Low-level laser therapy and dry needling for myofascial pain syndrome of the upper trapezius muscle: An interventional study

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Abstract. Myofascial pain syndrome is a frequently encountered musculoskeletal problem characterized by a hypersensitive trigger point. It presents with pain, increased pain threshold, and limited range of motion (ROM). This study compared the effectiveness of low-level laser therapy and dry needling to treat patients with myofascial pain syndrome. Men and women from 20 to 55 years of age with myofascial pain syndrome of the upper trapezius muscle and meeting the study criteria were randomly assigned to 4 weeks of low-level laser therapy three times weekly and dry needling once weekly. Responses were measured with a visual analog scale (VAS), pain threshold meter, and ROM of the cervical spine. Thirty-one patients completed the study, 15 received laser therapy, and 16 received dry needling. The median pretreatment VAS score was 6 in both groups. After 4 weeks of therapy, the severity of pain decreased in both groups. The decrease in VAS score was greater with low-level laser therapy than with dry needling, but the difference was not significant. Post treatment differences in pain threshold and cervical ROM were also not significant. Low-level laser treatment and dry needling were equally effective in reducing pain and increasing the pain threshold and cervical ROM in patients with myofascial pain syndrome of the upper trapezius muscle. Changes in VAS scores, pain tolerance values, and ROM were larger with low-level laser therapy than with dry needling.

1. Introduction

Myofascial pain syndrome is frequently encountered in clinical practice and can account for 21%–30% of all cases. The incidence of myofascial pain syndrome is not associated with race or sex. It can occur at any age, but most patients are between 27.5 and 50 years of age. The outpatient polyclinic of the Department of Medical Rehabilitation of Cipto Mangunkusumo Hospital report that there were 524 patient visits with complaints of neck and shoulder pain in 2014 [1-5]. Symptoms of myofascial pain syndrome include pain and increased pain threshold, muscle spasms, and range of motion (ROM) limitation. The symptoms affect quality of life, decrease productivity, reduce work time, and increase
the medical expenses borne by the patient. Myofascial pain syndrome frequently occurs in the upper body, with 84% of the trigger points found in the trapezius, scalene, levator scapulae, and infraspinatus muscles. The trapezius muscle is the most frequent site, being involved in 34% of cases [4,6,7].

Dry needling and low-level laser therapy are the treatments of choice in patients with myofascial pain syndrome. Dry needling at the trigger point mechanically releases the contractile tissue in shortened muscles. Controlled studies have shown that the return to the initial muscle length and elasticity leads to reduced pain, increased pain threshold, increased ROM, and improved quality of life [8-10]. However, dry needling is an uncomfortable procedure and an invasive treatment that has side effects such as bleeding and inflammation after needle insertion. The performance of dry needling therapy requires special competence, and it takes a long time to perform the procedure.

Laser therapy is a noninvasive modality that is currently used in clinical practice to reduce pain intensity. The laser acts as biostimulator to increase blood circulation and the formation of collagen, and reduce inflammation during trigger point healing. Previous studies have reported reduced pain, increased pain threshold, and improved quality of life in patients with myofascial pain syndrome who were treated with either laser therapy or dry needling. The advantages of laser therapy included noninvasiveness, convenience, and ease of performance [11-13]. Ilbuldu et al. (2004) and Uemoto et al. (2013) reported that low-level laser therapy was more effective for decreasing the severity of pain, increasing pain threshold, and increasing cervical ROM [14,15]. This study evaluated the comparative effectiveness of these two therapies in reducing the severity of pain, increasing the pain threshold, and reducing muscle spasms that inhibit ROM in myofascial pain syndrome.

2. Material and Methods
This randomized controlled clinical trial aimed to assess the comparative effectiveness of low-level laser therapy and dry needling in a group of patients treated at the Polyclinic Department of Cipto Mangunkusumo Hospital for myofascial pain syndrome in the upper trapezius muscle. Men and women 20–55 years of age with muscle myofascial pain that met the Simons criteria (Simons et al., 1999) of at least two trigger points in the upper trapezius muscle with a duration of at least 3 months, a minimum visual analog scale (VAS) pain score of 5, limited cervical ROM because of the trigger points, and who agreed to participate were eligible. Patients with fibromyalgia syndrome, an unfavorable general condition, infections that accompany myofascial pain, cervical radiculopathy or myelopathy, ongoing or needle insertion therapy in the previous 3 months, currently taking analgesics, steroids, and/or muscle relaxants, blood clotting disorders or taking anticoagulants, or contraindicated for laser therapy were excluded.

The study protocol had been approved by the Health Research Ethics Committee, Faculty of Medicine, Universitas Indonesia-Cipto Mangunkusumo Hospital. All participants gave consent after being informed of the study objective, the procedures to be performed, the follow-up and exercise during therapy, the risk of side effects that could occur, and their treatments. The participants were randomly assigned to low-level laser therapy group and dry needling therapy group. The study evaluations included the measurement of VAS scores, use of a pressure threshold meter (PTM) to evaluate pain threshold, and performance of flexion, extension, lateral flexion, and cervical rotation to determine cervical ROM. The participants were given an explanation of the possible side effects and how to handle them.

Participants treated by low-level laser therapy were given goggles for eye protection. The location of the trigger points on the upper trapezius and rhomboid muscles were marked with an "X" and the surrounding area was treated by direct contact. The irradiation dosage was 5 J/cm² at each trigger point for 6 minutes. The probe was lightly pressed against the skin above the trigger point. Stretching of the cervical ROM was done at the end of the session.

Participants in the dry needling group were treated at the central and peripheral areas of each trigger point in the right and left upper trapezius muscle. After skin asepsis, dry needling treatment was performed by inserting 25G needles at the trigger point location to a depth of 2 cm. The insertion site was monitored for local twitch responses (LTRs) for a maximum of 30 minutes with manipulation of
the needle until no LTRs were seen. The needles were removed and any bleeding that occurred was controlled. Stretching of the cervical ROM was done at end of the session. Participant VAS scores, PTM changes, and cervical ROM values were evaluated at the end of each of the 4 weeks of treatment. The participants were taught how to do the cervical joint stretching exercises at home.

The data were then analyzed by using several statistical analysis such as Mann-Whitney test, Fisher’s exact test, Kolmogorov-Smirnov test, Chi-square test, and independent t-test/.

3. Results
A total of 32 participants were included and were randomized equally to low-level laser therapy and dry needling, the characteristics of participants is shown in Table 1. One participant in the dry needle group experienced prolonged pain that improved within 2 days of treatment. There were no treatment-related side effects in the laser therapy group.

| Characteristic                   | Low Power Laser Group (n = 16) | Dry Needling Group (n = 16) | P-value |
|----------------------------------|-------------------------------|-----------------------------|---------|
| Age, median (min–max), year      | 30 (20–53)                    | 48.5 (37–54)                | <0.001a |
| Sex                              |                               |                             |         |
| Male                             | 3 (18,8)                      | 4 (25)                      | 1,000b  |
| Female                           | 13 (81,2)                     | 12 (75)                     |         |
| Nutritional status               |                               |                             |         |
| Underweight                      | 0 (0)                         | 2 (12.5)                    | 0.699c  |
| Normoweight                      | 8 (50)                        | 2 (12.5)                    |         |
| Overweight                       | 3 (18,8)                      | 3 (18,8)                    |         |
| Obese grade 1                    | 4 (25)                        | 8 (50)                      |         |
| Obese grade 2                    | 1 (6,2)                       | 1 (6,2)                     |         |
| Education                        |                               |                             |         |
| Elementary-Secondary             | 3 (18,8)                      | 7 (43,8)                    | 0.127d  |
| High (Academy Undergraduate)     | 13 (81,2)                     | 9 (56,2)                    |         |
| Occupation                       |                               |                             |         |
| Housewife (IRT)                  | 0 (0)                         | 4 (25)                      | 0.415c  |
| Administrative staff             | 6 (37.5)                      | 7 (44)                      |         |
| Medical personnel                | 10 (62.5)                     | 4 (25)                      |         |
| Private                          | 0 (0)                         | 1 (6)                       |         |
| Onset of complaint, median (min–max), month | 4.5 (3–6) | 4.0 (3–6) | 0.724* |

aMann–Whitney U test, bFisher’s exact test, cKolmogorov–Smirnov test, dChi-squared test, #Significant

The measurement of pain severity, pain threshold, and cervical ROM during 4 weeks of laser of dry needle treatment can be seen in Table 2–4.
Table 2. VAS scores of pain severity during the 4 weeks of laser of dry needle treatment.

| Week                      | Low-Laser Therapy Treatment Group (n = 16) | Dry Needling Therapy Treatment Group (n = 16) | P-value<sup>a</sup> |
|---------------------------|-------------------------------------------|-----------------------------------------------|---------------------|
| Pretreatment (week 0)     | 6 (5–7)                                   | 6 (5–8)                                       | 0.590               |
| 1st evaluation (week 1)   | 4 (3–6)                                   | 4 (4–6)                                       | 0.838               |
| 2nd evaluation (week 2)   | 3 (2–5)                                   | 3 (3–5)                                       | 0.210               |
| 3rd evaluation (week 3)   | 2 (1–4)                                   | 3 (2–4)                                       | 0.086               |
| 4th evaluation (week 4)   | 1 (0–3)                                   | 2 (1–2)                                       | 0.051               |

VAS change

| Week     | Low-Laser Therapy Treatment Group (n = 16) | Dry Needling Therapy Treatment Group (n = 16) | P-value<sup>a</sup> |
|----------|-------------------------------------------|-----------------------------------------------|---------------------|
| Week 1   | 1 (0–2)                                   | 1 (1–3)                                       | 0.897               |
| Week 2   | 2 (2–4)                                   | 2 (1–5)                                       | 0.445               |
| Week 3   | 3 (2–5)                                   | 3 (2–6)                                       | 0.270               |
| Week 4   | 4.5 (2–7)                                 | 4 (3–7)                                       | 0.270               |

<sup>a</sup>Mann–Whitney U test,

Table 3. Pain threshold scores during the 4 weeks of laser of dry needle treatment.

| Weeks          | Low-Laser Therapy Treatment Group (n = 16) | Dry Needling Therapy Treatment Group (n = 16) | p-value<sup>a</sup> |
|----------------|-------------------------------------------|-----------------------------------------------|---------------------|
| Pre (week 0)   | 2.18 ± 0.45                               | 2.81 ± 0.36                                   | <0.001<sup>a#</sup> |
| 1st evaluation (week 1) | 3.17 ± 0.61                               | 3.40 ± 0.35                                   | 0.191<sup>a</sup>   |
| 2nd evaluation (week 2) | 3.81 ± 0.95                               | 3.91 ± 0.77                                   | 0.730<sup>a</sup>   |
| 3rd evaluation (week 3) | 4.39 ± 1.09                               | 4.59 ± 0.65                                   | 0.546<sup>a</sup>   |
| 4th evaluation (week 4) | 4.95 ± 0.95                               | 5.00 ± 0.63                                   | 0.856<sup>a</sup>   |

PTM change

| Week     | Low-Laser Therapy Treatment Group (n = 16) | Dry Needling Therapy Treatment Group (n = 16) | p-value<sup>a</sup> |
|----------|-------------------------------------------|-----------------------------------------------|---------------------|
| Week 1   | 0.99 ± 0.50                               | 0.59 ± 0.28                                   | 0.010<sup>ab</sup>  |
| Week 2   | 1.63 ± 0.84                               | 1.10 ± 0.75                                   | 0.067<sup>b</sup>   |
| Week 3   | 2.22 ± 1.01                               | 1.78 ± 0.74                                   | 0.168<sup>a</sup>   |
| Week 4   | 2.77 ± 1.01                               | 2.19 ± 0.67                                   | 0.048<sup>ab</sup>  |

<sup>a</sup>Independent t-test, <sup>b</sup>Mann–Whitney U Test, <sup>#</sup>Significant

Table 4. Cervical ROM during the 4 weeks of laser of dry needle treatment.

| Weeks            | Low-Laser Therapy Treatment Group (n = 16) | Dry Needling Therapy Treatment Group (n = 16) | p-value<sup>a</sup> |
|------------------|-------------------------------------------|-----------------------------------------------|---------------------|
| Cervical Flexion |                                            |                                               |                     |
| Pre (week 0)     | 40 (30–60)                                 | 47.5 (40–60)                                  | 0.067<sup>a</sup>   |
| 1st evaluation (week 1) | 50 (40–70)                                 | 60 (50–70)                                   | 0.138<sup>a</sup>   |
| 2nd evaluation (week 2) | 60 (50–70)                                 | 60 (50–60)                                   | 0.724<sup>a</sup>   |
| 3rd evaluation (week 3) | 60 (50–70)                                 | 60 (60–70)                                   | 0.590<sup>a</sup>   |
| 4th evaluation (week 4) | 60 (50–70)                                 | 60 (60–70)                                   | 0.590<sup>a</sup>   |
Table 4. Continue

| Weeks                      | Low-Laser Therapy Treatment Group (n = 16) | Dry Needling Therapy Treatment Group (n = 16) | p-value |
|----------------------------|-------------------------------------------|----------------------------------------------|---------|
| **Cervical Extension**     |                                            |                                              |         |
| Pre (week 0)               | 50 (35–60)                                | 60 (40–80)                                   | 0.094a  |
| 1st evaluation (week 1)    | 60 (50–80)                                | 60 (50–80)                                   | 0.224a  |
| 2nd evaluation (week 2)    | 75 (60–80)                                | 75 (60–80)                                   | 0.897a  |
| 3rd evaluation (week 3)    | 80 (70–80)                                | 80 (60–90)                                   | 0.985a  |
| 4th evaluation (week 4)    | 80 (70–80)                                | 80 (80–90)                                   | 0.564a  |
| **Lateral Flexion**        |                                            |                                              |         |
| Pre (week 0)               | 30 (30–40)                                | 35 (30–40)                                   | 0.838a  |
| 1st evaluation (week 1)    | 40 (35–45)                                | 40 (30–45)                                   | 0.160a  |
| 2nd evaluation (week 2)    | 45 (35–45)                                | 40 (30–45)                                   | 0.032af |
| 3rd evaluation (week 3)    | 45 (45–45)                                | 45 (40–50)                                   | 0.564a  |
| 4th evaluation (week 4)    | 45 (45–45)                                | 45 (45–50)                                   | 0.564a  |
| **Cervical Rotation**      |                                            |                                              |         |
| Pre (week 0)               | 60 (35–70)                                | 67.5 (52.5–75)                               | 0.086a  |
| 1st evaluation (week 1)    | 70 (50–75)                                | 70 (60–75)                                   | 0.897a  |
| 2nd evaluation (week 2)    | 75 (60–80)                                | 75 (65–80)                                   | 0.402a  |
| 3rd evaluation (week 3)    | 75 (70–80)                                | 75 (70–80)                                   | 0.669a  |
| 4th evaluation (week 4)    | 75 (70–80)                                | 75 (75–80)                                   | 0.402a  |
| **ROM change**             |                                            |                                              |         |
| **Cervical Flexion**       |                                            |                                              |         |
| Pre (week 0)               | 10 (0–30)                                 | 10.0 (0–20)                                  | 0.897a  |
| 1st evaluation (week 1)    | 20 (0–30)                                 | 12.5 (−10–20)                                | 0.171a  |
| 2nd evaluation (week 2)    | 20 (0–30)                                 | 12.5 (0–30)                                  | 0.149a  |
| 3rd evaluation (week 3)    | 20 (0–30)                                 | 12.5 (0–30)                                  | 0.171a  |
| **Cervical Extension**     |                                            |                                              |         |
| Week 1                     | 10 (0–40)                                 | 10 (0–20)                                    | 0.642a  |
| Week 2                     | 22.5 (10–40)                              | 20 (0–30)                                    | 0.043af |
| Week 3                     | 30 (10–45)                                | 20 (0–40)                                    | 0.053b  |
| Week 4                     | 30 (10–45)                                | 25 (0–40)                                    | 0.151b  |
| **Lateral Cervical Rotation** |                                         |                                              |         |
| Week 1                     | 8.8 (−2.5–15)                             | 5 (0–10)                                     | 0.224a  |
| Week 2                     | 11.3 (−2.5–15)                            | 10 (−5–15)                                   | 0.080a  |
| Week 3                     | 15 (5–15)                                 | 10 (0–20)                                    | 0.642a  |
| Week 4                     | 15 (5–15)                                 | 12.5 (5–20)                                  | 0.867a  |
| **Cervical Rotation**      |                                            |                                              |         |
| Week 1                     | 10 (0–30)                                 | 0 (−10–10)                                   | 0.039af |
| Week 2                     | 15 (−10–25)                               | 7.5 (−5–22.5)                                | 0.151b  |
| Week 3                     | 15 (5–40)                                 | 10 (0–27.5)                                  | 0.102a  |
| Week 4                     | 15 (5–40)                                 | 10 (0–27.5)                                  | 0.160a  |

*a*Mann–Whitney *U* test, *b*Uji independent sample *t*-test, *c*Significant
4. Discussion
The age range in this series of upper trapezius muscle myofascial pain syndrome was 20–54 years. The median age in the laser therapy group was 30 years and that in the dry needling was 48.5. The age range is consistent with previous studies and in line with the tendency of myofascial pain syndrome to occur in young rather than older adults. Myofascial pain syndrome is thought to be associated with regular, excessive muscular activity in active young adults [16-20]. More women than men participated in this study, which is consistent with previous reports. The reasons for a higher prevalence in women than in men include iron deficiency associated with menstruation, and smaller and weaker cervical muscles size than in men [16-21]. The adipose tissue thickness is affected by the nutritional status and may reduce the effectiveness of laser therapy and dry needling. Half the study participants with laser therapy had normal body weights, but half of the subjects had obesity grade 1 body weights. The thickness of the adipose tissue in the overweight patients had an effect on the penetration of the laser and the needles, which was limited to an insertion depth of 2 cm.

The development of myofascial pain syndrome is related to excessive repetitive activity. It tends to occur in medical personnel and administrative staff, but a detailed analysis of the work activities, posture, and environment that predispose to the syndrome is lacking. Activities that cause muscle tension and fatigue, poor posture, and poor ergonomic work environment are likely to be involved. Studies have shown that overhead activity, even for only 10 minutes, can significantly lower the pain threshold and cervical ROM significantly [22,23]. In this study, there was no significant difference in the duration of pretreatment complaints in the two study groups. Hidayat, reported pain of 1–6 months duration in 59% of the study subjects, and Gunawan, reported pain of up to 12 months duration in 55% [16,17]. Initially, myofascial pain syndrome increases peripheral sensitization that leads to increased transmission of nociceptive stimulation of receptors to the central nervous system. If that is not addressed, progression of that disorder causes central sensitization, and pain initially localized to the affected muscle combines with the sources of other pain to cause a systemic effect [3,13,16,17].

Both groups had the same pretreatment median VAS score. The severity of pain decreased in both groups at each of the 4 weeks of treatment, and the week 3 and 4 scores were lower with laser therapy than with dry needling although the differences were not statistically significant. At the end of the treatment course, the VAS scores in both groups were below 3, indicating mild pain. The median reduction in the VAS score in the laser therapy group (80%) was higher than that in the dry needling group (66.7%), but the difference was not significant. A similar study by Ilbuldu et al. (2004) found a significant decrease in the VAS score with laser treatment, but no pain response to dry needling. The small size of the acupuncture needles used in that study may account for the lack of response compared to the 25G needles used in these participants of the present study [14].

The mechanisms underlying the pain reduction in response to low-level laser therapy may include increased local and systemic microcirculation that inhibit the development of ischemia-mediated inflammation. The reduction of pain severity after administration of laser therapy would thus be associated with increased oxygen delivery to hypoxic tissues. Increased blood flow is also associated with an increase in nitric oxide, which increases the blood vessel diameter. Five minutes of laser therapy has been shown to promote nitric oxide release both locally and systemically, inhibit other inflammatory mediators, including prostaglandin E and cyclooxygenase, and promote endogenous opioid release [24-29]. Dry needling acts mechanically to improve motor endplate dysfunction. Stabilizing the needle correctly at the trigger point frees actin and myosin attachments on the muscle fiber Z-bands. The resulting increase in sarcomere resting length reduces the extent of the overlap of actin and myosin filaments. The overall effect of mechanical stimulation is an increase in total muscle fiber length that activates the gate control system, blocks nociceptive stimulation of the trigger point, and results in a decrease in pain severity. The minimal tissue damage caused by dry needling also stimulates endorphin production [22]. Laser therapy caused an increasing in serotonin, a neurotransmitter that has been associated with greater pain relief, than that seen after dry needling [30].

Laser therapy and dry needling were equally effective in reducing pain severity. The effects may have been similar because the same repair mechanisms may have been involved after each treatment
session. Laser therapy promotes improvement through photostimulation mechanisms; dry needling therapy acts mechanically. The treatment outcome may also be affected by the type of work, activity, and posture of the patient, and the performance of cervical stretching exercises. The study results support both low-level laser therapy and dry needling for reducing pain severity in patients with myofascial pain syndrome. Laser therapy is noninvasive and can be as effective as dry needling without side effects.

PTMs are often used to determine an objective threshold of pain to evaluate the therapeutic effectiveness or the need for treatment. The pain threshold is correlated with the strength of the stimulation that is required until pain is perceived. If low-level stimulation results in pain sensation, the threshold is low [14,16,18]. Prior to treatment, the pain threshold was significantly lower in the laser therapy than in the dry needling group (p < 0.001). The pain threshold with laser therapy was significantly greater than that provided by dry needling. The difference in pain threshold in the two groups at week 4 was not significant. The results are consistent with the findings of Hakguder et al. (2003), Nanulaitta (2009), and Saefullah (2010) who found a significant increase in PTM values after laser therapy and dry needling [13,19,22]. Ilbuldu et al. reported a significant increase in the pain threshold after low-level laser therapy compared with dry needling [14]. The increase in pain threshold observed in this study may be the result of laser stimulation of the treated tissue that reduced peripheral sensitization by a blockade of nociceptive stimulation of the central nervous system. The effect would be an increase in the stimulation needed to excite a sensation of pain. Biostimulation and decreased peripheral sensitization are also produced in response to the mechanical stimulation of dry needling. The overall therapeutic effects of the two modalities on the mean PTM elevation between the two treatment groups were not statistically significant [13].

The actions of the upper trapezius and sternocleidomastoid muscles on head extension and neck movement and stabilization during upper limb activity are synergistic. The presence of a trigger point in the upper trapezius muscle causes a decrease in the cervical ROM, especially in flexion and lateral flexion [22]. The increase in cervical flexion was greater with laser therapy than with dry needling, but the difference was not statistically significant. Laser therapy provided a 20° improvement of ROM flexion while dry needling provided a 12.5° improvement. The improvements are similar to those reported by Ilbuldu et al. (2004) [14]. There were improvements in cervical extension in both treatment groups after 4 weeks of therapy, with a greater effect in response to laser therapy than dry needling at 2 and 3 weeks. Ilbuldu et al. (2004) reported a significant increase in cervical extension after laser therapy but not dry needling [14]. Gerber et al. reported improvements in cervical rotation but not extension or flexion after 3 weeks of dry needling [31]. The action of the upper trapezius muscle includes cervical lateral flexion, but the existence of a trigger point of the muscle can limit its function. At week 2, both laser and dry needling therapies achieved full cervical lateral flexion. The improvement in ROM was significant by week 2 in both groups, but did not improve further at weeks 2 and 3. The results are in line with those reported for laser therapy and dry needling by previous studies [14,31]. The changes in ROM that occurred by week 2 were responses to both laser photostimulation of a relatively large area and a localized, mechanical stimulation in the area of needle insertion. Lateral flexion is produced by the combined action of the upper trapezius, scalene, and sternocleidomastoid muscles. The relatively wide area of laser stimulation increases vascularization, reduces spasms in more muscle fibers, and would be expected to result in relatively large cervical ROM improvement.

The extent of cervical rotation increased in both treatment groups, with a 25% increase after laser therapy and 15% after dry needling. Ilbuldu et al. (2004) reported improvements with laser therapy but not dry needling. Gerber et al. (2015) found improvements with dry needling [14,31]. The effects of laser therapy on cervical ROM may be mediated decreased pain severity, increased blood flow and oxygenation because of improved trigger point microcirculation, as well as the activity of analgesics such as PGE2. The treatment results in reduced muscle spasm increase of muscle fibers to their resting length. The same effects occur with dry needling therapy, which has a mechanical mode of action. The overall effects achieved with these two treatments were similar, with both providing good improvement of ROM. Low-level laser therapy and dry needling were equally effective in reducing pain severity, increasing pain threshold, and improving cervical ROM in patients with myofascial pain syndrome.
Laser therapy is noninvasive and provides satisfactory patient comfort, but it requires three applications every week. The frequency may make it difficult for patients to complete the entire course of treatment. Dry needling requires special skills and has more contraindications and more frequent side effects than laser therapy, but requires only one weekly treatment. To choose between these two modalities in patients with myofascial pain syndrome, indications, therapeutic contraindications, time availability, patient comfort, available tools, and patient preference need consideration.

The limitations of this study include the small sample size, which reflects the difficulty of recruiting study participants because patients with a diagnosis of myofascial pain syndrome generally do not come directly to the outpatient clinic of the Medical Rehabilitation Department. Secondly, this study did not consider confounding factors such as activities that could aggravate the patients’ conditions, easy their complaints, or improve their posture. Third, there was no subject blinding led to the participants being aware of their treatment, which could have affected their perception, especially of pain. Fourth, researchers did not find a type of laser, dose, and duration recommended specifically for the therapy of myofascial pain syndrome of the upper trapezius muscle. The study strengths include being the first study in Indonesia to compare the effectiveness of low-level laser therapy and dry needling in patients with myofascial pain syndrome of the upper trapezius muscle. This study also used full cervical ROM as a variable to illustrate the impact of myofascial pain syndrome on patient function.

5. Conclusion
Both modalities achieved a decrease in pain severity, and an increase in pain threshold and cervical ROM. Changes in VAS scores, PTM values, and ROM were larger with low-level laser therapy than with dry needling.

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