



REVIEW

Effect of Dry Needling in Chronic Musculoskeletal Pain

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Abstract

Pain is a sensation felt in one or more parts of the body, and it is a bad feeling that bothers people. Every person who feels pain learns about pain early in life through experiences with injury. In recent years, chronic pain has begun to be accepted as a disease rather than a symptom. Therefore, pain does not always mean tissue damage. Although scientific studies have made rapid progress in our perspective on chronic pain, the mechanisms of pain have not yet been fully explained. Though many things have been tried, the continuation of pain and the inability to fully explain the pain mechanisms have increased the interest in complementary medicine applications. It has been shown that trigger points accompany many musculoskeletal pathologies within the concept of central sensitization, which has an important role in the pathogenesis of chronic pain. Dry needling therapy in trigger point therapy is often used as a minimally invasive complementary medicine option to manage pain. In this study, information about pain was examined in the light of current literature. We aimed to review the effects of dry needling therapy on the musculoskeletal system in chronic pain disease groups from a different and up-to-date perspective. After examining the literature and the concept of chronic pain and dry needling, the following conclusion was reached; When the effectiveness of dry needling is examined in chronic painful disease groups in the musculoskeletal system, dry needling, which is a minimally invasive method, is effective, but more studies are needed.

Keywords: Chronic Pain, Central Sensitization, Dry Needling, Complementary Medicine

INTRODUCTION

The cause of pain, with its pathophysiology and mechanisms, is a special issue that has not been fully elucidated for centuries. The perception of pain is actually a subjective experience that is influenced by the complex interactions of biological, psychological, and social factors. Although the level of pain sensation of the patients may vary from person to person, it is also affected by many extrinsic and intrinsic factors. Pain is a conscious experience in the brain¹. The International Association for the Study of Pain defines pain as an unpleasant sensory and emotional experience associated with or defined by actual or potential tissue damage². Central sensitization is the increased sensitivity of pain-sensitive neurons in the central nervous system to normal or sub-threshold stimuli^{3,4}. Central sensitization mechanisms have an important role in the pathogenesis of chronic pain. It has been shown to accompany trigger points in many musculoskeletal pathologies associated with

central sensitization. Dry needling in trigger point therapy is often used as a treatment option to manage pain. People with low back pain, neck pain, osteoarthritis, fibromyalgia, temporomandibular dysfunction, primary dysmenorrhea, migraine and tension-type headache, persistent musculoskeletal pain have different degrees and levels of hypersensitivity problems⁵. Many pharmacological and modern treatments are used to reduce pain in patients with chronic pain. In order to manage and reduce the pain process, many complementary medicine methods (osteopathy, apitherapy, chiropractic, acupuncture, homeopathy etc.) are applied by health professionals together with modern medicine⁷.

In this study, it was aimed to review the current literature on dry needling treatment in musculoskeletal patient groups with chronic pain.

Pathophysiological classification of pain

The International Association for the Study of Pain



has identified three different mechanisms of pain. This mechanisms nociceptive, neuropathic and nociplastic types². Nociceptive pain is defined as pain that occurs with the activation of nociceptors as a result of damage or risk affecting non-neural tissues. There is a mechanical, chemical and ischemic factor that activates the nociceptors in nociceptive pain transmitted to the brain through nociceptors on the nociceptive pain organ or peripheral organ or skin surfaces. There is a real risk of injury or injury affecting non-neural tissues⁸. Pain, which we can call mechanical problems and which occurs as a result of damage, can be evaluated in this group. Neuropathic pain, is defined as pain that occurs when somatosensory nerves are affected as a result of an injury or disease there is an injury, disease, pressure that affects the neural tissues. In general, allodynia may accompany, and hyperalgesia may be observed. In neuropathic pain, dermatomal/cutaneous distribution is mostly observed. The electric sensation is described as burning or aching. Neuroplastic pain, is pain caused by the sensitized nervous system without a detectable condition that fits the definitions of nociceptive and neuropathic pain. Neuroplastic pain is the type of pain used in chronic painful disease groups, which is associated with central sensitization mechanisms in the literature^{8,9}. In neuroplastic pain, the central nervous system is hypersensitive, normal and sub-threshold stimuli are amplified. Normal sensory conduction and modulation are affected. The descending inhibitory pathways cannot function effectively¹⁰. Today, drugs are widely used as a pharmacological method in the control of pain. Another approach used in the control of pain is non-pharmacological methods. These are massage, hot pack and cold pack applications, menthol applications to the skin, vibration, transcutaneous electrical nerve stimulation, manual therapy techniques, cupping therapy, cognitive behavioral techniques, placebo effect, surgical treatment methods, nerve blocks and dry needling are applied¹¹.

Classification by duration of pain

The pain duration classification system is determined by the length of time a person has experienced pain. According to this classification, the basic classification is acute, subacute and chronic pain. Acute pain is short-term pain that resolves within 1 month, and is often associated with acute injury or trauma. Subacute pain means symptoms for more than 1 month but less than 3 months. Chronic pain is defined as pain that affects

different systems, along with a much more complex process, and that still persists at the end of the prescribed period for the healing of tissues and this pain that lasts for 3 months or longer². It should not be forgotten that every pain has an acute onset before chronic pain occurs.

Dry needling and physiological mechanism

The history of dry needling It dates back to the 1940s. Dr. Janet Travell identified and outlined the muscle trigger points that occur with "wet needling", later discovering that "dry needling" produced the same results, and hence coined the term dry needling. Thus, the first generation of modern dry needling was established¹². The interest in dry needling in complementary medicine practices has increased in the last two decades, thanks to studies stating that the dry needling technique is simple and effective. Although the needles used during dry needling are similar to the acupuncture treatment method, dry needling is different from acupuncture. The similarity of dry needling and acupuncture treatment is the use of needles in both methods. The difference is that in acupuncture, the needles are inserted into certain points defined as meridians and waited for 20 minutes, whereas in dry needling treatment, the needle is applied to trigger points, tight bands, muscles with spasm or possibly spasm. Furthermore it is usually removed immediately, a long wait is also used in dry needling in some tense tissues^{12,13}. Dry needling shows its effect immediately. In dry needling, the needle is inserted into various tissue depths according to the neuroanatomical structure. Even though various clinical effects have been attributed to dry needling in studies, conclusive evidence about its potential physiological effects and mechanisms of action is still lacking. While the dry needling creates a minimal inflammation in the area where it is applied, it provides an increase in microcirculation, desensitization in the nervous system and a significant decrease in pain following the application. In the inhibition of pain, it is aimed to increase the stimulation in the damaged tissue with dry needling and to provide afferent regulation in the brain^{14, 15}.

Dry needling in migraine and tension-type headaches

Migraine is a primary episodic headache disorder accompanied by neurological, gastrointestinal and autonomic changes. Kamali F et al., in a study published in 2019 and conducted on 44 patients, evaluated the effectiveness of dry needling treatment in patients with tension-type headache.



Pain and algometric measurement parameters improved in both groups. No superiority of treatments was found over each other¹⁶. In a study conducted in 2020, Rezaeian T et al evaluated the effectiveness of dry needling treatment in 40 patients diagnosed with migraine and having an active trigger point in the sternocleidomastoid muscle. The patients were divided into two groups as dry needling and control groups. In the dry needling group, improvement was observed in all parameters immediately after the treatment and at the 1st month follow-up. It is recommended to keep this approach in mind in patients with migraine¹⁷. In conclusion, when the effectiveness of dry needling in migraine and tension headache is examined, dry needling method is effective, but more studies are needed.

Osteoarthritis and dry needling

Osteoarthritis is a degenerative disease characterized by progressive cartilage destruction, osteophyte formation, subchondral sclerosis, synovial membrane and a series of biochemical and morphological changes in the joint capsule, especially in load-bearing joints, with the effect of genetic, mechanical and biochemical factors. Sánchez Romero EA et al. In an article they conducted with 62 patients with knee osteoarthritis, they investigated the effectiveness of dry needling treatment. Exercise + dry needling was applied to one group, and sham-dry needling + exercise was applied to the other group. The superiority of dry needling treatment in pain and disability parameters has not been demonstrated¹⁸. Sánchez-Romero EA et al., in another article they published in 2018, investigated the effect of dry needling in knee osteoarthritis. This double-blind, parallel-group study included patients over 65 years of age with knee osteoarthritis with trigger points in the thigh muscles. The patients were divided into two groups as dry needling + exercise and sham-dry needling + exercise. Although pain and disability improved in both groups after 3 months, 6 sessions of dry needling did not contribute to exercise therapy¹⁹. Dunning J et al., in a study they published in 2018, investigated the effect of adding electrical stimulation dry needling treatment to manual therapy and exercise program in knee osteoarthritis with a study that included a total of 242 patients. In the group that received electrical stimulation dry needling, greater improvement in WOMAC disability scores was observed at 6 weeks and 3 months²⁰. As a result, when the effectiveness of dry needling in knee pain caused by osteoarthritis is

examined, the dry needling method is effective, but more studies are needed.

Dry needling and low back pain

Low back pain refers to pain, muscle tension, or difficulty in movement in the area below the arcus costarum and above the inferior gluteal folds. Most of the studies on low back pain in the literature investigated the effectiveness of dry needling in patients with nonspecific chronic low back pain. Loizidis T et al., in their article published in 2020, investigated the effect of dry needling treatment on pain and functional balance in patients with low back pain. At the end of the study, it was emphasized that dry needling provides statistically significant improvement in pain and balance, but more studies are needed on its effects on specific muscles²¹. Griswold D et al., in a study published in 2019, investigated the effects of manipulation techniques that do not include sudden maneuvers and segmental distal dry needling technique on pain, functionality, and recovery speed in patients with nonspecific low back pain. The patients were divided into two groups as dry needling and manipulation groups. Significant improvements were observed in both treatment groups, except for the pressure pain threshold. The superiority of the treatments over each other has not been demonstrated²². Tüzün EH et al., in their article published in 2017, compared the efficacy of physical therapy program and dry needling in patients with chronic low back pain. As a result of the study, it was observed that dry needling treatment reduced the number of pain and trigger points and reduced kinesiophobia in patients with chronic low back pain caused by lumbar disc herniation²³. Liu L et al investigated the effectiveness of dry needling treatment in low back pain associated with trigger points in a systematic review and meta-analysis published in 2017. As a result of the meta-analysis, it was concluded that dry needling treatment is superior to other treatments in pain and functionality, but that the combination of dry needling treatment with other treatments is superior to dry needling treatment alone²⁴. Koppenhaver SL et al., in their article published in 2015, investigated the factors affecting recovery in patients with low back pain who received dry needling treatment. At the end of the study, it was observed that the success of dry needling was high in low back pain that increased with the multifidus lift test or hip flexion in the supine position, and the success of dry needling decreased in cases of increased pain while standing,



pain radiating to the leg, and spinal hypermobility²⁵. Koppenhaver SL et al., in an article published in 2015, compared the multifidus function and nociceptive sensitivity of patients with low back pain who received dry needling therapy and patients who responded to and did not respond to treatment. At the end of the study, there were significant improvements in muscle function and nociceptive sensitivity of patients who showed clinical improvement, compared to patients who did not show improvement, at measurements after 1 week²⁶. As a result, when the effectiveness of dry needling in low back pain is examined, the dry needling method is effective, but more studies are needed.

Dry needling and temporomandibular pain

Temporomandibular pain is a clinical picture characterized by noise (crepitation or click) and irregular jaw movements in the jaw joint, and it is one of the most difficult conditions to treat among the causes of maxillofacial pain. Kütük SG et al., in their article published in 2019, evaluated the effectiveness of dry needling therapy in the treatment of temporomandibular pain. In their study on 40 patients, they applied one session of dry needling treatment to one group and one session of botulinum toxin injection to the other group in the lateral pterygoid muscle. In their studies in which they evaluated parameters such as resting pain, jaw protrusion angle, and mouth opening, significant improvement was found in both groups at the 6th week of treatment²⁷. It was determined that the improvement in resting pain and jaw protrusion angle was statistically superior in the dry needling group. Lopez-Martos R et al., in their article published in 2018, presented the effectiveness of dry needling treatment in patients with myofascial pain in the temporomandibular region in a placebo-controlled study. In the study, which included 60 patients, the patients were divided into 3 groups and the lateral pterygoid muscle was treated. One group received 3 sessions of percutaneous electrolysis, the other group received dry needling treatment, and the third group received sham-dry needling treatment. In the study, the parameters of resting pain, pain during chewing and maximum mouth opening were evaluated, and significant improvements were found in these parameters in the dry needling and percutaneous electrolysis groups²⁸. As a result, when the effectiveness of dry needling in temporomandibular pain is examined, the dry needling method is effective, but more studies are needed.

Dry needling and fibromyalgia

Fibromyalgia is a chronic pain syndrome characterized by widespread skeletal muscle pain and many tender points. In their article published in 2017, Castro-Sanchez AM et al evaluated the effects of dry needling treatment on thoracic and lumbar mobility and trigger points in patients with fibromyalgia syndrome. They included 64 patients in the study where they applied dry needling to one group and cross-tape to the other group. A total of 4 sessions of dry needling were applied to the latissimus dorsi, iliocostalis, multifidus, quadratus lumborum muscles once a week. In their study, in which they evaluated the algometric pain threshold and spinal mobility parameters before the treatment and in the first month of the treatment, they found that both treatment approaches had similar positive effects on spinal mobility. They also showed that dry needling treatment decreased the algometric pressure pain threshold²⁹. In their article published in 2019, Castro-Sanchez AM et al evaluated the effects of dry needling and myofascial release treatments on trigger points in the cervical region on many parameters in patients diagnosed with fibromyalgia. In their randomized controlled study in which 64 patients were included, they applied dry needling treatment to the occipito-frontalis, splenius capitis, sternocleidomastoid, scalene, trapezius, supraspinatus, infraspinatus and multifidus muscles once a week for a total of 4 sessions. They found that both treatment approaches had similar positive effects on pain intensity and fibromyalgia impact questionnaire scores in their study, in which the parameters were evaluated before treatment and at the first month of treatment. In addition, it has been found that the effects of dry needling treatment on quality of life, sleep quality, anxiety and depression are superior³⁰. As a result, when the effectiveness of dry needling in fibromyalgia is examined, the dry needling method is effective, but more studies are needed.

Dry needling and neck pain

Neck pain is defined as pain that occurs in the cervical, occipital or posterior scapular region without an underlying neurological problem, tumor, or a specific pathology such as inflammation. Studies on neck pain in the literature mostly investigated the effectiveness of dry needling in nonspecific chronic neck pain. If we take a look at these articles; In an article published in 2020, Arias-Buría et al investigated the treatment of active trigger points in the scalene muscles with dry needling in patients with mechanical neck pain.



Pain and functionality parameters were evaluated after treatment, one week and one month later. While there was no difference between the groups after the treatment and at the first week of the treatment, it was observed that the dry needling treatment was superior in reducing the pain at the first month of the treatment. In addition, dry needling therapy was found to provide a greater increase in inspiratory vital capacity in all control periods compared to local pressure therapy³¹. Cerezo-Téllez E et al., in an article they published in 2016, investigated the effectiveness of dry needling in their study on office workers with neck pain. Stretching exercise was given to one group and dry needling and stretching exercises were given to the other group, and they were followed for 6 months. Better results were found in the dry needling group in all parameters of the patients followed for pain, range of motion, muscle strength and functionality³². Manafnezhad J et al., in their article published in 2019, compared the effects of dry needling treatment and ESWT treatment on active trigger points in the trapezius muscle in patients with nonspecific neck pain. At the end of the study, improvements were found in both the dry needling group and the ESWT treatment group³³. Martín-Rodríguez A et al., in their article published in 2019, investigated the effects of dry needling treatment applied to the sternocleidomastoid muscle on motor control in patients with neck pain. At the end of the study, no significant difference was found between needling inside the trigger point and needling outside the trigger point, and it was seen that both treatment groups reduced pain and had a positive effect on cervical muscle control³⁴. Ziaiefar M et al., in their article published in 2019, compared the effectiveness of dry needling therapy to trigger points in the upper fibers of the trapezius muscle and pressure therapy applied to trigger points. At the end of the study, significant changes in DASH scores and pain intensity were detected both after treatment, after 2 weeks, and after 3 months. There was no significant difference between the groups in the measurements after 2 weeks and 3 months³⁵. Cerezo-Téllez E et al., in their article published in 2018, investigated the improvement in health-related quality of life in patients with chronic nonspecific neck pain in their secondary analysis from a single-blind randomized study. after treatment; It was evaluated at 1, 3 and 6 months. Improvements in both groups continued at all assessment times. In the 6th month evaluation,

which is the last evaluation, it was seen that the treatment group showed a statistically significant improvement compared to the control group³⁶. In their article published in 2020, Stieven FF et al investigated the effects of dry needling treatment added to the treatment protocols in patients with chronic neck pain. In the dry needling group, the decrease in pain intensity was observed in the measurements after 24 hours and in the measurements after 1 month; The authors concluded that dry needling therapy combined with protocol-defined rehabilitation programs did not provide additional benefit for patients with chronic neck pain³⁷. As a result, when the effectiveness of dry needling in neck pain is examined, the dry needling method is effective, but more studies are needed.

Dry needling and primary dysmenorrhea

Dysmenorrhea, defined as uterine menstrual contractions, is the most common gynecological problem in women of reproductive age. Before or during the menstrual period, some women experience pain problems due to uterine contractions. Gaubeca-Gilarranz A et al., in their article published in 2018, evaluated the effectiveness of dry needling treatment in patients with primary dysmenorrhea. In this study, one group received a single session of dry needling and stretching exercises for the rectus abdominis muscle, the other group received a single session of sham-dry needling and stretching exercises for the rectus abdominis muscle, and the third group received isolated stretching exercises. The patients were evaluated in the 1st and 2nd months of the treatment. Follow-up was done with parameters such as pain level, number of days with pain, number of pain medication use, quality of life, and significant improvements were found in the pain intensity and amount of medication use in the dry needling group compared to the other groups³⁸. In conclusion, when the effectiveness of dry needling in patients with primary dysmenorrhea is examined, the dry needling method is effective, but more studies are needed.

CLINICAL CONCLUSION

When the studies in the literature are examined, there are conflicting results, even if the studies on the dry needling method are limited. One of the reasons for these contradictions is that they may be related to chronic pain management because there is no direct relationship between pain and nociception. Pain is a reflection of our learned and past behavior



at the cortical level and is definitely the product of the brain. If no nociceptive stimulus can be found to explain the problem to people experiencing chronic pain, the problem should not be dismissed as psychological. Because pain is not always associated with a nociceptive stimulus (injury), many cognitive factors, stress obesity is also effective in the chronic pain process. The aim of the treatments in patients with chronic pain is to sensitize the hypersensitive system, including many techniques, complementary medicine applications, medical agents, etc. available. Dry needling method is also used as a reliable and minimally invasive method among these techniques. When chronic pain patients are examined, chronic pain turns into a situation that affects the whole body over time.

While dry needling therapy used by clinicians can be accepted in tactile and visual input, not only these but also proprioceptive input, vestibular input, nociceptive input from the patient, and knowledge and beliefs, past experiences, and predictions from patients are also necessary for pain modulation. It should not be forgotten that patients are affected by many factors in the treatment process of patients

with pain. Therefore, the use of dry needling, which is a complementary medicine application in chronic pain management, together with other treatment modalities may produce more effective results. The current literature is compatible with this idea and recommends a multidisciplinary approach³⁹. As a result, dry needling was found to be effective in most of the chronic painful disease groups. While patients perceptions of dry needling include higher expectations, the literature is limited in this subject.

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