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Original Article

Physiotherapy Section

Effectiveness of Dry Needling and Low-Level Laser Therapy in Nonspecific Low Back Pain

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ABSTRACT

Introduction: Musculoskeletal spinal disorders are an immense problem in industrialised societies resulting in tremendous personal and economic costs. Younger adults (30 to 60-year-old) are more likely to experience Low Back Pain (LBP) from the disc space or from back muscle strain or other soft tissue strain. Experiencing it earlier in life may lead to recurrent and chronic LBP in adulthood. Dry Needling (DN) which are utilised to treat low back torment in current patterns. Low Level Laser Treatment (LLLT) is utilised to treat LBP by concentrating on the trigger focuses.

Aim: To identify the effectiveness of DN and LLLT in the management of selected outcome variables among patients with nonspecific LBP.

Materials and Methods: The Quasi experimental study was conducted among a total of 30 subjects who met the inclusion criteria. The subjects were divided into 15 each as group A (DN) and group B (LLLT). The Numerical Pain Distress Scale (NPDS), Quebec Back Pain Disability Scale (QBPDS) and lumbar flexion range of motion were assessed, before and after two weeks of intervention program to identify the effectiveness. Data analysis was done through SPSS and graph pad, using paired t-test and independent t-test.

Results: Both groups have shown improvement after two weeks of intervention treatment program. Both groups showed significant difference in relieving pain, reducing disability and improving lumbar range of motion on nonspecific LBP individually. However, there was no significant difference found between the groups, thus null hypothesis was accepted and rejecting the alternate hypothesis.

Conclusion: Both the techniques are equally effective in reducing the pain, disability level and improving range of motion individually after two weeks of intervention.

Keywords: Numerical pain distress scale, Quebec back pain disability scale, Range of motion

INTRODUCTION

The Lower Back Pain (LBP) accounts for most of the common musculoskeletal pain conditions treated. In over all, about 40% of people have LBP at some point in their lives. The difficulty most often begins between 20 and 40 years of age [1]. A study had reported that approximately 12-80% of younger population, mainly student's experience LBP. Functional disability associated with LBP might not be the main concern in a younger population. However, experiencing it earlier in life may lead to recurrent and chronic LBP in adulthood [2].

Dry Needle (DN) is one of the common procedures, which is used to treat LBP in current trends. DN is a part of modern Western medicine principles, and supported by research [3]. DN can be used to treat for a variety of musculoskeletal problems [4]. Muscles are thought to be a primary contributing factor to the symptoms. DN can be used as part of complex treatment for chronic musculoskeletal pain and can be applied by family physicians, rheumatologists, orthopedic surgeons, physiatrists, pain specialists, dentists, and physical therapists [5]. DN is the first step in breaking the pain cycle, as research shows it will decrease muscle contraction, reduce chemical irritation, improve flexibility and decrease pain. Needle penetration will cause micro-trauma and micro bleeding localised inflammation [6]. The founder of DN Academy, states DN as methods which can help in providing the healthcare professionals a great tool to serve their patients with great result in conjunction to other therapeutic modalities [7].

Laser is one of the other advantageous techniques which are used to treat LBP by focusing on the trigger points. LLLT therapy uses red-beam or near-infrared laser with wavelength of 600-1000 nanometer (nm) and intensity of 5-500 mw to improve pain degree, joint stiffness and disability. Cold lasers are handheld devices used by the clinician and are often the size of a flashlight. The laser is placed directly over the injured area for 30 seconds to several minutes, depending on the size of the area being treated and the dose provided by the cold laser unit. During this time, the nonthermal photons of light that are emitted from the laser pass through the skin layers (the dermis, epidermis, and the subcutaneous tissue or tissue fat under the skin). This light has the ability to penetrate 2 to 5 centimeters below the skin at 90 mw and 830 nm. Despite a lack of consensus over its scientific validity, specific test and protocols for LLLT suggests that it may be mildly effective, but in most cases no better than placebo, in relieving short-term pain for arthritis, osteoarthritis, acute and chronic neck pain, tendinopathy, and possibly chronic joint disorders [8].

The NPDS (Visual analog scale) for pain and the QBPDS are validated methods for monitoring pain symptom/disability changes in LBP [9,10]. Since, the investigation's outcomes in LLLT and DN viability in LBP significant varies [11]. Hence, the present study was conducted with an aim to perceive the effectiveness of DN and LLLT on nonspecific low-back desolation patients and moreover to recognise which of the treatment is more fruitful in treating the unclear LBP patients with in shorter period to clear the symptoms.

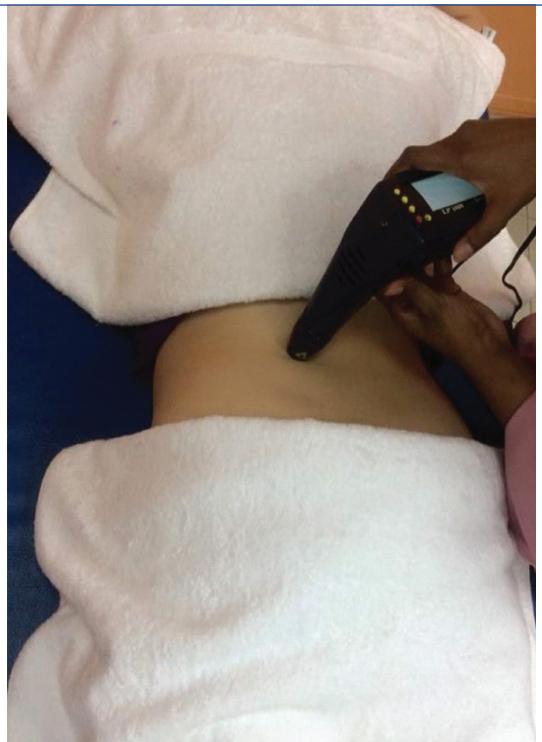
MATERIALS AND METHODS

A Quasi experimental study was conducted at Coimbatore (Lakshmi, and Ideal physiotherapy center) and the Singhania University Hospital and Research Centre (Department of physiotherapy), Pacheri Bari, Rajasthan. The duration of the study was from August 2017 to January 2018. The G power analysis tool was utilised to choose the sample size with the reference of previous study [12].

Inclusion criteria: Patients aged between 20 to 40 years, LBP lasting for more than thirty days or longer, nonradiating pain patients, nonspecific mechanical back pain.

Exclusion criteria: The patients with trauma or surgery over lumbar region, received intra-articular corticosteroid during the last 6 months, pregnant or lactating mothers, ongoing co-intervention program, severe cardiovascular, hepatic, renal, or haemopoietic diseases, neurological deficits (sensory or motor), heart pacemaker, type I or decompensated diabetes, uncontrolled systemic arterial hypertension, infectious back pain and inflammatory back pain. Outcome measures were pain intensity in numeric pain distress scale [9], functional disability measured in QBPDS [10], lumbar flexion range of motion by using Schober's test [13]. Measurement tools of this study were numeric pain distress scale (Visual Analog Scale, 0-10), QBPDS 0-100 points, inch tape, marker pen and hydraulic couch.

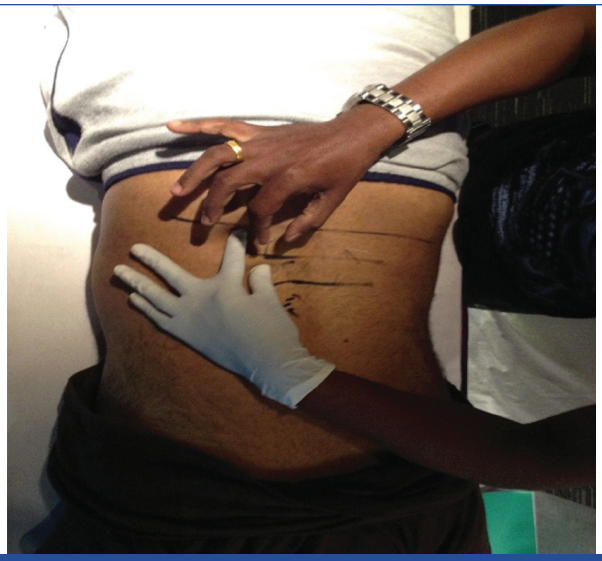
After attaining the university research Ethics committee approval, (SU/SOR/2017/103389) a total of 36 subjects with the age of 20 to 40-year-old patients of nonspecific LBP were selected. Due to exclusion criteria, four subjects were excluded. Remaining 32 patients who met the inclusion criteria were selected and equally divided for each group. During the period of study, two subjects were not able to commit for their treatment due to personal reasons, so they withdrew from the study. Only 30 subjects participated throughout the period of study. Those who are taking DN treatment as assigned as Group A and LLLT treatment was assigned as Group B. NPDS [14] and QBPDS questionnaire was issued to fill up by the subjects and also lumbar flexion range of motion were assessed as per the procedure by therapist. Each subject was treated with 2 weeks of period and observed. Intervention duration were 30 to 45 minutes/day, 3 sessions/week. All the subjects of group A and group B, after 2 weeks of intervention program, the post test assessment of NPDS, QBPDS, lumbar flexion range of motion were analysed [Table/Fig-1,2] [15,16].



[Table/Fig-1]: Application of Low Level Laser Therapy (LLLT).

STATISTICAL ANALYSIS

The data analysis was done by using descriptive statistics and inferential statistics. In descriptive statistics, mean±standard deviation is used and in inferential statistics, a pair t-test is used to find out difference within the group and independent t-test is used to find out the difference between the groups. p value less than 0.05 was considered as significant.



[Table/Fig-2]: Application of Dry Needling (DN).

RESULTS

Both groups shows extremely significant difference on pre-test and post-test evaluation [Table/Fig-3,4]. However, when it compares the post-test results, the two tailed values are 0.055 which was insignificant between the two groups [Table/Fig-5].

Group A	Mean	N	Std. deviation	Std. Error mean	Correlation	Sig.
DN pre-NPDS	7.53	15	1.24	0.32	0.58	0.02
DN post-NPDS	3.53	15	2.03	0.52		

[Table/Fig-3]: Pre-test Post-test score-NumericPain Distress Scale (NPDS)-Group A Dry Needling (DN).

Group B	Mean	N	Std. Deviation	Std. Error mean	Correlation	Sig.
Laser pre-NPDS	7.40	15	1.45	0.37	0.51	0.04
Laser post-NPDS	4.86	15	1.59	0.41		

[Table/Fig-4]: Pre-test Post-test score-Numeric Pain Distress Scale (NPDS)-Group B (Laser).

Dry needling vs Laser	N	Mean	Std. Deviation	Std. Error mean	Sig. (2-tailed)
DN	15	3.53	2.03	0.52	0.055
Laser	15	4.86	1.59	041	

[Table/Fig-5]: Post-test Values for Dry Needling (DN) Vs. LLLT–NPDS.

Both the groups shows extremely significant difference on pre-test and post-test evaluation [Table/Fig-6,7] as p-values were 0.006 and 0.01 which were significant. However, when it compares the post-test results, the two tailed values are 0.047 which was significant between the two groups [Table/Fig-8].

Group A	Mean	N	Std. Deviation	Std. Error mean	Correlation	Sig.
DN pre-QBPDS	77.26	15	15.19	3.92	0.67	0.006
DN post-QBPDS	40.73	15	16.67	4.30		

[Table/Fig-6]: Pre-test post-test score- Quebec Back Pain Disability scale (QBPDS)-Group A.

Group B	Mean	N	Std. Deviation	Std. Error mean	Correlation	Sig.
Laser pre QBPDS	78.86	15	13.34	3.44	0.64	0.010
Laser post QBPDS	51.80	15	12.09	3.12		

[Table/Fig-7]: Pre-test post-Test score- Quebec Back Pain Disability scale (QBPDS)-Group B.

DN vs Laser-Qbpds	N	Mean	Std. Deviation	Std. Error mean	Sig. (2-tailed)
DN	15	40.73	16.67	4.30	0.047
LASER	15	51.80	12.09	3.12	

[Table/Fig-8]: Post-test values for DN vs. LLLT-Quebac back pain disability scale.

Both the groups shows extremely significant difference on pre-test and post-test evaluation, with the two tailed p-value as 0.0001 [Table/Fig-9,10]. However, when it compares the post-test results between the two groups, the two tailed values were 0.276 which was insignificant between the two groups [Table/Fig-11].

Group A	Mean	N	Std. Deviation	Std. Error mean	Correlation	Sig.
DN pre Lumbar flexion ROM	3.98	15	0.46	0.11	0.86	0.0001
DN post Lumbar flexion ROM	4.49	15	0.33	0.08		

[Table/Fig-9]: Pre-test Post-test score Lumbar flexion Rom-Group A (Dry needling).

Group B	Mean	N	Std. Deviation	Std. Error mean	Correlation	Sig.
Laser pre Lumbar flexion ROM	4.30	15	0.59	0.15	0.97	0.0001
Laser post Lumbar flexion ROM	4.66	15	0.50	0.12		

[Table/Fig-10]: Pre-test Post-test score Lumbar flexion Rom-Group B (LLLT).

Dry need vs Laser-lumbar flexion rom	N	Mean	Std. Deviation	Std. Error Mean	Sig. (2-tailed)
DN	15	4.49	0.33	0.08	0.276
LLLT	15	4.66	0.50	0.12	

[Table/Fig-11]: Post-test values for DN vs. LLLT in Lumbar Flexion Rom.

DISCUSSION

Comparison of Laser, DN and Placebo Laser Treatments in Myofascial Pain Syndrome study noted a noteworthy decrease in pain at rest, at activity and increase in pain threshold as compared to other group. The study concluded that Laser therapy could be useful as a treatment modality in myofascial pain syndrome because of its non-invasiveness, ease, and short-term application [17]. In present study, DN is an invasive procedure whereas, laser is a non-invasive procedure, doesn't show much difference, but both are applied in a short term application. In that short term application DN group shown slightly better than LLLT group B, but it was not significant.

An experimental study about "Early Effects of DN and LLLT in Chronic Tennis Elbow", the study results for PRTEE score in DN and LLLT shown reduction in pain and disability of elbow. Both DN and LLLT patients were considered to be equally effective in chronic tennis elbow. However, after the first week of intervention, DN group was subjectively reported quick reduction tenderness over extensor origin [12]. In present study, short term application was there and DN group A shown slightly better than LLLT group B, but it was not significant. Additionally, 11 out of 15 patients who were treated with DN have encountered relief of pain after three sessions of period.

Limitation(s)

Less sample size, wide range of age group, specific region, specific ROM and short tern intervention period were the limitations of the study.

CONCLUSION(S)

Both DN and LLLT are similarly powerful in diminishing pain, disability level and improve function in patients with nonspecific LBP, after the two weeks of treatment program. However, comparatively both therapies don't show much significant difference on relieving pain, reducing disability and improving range of motion for a nonspecific LBP patient. Studies with large sample size, with more specific groups, with specific duration of pain intensity is recommended for future studies.

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