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COMPARE THE EFFECTIVENESS OF EMG BIOFEEDBACK ASSISSTED CORE STABILITY EXERCISES VERSUS CORE STABILITY EXERCISES ALONE ON PAIN AND DISABILITY IN PATIENTS WITH LOW BACK PAIN

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ABSTRACT

Background: Low Back Pain (LBP) is a health related problem than affects 80% of the population within the age limit of 15 to 45 years. The primary treatment used for patients with LBP includes muscle strengthening along with thermo-therapeutic modalities. Thus the purpose of the study is to see the efficacy of EMG biofeedback assisted core stability exercises versus core stability exercises alone in patients suffering from pain and disability.

Methodology: A total of 30 patients were divided through convenient sampling method into two group- A and B. Each group had 15 patients. In Group A-SWD, traction, IFT and core stability exercises were given where as in Group B EMG biofeedback assisted core stability exercises were given for 5 treatment session per week for 2 weeks and reassessment was done on 5th and 10th day post treatment.

Result: The result of the study showed that there was statistically significant ($p<0.05$) improvement in both Group A and B in terms of pain (NPRS) and disability (ODQ) after 10th day of treatment. Whereas on comparison within groups the result showed that there was significant ($p<0.05$) improvement in Group B 10th day post treatment rather than Group A on day 10th.

Conclusion: The study supports that EMG biofeedback assisted core stability exercises are helpful for treating patients with LBP to reduce their pain as well as disability.

Keywords: Core stability exercises, EMG biofeedback, Pain, Disability,SWD,NPRS.

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INTRODUCTION

Low back pain (LBP) is an important clinical, social, economic and public health problem. In a lifetime the chances that one could have of low back pain is 65% to 80%[1, 2] In India, nearly 60% of the population have experienced back pain in their life. Sharma (1999) reported the maximum frequency of low back pain in people involved in jobs requiring handling of heavy loads, sitting jobs, standing jobs and prolonged squatting [3].

Core stabilization exercises enhance neuromuscular co-ordination as it re-trains muscles around the lumbar spine [4]. Strengthening exercises includes abdominal curl ups, bridging on sides, and quadruped position with alternate arm/leg raises and pelvic bridging which has shown good results in activating the paraspinal muscles because it controls the neutral spine position [5,6].

EMG biofeedback is to enable the patient to require voluntary control over striated musculature. As patient is made aware muscle contractions through visual and auditory feedback [7].

So the aim of the study was to see the efficacy of EMG biofeedback assisted core stability exercises and core stability exercises alone on pain and disability in patients with LBP.

METHODOLOGY

Study design and sampling- The study was performed in DAV institute of Physiotherapy and Rehabilitation OPD in Jalandhar. Total duration of the study was one and a half years.30 patients (15 in each group) were selected for the study. Patients were taken from DAV institute of Physiotherapy and Rehabilitation, Jalandhar. Patients were assigned into Group A and Group B through convenient sampling method.

Sample selection- All patients were selected according to inclusion criteria- Both males and females, age between 18-45 years, low back pain for more than 3 months, score of 20-80% score on Oswestry Disability Score Index, co-operative and mentally fit, lumbar radiculopathy(pain radiating till buttocks).

The exclusion criteria was as followed any history of neurological disorder such as parkinson's disease, GBS syndrome, multiple sclerosis, polio, sensory deficit of lower limb and back, any congenital or acquired deformity of lower limbs such as genu varum or genu valgus, leg length discrepancy, history of any lower limb joint replacements or fracture to the lower limb, pregnancy, malignancy or spinal tumour, discogenic symptoms of PIVD, psychiatric problems, contraindication against electrotherapy.

- A written consent was obtained from all the subjects. Total of 43 subjects were assessed and out of that 30 subjects (with 15 in each group) those met the inclusion criteria were selected for the study.
- Group-A SWD, lumbar traction, IFT and core stability exercises were given for 5 days per week for 2 weeks. Group-B SWD, lumbar traction, IFT, EMG biofeedback assisted core stability exercises were given for 5 days per week for 2 weeks. Assessment on 1st (pre-treatment), 5th (post-treatment) and 10th (post treatment) day was done.

INTERVENTION OF GROUP A

1. Shortwave diathermy -SWD was applied in condenser technique to lumbar back for 15 minutes.
2. Lumbar traction - After unlocking the table knees and hips were flexed at 90 degrees and traction was applied for 10 minutes (with hold for 20 seconds and rest time was 5 seconds).
3. Interferential therapy- Four electrodes were placed over T12-S1 lines, IFT adjusted to base frequency of 4 KHz with trapezoid waveform was used.
4. Core stability exercises-Core stabilization exercises included abdominal curl ups (Figure 1), back bridge (Figure 2), back bridge with leg lifts (Figure 3), hand knee with one arm in flexion and opposite leg in extension (Figure 4) were done(10 repetitions with 10 seconds hold and 3 seconds rest).

INTERVENTION OF GROUP B

1. Shortwave diathermy -SWD was applied in condenser technique to lumbar back for 15 minutes.
2. Lumbar traction - After unlocking the table knees and hips were flexed at 90 degrees and traction was applied for 10 minutes (with hold for 20 seconds and rest time was 5 seconds).
3. Interferential therapy- Four electrodes were placed over T12-S1 lines, IFT adjusted to base frequency of 4 KHz with trapezoid waveform was used.
4. Core stability exercises with EMG biofeedback- Abdominal curl ups , back bridge, back bridge with leg lifts were done without EMG biofeedback assistance , whereas hand knee with one arm in flexion and opposite leg in extension (Figure 5) were done using EMG biofeedback emphasizing over lumbar multifidus for 10 repetitions with 10 seconds hold and 3 second rest.

Figure 1: Abdominal curl ups

Figure 2: Back bridge

Figure 3: Back bridge with leg lifts

Figure 4: Hand knee with one arm in flexion and opposite leg in extension

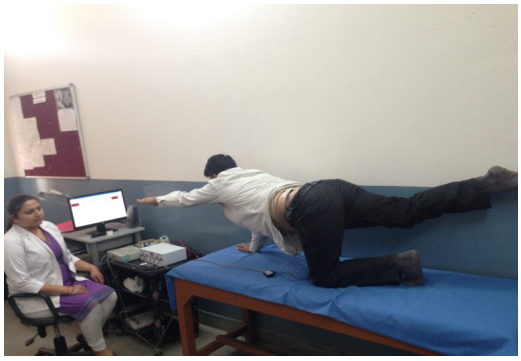


Figure 5: Hand knee with one arm in flexion and opposite leg in extension using EMG biofeedback emphasizing over lumbar multifidus

DATA ANALYSIS

Data was tabulated on master chart. SPSS software version 19.0 was used to analyze the data. Inter group and intra group comparisons were done. Following tests were used Arithmetic Mean, Unpaired 't' tests were used to check the significant differences between group A and group B Repeated measure of ANOVA test was used to see the effect within the groups. Post hoc turkey test as paired "t" test was done for within group analysis. Level of significance selected for the study was $p< 0.05$

RESULT

PAIN (NPRS)

Within group analysis- Pain was improved ($p<0.05$) significantly on the end of the 5th day post treatment in both the groups which was maintained till the end of the 10th day of the treatment.

Between the group analysis- There was non- significant ($p>0.05$) difference in term of pain in both the groups at the end of 5th day of treatment whereas by the end of 10th day of treatment group B showed significant ($p<0.05$) improvement than group A.

DISABILITY (ODQ)

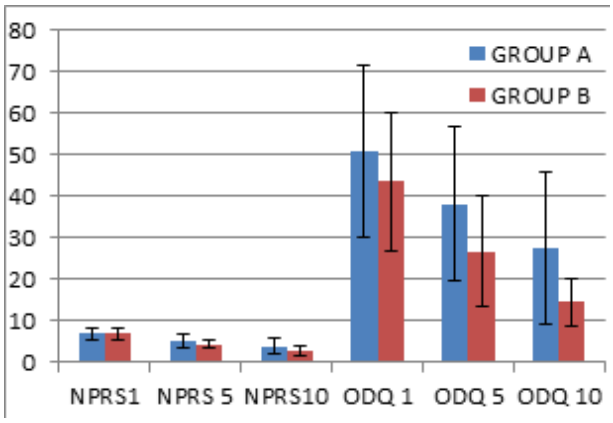
Within group analysis- Disability was improved ($p<0.05$) significantly on 5th day post treatment in both the groups which was maintained till the end of the 10th day of the treatment.

Between the group analysis- There was non- significant ($p>0.05$) difference in term of disability in both the groups at the end of 5th day of treatment whereas by the end of 10th day of treatment group B showed significant ($p<0.05$) improvement than group A.

TABLE 1: COMPARISON OF NPRS AND ODQ BETWEEN GROUP A AND B

Day	Group A	Group B	t-value	p-value	Significance
NPRS1	7.00± 1.414	6.93±1.438	0.128	>0.05	Non-significant
NPRS5	5.00± 1.648	4.47±1.060	1.051	>0.05	Non-significant
NPRS10	3.93± 1.751	2.80±1.207	2.064	<0.05	Significant
ODQ1	50.74± 20.647	43.56±16.661	1.048	>0.05	Non-significant
ODQ5	38.17± 18.638	26.22±13.404	2.017	>0.05	Non-significant
ODQ10	27.69± 18.270	14.55±5.783	2.656	<0.05	Significant

GRAPH 1: COMPARISON BETWEEN NPRS AND ODQ OF GROUP A AND B



DISCUSSION

The result of the study was statistically significant ($p<0.05$) improvement in terms of pain (NPRS) and disability (ODQ) after 10th day of treatment in both the Groups. Whereas comparing the result obtained between the two groups, the result of the study showed that EMG biofeedback assisted core stability exercises showed significant ($p<0.05$) improvement than core stability exercises alone on day 10th and has an advantage for the treatment of patients with LBP.

Group B patients were treated with EMG Biofeedback assisted core stability exercise, showed better recovery than Group A which is supported by the study conducted by Moritiani and Devries(1979). They hypothesized that use of biofeedback in recognition of facilitation pattern is responsible for increasing the work of motor neurons that helps in improving strength and endurance [8].

Radebold A (2000) stated that to maintain stability of lumbar spine, muscle recruitment and timing pattern play an important role. So in Group B exercises emphasizing on EMG biofeedback assissted lumbar multifidus contraction were preferred which proved to yield better results as compared to Group A [9].

Basmajian (1983) has proposed that subjects can control the discharging and recruitment of motor units using auditory and visual cues [10]. It can be assumed that the visual cues from the biofeedback unit enabled the group B to consciously and precisely control the exercise at sub maximal threshold level.

Therefore one can conclude from the work of Basmajian that greater gains in Group B were gained rather than Group A where biofeedback was not provided.

Group B showed significant decrease in levels of pain. The possible explanation for this improvement is due to EMG biofeedback that makes the patient feel more in control of the pain since there be a way to influence and thus reduce the pain levels. EMG biofeedback assisted core stability exercise programme strengthen the back muscles thus reducing the disability percentage. A similar study done by Ahmed H et al;(2013), on efficacy of electromyography biofeedback training on trunk stability in chronic low back pain also showed a significant improvement in endurance and pain. It thus provides visual feedback to the patient exercise performance in the form of maximal voluntary contraction of para vertebral muscles during exercises [11].

On the other hand Group A also showed significant improvement in levels of pain and disability. Core stability exercise helped patients to reduce pain and disability. The mechanism behind decrease in % of disability was reduction of pain and improvement in the ADL component thus increases in activity. There was another similar study done to by Inani SB et al.(2013), on effect of core stabilization versus conventional exercises on pain and functional status in non-specific LBP patients explaining the same cause for improvement [12].

Core stability exercises have beneficial effect in both the groups by reducing pain and disability of patients with low back pain as the segmental muscles were worked out [13].

Khan S et al. (2013), concluded that the addition of SWD along with exercises improves the symptoms of chronic LBP [14]. Another reason for the reduction in pain and disability in both group can be due to the application of SWD. Continuous SWD increases the thermal heating effects, increased collagen extensibility, increased nociceptive threshold acceleration of enzymatic activity, changes in muscle strength [15].

In a study Ahmed ET (2013) concluded that interferential currents have an effective result in treating LBP [16]. The advantage of IFC is that it generates low frequency current deep in the area of treatment this as supposed to provide effective relief for patients with pain [17].

Another mechanism that helped reduction of pain and disability in both the groups was lumbar traction. Its mechanism is to reduce pain and muscle spasm and relieve pressure on tissues and increase peripheral circulation [18].

CONCLUSION

It can be concluded from the result of the study that for treating patients suffering from LBP dealing with pain and disability, EMG biofeedback assisted core stability exercises are more beneficial than core stability exercises alone.

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