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Efficacy Of Dry Needling, Intramuscular Dry Needling Stimulation And Coventional Treatment Over Quadratus Lumborum Amoung Low Back Pain Patients

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ABSTRACT

Purpose: Around one quarter of persons experience chronic pain, and on average, the incidence of low back pain (LBP) can reach eighty-four percent LBP is characterized by lower back pain or discomfort and a reduction in flexion to the sides range of motion. Comparing the effectiveness of dry needling, lumborum muscle intramuscular dry needling stimulation (IMDNS), and conventional treatment (DN) in low back pain patients' distress, postural sway, and impairment was the goal of the study.

Methods And Outcomes: 51 participants who met the study's inclusion criteria and had low back pain with lumborum muscle pain between the ages of 30 and 45 participated in a randomized control trial. Participants will be divided into three groups at random (1:1), and each group will receive three sessions per week for three weeks. Group A will receive IMDNS, Group B will receive DN, Group C will receive an IFT, and each of the three groups will receive a quadrat lumborum stretch. The outcome metrics consist of Functional disability, postural sway, and pain were evaluated at baseline (pre-intervention) and follow-up (post-intervention) using the Oswestry Disability Index (ODI), Lord's sway meter, and Numerical Pain Rating Scale, respectively. A significance level of p less than 0.05 was established for the data.

Results: In three groups (A, B, and C), the study examined postural sway, disability, and pain in people with low back pain. Tukey's Post Hoc test and One-Way ANOVA were used to examine the data. The study discovered notable variations in back pain patients' postural sway, discomfort, and impairment. According to the findings, IMDN is a better course of treatment for people with low back pain. The null hypothesis is thus disproved.

Disussion And Conclusion: According to earlier research, mechanical low back pain can be effectively treated with intramuscular dry needling, dry needling, and IFT combined with QL stretching. We were confident that the evidence-based treatment for mechanical low back pain employed in this study would result in notable improvements in functional impairment, postural sway, and pain. Intramuscular dry needling is more successful among the three groups.

Keywords: *low back pain, NPRS, ODI, lords sway meter, IMDNS, RCT.*

1. INTRODUCTION

Lower back pain generally manifests by discomfort or pain which is often accompanied by decreased side flexion. Chronic pain affects slightly over one fifth of people, and eighty- four percent of people will experience LBP

over time. To find out how successfully conventional dry needling (DN) and the lumborum intramuscular dry needling stimulation (IDNS) alleviated pain and decreased postural sway in people with low back pain, this study was carried out [1,2].

In occidental countries, roughly one third of adults will experience LBP while participating in routine activities. LBP has a major impact on the economy and is one of the most prevalent illnesses that contribute to years existed with a disability [3]. The prevalence of persistent lower backache is particularly significant; research suggests that somewhere between sixty and eighty per cent of people will at some point in their lives suffer from lumbar pain. A number of causes, such as a population that is aging, a cultural change toward a lack of movement, and the building up of several risk factors, have contributed to the condition's rising prevalence. Low back discomfort has serious consequences, including a major decline in general quality of life, a drop in work productivity, and a reduction in involvement in everyday activities. [4-5].

LBP is frequently attributed to the lumborum (QL) muscle, which can lead to the development of trigger spots in the connective tissues. The QL is essential for maintaining the lumbar spine and preserving good body mechanics. Inappropriate body mechanics and bad posture can strain the quadratus lumborum, which can lead to trigger points. Additionally, lateral

flexion is essential for the spine's ability to absorb force, even if sagittal alignment is equally significant. It is conceivable that participants' lower back aches and pains and ensuing movement restrictions played a role in their LBP. This is supported by a comprehensive analysis of case-control studies conducted by Pérez-Palomares, S. (2010), which found a potential correlation between a decrease in the of while flexion of the side and the beginning of LBP [1,5–7].

Numerous approaches to treatment, such as manual therapy, exercises, needling, and other methods, have been promoted. The effectiveness and long-term consequences of physiotherapy treatments for trigger points

(TrPs), including electrical therapy, exercise, and intramuscular or dry needling, vary, according to recent study. To find the most effective treatment methods for TrPs, more study is therefore required [7–12].

Dry needle therapy as well intramuscular dry needling have been shown to be effective in relieving local and generalized pain, according to research by Dommerholt, J. and several physical therapists. These techniques also aid in the restoration of range, a restoration of the muscles, and the repair of activated muscle patterns. [13].

Two medium-frequency currents are combined to produce a low frequencies current in an electrical therapeutic technique known as IFT. Low-frequency currents are essential for the main advantage of interferential currents, which is the reduction of pain. The idea of gate control provides an explanation for this phenomena. Additionally, by increasing blood flow, it removes uncomfortable toxins from the affected area. The operation of the IFC application is fascinating [14].

Lord et al. (1991 and 1996) also recommended using a sway meter to detect body sway, stating that it is useful for posture analysis and shows good test-retest reliability [15, 16]. Additionally, Madsen et al. (2023) noted that postural sway is present in patients with low back pain. [17]. According to Alessandro Chiarotto et al., (2019) the Pain Severity subscale of the Brief Pain Inventory and the Numerical Rating Scale. Researchers and physicians prefer the NRS above other tools for measuring pain severity in LBP, according to recent consensus-based studies. Its measurement capabilities and viability, however, have not been specifically taken into consideration in this decision [18]. A range of techniques will be used to evaluate the interventions' impact. Low back pain causes disability, and there are a number of measuring instruments available, including the

Oswestry Disability Index, which is a practical one-way measure to determine disability function (Karlsson, M. et al., 2010). [19–21]

Investigating the physiological and biomechanical risk factors linked to LBA as well as lumborum strain is the aim of the study. A study concentrating on pain management, functional disability, and postural stability enhancement for patients with lower back symptoms will be conducted in the following phase to evaluate the effects of IMDN and DN methods on particular outcome measures. With the expectation that there will be notable variations in pain, functional disability and postural sway, the study will compare the effectiveness of IMDNS and DN in treating low back pain. Furthermore, it is expected that within well-defined categories, clear differences will appear between the control group and the experimental group.

2. METHODS

Sample estimation

The patient can choose the number that most accurately represents their level of pain on the NRS. The 11-point (0-10) NRS is the most commonly used variant, while there are variations in the opening question, temporal recall period, and vocal descriptions [18]. While the Oswestry disability index requires score of 10% or more than that is required [23] and lords sway meter strongly associated with coefficient of performance with correlation coefficient between 0.560 and 0.86 [17]. For our current study, minimal total sample size of 51 participants across the three groups and each group has 17 participants and by study setting statistical significance of the data was set as $p < 0.05$.

Study design

This study with randomized controlled trail design to assess determine the effectiveness of Intramuscular Dry Needling Stimulation and Dry Needling in the management of disability,

postural sway and pain in low back pain patients.

After obtaining informed consent form every participant, they experiencing symptoms and as they were examined by NPRS scale, lords sway meter, and ODI. After randomization, post assessments of pain, functional disability and postural sway will be noted in the 3rd week end.

Participants, therapists, centers

Fifty-one both male and female participants will be recruited for this study. The participants are taken within the criteria.

The consent form will be provided to participants to sign before participating in this study. To provide assistance in completing clinical outcome measures such as NPRS scale, lords sway meter and Oswestry disability index. These tools have demonstrated validity and appropriateness in measuring mechanical low back pain in previous research [16-19]. The study will take place in outpatient department in RVS College of physiotherapy, Coimbatore, Tamil Nadu, India.

Inclusion criteria

- Low back pain lasting more than 3 weeks
- Group of people between the ages of 30 and 45
- Both male and female were included
- The study included patients with functional disability due to muscle or QL tightness, painful spots.
- Individuals that were stable in their clinical condition.

Exclusion criteria

- Those who have already undergone spinal surgery and who were suffer from spine pathologies.
- Individuals suffering from impaired sensation, spinal cord damage, and hip joint pathologies.
- Fibromyalgia syndrome
- Suspected structural lesion in lumbar column
- Avulsion injuries, fractures.
- Open wounds and Metastatic disease
- Cardiovascular disease and Dermatitis.

Procedure

The randomized control trail process will be using a simple lottery method to ensure that participants are chosen. Once participants are selected with baseline measurements will be measured. Participants will be assigned randomly in a 1:1:1 ratio to one of the three groups is control group and other two groups are intervention groups. The interventions will be administered by the investigator one who has a privileged experienced in needling and is responsible for delivering the treatments.

Withdrawal criteria of this study

Patients with mechanical low back pain may withdraw from the study under the following criteria: demanding request, being diagnosed with a severe illness or experiencing adverse effects from the intervention.

Intervention/control

51 randomly selected individual and divided into three groups. Group A treated with Intramuscular Dry Needling Stimulation Group B treated with Dry Needling and control group treated with IFT and all group in addition of stretching od QL muscle can be given. Each group where have 17 subjects in their groups. For over three months, every subject had symptoms. Before starting treatment, participants were asked to rate their functional disability using the Oswestry Disability Index and their level of pain on a pressure algometry, where postural sway using lords sway meter. To assess pain, postural sway and lower extremity function, these were repeated after three therapy sessions over a three-week period.

Intramuscular dry needling technique

Intramuscular dry needling stimulation technique for the QL muscle. The patient is placed within, with the affected side on top of them. Raising the ipsilateral arm above the head is recommended, and a pillow may help support the lower trunk. More access will be available to the patient in this position. Standing behind the patient and facing their back is the therapist's position. Procedure of Intramuscular electrical stimulation of the

quadratus lumborum muscle (current frequency: 4 Hz, current type: low frequency), A 75mm acupuncture needle is the required size. The first electrode is positioned at the quadratus lumborum, while the remaining electrodes are positioned at the adjacent taut bands and connected to a crocodile electrode. The electrical impulse duration is 0.3 ms, and the treatment lasts for nine sessions, three sessions each week on alternate days. Each session lasted half an hour.) [5, 11].

Dry needling technique

The method for Dry Needling in the Quadratus Lumborum Muscle." The patient is positioned inside, lying with the side that

is afflicted on top. The ipsilateral arm should be raised above the head, and the lower trunk may benefit from a pillow. In this position, the patient will have greater access. Therapist position: facing the patient's back while standing behind them. In the affected side, palpate and locate the 12th rib and iliac crest. Lateral to the lateral border of the Erector spinae, this muscle can be felt between these two landmarks. To palpate this muscle, use deep, gentle pressure. The L4 vertebra is the greatest place to palpate this muscle. (The size of the needle is 75 mm for averagely built and 100 mm for heavily built.) Needle Procedure: Point the needles in the direction of the lumbar vertebra's transverse process. To shorten the space between the skin and beneath it, depress the needle and subcutaneous tissue. Three sessions over three weeks make up the treatment duration [11, 26- 32].

Interferential therapy

The patients received IFC for twenty minutes In order to position the pain location in the center, four electrodes were positioned across. With an amplitude modulated frequency of 100 Hz, the source voltage frequency was set to 4000 Hz. Three IFT sessions per week, for a total of ten sessions, were applied [35- 36].

For all the three group will receive simultaneously stretching of QL muscle. Self- stretching while standing, the patient positions their left foot in front of their right, then laterally flexes their trunk with their arm elevated above and brought to their left side in order to stretch their right QL [37, 38].

Outcome measures NPRS Scale

The words "No Pain" and "Worst Imaginable Pain" were placed on the left and right of an 11-point NPRS that ranged from 0 to 10. The patients' pain levels during the previous 24 hours were assessed as best, worst, and current. The patient's overall level of pain was represented by the average of the three scores. [18, 23-25].

Lords sway meter

To rule out visual effect, a sway meter was positioned at the ASIS. The subjects stood three inches apart on a piece of paper with footprints. Behind the subject was a graph sheet that had been flattened to avoid displacement. Each trial lasted 30 seconds, during which participants were asked to stand on foot impressions. On the graph sheet, a starting point was indicated, and the rod was taken out at the conclusion. Each trial was followed by a 10-next seconds rest period, and the process was repeated six times for a total of 6-7 minutes. Lords meter strongly associated with coefficient of performance with correlation coefficient between 0.560 and 0.86

[16, 17]

Oswestry Disability Index

A questionnaire consisting of ten items, the ODI evaluates the impairment caused by low back pain. The six-level ordinal scale used to evaluate each item has a '0' for no limitation and a '5' for considerable limitation. By dividing each response by 50 and then multiplying the result by 100, the final score is determined. The greatest degree of

independence and functioning is represented by a score of zero [21, 22].

3. RESULTS

Three groups of patients with mechanical low back pain were examined in the study: A, B, and C. Postural sway, disability, and pain were examined. Tukey's post-Hoc test and One-Way ANOVA were used to examine the data. For postural sway, the essential "F" value at the

0.05 level is 3.07, but the computed "F" value is 8.43. There is a substantial difference in the improvement of postural sway in people with back pain patients across all three groups since the calculated "F" value is higher than the crucial "F" value. since the computed "P" value of 0.001 is below the standard alpha threshold of 0.05.

Disability, the crucial "F" value at the of 0.001 is below the standard alpha threshold of 0.05 level is 3.07, and the computed "F" value is

4.06. There is a notable difference in the improvement of disability among patients with back pain across all three groups because the computed "F" value is higher than the crucial "F" value. Given that the computed "P" value for is below the standard of 0.05.

The computed "F" value is 5.114 for the pain. The three groups' improvements in back pain patients' pain differ significantly because the computed "F" value is higher than the essential "F" value. because the computed "P" value of

0.001 is below the standard alpha threshold of

0.05. The results suggest that IMDN is a more effective treatment option for low back pain patients. Therefore, the null hypothesis is rejected.

Table 1: F AND P VALUE OF THREE GROUPS

Outcomes	Groups	Sum of Squares	Difference	Mean Square	F	Significant
Postural sway	A B C	12.45 35.46 47.91	2 48 50	6.22 0.73	8.43	0.001
Disability	A B C	158.157 943.353 1092.51	2 48 50	79.08 19.47	4.06*	0.023
Pain	A B C	14.39 67.52 81.92	2 48 50	7.196 1.406	5.114	0.009

4. DISCUSSION

The present study was aimed that at investigation of pain, disability and postural sway. Based on the study results, participants in the three group of low back pain significantly lower pain, disability and postural sway but in the Group-A has improved more than other two groups. Some of the studies also shows improvement in three interventions, As DN's efficacy is similar to that of PENS, Pérez- Palomares (2010) came to the conclusion that it might be regarded as an additional helpful tool with few side effects in the multidisciplinary strategy needed to treat non- specific LBP [5].

Hadizadeh & Dommerholt, J (2021) conducted short trials have provided early evidence of IMES's effectiveness in treating myofascial pain syndrome. The information is in favor of doing larger studies to find the best settings and dosage for the intervention, as well as to examine the effectiveness and relative effectiveness of IMES.

Rampazo, É. P., & Liebano, R. E. (2022) Significant analgesic effects were demonstrated by IFC in individuals with low back pain. This electrical current appears to have a stronger analgesic impact than higher, more pleasant carrier frequencies, and the majority of IFC parameters do not seem to affect this effect. They support more research to look at the IFC's mode of action.

Some articles show that present measures are validity. According to Sturnieks, D. L., Arnold, R., & Lord, S. R. (2011), the Sway meter is a valid tool for measuring postural sway that can distinguish between young and old individuals in a variety of sensory contexts. Sway path measurements revealed an offset that grew with the amount of sway.

Alessandro Chiarotto et al., (2019) the Pain Severity subscale of the Brief Pain Inventory and the Numerical Rating Scale. Researchers and physicians prefer the NRS above other tools for measuring pain severity in LBP, according to recent consensus-based studies. Its measurement capabilities and viability, however, have not been specifically taken into consideration in this decision.

According to Koivunen, K., (2024). A unidimensional, internally consistent scale called the Oswestry Disability

Index. Walking and standing were the least significant factors in determining the degree of handicap in the population under study, while "traveling," "social life," "sex life," and "personal care" were the most crucial. The small size and heterogeneity of the cohort under study may have an impact on how broadly the findings can be applied.

Previous literature supports that intramuscular dry needling, dry needling and IFT with all these accompanied QL stretching is effective treatment for mechanical low back pain. We strongly believed that the evidenced based intervention used in this research for treating mechanical low back pain will provides significant improvements in pain, postural sway and functional disability. Among the three-group intramuscular dry needling are more effective.

5. CONCLUSION

This study concluded that all the three interventions are effective for mechanical low back pain and results of all three group are significant. Even though all the three-group effective, Intramuscular dry needling show much better significance than all among the groups.

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Conflict of interest

All the authors declare that they have no conflict of interests

Ethical approval and consent to participate

Participants were signed a written informed consent before the participation. Participants signed a written informed consent before intervention. the study was approved by the clinical research ethical committee under reference number

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