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ORIGINAL ARTICLE

A STUDY TO COMPARE THE EFFECTIVENESS OF SHORTWAVE DIATHERMY WITH BACK EXTENSOR EXERCISES v/s ULTRASOUND WITH BACK EXTENSOR EXERCISES TO REDUCE PAIN AND DISABILITY, AND IMPROVE QUALITY OF LIFE IN CASE OF SINGLE LEVEL LUMBAR MICRODISCECTOMY

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ABSTRACT: In industrialized countries, approximately 50-80% of the populations have low back pain at some times in their lives. Lumbar disc Herniation with low back pain is one of the most frequent reason for physical & functional restriction in patients. There is a steady rise in surgical interventions for the disc herniation. Microdiscectomy is a choice for symptomatic, single level lumbar disc herniation. The question is whether a post-microdiscectomy physiotherapy intervention reduces low back pain & enhances functional activities has not been systematically explored

We have done this study to assess effectiveness of SWD with back extensor exercises to reduce disability and improve quality of life after single level lumbar microdiscectomy, to assess effectiveness of US with back extensor exercises to reduce disability and improve the quality of life after single level lumbar microdiscectomy.

KEYWORDS : Shortwave Diathermy, Ultrasound, Lumbar Microdiscectomy, VAS, MMST, MODQ.

INTRODUCTION: LOW - BACK PAIN: Low back pain [LBP] which was known as an ancient curse is now known as a modern international epidemic. Epidemiological data shows that the prevalence of LBP is not decreasing and is still at epidemic proportions [Waddell & Burton 2005][1-2]

It is the most widely reported musculoskeletal disorder in the world, and 70-80% of all people will develop LBP in their life [Anderson 1997; Deyo and Mizra 2006].[1-2]

Low Back ache can be classified into three types:[3]

1. Acute low back pain which lasts less than 6 weeks.
2. Sub-acute low back pain which lasts between 6 to 12 weeks
3. Chronic low back pain which lasts more than 12 weeks.

In industrialized countries, approximately 50-80% of the adult populations have low back pain at some time in their lives. There are various causes of Low Back Pain, although there are many structural causes for low back pain like injury to the supporting paraspinal muscles, the complex network of supporting ligaments, facet joint cartilage, vertebral bones and compression of spinal structures due to herniated nucleus pulposus of lumbar disc etc.[4] out of which the lumbar disc herniation is one of the most frequent reason for physical, functional restriction in patients.[5]

Study Design: A comparative study with 60 patients, randomized into 2 groups. 30 patients in Group "A" who received SWD with back extensor exercises and 30 patients in Group "B" who received US

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with back extensor exercises. The pain, ROM & functional disability of the patients were assessed respectively with VAS score, Lumbar flexion ROM by MMST and MODQ score.

NEED OF THE STUDY: Currently we are approaching the end of the bone & joint decade, which at its onset identified low back pain as one of its main focuses. Repeated mechanical micro trauma may lead to cumulative degeneration of the lumbar disk & disc herniation at L4-L5 or L5-S1, which is the common reason of low back pain, which hampers daily functional activities and thus quality of life.

Microdiscectomy is the most well-known surgical technique which is commonly used in single-level disc prolapse. There are limited number of studies have evaluated the impact of early physical intervention to enhance the efficacy of the post-operative functional outcome in the patients with single-level LMD.

There are many forms of physical therapy agents/modalities and exercise programs are available to enhance the early post-operative outcome of LMD. But still there is need for finding out the combination of physical agent with particular back extensor strengthening exercise protocols to reduce pain & functional disability after single-level LMD.

This study is intended to find out the effects of SWD with back extensor exercises versus US with back extensor exercises to reduce pain, disability, and improve the quality of life respectively with VAS, ROM and MODQ in case of single level LMD with 4-weeks of physical intervention.

In this comparative study, 60 patients are randomized into two groups, 30 subjects in group "A" (SWD with back extensor exercises) & 30 patients in group „B" (US with back extensor exercises), were undertaken to study the effects of physical therapy treatment on pain [VAS score], Spinal ROM [MMST] & functional disability [MODQ score].

In Table 4 mean age and Standard deviation (SD) is taken for both the Groups (p = 0.512), Group „A" mean ± SD is 41.10±11.58 and in Group „B" it is 42.87±10.28. In Table 5 Gender distribution is expressed in percentage % for both the Groups (p = 0.273), in Group "A" Male are 18 (60%) & Female are 12 (40%) where as in Group "B" Male are 22 (73%) & Female are 8 (27%).

In Table 6 comparison of spinal level involved in patients is expressed in percentage %, in Group „A" L4-L5 level involved in 66.70% patients & L5-S1 level involved in 33.30% patients where as in Group „B" L4-L5 level involved in 73.3% patients & L5-S1 level involved in 26.70% patients. All the above basic characteristics are matched to obtain a statistical significance having the P value of 0.512 for Age, 0.273 for Gender and 0.573 for involved spinal level i.e. L4-L5 or L5-S1.

DISCUSSION: This study is intended to find out the effects of SWD with back extensor exercises versus US with back extensor exercises to reduce pain, disability, and improve the quality of life respectively with VAS, ROM and MODQ in case of single level LMD with 4-weeks of physical intervention.

In this comparative study, 60 patients are randomized into two groups, 30 subjects in group "A" (SWD with back extensor exercises) & 30 patients in group „B" (US with back extensor exercises), were undertaken to study the effects of physical therapy treatment on pain [VAS score], Spinal ROM [MMST] & functional disability [MODQ score].

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In this study all the basic characteristics are matched at the time of enrolment as to keep aside any influence of these parameters on the outcome of results. Matching of the samples gives us clear idea and helps us to derive a conclusion regarding the effects of the treatment. Thus, by matching the basic characteristics we can say that the result obtained at the end of the study is pure because of the clinical intervention given by the therapist and other influences are not resulting from the basic characteristics.

In Group "A" mean ± SD values for pre-intervention were 5.27±0.78, 1.80±0.71 & 59.40±5.12 for VAS, Lumbar ROM & MODQ respectively where as in Group "B" mean ± SD values for pre-intervention were 5.03±0.93, 1.90±0.66 & 61.33±5.48 for VAS, Lumbar ROM & MODQ respectively. After the 4th week of physical intervention mean ± SD values for Group "A" were 2.93±0.64, 3.53±1.04 & 30.80±3.38 for VAS, Lumbar ROM & MODQ respectively where as in Group „B" mean ± SD values for post-intervention were 1.93±0.66, 4.33±0.71 & 28.40±5.88 for VAS, Lumbar ROM & MODQ respectively.

By the end of 4th week intervention - VAS had improved from 5.27 to 2.93 in Group "A"& from 5.03 to 1.93 in Group „B"; Lumbar Flexion ROM in cm [MMST] had improved from 1.8cm to 3.53cm in Group "A" & from 1.9cm to 4.33cm in Group "B"; functional disability [MODQ score] had improved from 59.40% to 30.80% in Group "A" & from 61.33% to 28.40% in Group "B".

Interpretation of the above mentioned statistical analysis is as follows: both the Groups „A"& "B" shows statistically significant improvement in the entire outcome - 50 -measures i.e. VAS, MMST & MODQ, after the end of 4th week intervention. But Group "B" [US with back extensor exercises] shows statistically greater significant improvement in VAS, MMST & MODQ compare to Group "A" [SWD with back extensor exercises] with 95 % CI (p value <0.001**).

MATERIALS & METHODS:

SOURCE OF DATA: Patients with post-operative single level LMD referred from Kempegowda Institute of medical Science Hospital and Research Centre [KIMS-RC], Bangalore to KIPT OPD.

Patients with post-operative single level LMD directly registered to Kempegowda Institute of Physiotherapy [KIPT] OPD, Bangalore.

METHODS:

Research Design: Experimental study design.
Study Design: Comparative study design.
Sample Size: 60 Subjects [30 in each group].
Sample Method: Simple random sampling method.
Duration of the Study: 3years [2010 – 2013].

Inclusion Criteria: Subjects were selected for the study who fulfilled the following inclusion criteria: Age between 20 – 60 years of both sexes.

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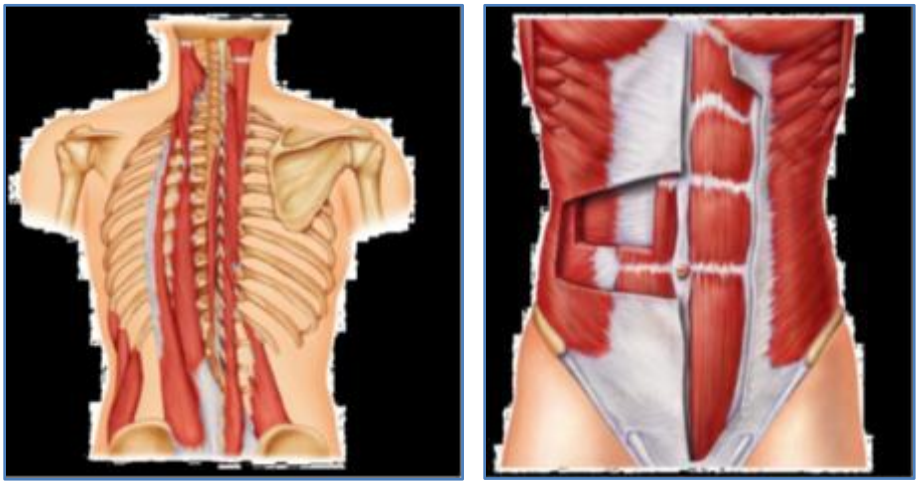
- Undergone the lumbar disc herniation operation i.e. LMD for the first time.
- Being operated on at a single level only.
- Being in the first two post-operative week.
- Pre-operative MRI for confirmation of level of disc herniation.

Exclusion Criteria: Patients were excluded from the study who met with the following exclusion criteria:

- Severe spinal osteoarthritis or osteoporosis.
- Presence of spondylolysis or spondylolisthesis or spinal canal stenosis.
- Any congenital spinal deformity-kyphosis, lordosis & scoliosis.
- Any associated neurological disorders.
- Cognitive dysfunction.
- Uncontrolled cardiovascular and respiratory diseases.
- Systemic joint infections or diseases.
- Pregnancy.
- TB and Cancer spine.
- Failed Back Syndrome.

Single-level lumbar micro discectomy associated with any spinal fracture.



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PHYSIOTHERAPEUTIC INTERVENTION: Shortwave diathermy is a therapeutic device which produces heat in the connective tissues by electromagnetic waves of 27.12MHz, to treat a wide range of musculoskeletal and other conditions [Maryam M. Al-Mandeel& Tim Watson].[4-5]

According to AL Mandeel and Watson, 2006 - Shortwave diathermy can be used to relive pain and it has been accepted widely to be one of the most widely employed clinical modality.

Shortwave Therapy was found to be effective in speeding the recovery of soft tissue injuries by increasing the activity of fibroblasts and the stimulation of ATP and protein synthesis [Cameron et al 1999], which may increase in the rate of collagen deposition [Low & Reed 2000].[4]

Reduction of pain could occur as a result of the inhibition of sensory impulse transmission, which may lead to a sedative effect in the treated area. Inflammatory pain is expected to reduce as a result of the vasodilatation and absorption of the exudates accumulating in the tissues [Ward 1980].[4]

Mechanical waves of a frequency higher than 20, 000 Hz are called ultrasound.24 It consists of inaudible high-frequency mechanical vibrations created when a generator produces electrical energy that is converted to acoustic energy through mechanical deformation of a piezoelectric crystal located within the transducer.[6]

SUMMARY: Micro discectomy is a choice for symptomatic, single level lumbar disc herniation. The question is whether a post-micro discectomy physiotherapy intervention reduces low back pain & enhances functional activities has not been systematically explored.

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In this experimental study design, 60 patients were randomly assigned into two groups, 30 patients in each group.

- Group "A" received SWD with back extensor exercises.
- Group "B" received US with back extensor exercises.

The treatment period is comprised of 3 sessions per week for 4 weeks. All the Patients were assessed at the beginning of the treatment and at the end of 4 weeks.
Primary outcome measures are: (1) VAS for pain, (2) MMST for lumbar ROM & (3) MODQ for functional disability. The values of primary outcome measures will be compared to see the effectiveness of the treatments in two groups.

Both the Groups "A"& "B" shows statistically significant improvement in the entire outcome measures i.e. VAS, MMST & MODQ, after the end of 4th week intervention. But Group "B"[US with back extensor exercises] shows statistically greater significant improvement in VAS, MMST and MODQ compare to Group "A" [SWD with back extensor exercises] with 95 % CI (p value <0.001**).

RESULTS: Both groups showed clinically & statistically significant improvement in VAS, MMST and MODQ scores, with p value <0.001**, after 4 weeks of physiotherapy intervention. At the end of 4th week intervention, both groups were substantially improved over baseline measurements but Group "B" showed better improvement compared to Group "A" at 95% CI.

CONCLUSION: In this comparative experimental study shows that US with back extensor exercises are more effective compared to SWD with back extensor exercises, to reduce pain and functional disability & thus it improves the quality of patient's life immediately after single-level LMD.

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