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PHYSICAL THERAPY AND THE INTEGRATION OF DRY NEEDLING

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Abstract

This research paper analyzes how the field of Physical Therapy has grown and evolved in the United States over the last sixty years. It also explores the education process of becoming a therapist, the responsibilities it entails, and the different treatment interventions therapist can use by taking a deeper look at the integration of dry needling techniques into the field of Physical Therapy.

Dry needling is defined and different techniques being utilized in the field currently are explained. Also discussed are locations where physical therapists are legally allowed to perform dry needling in the United States, the certification process, precautions to consider when deciding if dry needling is a viable treatment option, different demographics that benefit from dry needling, and overall effectiveness of dry needling. Observations from field research conducting a case study evaluating dry needling in a physical therapy clinic have also been included to show how it is being used today.

Key Words: Physical Therapy, Dry Needling
The History of Physical Therapy in the United States

According to the American Physical Therapy Association’s (APTA) website, the field of physical therapy has been practiced around the world for centuries and took roots in the United States in 1921 with the formation of the first governing body of physical therapists known as the American Women’s Physical Therapeutic Association. The association later changed its name to the American Physiotherapy Association to include men. By the 1930s, the organization’s membership grew to nearly 1,000 members as their first “Code of Ethics” was introduced.

It was not until after the polio epidemic and the need to care for wounded World War II Veterans in the 1940s and 1950s that the field of Physical Therapy really began to grow. During this time, the American Physiotherapy Association became known as the American Physical Therapists Association (APTA). Membership grew to an estimated 8,000 members, and 39 physical therapy education programs were established across the country. The APTA opened its first office in New York City and hired full-time staff members who worked to establish APTA policies and guidelines for physical therapy care in the United States.

By the 1960s, APTA membership reached almost 15,000 and the number of education training programs reached a high of 52 programs. Currently, the APTA is headquartered in Alexandria, Virginia representing more than 95,000 members throughout the United States overseeing educational programs offered by 213 institutions nationwide. Operating with the goals of fostering advancements in physical therapy practice, research, and education to keep up with today’s ever-changing society, the APTA continues to grow today. (APTA, 2015)
Physical Therapy Defined

The World Association of Physical Therapy is defined as services provided by highly trained therapists to develop, maintain, and restore maximum movement and functional ability throughout all life stages. Services are provided in situations where movement and function are jeopardized due to aging, injury, pain, diseases, disorders, conditions, or environmental factors. Physical Therapy relies on the understanding that functional movement is central to maintaining health (World Association of Physical Therapy, 2016).

Physical therapists are healthcare professionals who diagnose and treat medical problems associated with limited movement in individuals of all ages. Therapists examine patients and create treatment plans that promote movement, reduce pain, restore function, and prevent disability. They also play an active role in preventing the onset, symptoms, and development of impairments that result from disease, disorder, conditions, or injuries.

In order to become a physical therapist in the United States, all entry level therapists must receive a Doctorate of Physical Therapy (DPT) degree. Typically, students complete a four-year bachelor's degree and apply to graduate programs during their fourth year, although some programs offer an accelerated 3+3. In programs like this, undergraduate studies are condensed to three years and admissions into graduate studies are contingent upon completed coursework and meeting a set GPA requirement.

DPT programs consist of 3 years of graduate school. Education programs for physical therapy consist of a majority of didactic learning with curriculums focusing on biology, anatomy, exercise physiology, biomechanics, kinesiology, neuroscience, pharmacology, pathology, behavioral sciences, communication, ethics/values, management sciences, finance, sociology, and clinical reasoning. In addition to classroom learning, DPT curriculums also include a section
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of hands on clinical education. On average, students spend 27.5 weeks in their final clinical experience. Upon completion of DPT programs, students must pass a national licensure exam prior to being able to practice. As the need for specialized physical therapists continues to grow, residency programs have continued to become more popular as well (Furze, Tichenor, Fisher, Jensen & Rapport, 2016)

According to the APTA, after completing DPT programs and passing the national licensure exam, therapists are able to practice in a variety of settings as well as specialize in different aspects of the field by obtaining. Physical therapists can practice in hospital settings, but the majority of therapists practice in outpatient clinics or offices, inpatient rehabilitation facilities, skilled nursing, extended care or subacute facilities, homes, and hospice settings. Physical therapy has also been integrated into school systems as well as industrial, workplace or other occupational environments, fitness centers, and sports training facilities. Outside of providing direct care, therapist can also work in education and research centers.

On a daily basis, physical therapists are responsible for completing examinations, diagnosing, implementing, and adjusting plans of care to help improve the quality of life of patients. Examinations consist of testing muscle function, strength, joint flexibility, range of motion, balance and coordination, posture, respiration, skin integrity, motor function, overall health, and activities of daily living. Once an examination is completed, short term and long term functional goals are established and intervention is implemented. Interventions can include but are not limited to exercise, traction, mobilization/manual therapy, ultrasound and/or electrotherapy, vestibular training, motor learning and development, and patient and family education. Physical therapists also determine a patient’s ability to reintegrate into the workforce
or community after illness or injury and help to prevent further injuries to maintain wellness
(American Association of Physical Therapy, 2015).

**Treatment: Dry Needling**

Dry needling is a minimally invasive procedure done by physical therapists to treat pain, functional impairments, and disabilities. Dry needling therapies use “dry” needles, or thin monofilament needles also used in acupuncture, which are inserted into the skin without anything being injected. The use of dry needles allows practitioners to target tissues such as the iliacus and lateral pterygoid muscles that cannot otherwise be reached through manual therapy. During a dry needling session, the monofilament needles are inserted subcutaneously into tendons, ligaments, fascia, scar tissue, peripheral nerves, and neurovascular bundles to change structures and functions within the body (Dunning et al, 2016). Most commonly, the needles are inserted into hard, discrete knots in skeletal muscle known as myofascial trigger points (MTrP). MTrPs are associated with pain syndromes such as Myofascial Pain Syndrome (MPS), a condition that can be both chronic and acute that involved dysfunction in muscles and the surrounding connective tissue (Shah, Thaker, Heimur, Aredo & Sikday, 2016). MPS is commonly seen by practitioners worldwide and is reported to affect 10% of adults worldwide, accounting for acute and chronic pain complaints.

When the needles are inserted into MTrPs, they prick small nerve endings initiating a local twitch response (LTR). The twitch response provides a strong neural impulse which breaks the MTrP circuit and relieves pain. Relief has been proven to help reduce disability in patients suffering from pain syndromes.

Physical therapists evaluate patients implementing a battery of assessments to determine the best mode of treatment. When deciding whether or not someone is a good candidate for this
type of treatment, there are many precautions to consider. Patients with a phobia of needles may be hesitant to agree to dry needling therapy without receiving proper education on the procedure. Patients with significant cognitive impairment who are unable to understand treatment parameters may also not be good candidates because consent must be given. In addition, dry needling may not be a suitable treatment option in patients with abnormal bleeding tendencies or those on anticoagulant therapies as well as those with sensitivities/allergies to metals such as nickel and chromium which are found in the needle. It is also important to avoid local skin lesions and areas where local lymphedema is present and conditions such as vascular disease and varicose veins are absolute contraindications for performing dry needling (Shah et al, 2016).

**Pros and Cons of Dry Needling**

In their studying evaluating the adverse effects following the use of acupuncture needles, White and colleagues discussed the advantages and that need to be considered when deciding if it is an effective treatment option to utilize. Advantages of dry needling include the fact that it is a relatively easy treatment for practitioners to learn. Training courses as well as actual dry needling treatments are both relatively low in cost making it accessible to people of varying socioeconomic status. In addition, effects are seen almost immediately and short-term relief can be provided with as little as 90 seconds of a dry needling session (White, Hayhoe, Hart & Ernst, 2001). There are little to no risk associated with treatments which also provides a great advantage to practitioners looking to use dry needling therapies to produce great results.

However, there are some disadvantages. Although immediate improvements in pain levels and functional movement can be seen following a dry needling session, very little research has been conducted looking into the long term effects and benefits. Dry needling may also cause local hemorrhaging in the area where the needles were inserted. There have also been reported
cases of syncope in patients during treatments. The general soreness experienced after sessions should also been considered a disadvantage of treatment.

Research to assess whether the advantages of dry needling outweigh the disadvantages as well as the overall safety of treatments is continuing to be conducted. In an observational study conducted by German physicians to study the adverse effects of needling, 229,230 patients received an average of ten treatments. Of the 229,230 study participants only 8.6% of patients reported experiencing adverse effects. Of this 8.6%, only 2.2% reported adverse effects that required further treatment. Among all the adverse effects reported, 58% of reported effects were bleeding or hematoma and reported pain constituted 1.7% (Witt et al, 2009). Another British study completed found that no serious adverse affects were reported after sessions done by physicians and physical therapists. The study also determined that minor adverse effects occurred in 671 per 10,000 sessions. All adverse effects reported by study participants cleared up within a week (White et al, 2001).

From these results, it can be concluded that although adverse effects to dry needling exist, their occurrence rates are low. Based on research that has been completed, it can be concluded that dry needling performed by physicians and physical therapist poses very low risks and is an extremely safe treatment option.

Dry Needling Techniques

Dry needling therapists utilize a variety of different insertion techniques depending on where the needles are placed, the condition being treated, and how the needles are inserted. Some techniques may be more beneficial than others and deciding which technique is best to use is based on the discretion of individual practitioners.
**Myofascial Trigger Point (MTrP) Approach**

In 1979, Karel Lewit, a Czech physician, proposed that the mechanical stimulation of inserting a needle directly into a MTrP, causes it to release. Since then, dry needling has widely been used to treat MTrPs. The MTrP method works best when the inserted muscle causes a local twitch response (LTR). The LTR causes rapid depolarization of muscle fibers. When the muscle is done twitching, the electrical activity from the nerve impulse subsides and the pain and dysfunction decrease drastically (Shootsky, Jaeger & Oye, 1989).

Epidemiologic studies conducted in the United States have shown that MTrP were the primary source of pain in 30% to 85% of patients reporting chronic back pain in primary care settings and pain clinics. The studies also found that within a group of 96 patients reporting musculoskeletal pain while being seen by a neurologist in a community pain center, 74% of patients were able to attribute the primary source of their pain to MTrPs. When looking at community pain centers in general, 85% of 283 participants studied were also able to attribute their pain primarily to MTrPs. Furthermore, it was found that 55% of 164 patients referred to a dental clinic for chronic head and neck pain had active MTrPs as the cause of their pain (Shootsky et al, 1989). From these studies, researchers were able to conclude that pain caused by MTrPs is responsible for a great deal of complaints. Without proper diagnosis of MTrPs as the cause of musculoskeletal pain, they often go untreated and lead to chronic conditions. It has been documented that dry needling treatment administered by physical therapists has been able to reduce patient “re-visits” seeking pain relief. (Shootsky et all, 1989).

**Intramuscular Stimulation (IMS)**

Intramuscular Stimulation (IMS), is a technique developed by Canadian physician Dr. Chan Gunn. The Gunn IMS technique is based on the idea that Myofascial Pain Syndrome is
always the result of peripheral neuropathy or radiculopathy. When the paraspinal muscles are shortened or become tight, it causes disordered function in the peripheral nerves. When the nerve supply is cut off, the tissues in areas innervated by the nerve become hypersensitive causing shortening, pain and the development of MTrPs in muscles. The shortened paraspinal muscles in the back lead to disk compression and narrowing of the intervertebral foramina. This puts direct pressure on the nerve root and causes peripheral neuropathy and the development of supersensitive pain receptors. The compression also restricts the flow of nerve impulses to structures like skeletal muscle, smooth muscle, spinal neurons, sympathetic ganglia, adrenal glands, sweat cells, and brains cells that are innervated by the nerve. The restricted nerve flow to these structures can cause muscle loss, increased irritability, and sensitivity. According to Gunn’s IMS method, needling should be done at the site of pain as well as in the paraspinal muscles of the same spinal segment that innervates the area of the painful muscles. When inserting the dry needle using the IMS method, it is not necessary to insert the needle directly into trigger points (Kalichman et al, 2010).

In a single-blind randomized controlled trial, the effects of dry needling with and without paraspinal needling were compared in forty elderly patients diagnose with Myofascial pain syndrome. Eighteen of the participants received a dry needling treatment in the upper trapezius MTrP for three weeks. The remaining twenty-two participants received similar treatment with the addition of paraspinal needling. A follow up was conducted at week four. The participants that received paraspinal dry needling had greater reduction in subjective pain than the group that just received dry needling to the upper trapezius. The paraspinal participants also saw significant improvements of ratings on the geriatric depression scale that the group with just dry needling alone did not see. Additionally, the eighteen participants who received paraspinal needling with
dry needling also showed increased cervical range of motions that the other did not see (Hyuk Ga et al, 2007). Although this study was conducted among a small number of elderly adults, it is reasonable to conclude that Gunn’s method of IMS in treating elderly patients suffering from MPS is more effective than dry needling alone.

Deep Versus Superficial Needling

In the early 1980s, Peter Baldray developed the superficial needling which he applied to MTrPs throughout the body, receiving beneficial results (Edward & Knowles, 2003). When administering superficial dry needling, the needle is inserted into the tissues above a MTrP only to a depth of 5 to 10mm. In superficial dry needling, the needle doesn’t actually touch the MTrP, so no twitch response is expected. The needle is left in position for 30 seconds and then removed. If residual pain is present after the initial insertion, the needles are reinserted a second time and left for 2 to 3 minutes. In contrast, deep dry needling requires that the needle by inserted into MTrPs in muscles. When doing DDN, the needles are inserted through the skin to a depth of at least 10mm. If DDN is done correctly, it should stimulate the LTR, causing the muscle to twitch and release, alleviating pain. Current research shows that DDN is more effective than superficial needling in the treatment of pain caused by MTrPs (Edward & Knowles, 2003).

Selecting to use superficial needling raises numerous issues to consider. It is simpler to carry out and there is a minimal risk of damaging nerves, blood vessels, and other structures because the needles are very shallowly inserted. Although the effects of treatment seen in superficial dry needling were to a lesser extent than deep dry needling, superficial needling has been found to be safer when treating areas around large blood vessels as well as the lungs. During treatments, superficial dry needling is less painful and following treatments has a lower
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incidence of soreness. Although deep dry needling has proven to be more painful, the long term effects seem to elicit greater results. In a randomized control trial, where one group received superficial dry needling and another received deep dry needling, the group that received deep dry needling experienced significantly less pain after six weeks of treatment (Edward & Knowles, 2003).

*Ultrasound Dry Needling*

Like other techniques, Ultrasound Dry Needling uses ultrasound to guide the dry needle into MTrPs. It is also used to help guide the needle into injured tendons to help promote healing by increasing blood flow to the area. In his study, Bubnov (2011) discusses how the use of ultrasound with dry needling has been proven to help increase accuracy of inserting the needle into the affected area. Ultrasound dry needling is currently being used to treat a wide range of musculoskeletal injuries including shin splints, plantar fasciitis, low back pain, sciatica and piriformis syndrome, neck pain and whiplash systems, headaches, tennis and golfer’s elbow, shoulder pain, repetitive overuse injuries, and chronic pain.

In 2007, magnetic resonance elastography was used to image and record zones of reduced flexibility in the location of trigger point. Since the initial imaging, ultrasound guided manipulations have become more common because of the obvious advantage of being able to visualize where the needle is going provides. A study conducted by Botwin in 2008 found that the use of ultrasound guided injections helped to reduce complications seen from damage to blood vessels and nerves. The ultrasound also helped to improve the effectiveness of the manipulation (Bubnov, 2011).

Although a little more expensive than other dry needling techniques, the use of ultrasound allows practitioners to monitor exactly where the needle is going. Ultrasound dry
needling could be extremely useful when needling sensitive, high risk areas. By helping to improve insertion accuracy, results can be seen quicker, as there is no ambiguity as to where to insert the needle. The increased accuracy gained from using ultrasound guidance could also be used with patients who dislike needles to help decrease the number of times the needle needs to be inserted to get the same results.

**Effectiveness of Dry Needling**

Common consensus among health care professionals, clinicians, and researchers that myofascial trigger points are primary sources of pain, suggesting that finding a proper way to treat them will provide great relief for many people. However, opinions about the efficacy of dry needling, both short-term and long-term, are far from unanimous and are often conflicting. While some studies report clear short-term benefits from dry needling, others suggest that the improvements should be attributed to the placebo effect. As mentioned before, very little long-term research on dry needling has been conducted. Before opinions on the true efficacy of dry needling can be effectively conducted, a gap in the literature exists needing more quality methodological studies to be completed (Tough & White, 2013).

Current research has found that dry needling is as effective as therapy when it comes to providing short term relief from pain and improvements in movement. However, it is not clear whether or not the improvements seen are because of the actual resolution of the underlying causes of pain or simply because of a placebo effect. In a systematic review looking at seven randomized control trials of acupuncture and dry needling for the management of MTrPs, different results from treatment outcomes were analyzed. One study reviewed found that the use of dry needling in treating MTrPs was more effective than standard care. Other studies that included a placebo control in additional to the treatment group reviewed found that dry needling
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was statistically more effective in providing desired improvements in pain levels compared to the placebo group (Tough & White, 2013).

Another systematic review conducted examined different needling options to determine if there is evidence for or against the effectiveness of needling techniques as treatment options for MTrP pain. Like the study above, researchers conducting this review found no difference in the effectiveness between needling using point injections (wet needling) and dry needling. Among the studies reviewed, trials in different settings that looked at different presentations of MTrP pain performed over the course of 18 years, found that beyond a placebo effect, there is very little evidence that needle therapies have long lasting efficacy (Cummings & White, 2001).

Examining the efficacy of dry needling for the treatment of low back pain, a systematic review of 35 randomized controlled trials was conducted. The trial consisted of adults with non-specific acute chronic back pain or myofascial pain syndrome from around the world. Findings support evidence that suggests the use of needling techniques in conjunction with conventional therapies provided greater pain relief and improvements in functional capacity than using conventional therapy methods alone. However, the effects were found to be small. Although researchers were able to conclude that dry needling does provide small improvements when treating chronic low back pain from conducting their review of different trials, they were not able to determine the most effective techniques to use (Furlan et al, 2005).

Although research has been unable to confirm the effectiveness of dry needling beyond short-term relief and a possible placebo effect, the immediate pain relief provided and increases in functional movement reported are enough to justify the use of needling techniques in the treatment of MTrP pain, low back pain, and other conditions. By providing immediate relief, dry needling has been documented to be effective in helping patients become more active and live
better day to day lives. Increasing activity and overall quality of life allow patients to help
manage conditions, decrease their risks of developing additional chronic conditions, and improve
their overall health status.

The Integration of Dry Needling in Physical Therapy

Over time, the field of Physical Therapy in the United States has continued to evolve in
response to the dynamic needs of society. The need for clinicians with skills in advanced areas of
practice has expanded the scope of care of physical therapists a great deal (Jones et al, 2016). As
the need for more diverse practitioners within the field of physical therapy has expanded, dry
needling has grown in popularity.

As the use of dry needling continues to gain popularity within the field of physical
therapy, there has been a great deal of debate among acupuncturist who argue that the use of
acupuncture needles in dry needling therapy is not within the scope of care of physical therapists.
In November of 2013, the National Center for Acupuncture Safety and Integrity (NCASI) sent a
letter to a number a state regulatory boards stating that, among other things, the use of
acupuncture needles in trigger point dry needling by physical therapists is not consistent with the
FDA regulations for the use of acupuncture needles. In response to the letter, the APTA
commissioned a legal analysis to determine if the allegations made by the NCASI were of merit.
In a letter issued by then president Paul Rockar, the APTA took the stance that, based on FDA
regulations, dry needling was within the scope of practice of physical therapists (APT, 2014).

In the United States, the U.S. Food and Drug Administration (2017) approved the use of
acupuncture needles (the same needles used by therapists to complete dry needling) by licensed
practitioners for the treatment of conditions such as pain, nausea, vomiting, substance abuse,
asthma and other respiratory conditions, and stroke. Although the use of needles was approved
by the FDA, the decision of which practitioners were qualified to use them was left up to each state individually. As of April 2014, state regulatory boards in Alabama, Arizona, Colorado, the District of Columbia, Georgia, Iowa, Kentucky, Maryland, Mississippi, Montana, Louisiana, Massachusetts, Nevada, New Hampshire, New Mexico, North Carolina, Ohio, Oregon, South Carolina, Tennessee, Texas, Virginia, West Virginia, Wisconsin, and Wyoming have stated that the use of acupuncture needles is within the scope of care that physical therapists are qualified to perform, which also includes dry needling treatments (The U.S. Food and Drug Administration 2017).

The Use of Dry Needling in Physical Therapy

Physical therapy very rarely uses dry needling as a stand alone treatment. Typically, dry needling is paired with what are considered to be conventional treatment options to provide faster, more effective treatment. Dry needling is performed once the physical examination and evaluations have been completed and no contraindications have been discovered. Prior to beginning treatment, patients should be given an explanation of what the procedure entails, what to expect during and after the treatment, possible side effects, and expected outcomes. Once a therapist has determined that dry needling is appropriate, different techniques can then be carried out to administer treatment often in conjunction with other complimentary modalities.

The certification process for physical therapists who wish to become certified to practice dry needling varies across the states that have approved it, but in all cases further education is required. In order to become certified in dry needling, physical therapists in approved states must complete a certification process. Typically, the process begins with the completion of a Dry Needling Level 1 course. Once The level 1 course has been completed, it must be followed by a required level 2 course. After completing the two courses, 6 months of recorded clinical dry
needling experience is also required. After the educational training process is completed, therapists are required to take a certification exam that consists of two parts—a 30-minute theory paper and a 30-minute practical session. The certification exam is used to demonstrate that therapists have completed significant training in dry needling techniques and have acquired the skills necessary to safely and effectively carry out treatments (The Dry Needling Institute, 2018).

In addition to completing certification requirements, therapists must also be trained in and follow the bloodborne pathogen standards established by the Occupational Safety and Health Administration (OSHA), which states that gloves should be worn when it can be reasonably anticipated that the employee may have hand contact with blood, or other potentially infectious materials, mucous membranes, and non-intact skin (OSHA, 2012).

Once a physical therapist becomes certified in dry needling, they are able to use different techniques to treat patients with a wide range of conditions. Depending on the condition, different dry needling techniques can be used in order to receive the best possible results. Common populations in physical therapy where dry needling has been shown to improve overall outcomes in patients’ well being include stroke patients, knee replacement patients, and cancer patients (APTA, 2015).

*Cerebrovascular*

It is not uncommon for stroke patients to be treated in a physical therapy setting in order to help improve functioning. A stroke can be defined as a death of brain cells due to lack of oxygen as a result of a blockage of blood flow or a rupture of an artery to the brain. Following a stroke, loss of speech, weakness, or paralysis of one side of the body can occur. Another common symptom experienced by 43% of first-time stroke patients is muscle spasticity. Muscle spasticity is characterized by stiff muscles and the inability to control those muscles. When left
untreated, spasticity greatly affects overall well being by leading to declined functional ability, an inability to complete activities of daily living, and decreased social interaction.

After someone has had a stroke, physical therapy is often used to help regain as much normal functioning as possible. Stretching, the neurodevelopmental approach, and physical agents are among typical approaches used in a physical therapy setting to help prevent spasticity. Recently, dry needling has begun to be used to treat conditions like hemiparetic shoulder pain that occur with neurological conditions like strokes.

In a case study conducted by Ansari & Naghdi (2014), a 53-year-old man with a 13-year history of ischemic stroke resulting in unilateral paralysis received dry needling in an outpatient Neurological Physical Therapy Clinic. Prior to dry needling treatment, the patient was not able to preform voluntary movements in his upper extremity. With the patient in a supine position, dry needling was performed on the patient’s affected pronator teres and flexor carpi ulnaris. Each muscle was dry needled for one minute, quickly moving the needle in and out of the muscle. After dry needling treatments were completed, significant improvement was seen in both upper extremity and hand functioning. In this instance, the use of dry needling by physical therapists to treat spasticity due to stroke allowed the patient to regain functional movement in the upper extremity not seen from using other rehabilitation techniques.

Shoulder Impingement

Shoulder impingement is a common condition that occurs in populations who complete repeated overhead motions. It is caused when the tendons of the rotator cuff muscles become impinged as they pass through the subacromial space in the shoulder joint. With repeated overhead motion, the tendons get pinched and become irritated and inflamed. This irritation may lead to thickening of the tendons. This thickening will further narrow the subacromial space and
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Exacerbate symptoms. When left untreated, shoulder impingement can result in bursitis and the eventual tearing of the rotator cuff.

Conventional treatment of impingement syndrome has focused on stretching the posterior rotator cuff muscles, however this treatment has not always been effective. The lack of results from traditional treatment modalities has created a need for additional further therapy techniques. In a controlled trial three athletes who routinely completed overhead motions diagnosed with impingement syndrome were studied. Two of the patients selected received conventional treatments, but received no results. Researches then treated these patients with trigger point dry needling of the subscapularis in conjunction with traditional stretching methods. During dry needling treatments, the patients were placed in a supine position with the arm supported and positioned in 0° to 15° of internal rotation and 75° of abduction. Once the subscapularis trigger points were palpated and identified, dry needles were inserted using a fast in, fast out method. The dry needling was continued until no further twitch response was evoked. After the needling session was completed, patients were then taken through a full range of motion, abducting several times through an arc of 90° to 180° and back to 90°. Patients receive this dry needling treatment once a week over the course of the trial and received an average of 11 treatment sessions in total.

After receiving dry needling treatment in conjunction with conventional treatment options, all three patients involved reported decreased pain. All patients also reported having a full function of the shoulder joint with no further limitations when trying to complete everyday activities. All were able to return to recreational activities like tennis and racquet ball without further inflammation. As a result, researches were able to conclude that trigger point needling of the subscapularis in conjunction with progressive therapeutic stretching programs was effective
in returning study participants to normal daily activities. Although the need for further randomized controlled clinical trails should not be overlooked, it seems reasonable to suggest that patients with shoulder impingement will benefit from receiving a series of dry needling treatments to the subscapularis trigger points (Ingber, 2000).

*Knee arthropalsty*

Knee replacement surgery is one of the most common bone surgeries done in the United States. Knee replacements are commonly done in people with conditions such as osteoarthritis, rheumatoid arthritis, and joint deterioration. During the procedure, the weight-bearing surfaces of the knee joint are replaced to relieve pain and disabilities. Following a knee replacement surgery, physical therapy is extremely important in helping patients regain proper joint functioning.

A case series conducted on 14 patients experiencing persistent postsurgical pain after undergoing total knee replacement surgeries was conducted. The pain that these patients presented with was attributed to MTrPs. When treated with conventional therapy techniques and pharmacological interventions alone, the MTrPs were nonresponsive and the patients continued to experience pain. In an attempt to help decrease pain in these patients, physical therapists conducted dry needling sessions. Prior to beginning needling sessions, patients’ pain levels and joint functionality were assessed and recorded.

Over the course of four weeks, each patient received one needling session a week. After four weeks of receiving dry needling in addition to continuing traditional therapy techniques, all patients reported experiencing a decrease in their chronic pain. The patients also experienced clinically significant improves in pain, range of motion, function, and MTrPs. The results seen with patient suggest that it is beneficial to use dry needling in physical therapy settings with knee
replacement patients (Nunez-Cortes, Cruz-Montecines, Vasquez-Rosel, Paredes-Molina & Cuesta-Vargas 2017).

Lateral Epicondylitis

Lateral epicondylitis, or tennis elbow, occurs when the tendons that join the forearm muscles to the elbow become inflamed. Often times, the inflammation is caused when of the tendons elbow become inflamed are overworked from repetitive motions of the wrist and the arm. Common symptoms include pain or burning on the outer part of the elbow and a decreased grip strength. Lateral epicondylitis is most commonly seen in adults who are 30-50 years old and athletes who play sports like tennis.

Currently, there are many treatment options for lateral epicondylitis. In a physical therapy setting, lateral epicondylitis is commonly treated by strengthening the muscles of the forearm and using ultrasound or ice massage. Muscle stimulating techniques have also proven to be effective in improving muscle healing. In a randomized controlled pilot trial of dry needling as a stand alone treatment, 13 participants diagnosed with lateral epicondylitis received dry needling over the course of 6 months. Dry needling treatments were done to the extensor origin tendon inserting the needling through the long axis of the tendon.

While completing their study, researchers determined that treatment was to be considered successful if patients reported more than a 25 percent reduction in pain scores. After 6 months of dry needling treatment, study participants reported a 34 percent reduction in pain scores. Despite being limited in the number of test subject treated with dry needling, researchers were able to suggest the dry needling is a successful treatment option for people suffering from lateral epicondylitis (Senhouse, Sookur & Watson, 2012).
Sciatica Pain

Experienced by nearly 40% of the population, sciatica is a common pain condition that can affect the back, hip, and outer side of the leg that is associated with compression of the sciatic nerve. Compression of the sciatic nerve is caused by a herniated disk, bone spurs, and narrowing of the spinal cord. When the nerve root gets compressed, the area becomes inflamed which causes pain and sometimes numbness in the leg. Common symptoms of sciatica include pain that radiates from the lower back to the buttocks, pain down the back of the leg, numbness, tingling, and weakness. Mild cases of sciatica often clear up on their own, but more chronic cases require medical treatment. Among other therapeutic options, dry needling has shown to help treat sciatica.

In a study conducted by Skorupska, Rychlik & Samborski (2015), fifty Caucasian patients around the age of 40 diagnosed with sciatica were analyzed. Of the fifty patients experiencing sciatica, one in three were also diagnosed with active MTrPs. Every study participant received dry needling sessions. During needling sessions, patients were in a side lying position. After receiving dry needling treatments, patients who were diagnosed with active MTrPs experienced an increase in temperature that researchers attributed to the MTrPs being poked. The rise in temperature was also determined to be a result of vasodilation, or the expansion of the blood vessels. Since therapists were able to use dry needling to help expand vessels, compression on the sciatic nerve was relieved, resulting in a decrease of sciatica conditions in patients (Skorupska et al, 2015).
Case Study

To gain a stronger understanding of the use of dry needling as a therapeutic treatment option, I emerged myself in clinical observational hours. As an undergraduate researcher and student pursuing graduate studies in the field of Physical Therapy, I dedicated my 120-hour practicum to collecting field notes on dry needling observing 12 patients with numerous conditions and symptoms warranting treatment. Conditions I observed included Morton’s Neuroma, Multiple Sclerosis, patients with scarring from surgery and cancer treatments, as well as ballerinas suffering from reported muscle tightness and decreased range of motion. I was also able to observe dry needling treatments administered to professional ballerinas.

Of the patients I observed, almost everyone had positive comments regarding their experiences with dry needling therapy sessions. To summarize my experiential observations, I carefully reflected on my field notes for major themes that emerged in the data. Five themes—instant relief, effectiveness, apprehension, affordability, and reliance were common among patients receiving treatments.

The general consensus among the patients I observed in regards to the effectiveness of dry needling was that it provided them “instant relief” that they were not able to achieve through other treatment options. Many patients reported that this instant relief allowed them to complete activities of daily life easier and without experiencing pain. On multiple occasions, patient appeared stunned by improvements in pain and functional capacity after just one needling session. In addition to being pleased with the immediate results, patients also mentioned the affordability of dry needling treatments in comparison to other treatment options.

Another common theme I observed form completing my case study, was the initial apprehension people had to have the needling. Consistent with the literature I reviewed,
discussing the pros and cons of dry needling treatments, fear of needles and the pain associated with the insertion of them, patients reported delaying starting dry needling treatments out of fear. In almost all the patients who reported needle phobias and hesitation due to the pain associated with needles, quickly realized that the benefits of dry needling treatment outweighed the downsides of using needles. Not only were they able to see the clear benefits of looking beyond the undesirableness of the needles, some even stated that the pain from the needle stick become more tolerable with more treatment sessions because they knew what to expect.

The negative comments I received when talking to patients about their experience had to do with long term results from dry needling sessions. One client expressed concern with whether or not he was ever going to be able to stop needing dry needling sessions to continue to feel as good as he was while receiving them. This comment was especially interesting to me as it aligned almost perfectly with a good deal of the literature I reviewed discussing the unknown long-term effectiveness of dry needling treatment. Although the patient had some concerns, he maintained an overall positive opinion of dry needling explaining that the results he was seeing were allowing him to be more physically active and do more. Despite questioning long-term benefits, the treatments were still worth it in his opinion.

When looking at each of the special populations I observed, each had different experiences with dry needling and their opinions on the effectiveness of sessions. The ballerinas I observed absolutely loved being dry needled and the almost instant range of motion improvements they experienced. The increase in range of motion allowed them to improve their positioning tremendously while dancing. One dancer reported loving dry needle sessions because they fit well in her busy schedule. In a matter of ten to fifteen minutes of dry needling treatments to her thigh muscles and hip flexors, almost all of the tightness she experienced was reversed. In
addition to being satisfied with how little time dry needle sessions took to receive such results, the dancer was expressed that she was able to rehearse longer and do more without experiencing a return in tightness. After being asked if the ballerina would recommend this therapy to other dancers, she said she absolutely would.

Like the ballerinas, the two cancer patients I saw also had exceedingly positive results from dry needling treatments. One cancer patient, had scar tissue covering a large portion of his upper body as a result of radiation treatment done over ten years prior to me observing dry needling treatments. The scar tissue caused the patient to lose a great deal of functioning in his upper extremities and also left him in a great deal of pain. This patient came into the clinic occasionally and had been receiving dry treatments over the course of a few years. By inserting the dry needles in to the scar tissue, some of it began to loosen and some normal functioning returned. The patient also reported being in less pain overall since beginning dry needling sessions.

The second cancer patient I observed was receiving dry needling treatments to help breakdown scar tissues surrounding a cancer port placed on the left side of her chest a few inches below her clavicle. The patient reported that the area was often times very painful for her and extremely sensitive to the touch. She was also self-conscious about the appearance of the area as it was very raised, red, and in her opinion not very attractive to look at. Over the course of a few months, this patient had smaller dry needles inserted into the area. In addition to the needles, cupping therapy was also used while the needles were inserted into the scar tissue in the hopes of increasing blood flow to the area to promote healing and better results. Similar to the other cancer patient, she was very pleased with the results she was seeing. From dry needling treatment, the patient experienced a decrease in sensitivity and pain surrounding her port. The
patient was even happier with the decrease in size and redness of the area, which gave her more confidence.

As a result of completing my case study, I was able to see first hand how dry needling techniques are being used today. By interacting with patients during treatment sessions, I was able to gather first hand reports about the effectiveness and patients’ general opinions, most of which aligned with the research I conducted.

**Conclusion**

My observations as a student researcher allowed me to explore a specific discipline within the field of Physical Therapy. Having the freedom to conduct my research project on the topic of my choice allowed for some creativity in my coursework. In addition, my project provided me with an additional opportunity to gain hands on experience in a setting where I could apply what I have spent the past fours years learning in a critical, realistic way. I also learned a great deal about what the process of conducting research is like and the importance of research.

Prior to conducting my project, I had limited experience with initiating my own research project, the proposal process, designing the structure, and how to go about collecting subjective data in the most effective way. I very quickly learned how much work goes into research that goes beyond simply writing. By completing my project, I was also able to gain valuable insight into the importance of setting firm dates and deadlines and sticking to them. The knowledge I gained about the research process will no doubt be beneficial and help to set me out from other students as I make the transition into graduate school.

The benefits of completing this research project are clear, but overall, I felt the guidance I was provided from the Honors College left me extremely unprepared when it came to starting
my project. The guidelines and expectations were vague and if it wasn’t for the support and help from my project advisor, I doubt I would have been able to complete my project. The timing of the project was also horrible due to the fact that I was preparing to graduate, getting ready to transition into graduate school, and finish my normal coursework. In retrospect, completing my research project, or at least having information sessions about what was expected, during my third year of studies would have been better. I also would have been able to dedicate more time. Overall, I am glad I completed this project and gained a great deal of knowledge.
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