VAS, ROM of the spine will be measured by schober's test and disability will be measured by Roland Morris Questionnaire. The outcomes measures will be taken at the end of the treatment on the day 1,week 2 and week 4 respectively.












Statistics:

Week 2	GROUP A		GROUP B		P value
	MEAN	SD	MEAN	SD	
MODIFIED SCHOBER'S TEST - FLEXION	4.483	0.601	4.133	0.673	**0.027*(t=2.259)**
MODIFIED SCHOBER'S TEST - EXTENSION	2.243	0.408	1.99	0.276	**0.006*(t=2.837)**
VAS SCALE	4.733	0.784	4.166	0.859	**0.009*(t=2.692)**
ROLAND'S MORRIS QUESTIONNAIRE	17.5	1.668	16.3	2.261	**0.0189*(t=2.416)**

This table shows the comparison of two groups of week 2 (back strengthening exercise with IFT and abdominal strengthening exercise with IFT) between the groups. The statistical significance is observed with most of the modality and exercise where both the groups showed improvement but group A is slightly to be a better compared to group B

Week 4	GROUP A		GROUP B		P value
	MEAN	SD	MEAN	SD	
MODIFIED SCHOBER TEST – FLEXION	4.934	0.561	4.55	0.716	**0.0175*(t=2.445)**
MODIFIED SCHOBER'S TEST - EXTENSION	2.7	0.374	2.34	0.415	**0.0006*(t=3.618)**
VAS SCALE	1.466	0.498	1.916	0.718	**0.005*(t=2.851)**
ROLAND'S MORRIS QUESTIONNAIRE	11.964	2.045	10.436	1.631	**0.002*(t=3.164)***

This table shows the comparison of two groups of week 4 (back strengthening exercise with IFT and abdominal strengthening exercise with IFT) between the groups. The statistical significance is observed with most of the modality and exercise where both the groups showed improvement but group A is slightly to be a better compared to group B.

III. Discussion:

The present study was conducted to analyze the effect of back strengthening exercises with interferential therapy versus abdominal strengthening exercises with interferential therapy. Evidence from various literatures demonstrates that the importance of exercise after the first incidence of low back pain was to improve the strength of back muscles, posture and stability in lumbar spine.

The results of the study showed that there is a specific importance of back muscle strengthening exercise versus abdominal muscle strengthening exercise in low back pain.

In the present study the researcher had selected 60 subjects which were equally distributed into two groups within the age group of 35-60 years with acute low back pain.

In the present study researcher had selected that interferential therapy as the treatment modality for low back pain subjects in both the groups. It had given the very good result in decreasing the pain.

In the present study researcher had selected abdominal strengthening versus back strengthening exercises in exercise therapy as the treatment protocol. Exercise therapy is the very important modality in preventing the low back pain.

The effect of Lumbar / back strengthening exercises as the treatment procedure for Group A. It had given significant result in decreasing in the pain (VAS), increasing the range of motion (Modified Schober Test) and improvement in disability questionnaire (Roland Morris Disability Questionnaire) for 4 weeks.

The effect of abdominal strengthening exercise as the treatment procedure for group B. It had given significant result in decreasing the pain (VAS) and increasing the range of motion (Modified Schober Test) and improvement in disability questionnaire (Ronald Morris disability questionnaire). Comparing to both groups, group A showed slightly more improvement than Group B.

IV. CONCLUSION:

In the research, Visual Analog Scale (VAS) shows drastic reduction of pain in Back strengthening exercise with interferential therapy subjects (Group A) compared to abdominal strengthening exercise with interferential therapy subjects (Group B).

Back strengthening exercise with interferential therapy subjects (Group A) shows better improvement in increasing the ROM measured by Modified Schober Test compared to abdominal strengthening exercise with interferential therapy subjects (Group B).

Disability score has decreased in back strengthening with interferential therapy subjects (Group A) compared to abdominal strengthening exercise with interferential therapy subjects (Group B) according to Roland Morris Disability questionnaire.

Limitation:

- This study was carried out on small sample size
- No long term follow up was carried out to assess whether subjects retained the gained improvement after 4 weeks of the intervention
- The age group of the patient limits the study
- Uncooperative patients limit the study
- The frequency of male and female subjects was not equally distributed that limits the study

V. SUGGESTION AND RECOMMENDATION:

- As this study was done only acute low back ache, further studies are also suggested to detect the progress in patients with other low back pain conditions.
- In this study, subjects were tested for pain and functional disability; similar studies could also be done to detect the strength of core muscles.
- Further studies should be conducted in larger sample size.
- As this study was done only for a longer duration, further study should be conducted with short term follow up sessions to know the effectiveness of the treatment.

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