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Original Research

Comparison Between Dry Needling And Laser Combination Of Core Stability Exercise To Decrease Myogenic Low Back Pain Complaints

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ABSTRACT

Background: *While performing daily activities, the incidence of myogenic low back pain (LBP) is experienced by many people. Physiotherapy technology in the form of dry needling and laser after both have received core stability exercise has not been widely applied in physiotherapy measures to reduce pain in complaints of myogenic low back pain. Therefore, further research is needed to compare the effectiveness of dry needling and laser with a combination of core stability exercises on low back pain myogenic complaints.*

Methods: *The research was conducted in 2021 at Sunafa physiotherapy practice, Colomadu, Karanganyar. Subjects with myogenic low back pain complaints who met the study criteria. Analysis of the research data obtained, the data is not normally distributed, therefore tested with a non-parametric test, namely the Wilcoxon test and Mann-Whitney test.*

Results: *Has the effect of dry needling with core stability exercise on pain reduction in myogenic low back pain complaints (p = 0,000), has the effect of a laser with core stability exercise on pain reduction pain in myogenic low back pain complaints (p = 0,000), there is a different effect between dry needling and core stability exercise and laser with core stability exercise to reduce pain in myogenic low back pain complaints (p = 0.002), dry needling with core stability exercise was more effective than laser with core stability exercise in reducing pain in myogenic low back pain complaints with a mean difference of 8.94 mm more significant in the group I.*

Conclusion: *Dry needling is more effective than laser after both have undergone core stability exercise to relieve pain with myogenic low back pain complaints equations. So dry needling is preferable to laser in the treatment of myogenic low back pain.*

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INTRODUCTION

In their daily activities, many people complain of myogenic low back pain (LBP). Physiotherapy modalities for myogenic low back pain in the form of dry needling or

laser with a combination of each with a core stability exercise are still rarely offered in physiotherapy departments. Research is therefore necessary to empirically prove the application of dry needling and the laser which is accompanied by a core stability exercise respectively on the pain of complaints of myogenic low back pain. The calculated incidence of LBP was 18.6% (95% confidence interval [CI], 14.2%-23.0%). Most episodes of LBP are mild. Some 1.0% (95% CI, 0.0%-2.2%) developed intense and only 0.4% (95% CI, 0.0%-1.0%) developed disabling LBP (Cassidy et al., 2005)

Conducted a previous study titled Differences in the Effectiveness of Dry Needling with Myofascial Release and Laser with Myofascial Release on Pain Reduction in Myogenic Low Back Pain Complaints, so that this research refines the efficiency of dry needling and the laser. with different combinations, namely with the core stability exercise (Zuhri and Rustanti, 2020). Another study by (Ilayaraja et al., 2020) entitled "Effectiveness of Dry Needling and Low-Level Laser Therapy in Nonspecific Low Back Pain", compared to this study, it is different from the subject's condition, namely non-specific low back pain and without any other treatment.

There is a difference with previous studies where in this study a core stability exercise was also given which would trigger the activation of the lower back muscles so that after the administration of dry needling or laser, it would be more effective in reducing pain caused by complaints of myogenic low back pain (Akuthota et al., 2008; Javadian et al., 2015; Coulombe et al., 2017).

MATERIALS AND METHOD

The design of the experimental research was in the form of a two-group pre-test and post-test design. The research was conducted at the Sunafa physiotherapy practice, Colomadu, Karanganyar. The results of the data analysis are not distributed normally, so it is tested with a nonparametric test, namely the Wilcoxon test and Mann-Whitney test. The research subjects were taken from population by purposive random sampling. The research subjects were all patients with complaints of myogenic low back pain who met the study criteria.

The inclusion criteria included: (1) subjects complaining of myogenic low back pain, (2) 18-60 years old, (3) research motivation. Exclusion criteria included: (1) lower back posture abnormalities, (2) lower back stability disturbances, (3) wearing a pacemaker, (4) altered sensitivity (5) the presence of malignant tumors in the lower back. Includes cancellation criteria: (1) do not follow the treatment program >1 time, (2) experiencing a worsening of her condition, (3) not attending the final study evaluation. VAS research measuring instrument for measuring the degree of pain.

The researcher submitted a cover letter for a research permit from the director of Poltekkes, Ministry of Health, Surakarta to the director of the physiotherapy practice of Sunafa. Additionally, the research team approached the patient to obtain consent as a research subject by completing an informed consent. Research tools and materials that should be prepared include: (1) research form, consent form, and writing instruments, (2) dry needle, alcohol swab, (3) DLTO laser device, gel laser, (4) massage oil cream, (5) VAS form. This study has been approved by the Institutional Review Board of the School of Medicine, Universitas Muhammadiyah Surakarta No.3572/B.2/KEPK-FKUMS/V/2021.

RESULTS

Characteristics of research subjects

The study of Comparison Between Dry Needling and Laser Combination Of Core Stability Exercise To Decrease Myogenic Low Back Pain Complaints was divided into 2 research groups. Group I (dry needling intervention with core stability exercise) got 37 subjects, but dropped 1 person, so that only 36 people were left. Group II (laser intervention and core stability exercise) consisted of 37 subjects.

Descriptive data for group I were obtained by 36 subjects, namely the minimum age of 15 years and a maximum of 70 years, 19 men and 17 women, the initial VAS value of at least 30 mm and a maximum of 80 mm with an average of 56.03 mm. In descriptive data group II, 37 subjects were obtained, namely the age of at least 18 years and a maximum of 71 years, there were 13 men and 24 women, the initial value of VAS was at least 30 mm and a maximum of 80 mm with an average of 46.08 mm.

Data at the start and at the end of the study

The initial data for group I is a minimum VAS value of 30 mm and maximum of 80 mm with an average of 56.03 mm and group II, which is a minimum VAS value of 30 mm and maximum of 80 mm with an average of 46.08 mm. Then the final data for group I had a minimum VAS value of 0 mm and a maximum of 40 mm with an average of 9.58 mm and group II a minimum VAS value of 0 mm and a maximum of 27 mm with an average of 9.58 mm and group II a minimum VAS value of 0 mm and a maximum of 27 mm. average 8.57 mm.

The test of normality for group I data is the initial VAS test p = 0.021 and the final VAS test p = 0.000. Meanwhile, the test of normality of the data for group II was the initial VAS p = 0.000 and the final VAS p = 0.000.

Table 1. Data Normality Test

Groups	Initial VAS (p)	Late VAS (p)
I	0.021	0.000
II	0.000	0.000

Data normality test results were indicated by group I for the initial VAS (p=0.021), the data was not normally distributed (p <0.05), while the final VAS (p=0.000) showed that the data were not normally distributed (p <0.05). Therefore, the inference test used a nonparametric test. In addition, to test the normality of the group II data for the initial VAS (p=0.000), the data was not normally distributed (p<0.05), and the final VAS (p=0.000) was showed that the data were not normally distributed (p<0.05). The following inference test therefore used a non-parametric test.

Additionally, to test the difference between the two groups because group I and group II for the initial data were not normally distributed, the inferential test used a nonparametric test in the form of the Mann-Whitney test.

In the initial VAS data normality test, both groups I and II showed that the data was not distributed normally, so the data homogeneity test was used using the Mann-Whitney test to get p=0.004, this was indicated by the fact that the data were inhomogeneous. (p<0.05).

Table 2. Data Homogenity Test

Group	Initial VAS (*p*)
I	0.004
II	<0.05

From the results of the data homogeneity test with p = 0.004, it was shown that the data was not homogeneous (p <0.05), then the statistical test for the difference in mean between groups was the difference between the initial and final data of the two groups I and II.

Hypothesis I test: it has the effect of dry needling with core stabilizing exercise to reduce the pain of myogenic back pain. Hypothesis I test with Wilcoxon test obtained p=0.00, it is shown that there is a difference in the VAS data before and after treatment (p<0.05)

Table 3. Test Of Hypotheses I

Group	Hypothesis testing	Result
I	Wilcoxon *test*	p=0.000

Hypothesis II test: There is an effect of laser with core stability exercise on pain relief in complaints of myogenic low back pain. The second hypothesis test with paired t test was obtained p=0.00, it was shown that there was a difference in the VAS data before and after treatment (<0.05).

Table 4. Test Of Hypotheses II

Group	Hypothesis testing	Result
II	*paired t-test*	*p*=0.00

Hypothesis III test: There is a difference in the effect of dry needling with core stability exercise and laser with core stability exercise on the pain relief of myogenic back pain symptoms. The test of hypothesis III with the Mann-Whitney test was obtained p=0.002, it was shown that there was a difference in the VAS data before and after treatment between groups I and II (p<0.05)

Table 5. Test Of Hypotheses III

Groups	Hypothesis testing	Result
I and II	Mann-Whitney test	p=0.002

Hypothesis test IV: Dry needling with core stability exercise is more effective than laser with core stability exercise to relieve the pain associated with myogenic low back pain.

According to the results of the different tests before and after treatment, group I with Wilcoxon test and group II with Wilcoxon test showed a difference (p<0.05). In addition, the difference test for groups I and II with the Mann-Whitney test showed that there was a difference between groups I and II after receiving the treatment (p<0.05). The difference in the decrease in myogenic low back pain complaints was greater in group I, namely 8.94 mm. Group I treatment, dry needling with core stability exercise, was shown to be more effective than group II treatment, laser with core stability exercise on pain in low back pain complaints. myogenic.

DISCUSSION

There were 36 subjects in Group I, consisting of 19 males and 17 females with an average age of 43.78 years. Group II was targeted at 37 people, with an average age of 13 males and 24 females aged 38.24. From the data of the two research groups, it is shown that group I is relatively balanced between males and females and is different for group II, which is more dominant in women than in men.

Similarly, the average age of the people surveyed, although it seems that group I is relatively older than the average group II, which is 5.54 years apart, but the standard deviation of the difference in age is 1.262 in group II, so the age difference is relatively balanced. During this time, the initial composition of the VAS was relatively balanced, although group I was slightly more painful, namely the 10.05 mm difference from group II with a standard deviation of 2.672 mm wider in the group. I, so this is a relatively small difference in the value of the pain level.

According to research (Waterman et al., 2012) entitled "Low back pain in the United States: incident and risk factor for presentation in the emergency setting", it is shown that there is a relationship between age and age variables. sex on low back pain. In this study, the average age of the two groups was over 30, so they were relatively balanced. Meanwhile, the sex in Group I was relatively balanced, while Group II was more dominant in terms of the female gender who had higher pain sensitivity than the men. However, by using a quadruple VAS measuring instrument, the sensitivity of gender subjectivity can be checked.

In this study, dry needling treatment with core stability exercise was found to have an effect on pain reduction. Dry needling where the needle is inserted at the trigger point of the lower back muscle, triggers the release of endorphins as a pain-relieving neurotransmitter, Pain is suppressed at synaptic levels, namely beta-endorphins causes analgesia by binding to opioid receptors and postsynaptic nerve endings, the impact of its effects is mainly through the presynaptic link (Sprouse-Blum et al., 2010).

This is consistent with the article by (Butts & Dunning, 2016) titled "Peripheral and Spinal Mechanisms of Pain and Dry Needling Mediated Analgesia: A Clinical Resource Guide for Health Care Professionals" in this article which shows that dry needling may increase the effects, side effects of opioids, nervous system pain, endogenous and sympathetic cannabinoid-mediated and non-opioid pain relief via brainstem serotonin and norepinephrine. Dry needling also induces a centralized hypothalamic-pituitary-adrenal axis, and corticotropin locally releases the hormone propiomelanocorticosteroid axis to Cox-2 inhibit, this reduces inflammatory cytokines.

This study is consistent with the study by (Mahmoudzadeh et al., 2016) with title “Effect of dry needling on radiating pain in subject with discogenic LBP pain: A randomized control trial”, dry needling interventions have been reported to significantly reduce pain.

Itoh et al. (2011) showed the principle that needle penetration is important for alleviating myalgia. Additionally, needling, including dry needling, will increase blood flow by stimulating vasodilators, in particular, prostaglandins secreted during injuries, including puncture injuries. Various studies have shown that needling can improve blood flow and oxygen supply to muscles (Cagnie et al., 2013). This is consistent with the meta-analysis by (Rodríguez-Mansilla et al., 2016) titled “Effectiveness of dry needling on reducing pain intensity in patients with myofascial pain syndrome: a meta-analysis” the meta-analysis is reported to include a total of 10 of 19 potentially related

clinical studies, concerning reductions in pain intensity before and after the intervention, dry needling improved compared to placebo treatment.

While the application of core stability exercises for myogenic low back pain contributes to a neutral and stable spinal posture (Coulombe et al., 2017), so that a normal posture is formed with a balanced distribution of muscle work in the lower back area. Thanks to a normal body posture and a stable balance of muscle work, it will facilitate blood circulation, an optimal local metabolism so that the pain is reduced or even disappeared. Well-known among the causes of pain due to muscle tension where muscle work between agonists and antagonists is not balanced, there are obstacles to fluid blood circulation, ischemia occurs in local tightness, lactic acid accumulates so that the tissue becomes acidic.

Acidic tissue sensitizes nociceptors and causes pain. When blood circulation is smooth, metabolite circulation is also smooth, blood supply is sufficient, lactic acid accumulation is carried, and tissues do not become hyperacidic, nociceptor sensitization is reduced and pain is reduced or even disappeared. Stability of the trunk is essential for a good balance of loads on the spine, pelvis, and the kinetic chains of the trunk muscle groups surrounding the abdominal column and viscera. The abdomen, buttocks, hips, paraspinal column and other muscles work together to provide stability to the spine.

Its central stability and motor control have been shown to be important for initiating functional limb movements as required in athletics. Core stability exercise techniques are used to improve performance and prevent injuries. Core strengthening is the stabilization of the lumbar spine used as an exercise therapy for low back pain (Akuthota et al., 2008).

In this study, the administration of lasers with core stability exercise was also shown to have an effect on pain reduction. Low-intensity laser treatment has been used in a variety of medical treatments. Lasers have a positive effect on energy metabolism (Heu et al., 2013). Applying a laser to the painful area of the lower back has a particularly biostimulating effect on improving blood circulation (Schindl et al., 2003) to be able to increase local metabolism of the lower back. Sufficient blood flow and increased local metabolism in the lower back relieve tension in the lower back muscles, facilitating all functions, including nerve compression due to muscle tension, and reducing or relieving pain.

Lasers can relieve pain through one or more mechanisms, including increased collagen, anti-inflammatory effects, increased blood flow, and stimulation of peripheral nerves. A study by (Kholoosy et al., 2020), with title “Evaluation of the Therapeutic Effect of Low Level Laser in Controlling Low Back Pain: A Randomized Controlled Trial” reported that laser treatment (in combination with NSAIDs) is an effective and long-term treatment strategy for pain relief. Back pain without noticeable side effects.

The results of this study are in line with the study using dry needling versus laser intervention (LLLT) on the reduction of non-specific low back pain conducted by Ilayaraja et al. (2020) entitled “Efficientness of Dry Needling and Low-Level Laser Therapy in Nonspecific Low Back Pain”, published in Journal of Clinical & Diagnostic Research, 14 (11). The results showed that the two treatments were equally effective, both dry needling and laser (LLLT) in reducing nonspecific low back pain.

Additionally, in this study, where the group II treatment was laser followed by core stability exercise on myogenic low back pain complaints, the contributing effect was in the form of an ideally neutral and stable spine posture. from the core stability exercise (Coulombe et al., 2017). This leads to the potentiation of the restoration of

normal posture after pain reduction due to the laser effect. This core stability exercise also has an effective impact on improving posture, especially lumbar stabilization (Javadian et al., 2015).

n addition, the effect of core stability exercise also has a strengthening effect on the core muscles in the form of abdominal muscles, glutes, hips, paraspinals and others working together to ensure the stability of the spine (Akuthota et al., 2008) which can encourage the formation of a normal posture which has an impact on increasing blood circulation and increasing metabolism, so that pain can be reduced.

This study showed that dry needling and laser use, followed by core stabilizing exercises in myogenic low back pain, relieve pain. However, the group I treatment, i.e. dry needling with core stability exercise, was more effective than the group II treatment, i.e. laser with core stability exercise, in reducing the pain of myogenic low back pain complaints. Dry needling of myofascial trigger points by mechanical stimulation has an analgesic effect. This mechanical stimulus causes a local seizure response (LTR). The LTR is an involuntary spinal reflex contraction of the muscle fibers of the joint, which cannot be achieved with the application of laser.

In addition, the effect of dry needling is more dominant in inhibiting pain at the synaptic level (Sprouse-Blum et al., 2010) and metabolism (Cagnie et al., 2013), anti-inflammatory effect while using the laser in the area of collagen growth, improvement of circulation and stimulation and metabolism of peripheral nerves (Heu et al., 2013). This indicates that the long-term effect is stronger in second-order neurons which are dominant in the dry needling effect than in first-order neurons which are dominant in the laser effect. Additionally, for later application, both groups received a core stability exercise that resulted in improved posture (Javadian et al., 2015) as well as a core muscle stabilization exercise (Akuthota et al., 2008) which had an impact on the increase in metabolism.

Thus, the end result is that the effect of dry needling with core stability exercise is greater than that of laser with core stability exercise on pain reduction in myogenic low back pain complaints.

CONCLUSION

Dry needling with core stability exercise had an effect on pain reduction in myogenic low back pain complaints ($p = 0.000$). Laser with core stability exercise has an effect on pain reduction in myogenic low back pain complaints ($p = 0.000$). There is a difference in the effect of dry needling with core stability exercise and laser with core stability exercise on the pain relief of myogenic low back pain complaints ($p = 0.002$).

Dry needling with core stability exercise is more effective than laser with core stability exercise in reducing pain in myogenic low back pain complaints. More studies are needed to compare the effectiveness of dry needling versus laser in pain management. So that the effect of each treatment is not biased with the effect of other treatments such as the combination with core stability exercise in this study. Then the results of the following study were compared to the results of previous studies in 2021, namely a combination of 2 treatments with the addition of each core stability exercise.

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