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Effects of Low Level Laser Therapy in Focal Soft Tissue Rheumatism: A Randomized Control Trial

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Abstract

Background: Treatment of focal soft tissue rheumatism is very important. **Objective:** The purpose of the present study was to see the effectiveness of low level laser therapy for the patients suffering from focal soft tissue rheumatism. **Methodology:** This randomized control trial was carried out in the Department of Physical Medicine and Rehabilitation at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh from March 2006 to August 2006 for a period of 6(six) months. The patients having focal soft tissue rheumatism were selected from the dept. of Physical medicine and Rehabilitation who were referred from other outpatient department of BSMMU and also from general practitioners outside the hospital. Patients were divided into two (02) groups designated as study group who were treated with Low level laser therapy, NSAIDs under the coverage of Omeprazole and ADL advice and control group who were treated with NSAIDs under the coverage of Omeprazole and ADL advices. Each group was treated and followed up for six weeks. **Result:** A total number of 44 patients were recruited for this study who were presented with different focal soft tissue rheumatism. Of these 44 patients, 32(73.0%) patients were female and 12 (27.0%) were male. Maximum patients belong to 31 to 50 years of age group in both sexes. The clinical improvement of group A was 84.0% and group B 60.0%. Results of the two groups were within narrow range. **Conclusion:** In conclusion though cannot be established, yet LLLT prove to be of some benefit to focal soft tissue rheumatism patients. *[Journal of National Institute of Neurosciences Bangladesh, 2018;4(1): 18-22]*

Keywords: Focal Soft Tissue Rheumatism; low level laser therapy; efficacy

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Introduction

Laser is the acronym for light amplification by stimulated emission of radiation[1]. Low level laser typically delivers less than 90 mW and minimal energies (between 1- 4 J) and can be considered a form of intense, focal light therapy[2]. Low level laser therapy (LLLT) has gained varying acceptance as a treatment for a broad range of soft tissue, musculoskeletal and neurological conditions[3]. Laser emits photons that can produce photothermal and or photochemical reactions. Laser differs from diffuse light in terms of their

monochromaticity, coherence and high intensity[4]. It produces significant bioeffects. These effects are manifested in biochemical, physiological and proliferative phenomena in various enzymes, cells, tissues, organs and organisms. Examples are given of the effect of He-Ne laser irradiation in preventing the post-traumatic degeneration of peripheral nerves and the postponement of degeneration of the central nervous system[5].

Soft tissue rheumatism exerts significant effects on community life, apart from causing pain and discomfort. Workdays lost directly means diminished income in populations lacking any form of unemployment benefits[6]. The decrease in symptoms and improvement in functional status that result from LLLT can enable a return to remunerative employment as well as recreational activities. Low level laser therapy (LLLT) is now a basis for the conservative treatment of a variety of musculoskeletal, neurological, and soft tissue conditions in many parts of the world[7]. Soft tissue rheumatism includes disorders of tendons and their sheaths, ligaments, bursae, joint capsules, muscles, fasciae and others. The origin of the pathology of soft tissue rheumatism is in the soft tissues like muscles, tendon, fascia, ligaments, joints capsule etc. Symptoms are principally describes as muscle ache. Despite the apparent non- anatomic nature of the symptoms, the connective tissues like fascias, ligaments burse, synoivial membrane, tendons & joint capsule are obviously the tissues of origin of the pathology of soft tissue rheumatism[8].

Lasers are light and such have some characteristics in common with diffusive light. In contrast with the later, however, a laser is a form of light amplifier, a culmineted beam of photons of the same frequency, with the wavelength in phase[9]. Photons of the same wavelength, whether in diffuse light or laser, have basically the interaction with tissue. As in diffusive light, a laser that produce photons of red or infrared heats the tissues and photons of ultraviolet lightning a laser produce photochemical reaction. As in diffuse light, the absorption and reflection characteristics of the tissues vary with the wavelength of the photons. Laser emits photons that can produce photo thermal or photochemical reactions, as is the case with conventional (diffuse) light[10]. Laser differs from diffuse light in term of their monochomaticity, coherence and high intensity. In turn, the intensity of the biological reaction depends upon the absorption, reflection on, and transmission of the wavelength; the power density; the time of exposure; and the blood flow[11].

Many authors and experts have proposed low level laser therapy as a treatment modality for various musculoskeletal disorders. No study has been found yet regarding the efficacy of low level laser therapy in focal soft tissue rheumatism in Bangladesh so far. So, in this study, an attempt has been made to find out the effect of low level laser therapy in focal soft tissue rheumatism. Therefore, this study was undertaken to use of low level laser therapy in patient management in the field of focal soft tissue rheumatism.

Methodology

Study design & Settings: This was a prospective, randomized, experimental study. This study was carried out from March 2006 to August 2006 for a period of six (06) months. This study was conducted in the Department of Physical Medicine and Rehabilitation at Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh. The patients having focal soft tissue rheumatism were selected from the dept. of Physical medicine and Rehabilitation who were referred from other outpatient department of BSMMU and also from general practitioners outside the hospital. On arrival at the department detailed history was taken and clinical examination was carried out properly. Patients having clinical symptoms of focal soft tissue rheumatism like tennis elbow, de Quervain`s disease, trigger finger, bursitis, patients with the age between 20 to 70 years with both male and female were included as study population. Patients age below 20 and above 70 years, photosensitive patients or who are on photosensitized medication, patients having skin infections and patients suffering from malignant disease, severe infection were excluded from this study.

Randomization and Blinding: Total 44 patients were divided in to two groups by the way of lottery. Group A was study group and Group B was control group. This was a single blind study.

Intervention: In group A 24 patients were treated with Low level laser therapy with NSAIDs under the coverage of Omeprazole and ADL advices. In group B 20 patients were treated with drug- NSAIDs under the coverage of Omeprazole, and ADL advices.

Follow up and Outcome Measures: All the patients were assessed initially and weekly for 6 weeks. The following factors were used for comparing the treatment like physician assessment of severity of condition pain score, tenderness index, pain frequency score. Patients' assessment score (visual analogue score)

Results

During the study period a total of 2350 patients were examined in the Department of Physical Medicine and Rehabilitation, BSMMU, Dhaka. Among them 44 patients presented with different focal soft tissue rheumatism. Percentage of patients with focal soft tissue rheumatism were 1.87%.

To ascertain about the significance of LLLT over the control group, necessary statistical analysis were done. By chi-square test, x^2 was calculated which stands at 1.93 and probability against this value at corresponding degrees of freedom was less than the table value at 0.05 level of significance (x^2 value at 0.05 level of significance is 3.84). Thus it can be concluded that

Table 1: Effectiveness of LLLT for the treatment of Tennis elbow (n=8)

Outcome	Group A	Group B	Total	P Value
Recovered	2(20.0%)	1(12.5%)	3	
Improved	8(60.0%)	4(50.0%)	12	<0.05
Unchanged	2(20.0%)	3(3.5%)	5	
Total	**12(100.0%)**	**8(100.0%)**	**20(100.0%)**	

Interpretation of Chi-square test and probability *'p'* of present study

Table 2: Effectiveness of LLLT for the treatment of de Quervain`s Rheumatism (n=8)

Outcome	Group A	Group B	Total	P Value
Recovered	1(16.5%)	1(16.5%)	2	
Improved	4(67.0%)	2(33.0%)	6	<0.05
Unchanged	1(16.5%)	3(50.5%)	4	
Total	**6(100.0%)**	**6(100.0%)**	**12(100.0%)**	

Interpretation of Chi-square test and probability *'p'* of present study

Table 3: Effectiveness of LLLT for the treatment of golfers elbow Rheumatism (n=8)

Outcome	Group A	Group B	Total	P Value
Recovered	1(50.0%)	0(0.0%)	1(25.0%)	
Improved	1(50.0%)	2(100.0%)	3(75.0%)	<0.05
Unchanged	0(0.0%)	0(0.0%)	0(0.0%)	
Total	**2(100.0%)**	**2(100.0%)**	**4(100.0%)**	

Interpretation of Chi-square test and probability *'p'* of present study

Table 4: Effectiveness of LLLT for the treatment of Trigger finger Rheumatism (n=8)

Outcome	Group A	Group B	Total	P Value
Recovered	1(25.0%)	0(0.0%)	1	
Improved	2(50.0%)	2(50.0%)	4	<0.05
Unchanged	1(25.0%)	2(50.0%)	3	
Total	**4(100.0%)**	**4(100.0%)**	**8(100.0%)**	

Interpretation of Chi-square test and probability *'p'* of present study

Table 5: Effectiveness of LLLT for the treatment of Soft Tissue Rheumatism (n=44)

Outcome	Group A	Group B	Total	P Value
Recovered	5(21.0%)	2(10.0%)	7(15.9%)	
Improved	15(63.0%)	10(50.0%)	25(56.8%)	<0.05
Unchanged	4(16.0%)	8(40.0%)	12(27.3%)	
Total	**24(100.0%)**	**20(100.0%)**	**44(100.0%)**	

Interpretation of Chi-square test and probability *'p'* of present study

there is no significant difference between the two groups.

Discussion

Soft tissue rheumatism is not an uncommon disorder in our community[12]. The most common causes of soft tissue rheumatism are misalignment, microtrauma, overstraining, and occasionally intrinsic diseases. It is broadly divided into two types, generalized and localized or focal. Among focal soft tissue rheumatism, the common are- lateral epicondylitis, de Quervain`s, trigger fingers and medial epicondylitis[13].

The word LASER is an acronym for light amplification by stimulated emission of radiation[14]. The LASER is the latest and most advanced of our light sources. Low level laser therapy commonly known as LLLT, is a form of phototherapy which involves the application of low power monochromatic and coherent light to injuries and lesions to stimulate healing[15]. Laser Therapy is the application of red and near infra-red light over injuries or lesions to improve wound or soft tissue healing and give relief for both acute and chronic pain. It is now officially referred to as (Low Level Laser Therapy) LLLT[16]. Low Level Laser Therapy is a high intensity light into the area of interest, it's just that this "light" is very intense, "monochromatic" (one wavelength), coherent (all the photons are in phase and synchronized) and is applied with a very specific dose (collimation) in mind[17]. It is painless, non-toxic, non-invasive, without drugs and very safe if applied by a trained practitioner.

Laser therapy is highly rated against other electromagnetic modalities such as ultrasound, Interferential therapy and pulsed short- wave for treatment effects including pain relief and stimulation of wound[18]. Lasers are divided into classes (1, 2,3A, 3B and 4) according to the degree of potential hazard they presence. Class 1 device is considered to be safe and no especial precaution need to be taken when using them. Class1 devices include bar – code readers, CD players and laser pointers. Class 2 is used for physiotherapy. Class 3 is categorized in to 3A and 3B. Most therapeutic lasers are class 3B devices. Viewing the laser beam directly from these devises may be hazardous but diffuse reflections are normally safe. Laser tend to fall in the category of the laser light known as 3A or 3B and referred to as soft laser or more recently as low level laser Therapy (LLLT). Class 4 devices are the most hazardous and require strict procedures to ensure their safe use. Such devices include surgical lasers. LLLT involves treatment with dose that causes no detectable temperature rise in the treated tissue and no macroscopically visible change in tissue structure[19]. The use of LLLT is known to ease the pain of soft tissue trauma. In Physical Medicine and Rehabilitation, we are using the laser 750 (model 88) of Electro- Medical Supplies (Greenham) limited, England. It is a LLLT, Helium-neon, He Ne (632.3 nm) which have semiconductor laser or lead light sources. Unlike conventional; lasers, semiconductor lasers produce a beam of coherent, monochromatic light, which is not collimated but divergent. This means that the optical intensity of the beam emitted by the laser probe has reduced to a non-hazardous level just a few centimeters from the laser aperture of the probe. The intensity during treatment incident upon the treatment is still high as the probe is used either in contract with the patient or only separated by a few millimeters. It is, however, still recommended that protective eyewear be worn during treatment[20].

The aim of the treatment of focal soft tissue rheumatism is to control pain, maintenance or improvement of strength, endurance and mobility, maintenance of independent activities of daily living. Low level laser therapy is a universal method of treating muscle, tendon, ligaments, connective tissue, bone and skin tissue. It has been found to offer superior healing and pain relieving effects compared to other electrotherapeutic modalities. In this study, Total 44 patients were selected for the study and they were divided in to two groups. Group-A is study group, and Group-B control group. Laser was given to group- A at a range of 0.3-0.4 J/ cm^2 at the area of maximum tenderness for 60 seconds daily for two weeks. Assessment after low level laser therapy revealed that improvement was found in 20(84%) cases treated with LLLT and 12(60%) cases treated without LLLT. Analysis of the present study showed that Chi-square value is 1.93 and ‘p’ is more than 0.05, statistically not significant. In the present study in terms of overall assessment, patient belonging to group-A (with LLLT) has shown 84% improvement, which is a little higher than the group-B (without LLLT), which is 60.0%. However, obtained Chi-square value x^2 was 1.93 and probability against this value at corresponding degrees of freedom is less than the table value at 0.05 level of significance (x^2 value at 0.05 level of significance is 3.84). So, from the present study no recommendation should be made in favour of LLLT as a treatment modality superior to others.

Conclusion

In conclusion it can be concluded that though not established, low level laser therapy can be a valuable adjunct to other modalities of treatment for focal soft tissue rheumatism patients. As the numbers of patients studied are very small, no firm conclusion could be drawn from this study. The information collected need verification by bigger studies on this subject.

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