Effect of Ultrasound Therapy in the management of Chronic Nonspecific Low Back Pain

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Abstract

Background: Chronic non-specific low-back pain (NSLBP) has become one of the main causes of disability in the adult population around the world. Therapeutic ultrasound is frequently used by physiatrists in the treatment of LBP and is one of the most widely used electro-physical agents in clinical practice. Objective: To see the effects of ultrasound therapy (UST) in the patients with chronic nonspecific low back pain. Methodology: This randomized control trial was performed in the Department of Physical Medicine & Rehabilitation of Dhaka Medical College Hospital during the period from December 2014 to May 2015. Patients presented with chronic nonspecific LBP in an age between 18 and 55 years of both sexes attending in the Department of Physical Medicine & Rehabilitation at Dhaka Medical College Hospital, Dhaka were included as study population. A total of 80 patients presented with chronic nonspecific LBP who had fulfilled the selection criteria were taken as study population. They were divided into two groups named as treatment group (Group A) and control group (Group B). Each group had 40 patients. During follow up 8 patients (4 patients from each group) were lost. Final analysis was done with data collected from 72 patients. Patients of group A were given UST, NSAIDS, exercises and ADL instructions whereas patients of group B were given same treatment except UST. Result: In both groups female were predominant than male. Most of the patients were in 31 – 40 years age group. Mostly housewives suffered from NSLBP. All patients were from either poor or middle-class family. Mean (±SD) duration of pain was 11.3 (±12.5) months and 11.7 (±8.7) months in group A and group B respectively. Sedentary life style and repetitive lifting are the major risk factors in both groups. Character of pain was mostly dull in both groups, severity of pain was mostly moderate and relieving factor was mostly rest in both groups. Prolonged standing and prolonged sitting were the major aggravating factors in both groups.VAS and ODI were reduced gradually in both groups. Conclusion: Ultrasound therapy has a significant role in the management of chronic nonspecific low back pain. [Journal of National Institute of Neurosciences Bangladesh, July 2021; 7(2): 122-125]

Keywords: Chronic nonspecific; low back pain; ultrasound therapy

Introduction

Low back pain is defined as an uncomfortable sensation in the lumbar and buttock region originating from neurons near or around the spinal canal that are injured.
or irritated by one or more pathological process. It affects the area between the lower rib cage and gluteal folds. For the majority of patient with low back pain a specific diagnosis cannot be defined on the basis of anatomical or physiological abnormalities. Chronic Non-specific Low back pain refers to an episode of activity-limiting low back pain (with no pain referred into either lower limb) that lasts for 3 months or more. Chronic low back pain is very frequently found in our day to day practice. Risk factors include heavy lifting, bending and twisting, bodily vibration, obesity, and poor conditioning, although low back pain is common even in people without these risk factors. It is the most common reason that adults seek outpatient physical therapy. Therapeutic ultrasound (US) is among the commonly used physical modalities for treating with soft tissue injuries. There is a dearth of evidence for the clinical use of therapeutic US in patients with LBP. In attempts to document treatment effectiveness the randomized clinical trial is regarded as most important scientific instrument.

In Bangladesh, although many people in the community is suffering from nonspecific low back pain, a paucity of information exists regarding exact role of physiotherapeutic measures including ultrasound therapy (UST) in the management of chronic nonspecific low back pain. The incidence of nonspecific low back pain and its socioeconomic implications have led to the search for improved methods of management to reduce pain & stiffness, improve mobility, optimize function & hence they can contribute for their family, society, nation as well as themselves. So, this present study was undertaken to evaluate the effect of ultrasound therapy (UST) on pain & functional performance in patients with chronic nonspecific low back pain.

### Methodology

**Study Population & Settings:** This was a randomized clinical trial. This study was carried out from December 2014 to May 2015 for a period of six (6) months. This study was conducted in the Department of Physical Medicine and Rehabilitation at Dhaka Medical College Hospital, Dhaka, Bangladesh. The patients having Chronic nonspecific LBP with the age between 18 and 55 years with both male and female were included as study population. Patients having inflammatory spondyloarthropathy, traumatic LBP, malignancy, cauda equina syndrome were excluded from study.

**Randomization and Blinding:** This was a single-blind study where individual patients were kept blinded. They were blinded to treatment allocation in groups. Patients were randomly divided in to two groups by the way of lottery. Group A was treatment group and Group B was control group.

**Intervention:** Patients in both groups were treated with same drugs (Tab. Ibuprofen 400 mg thrice daily orally after meal for 2 weeks was prescribed to all patients of two groups with coverage of cap. Omeprazole 20 mg twice daily before meal), same exercise was prescribed and same ADL was advocated. Furthermore, treatment group (group A) was treated with ultrasound therapy three times weekly for 4 weeks of a total of 12 sessions. Ultrasound treatment was administered for 10 minutes per session to the most tender area over low back region at a frequency of 1 MHZ and an intensity of 1.5 W/cm², pulsed mode 1:4, with a transducer of 5 cm² and with aquasonic gel. UST was given by the physiotherapists.

**Follow up & Outcome Measures:** The follow up of the all patients of both groups were done after 2 weeks, 4 weeks and 8 weeks from the first visit. The outcome of the study was to estimate the pain after giving the treatment. The pain was measured by VAS scale as well as by Oswestry disability index (ODI). Eight patients were dropped out (4 patients from each group) during follow up. Finally, 72 patients were found at the time of final follow up.

**Statistical Analysis**: Statistical analysis was performed with Statistical Packages for Social Sciences (SPSS-17) (SPSS Inc, Chicago, IL, USA). 95% confidence limit was taken. All data were recorded systematically in preformed data collection Data was presented on a categorical scale compared between the groups using Chi-square (X²) or Fisher’s Exact Probability test, while the data presented on a quantitative scale was compared between the groups using Student’s ‘t’ test. For all analytical tests, a probability (p) value of < 0.05 (p<0.05) was considered statistically significant and p<0.01 was considered highly significant but p>0.05 was taken as non-significant.

**Results**

A total number of 72 nonspecific chronic LBP patients were recruited for this study of which 36 patients were in treatment group (group A) and the rest 36 patients were in the control group (group B).

The majority of the patients in both, group A (44.4%) and group B (52.8%) were in 31 to 40 years age group (Table 1). The mean (SD) age of the participants in group A was 35.7 (7.8) years and in group B was 34.8 (7.7) years. No significant difference of mean age in groups was observed (p >0.05).
Introduction

in the lumbar and buttock region originating from Non-specific Low back pain refers to an episode of anatomical or physiological abnormalities. Chronic were blinded to treatment allocation in groups. Patients Randomization and Blinding: Chronic nonspecific LBP with the age between 18 and Hospital, Dhaka, Bangladesh. The patients having Medicine and Rehabilitation at Dhaka Medical College Study Population & Settings: Methodology

for improved methods of management to reduce pain & and its socioeconomic implications have led to the search document treatment effectiveness the randomized was taken as non-significant. p<0.01 was considered highly significant but p>0.05 Statistical Analysis:

Student t-test was done to measure the level of significance

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Group A</th>
<th>Group B</th>
<th>Total</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤30</td>
<td>13 (36.1)</td>
<td>10 (27.8)</td>
<td>23 (31.9)</td>
<td></td>
</tr>
<tr>
<td>31 to 40 Years</td>
<td>16 (44.4)</td>
<td>19 (52.8)</td>
<td>35 (48.6)</td>
<td></td>
</tr>
<tr>
<td>41 to 50 Years</td>
<td>6 (16.7)</td>
<td>5 (13.9)</td>
<td>11 (15.3)</td>
<td>0.609</td>
</tr>
<tr>
<td>&gt;50 Years</td>
<td>1 (2.8)</td>
<td>2 (5.6)</td>
<td>3 (4.2)</td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>35.7 ± 7.8</td>
<td>34.8 ± 7.7</td>
<td>0.609</td>
<td></td>
</tr>
</tbody>
</table>

*Student t-test was done to measure the level of significance

Table 2: Distribution of the patients according to gender (n=72)

<table>
<thead>
<tr>
<th>Gender</th>
<th>Group A</th>
<th>Group B</th>
<th>Total</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>13 (36.1)</td>
<td>11 (30.6)</td>
<td>24 (33.3)</td>
<td>0.617</td>
</tr>
<tr>
<td>Female</td>
<td>23 (63.9)</td>
<td>25 (69.4)</td>
<td>48 (66.7)</td>
<td></td>
</tr>
</tbody>
</table>

Chi-square test was done to measure the level of significance

Table 3: Outcome of the patients according to Oswestry disability index (ODI)

<table>
<thead>
<tr>
<th>Disability assess by</th>
<th>Group A</th>
<th>Group B</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oswestry disability index (ODI)</td>
<td>(Mean ± SD)</td>
<td>(Mean ± SD)</td>
<td></td>
</tr>
<tr>
<td>Pre treatment</td>
<td>37.2 ± 6.4</td>
<td>36.5 ± 5.8</td>
<td>0.608</td>
</tr>
<tr>
<td>2 weeks after treatment</td>
<td>29.0 ± 4.5</td>
<td>31.7 ± 6.0</td>
<td>0.034</td>
</tr>
<tr>
<td>4 weeks after treatment</td>
<td>25.0 ± 3.5</td>
<td>27.3 ± 4.5</td>
<td>0.017</td>
</tr>
<tr>
<td>8 weeks after treatment</td>
<td>21.0 ± 2.7</td>
<td>22.1 ± 1.6</td>
<td>0.042</td>
</tr>
</tbody>
</table>

Student t-test was done to measure the level of significance

The patient's disability as measured by the Oswestry Disability Index (ODI) is illustrated in Table 3. Before treatment, the mean (SD) ODI score in groups A and B was 37.2 (6.4) and 36.5 (5.8), respectively and the difference of mean between groups was not statistically significant (p>0.05). After treatment (2, 4, and 8 weeks) the ODI gradually declined in both groups. A statistically significant difference in mean ODI score in between groups was observed after 2 weeks, 4 weeks, and 8 weeks of treatment (p< 0.05).

Table 4 depicts pain of patients assessed by visual analogue scale (VAS). The mean (SD) score of VAS before treatment was 6.6 (0.9) and 6.5 (0.8) in group A and group B respectively; this difference of mean between these two groups was not statistically significant (p>0.05). A statistically significant difference in mean score of VAS in between groups was observed after 2 weeks, 4 weeks, and 8 weeks of treatment (p< 0.05). The VAS was decreased gradually in both groups.

Table 3: Outcome of the patients according to Oswestry disability index (ODI)

<table>
<thead>
<tr>
<th>Assessment by</th>
<th>Group A</th>
<th>Group B</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual analogue scale</td>
<td>(Mean ± SD)</td>
<td>(Mean ± SD)</td>
<td></td>
</tr>
<tr>
<td>Pre treatment</td>
<td>6.6 ± 0.9</td>
<td>6.5 ± 0.8</td>
<td>0.682</td>
</tr>
<tr>
<td>2 weeks after treatment</td>
<td>4.9 ± 0.7</td>
<td>5.3 ± 0.8</td>
<td>0.028</td>
</tr>
<tr>
<td>4 weeks after treatment</td>
<td>3.8 ± 0.6</td>
<td>4.2 ± 0.7</td>
<td>0.016</td>
</tr>
<tr>
<td>8 weeks after treatment</td>
<td>2.6 ± 0.6</td>
<td>2.9 ± 0.6</td>
<td>0.038</td>
</tr>
</tbody>
</table>

Student t-test was done to measure the level of significance

Discussion

In a study in the USA it is found that LBP is the most common single musculoskeletal complaint and a major cause for being out of work, resulting in billions of dollars in lost wages and compensations payment annually. So, for various reasons we cannot manage a huge number of disabled patients with low back pain with our present resources and management system. So, the aim of this study is to find out the effects of physiatric modalities regarding the management of the patients with chronic nonspecific low back pain and to make the disabled patients into a working one, so that they can contribute for the prosperity of the persons themselves as well for the nation. Medication and physical therapy including Ultrasound therapy (UST) have proven to be useful adjuncts to an active program of exercise and education that promotes functional restoration.

A total number of 72 nonspecific chronic LBP patients were included for this study of which 36 patients were in treatment group (group A) and the rest 36 patients were in the control group (group B). In both groups female were predominant than male. In group A, female and male were 23 (63.9%) cases and 13 (36.1%) cases respectively. Similarly, female and male were 13 (36.1%) cases and 11 (30.6%) cases respectively in group B.

In group A, majority of the patients (44.4%) were in age group of 31 to 40 years. Similarly in group B, majority of the patients (52.8%) were in the age group of 31 - 40 years. The mean (SD) age of the patients was 35.7 (7.8) years and 34.8 (7.7) years in group A and group B.
Low back pain is defined as an uncomfortable sensation resulting from irritation of the neurons near or around the spinal canal that are injured by mechanical pressure or chemical irritation. In our study, where individual patients were kept blinded, we observed that most of the patients got relieved while resting. Most of the cases in both groups were moderate pain with no pain referred to day to day practice. Risk factors included heavy lifting, chronic nonspecific low back pain, the incidence of nonspecific low back pain, and prolonged working. Factors such as smoking, obesity, repetitive lifting, and sedentary life style were found to be the risk factors in group A and group B respectively. The mean (SD) duration of pain was 11.3 (12.5) months and 11.7 (8.7) months in group A and group B respectively. The mean (SD) ODI score before treatment was 37.2 (6.4) and 36.5 (5.8) in group A and group B respectively; the difference between these two groups was not statistically significant (p>0.05). The mean (SD) ODI after 8 weeks of treatment were 21.0 (2.7) and 22.1 (1.6) in group A and group B respectively; the difference between these two groups was statistically significant (p<0.05). In both groups, disability was decreased gradually but the improvement was better in group A patients than group B patients. Similar result was found in the study of Ebadi et al., (2012)\textsuperscript{11}.

Pain of patient was assessed by visual analogue scale (VAS). The mean (SD) score of VAS before treatment were 6.6 (0.9) and 6.5 (0.8) in group A and group B respectively; the difference between these two groups was not statistically significant (p>0.05). The mean (SD) score of VAS 8 weeks after treatment were 2.6 (0.6) and 2.9 (0.6) in group A and group B respectively; the difference between these two groups was statistically significant (p<0.05). In both groups, pain was decreased gradually but the improvement was better in group A patients than group B patients, a similar result was seen in the study of Ebadi et al., (2012)\textsuperscript{11}.

**Conclusion**

The ultrasound therapy could aid in reducing the pain intensity and disability of patients with chronic nonspecific low back pain, effectively. But further multicenter study with a larger sample size is needed to address its benefits to use it routinely and overcome the limitations of this study.

**References**