



Patient's Perception Of Dry Needling By Self-Made Questionnaire

¹Ishwari Yashwant Pawar, ²Dr. Mansi Chaudhari,

¹BPTH, ²Assistant Professor of Musculoskeletal Physiotherapy department, Late Shree Fakirbhai Pansare Education Foundation's College of Physiotherapy, Nigdi, Pune.

¹Late Shree Fakirbhai Pansare Education Foundation's College of Physiotherapy, Nigdi, Pune, Maharashtra, India.

Abstract: Dry needling is an evolving intervention utilized in patients with many musculoskeletal and neuromuscular pathologies to treat pain, functional impairments, and disabilities. Despite dry needling proving to be a safe and effective treatment for neuromusculoskeletal pain, a notable literature deficit exists concerning the patient's experience, with the majority of studies relying on clinician-reported data. A patient's perception of a medical procedure is built not just on the physical sensation or outcome, but also on their feeling of safety, respect, and professionalism during the process. This self-made questionnaire is focused on subject's or patient's pre-requisite knowledge about invasive Dry needling technique.

Objectives: We have designed a self-made questionnaire to check the patient's perception of post dry needling application who have undergone Dry needling.

Result: It indicates that the participants demonstrate high patient satisfaction and a significantly positive perception of Dry Needling. Regarding efficacy, two-thirds of participants reported achieving the desired immediate effect, with a 55% majority reporting this positive effect was sustained for at least one day. Furthermore, patient-centered care and safety were highly rated, as 98% confirmed receiving a pre-procedure explanation and 97% confirmed consent was taken. A key psychological benefit observed was the successful mitigation of apprehension, with 73% of respondents affirming that their pre-existing fear of needles had been alleviated post-treatment, and 94% reported an absence of adverse dermal reactions.

Conclusion: Patients perception is a key matter, where they were clarified about the technique, communicating with patient, hygiene is maintained, asked for an informed consent before inserting needle and explaining the desired effects of dry needling which may help in speedy recovery of the patient. It also helps to understand the patient behavior towards needle related activity receiving immediate feedback and evaluating the psychological impact of invasive techniques done by physiotherapist. It provides a standardized framework for the physiotherapists to inculcate Dry Needling Technique with appropriate measures for patient-care.

KEYWORDS: Dry needle, Perception, Questionnaire, Needle phobia, Consent, Physical therapy.

I. INTRODUCTION

Dry needling (DN) is an evolving intervention utilized in patients with many musculoskeletal and neuromuscular pathologies to treat pain, functional impairments and disabilities. Dry Needling is an intervention that involves the insertion of a thin, solid filament needle into muscles, ligaments, tendons, and scar tissue. This intervention is also known as intramuscular manual therapy. Dry needles are inserted through the skin in the proximity of peripheral nerves to manage pain syndromes in neuro-

musculoskeletal. Dry Needling can also be treated with intramuscular stimulation. Despite dry needling (DN) proving to be a safe and effective treatment for neuromusculoskeletal pain, a notable literature deficit exists concerning the patient's experience, with the majority of studies relying on clinician-reported data. ^[1]

Myofascial pain syndrome (MPS) is a common diagnosis in patients with musculoskeletal pain associated with active and latent myofascial trigger points. ^[2] Dry needling is an invasive procedure that is cheap and easy to master with the right training. The method of deep dry needling has been shown to be more effective than the superficial one for the treatment of pain associated with myofascial trigger points. ^[3] Manipulation of the needle by the mechanical coupling of collagen fibers to the needle, the direct pull on collagen fibers improves collagen bundle alignment, stimulates cells via mechano-transduction; Needle rotation results in significantly greater C-fiber activation, distal superficial, deep mechanoreceptors and stretch receptors compared to lifting, thrusting, scraping, shaking and flicking. ^[4]



Fig 1.1 Dry needling technique for Trapezius muscle Rhomboids muscle



Fig 1.2 Dry needling technique for Rhomboids muscle

Myofascial pain is a major cause of musculoskeletal regional pain. Myofascial pain, which is a high-prevalence but a treatable condition, it is almost universally underdiagnosed by physicians and undertreated by physical therapy modalities. Large numbers of patients can be left suffering in chronic pain for years. Dry needling is a method in the arsenal of pain management which has been known for almost 200 years in Western medicine. With the increase in research in this field over the past two decades, there are many high-quality studies that demonstrate dry needling to be an effective and safe method for the treatment of myofascial pain when diagnosed and treated by adequately-trained physicians or physical therapists. ^[3]

Uses of Dry Needling are as follows- For Muscle strain direct dry needling is an efficacious treatment, Pain can also be reduced via dry needling by improving blood circulation and the placebo effect. For Postural imbalance Dry needling creates immediate, short-term improvements in dynamic and static postural control after a single application to TrPs. ^[4] Spasticity is a higher number of patients receiving Dry needling technique which exhibits a lower degree of spasticity. ^[5]

There are two types of dry needling- Superficial & Deep dry needling. In superficial dry needling the activated and sensitized nociceptors of a Myofascial trigger points cause it to be so exquisitely tender that firm pressure applied to it gives rise to a flexion withdrawal reflex (jump sign) and in some cases the utterance of a shout sign. Inserting a needle (0.3mm x 30mm) into the tissues immediately overlying the Myofascial trigger points to a depth of 5-10mm and to leave it long enough for the two reactions to be abolished. For an average reactor this is about 30secs. And for a strong reactor the insertion of the needle and its immediate withdrawal is all that is required. In Deep dry needling, a shortening of muscle due to any possible causes such as spasticity, sprain or adaptive muscle tightness the preferred method would be deep dry needling. A technique in which needle is evoked in multiple local twitch responses at the MTrP sites, a procedure called twitch-obtaining intramuscular stimulation (TOIMS). ^[6]

Physiological effects on taut bands are as it has been demonstrated that DN may influence the spontaneous electrical activity (SEA) by eliciting a Local twitch response (LTR). Another working mechanism could be that sufficient mechanical needling activation around the endplate area causes muscle fibers to discharge and thus elicit LTR. Effects on Blood Flow is by the most plausible one when the needle is inserted into the skin, the release of vasoactive substance occurs, such as Calcitonin gene-related peptide and Substance P which, upon activation of A δ - and C-fibers leads to vasodilatation in small vessels and increased blood flow. Effects on Peripheral Sensitization is the increased COX-2 and Tumor Necrosis factor levels are associated with muscle damage. Effects on Central Sensitization, DN stimulates, both large myelinated fibers (A β and A δ -fibers), as well as C-fibers, indirectly via the release of inflammatory mediators. Placebo Effects are well known that expectation can significantly modulate pain perception, a mechanism frequently referred to as placebo analgesia. [7]

According to the patient's perspective, local adverse events (i.e., soreness, pain) appear to be more frequent in comparison to those generalized to the entire body. However, regardless of the presence of adverse events, 82.1% of respondents would recommend Dry Needling to a family member or friend. Physical therapists and practitioners who utilize Dry Needling have a responsibility to communicate the range of adverse events that may occur within the first 24 hours following the intervention. [1] Related to the analysis of variables associated with post needling soreness, a previous study showed that some psychological factors, such as somatization and anxiety, are involved in post needling soreness. However, the relationships found did not rely on psychological variables specifically conceptualized for a better understanding of pain experience, such as catastrophizing, fear of pain, kinesiophobia, or pain anxiety. [8]

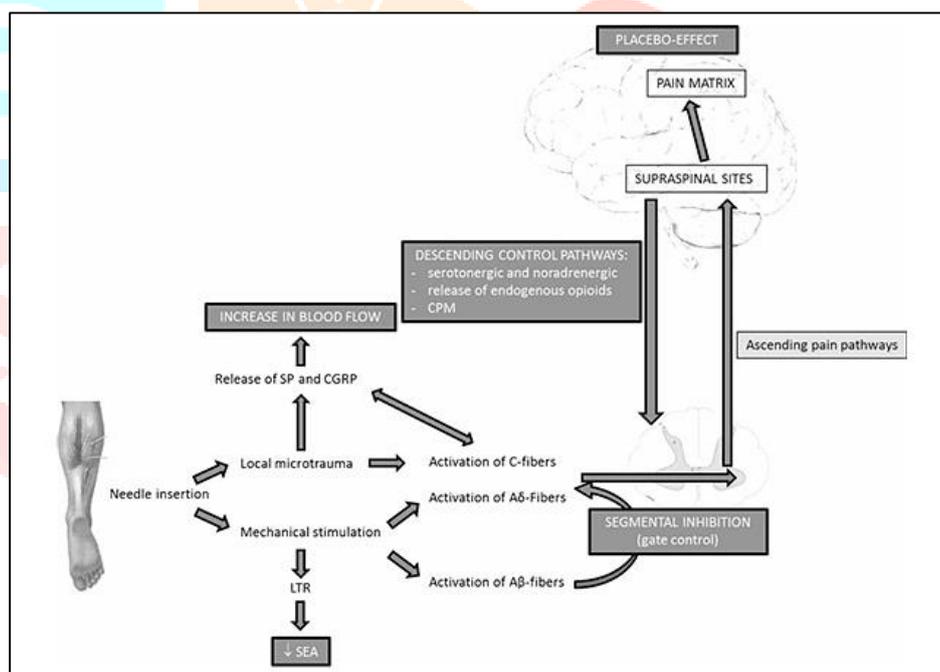


Fig 1.3 Schematic diagram of physiological effects of Dry needling

II. METHODS

Study design- Observational study

Sample size- 75 participants

Sampling method- Convenient sampling

Study duration- Six months

Study Area- Pimpri Chinchwad region

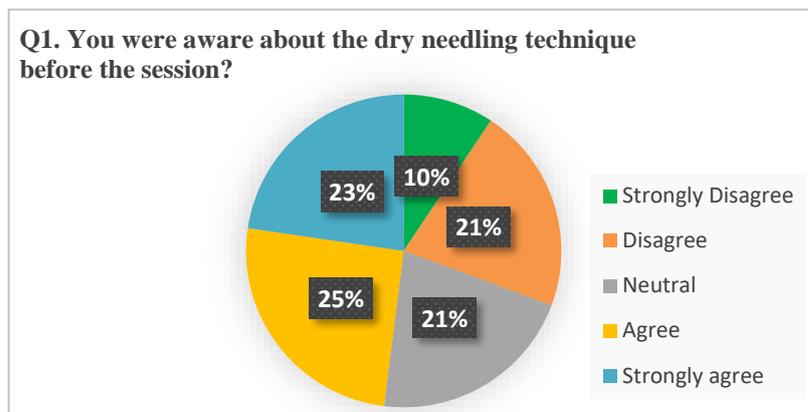
The study employed specific criteria for participant selection.

Inclusion Criteria required subjects to be within the age group of 20 to 40 years, willing to participate, literate enough to complete the questionnaire and to have experienced Dry Needling more than one time. Furthermore, data collection was restricted to subjects who were immediately post-dry needling technique session, specifically within 30–60 minutes of the treatment. Exclusion Criteria eliminated potential participants exhibiting skin infections, open wounds, or active

systemic infectious diseases. Additionally, any subjects with compromised cognitive function, such as those with short- or long-term memory that was not intact, or those who were unconscious or disoriented to time, place and person were excluded from the study.

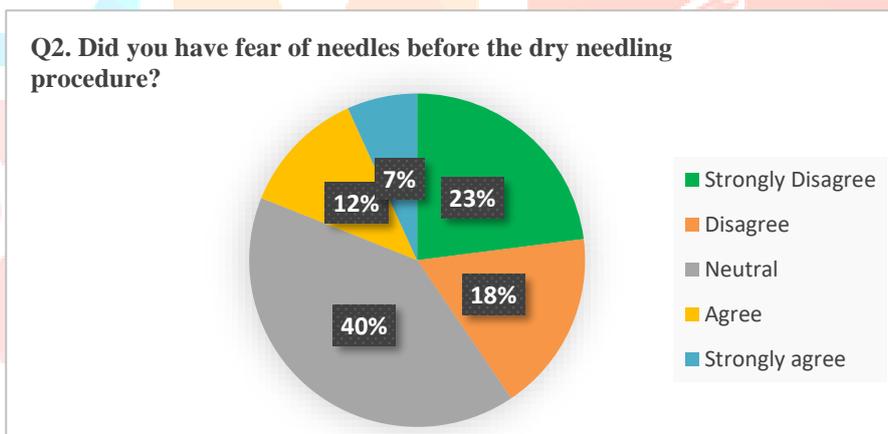
III. STATISTICAL ANALYSIS & RESULT

Graph 1-



Regarding awareness of the dry needling technique among the 75 participants, 23% strongly agreed and 25% agreed expressed some level of agreement. Conversely, 10% strongly disagreed and 21% disagreed were unaware or strongly unaware. The remaining 21% held a neutral opinion.

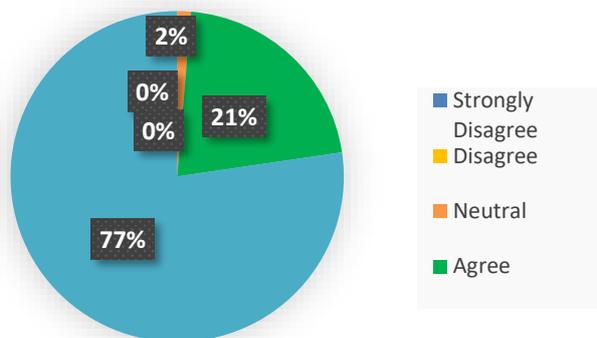
Graph 2-



A substantial proportion of the 75 participants, specifically 23% strongly disagree and 18% disagree, expressed that they were not fearful of needles prior to the DN procedure. In contrast, 7% strongly agree and 12% agree admitted to having a needle phobia. A 40% contingent of participants held a neutral position on the issue of needle fear.

Graph 3-

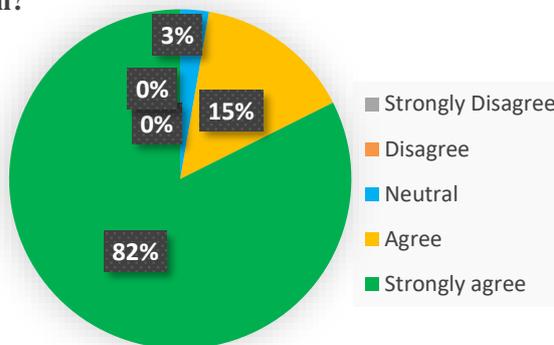
Q3. You were explained about the dry needling procedure before the application?



Out of total 75 participants, 77 per have strongly agreed, 21per agreed that they were explained about Dry needling technique before application whereas 2per have neutral opinion about the explanation of dry needling technique before application.

Graph 4-

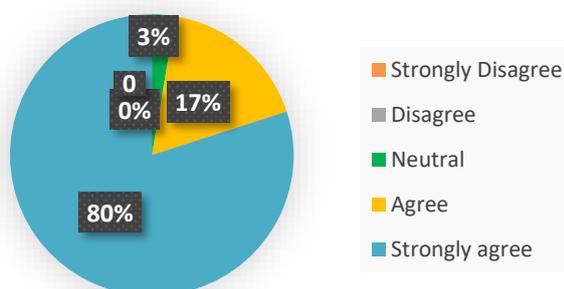
Q4. The part preparation was done before the dry needling application?



Of the 75 participants overall, an overwhelming majority of 82% strongly affirmed, and another 15% agreed, that the area was prepped prior to the dry needling procedure. Only a small fraction 3% expressed a neutral viewpoint on the necessity of preparation.

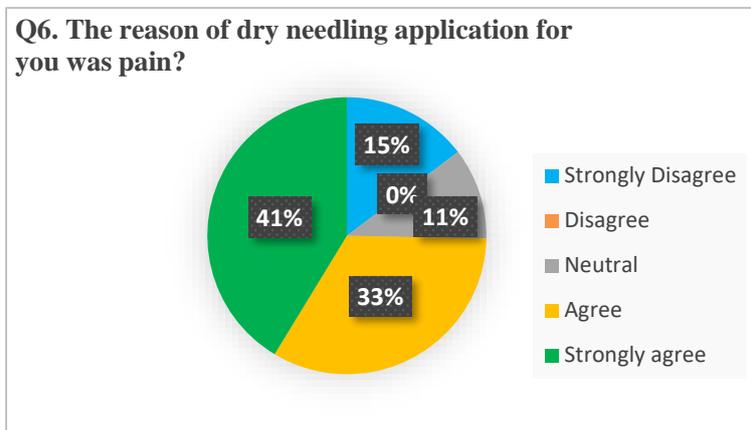
Graph 5-

Q5. There was any written or verbal consent taken before the treatment?



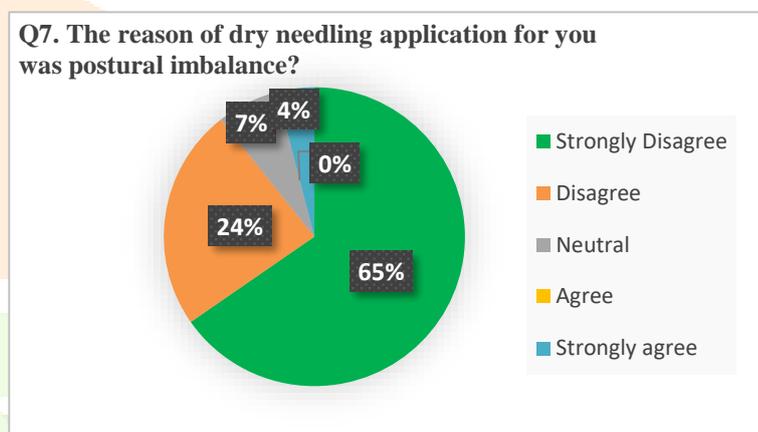
There was a strong consensus among the 75 participants concerning the consent process before dry needling: 80% strongly agreed and 17% agreed that the necessary verbal/written permission had been secured. Just 3% held a neutral opinion on whether consent was taken.

Graph 6-



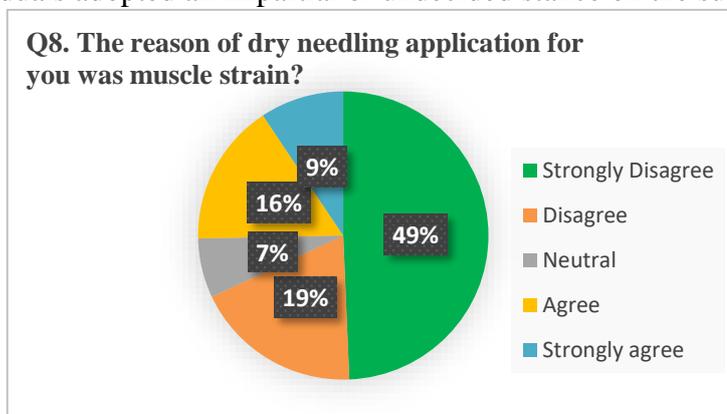
The data from the 75 participants concerning the performance of Dry Needling for pain showed varied results. Strong agreement that pain was the reason was recorded by 41% of respondents, with an additional 33% expressing agreement. Furthermore, 11% were neutral regarding this indication, while a substantial 15% strongly contested the notion of pain being the purpose of the Dry Needling intervention.

Graph 7-



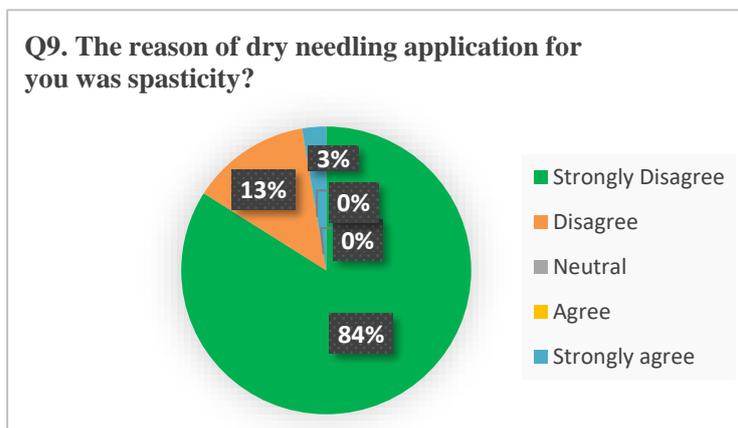
Regarding the rationale for dry needling application, a clear majority of the 75 total participants expressed opposition to postural imbalance being the cause. Specifically, the vast proportion of respondents either strongly dissented 65% or simply disagreed 24% with this premise. Conversely, only a minor segment, 4% was in firm affirmation that postural imbalance warranted the procedure. The remaining 7% of the individuals adopted an impartial or undecided stance on the subject.

Graph 8-



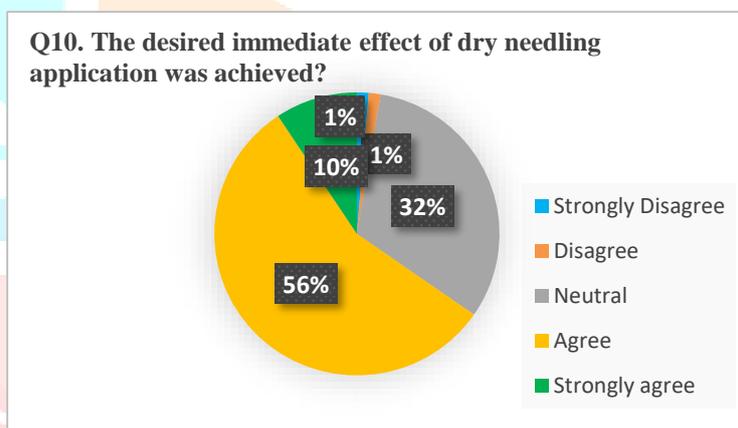
Out of total 75 participants, 7per strongly agree, 16per agree for muscle strain as the reason of dry needling application. 7 per are neutral about muscle strain as the reason for application of dry needling whereas 49 per strongly disagree, 19 per disagree muscle strain not being the reason of dry needling application.

Graph 9-



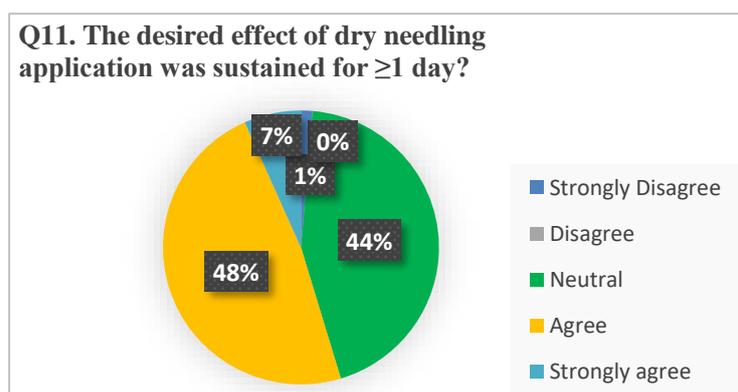
The opinions of the 75 participants regarding the use of dry needling for spasticity were heavily skewed against this application. A decisive majority, 84%, expressed strong disapproval, while an additional 13% also disputed the rationale. Conversely, only a minuscule 3% of the individuals were in firm agreement with this application as they were treated for spasticity.

Graph 10-



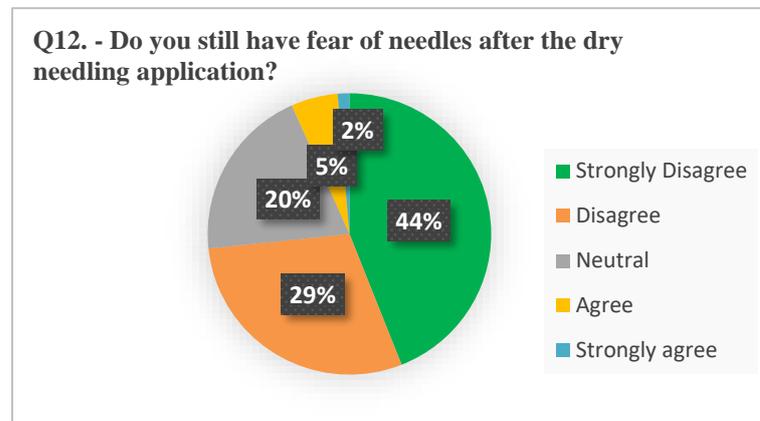
A substantial majority of the 75 participants reported an immediate desired outcome following the application of dry needling. A commanding 56% expressed agreement that this impact was achieved, with an additional 10% registering strong agreement. This means two-thirds of the respondents perceived a quick positive result. Conversely, only a minuscule 1% either disagreed or strongly disagreed that a desired immediate effect occurred. The remaining 32% maintained an undecided or neutral perspective regarding the rapid post-procedure effect.

Graph 11-



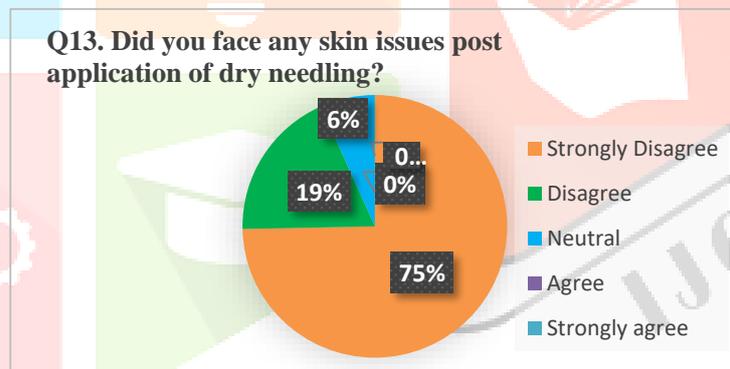
Regarding the sustained impact of the dry needling application, a significant portion of the 75 participants reported a desirable effect lasting for one day or longer. Over half of the respondents affirmed this duration, specifically with 48% simply agreeing and an additional 7% expressing strong agreement. However, a large minority, 44%, held an impartial or undecided view on whether the desired effect persisted for this time frame. Notably, only a negligible fraction of the participants, 1% strongly disputed that the immediate positive outcome was sustained for ≥ 1 day.

Graph 12-



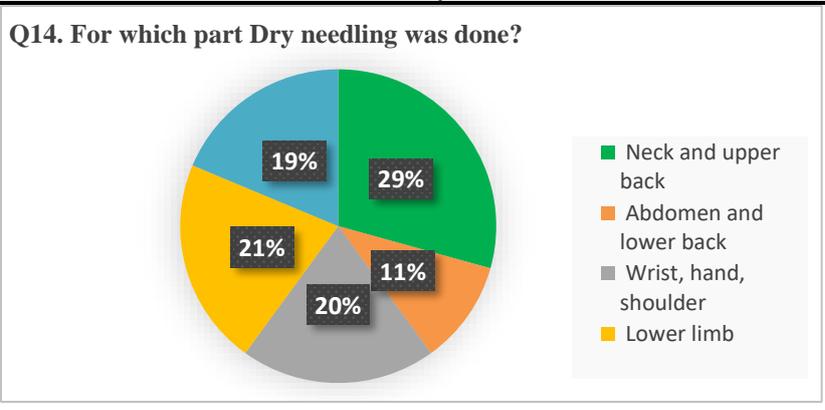
The dry needling treatment successfully mitigated the fear of needles for the majority of the 75 participants. A combined 73% (44% strongly disagree and 29% disagree) affirmed that their phobia had been alleviated. Only a small minority, 7% (5% agree and 2% strongly agree), reported a lingering apprehension toward needles. The remaining 20% of individuals maintained a neutral perspective on their post-treatment anxiety.

Graph 13-



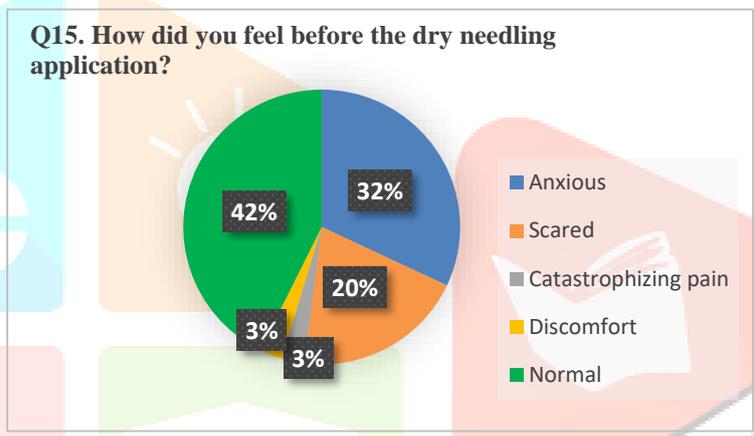
The survey results from the 75 participants regarding the occurrence of skin-related issues following dry needling application indicated a strong consensus that such complications were not experienced. A decisive 75% (56 individuals) expressed strong disagreement with the statement that they faced skin issues, and an additional 19% (14 individuals) simply disagreed. Collectively, this signifies that 94% of respondents reported an absence of adverse dermal reactions post-procedure. Only a small fraction, 6% (5 individuals), maintained an impartial or undecided view on the matter of post-treatment skin concerns.

Graph 14-



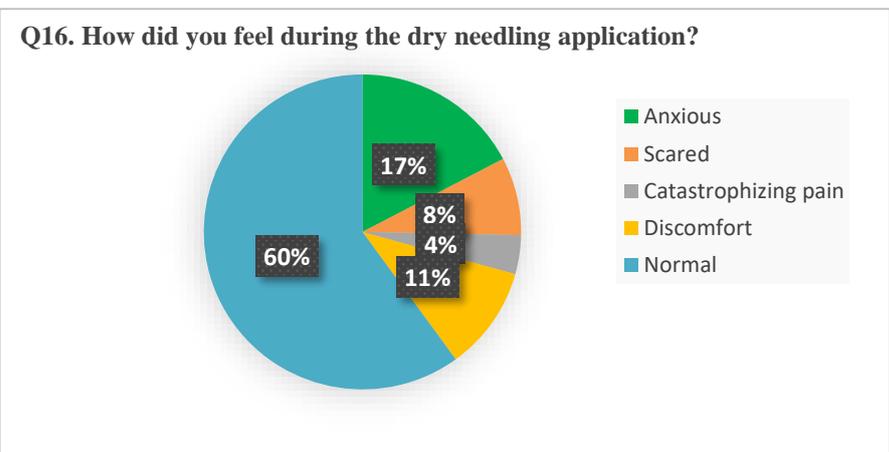
The location of dry needling application varied across the 75 participants but was most frequently applied to the neck and upper back, accounting for 29% (22 individuals) of the total. Treatment for the lower limb was the next most common site at 21% (16 individuals). Closely following this were applications to the wrist, hand, and shoulder, which represented 20% (15 individuals), and procedures targeting multiple joints at 19% (14 individuals). The abdomen and lower back saw the least frequent application, with 11% (8 individuals) receiving treatment in this area.

Graph 15-



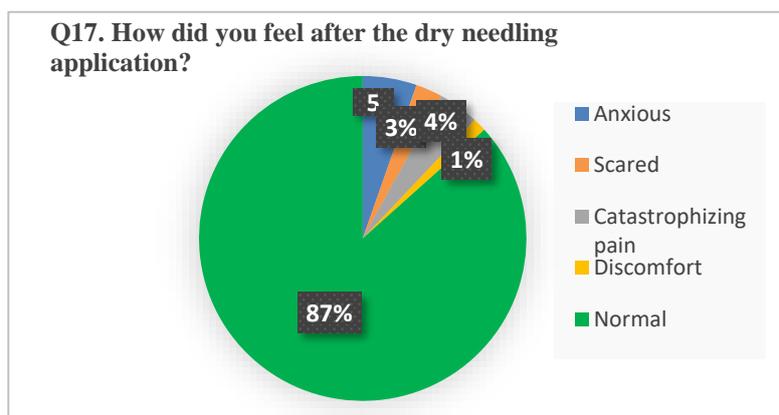
Prior to the dry needling procedure, the 75 participants displayed a range of emotional states, yet a plurality felt composed. Specifically, 42% (32 individuals) reported feeling normal or at ease. However, a notable number experienced apprehension: 32% (24 individuals) felt anxious, and 20% (15 individuals) admitted to being scared. A very small contingent, 3% (2 individuals), reported extreme distress, describing feelings of catastrophizing pain and discomfort before the application.

Graph 16-



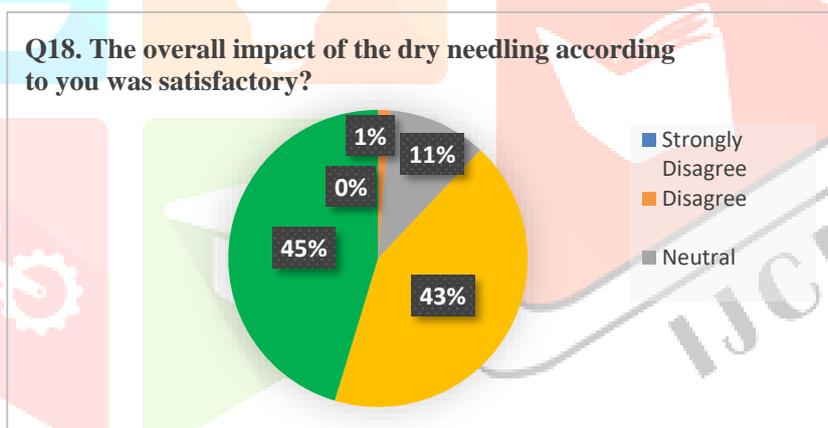
During the dry needling procedure, the 75 participants overwhelmingly reported a sense of calmness, with 60% feeling normal. However, a segment of the group experienced negative sensations. Anxiety was felt by 17% while 8% were scared. Furthermore, 11% reported general discomfort, and 4% experienced severe distress characterized as catastrophizing pain.

Graph 17-



Following the dry needling procedure, the emotional response among the 75 participants was overwhelmingly positive and stable. A vast majority, 87% reported feeling normal and composed after the application. Reports of negative feelings were minimal: only 5% felt a lingering anxiety, 3% were still scared, and a negligible 1% experienced residual discomfort.

Graph 18-



The overall consensus among the 75 participants regarding the impact of the dry needling procedure was highly favorable. A dominant 45% (34 individuals) registered strong agreement that the outcomes were satisfactory, complemented by an additional 43% (32 individuals) who simply agreed. This collective affirmation by 88% of the respondents indicates a profound satisfaction with the procedure's efficacy. A small segment, 11% (8 individuals), maintained an impartial view, while only a negligible 1% (1 individual) expressed disagreement with the perceived overall benefit.

IV. DISCUSSION

We have designed self-made questionnaire for perception of Dry needling technique. This questionnaire is focused on subject's or patient's pre-requisite knowledge about invasive Dry needling technique. Done for various MSK and Neuromuscular conditions. We've included questions regarding communications from therapist, proper assessment of the part to be treated, hygiene maintenance, verbal/ written consent obtained before treatment; highlights of the questions are about perception of needle and technique before, during and immediately after application with its effect on the physiotherapy treatment. A patient's perception of a medical procedure is built not just on the physical sensation or outcome, but also on their feeling of safety, respect, and professionalism during the process. The study's results show that while patient perceptions vary, the overall outcome is positive. A balance was observed among participants, with some having prior knowledge of dry needling and others being

completely unaware before the application. Therefore, participants need to understand the concept of dry needling. DN is an intervention that involves the insertion of a thin, solid filament needle into muscles and other soft tissues, such as ligaments, tendons, and scar tissue. The explanation of Dry Needling ensures the participant is able to make an informed, voluntary decision to proceed based on a clear understanding of the procedure. Patients should be informed of the specific condition that necessitates the dry needling. Furthermore, participants are required to know the potential adverse effects of the technique, especially when needling is performed near the chest wall.

Dry needles are inserted through the skin in the proximity of peripheral nerves to manage pain syndromes in neuro-musculoskeletal. By describing the prick sensation during the insertion of DN and the twitch response will help them prepare and ensure to stay calm while it occurs. The findings in this study overwhelmingly indicate that the participants felt they were adequately informed about the dry needling procedure beforehand. Crucially, no participants disagreed or strongly disagreed with the statement, suggesting universal satisfaction regarding the pre-procedure explanation among those surveyed. The question of “was the part being cleaned before the DN application” measures the patient's perception of hygiene and safety. Seeing the area cleaned increases the patient's confidence in the physiotherapist's professionalism and reduces perceived risk of infection, contributing directly to a positive or negative perception of the entire procedure. Giles Gyer and others in 2016 reported that the part of the body to be treated before dry needling application should be cleaned and must be free of any cuts or wounds, for the skin disinfection the pre-packaged 70 percent isopropyl alcohol swabs are used to avoid infections. ^[7]

According to the study data collection it demonstrates a very high level of agreement that the necessary preparation of the treatment area was carried out prior to the dry needling procedure. Significantly, zero participants indicated that they disagreed/strongly disagreed with the statement, reinforcing the conclusion that procedure preparation was consistently and effectively performed across the participant group. By taking a consent form it measures the patient's perception of being respected and informed. If the patient perceives that no consent was taken, it severely impacts their trust, anxiety level, and overall satisfaction, regardless of whether consent was technically documented. This perception is crucial for assessing ethical treatment. Also, we understand the participant is fully aware of the technique that will be performed. This demonstrates that the therapist has thoroughly explained the dry needling technique to the patient. Consent also helps the therapist to carry out the DN technique smoothly. Without proper consent, the participant might discover things during the procedure, which could affect the recovery outcome. After the application, participants reported that they no longer had fear of needles. This suggests that the positive experience and successful application of dry needling helps in relieving needle related fears. Leonard Joseph and others concluded that the fear of needles does not influence the pain pressure threshold, nor blood pressure and heart rates among those subjects with a fear of needles. ^[11] Barbara Cagnie and others stated that when the needle is inserted into through the skin and into the muscle to relieve pain, the release of vasoactive substance occurs, upon activation of A δ - and C-fibers it leads to vasodilatation in small vessels and increased blood flow. Repeated localized DN may potentially increase capillarity in the skeletal muscle and improve the circulation in muscles. ^[7]

R. Bubnov & others reported that all 30 patient's movement were restored and pain decreased after performing DN – US on the major fascial points; thoracolumbar fascia, sacroiliac joint, pelvis ligaments, rotator cuff, nerve sheath surrounding nerves (sciatic nerve, brachial plexus) smaller fascia, joint capsule thickening. There was improvement in postural balance seen and pain was decreased. ^[12] Scott C Dembowski illustrated that the use of dry needling and eccentric exercises facilitated a favorable outcome in an athlete following a hamstring injury. The result indicated that dry needling is a useful adjunct therapy to an eccentric based training program allowing athletes to return to sport quickly. ^[13] Rodrigo Nunez Cortes in 2020 stated that DNT alone or within a multimodal treatment is effective in reducing the spasticity of stroke and improving the passive range of motion and sensitivity to pressure pain in the short term. ^[4] G. dar and others in 2016 study result showed that the significant difference was found in the percentage of change of muscle activation post needling between groups on the right side at level L4-5. A slight increase in the percentage of muscle activity. An improvement of back muscle function was observed by performing dry needling procedure in healthy individuals. This implies that dry needling stimulates motor nerve fibers and as such increase muscle activity. ^[5]

David Boyce discussed that the participants who had undergone DN were reported with minor AE. The major AE's were also reported but they were less than the minor AE's. Expected minor AE's such as

mild bleeding, bruising and pain during DN were common and major AE's were rare.^[15] In this study it was observed that more than half population has reported that no skin complications were faced post Dry needling application as the needles create only a tiny puncture wound, which minimizes irritation, major bleeding, and subsequent infection risk at the insertion site. The needle targets the trigger points deep within the muscle, meaning the skin itself is passed through quickly and is not the primary target of the treatment. Trained practitioners follow rigorous safety protocols to prevent infection and severe reactions. The adherence to these steps is the single most important factor in preventing true "skin issues" like infection or severe irritation. Barbara Cagnie and others stated that a well-known that expectation can significantly modulate pain perception, a mechanism frequently referred to as placebo analgesia. Participants reported their emotional state before the dry needling procedure as anxious and some reported as normal.^[7] Theodoros Loizidis and others in 2020 stated that Dry needling in painful areas and penetrating all the muscle groups seems to improve pain and functional balance.^[16] Dry needling can be used as part of complex treatment for chronic musculoskeletal pain.^[22] This study concludes that Dry needling technique helps in relieving acute and chronic pain, muscle tightness, reduces spasticity and corrects postural imbalance. The study highlights that patients' perception of Dry Needling (DN) is overwhelmingly positive, built upon thorough pre-procedure explanation and demonstrated professionalism such as hygiene, taking consent. The positive clinical outcomes of Dry needling, including relief of acute/chronic pain, decreased spasticity, and improved muscle function/postural balance, reinforce the favorable patient perception, making DN a well-received component of a complex treatment plan for musculoskeletal and neuromuscular conditions.

V. CONCLUSION

Patients perception is a key matter, where they were clarified about the technique, communicating with patient, hygiene is maintained, asked for an informed consent before inserting needle and explaining the desired effects of dry needling which may help in speedy recovery of the patient.

This questionnaire helps to measure the short term and long-term effectiveness of Dry needling technique. It also helps to understand the patient behavior towards needle related activity receiving immediate feedback and evaluating the psychological impact of invasive techniques done by physiotherapist. It provides a standardized framework for the physiotherapists to inculcate Dry Needling Technique with appropriate measures for patient-care.

VI. FUTURE SCOPE OF THE STUDY

An Inter disciplinary study can be performed by the Physiotherapist in association with Psychologist to study detailed psychological impact and behaviour of patients regarding invasive technique of Dry Needling.

VII. REFERENCES

1. Melissa Tolbert, K Suzanne Leach., Matthew P Condo, Anthony Mancini, Rachel Tinius Patient-Perceived Benefits and Adverse Events of Dry Needling, Int. Journal of sports physical therapy, 2025 Sep, 1;20[9]: 1355- 1363
2. Yacov Fogelman, John Kent Efficacy of dry needling for treatment of myofascial pain syndrome, Feb 1 2015, Journal of back and msk rehab, volume 28, issue 1
3. Gary Kearns- Dry Needling by the Physical Therapist in the Medical Model, Integrative Medicine Symposium 2019.
4. Jennifer F. Mullins, Matthew C, Kyle B, Nicholas R, Phillip A, Philip M, Arthur J Nitz- Effect of Dry Needling on Spinal Reflex Excitability and Postural Control in Individuals with Chronic Ankle Instability, Journal of manipulative and physiological therapeutics, volume 44, Issue 1, January 2021, pages 25-34.
5. Rodrigo Nunez Cortes, Carlos Cruz Montecinos, Rodrigo Latorre García, Sofía Perez Alenda and Rodrigo Torres Castro- Effectiveness of Dry Needling in the Management of Spasticity in

- Patients Post Stroke, *Journal of Stroke and Cerebrovascular Diseases*, Vol. 29, No. 00, 2020: 105236
6. Peter Baldry- Superficial Versus Deep Dry Needling, *Acupuncture in medicine* 2002;20(2-3):78-81.
 7. Barbara Cagnie & Vincent Dewitte & Tom Barbe & Frank Timmermans & Nicolas Delrue & Mira Meeus- Physiologic Effects of Dry Needling, *Curr Pain Headache Rep* (2013) 17:348
 8. Aitor Martín-Pintado-Zugasti PT, Almudena López-López , Daniel Pecos-Martín PT, Ángel Luis Rodríguez-Fernández PT, Isabel María Alguacil-Diego, Tomás Gallego-Izquierdo PT, Josue Fernández-Carnero PT- The role of psychological factors in the perception of post needling soreness and the influence of post needling intervention, *April 2017, Pages 348-355, Volume 9, Issue 4*
 9. Giles Gyer, Jimmy Michael and Ben Tolson- Dry needling for manual therapists, First published in 2016.
 10. Mehrdad Imani, Leila Abbasi, Shohreh Taghizadeh, Mohammad Amir- Comparison of the effect of two different types of dry needling techniques on subacromial impingement syndrome, *Journal of Bodywork & Movement Therapies*, accepted in 15 October 2020.
 11. Leonard Joseph, Katijabhe Moh Ali, Ayiesah Ramli, Vikram Mohan- Fear of needles does not influence pain tolerance and sympathetic responses among patients during a therapeutic needling, *Vol 20, issue 1, sept 2013, pgs 1-7*
 12. R. Bubnov, L. Kalika- POS1284 Fascial ultrasound: the context for Dry needling trigger points in the treatment of myofascial pain, *Postural imbalance*. 2021, Vol 80, Issue suppl 1
 13. Scott C Dembowski, Richard B Westrick, Edo Zylstra, Michael R Johnson- Treatment of hamstring strain in a collegiate pole- vaulter integrating dry needling with an eccentric training program, *Int. Journal of sports physical therapy*, 2013 Jun;8(3):328–339.
 14. G. dar, G. Hicks- The immediate effect of dry needling on multifidus muscles' function in healthy individuals. *Journal of back and musculoskeletal rehabilitation*. May 1, 2016. Volume 29, issue 2
 15. David Boyce, Hannah Wempe, Courtney Campbell, Spencer Fuehne, Adverse events associated with therapeutic dry needling, *Int. Journal of sports physical therapy*, 2020 Feb;15(1):103–113.
 16. Theodoros Loizidis, Thomas Nikodelis- The effects of dry needling on pain relief and functional balance in patients with sub-chronic low back pain. *Journal of back and msk rehab*, Nov 2020. Vol 33, issue 6
 17. Elizabeth A Tough, Adrian R white, Michael Cummings, Suzanne Richards, John Campbell- Acupuncture and dry needling in the management of myofascial trigger point pain: A systematic review and meta-analysis of randomised controlled trials, *European Journal of pain*, Jan 2009, Pages 3-10. Volume 13, Issue 1.
 18. Hyuk Ga, Ji ho Choi, Chang Hae park and Hyun Jung Yoon- Dry Needling of Trigger Points with and Without Paraspinal Needling in Myofascial Pain Syndromes in Elderly Patients, *The journal of alternative and complementary medicine*, 25 Aug 2007, Vol 30, no 6
 19. Seyed Mansoor Rayegani, Masume bayat- Comparison of dry needling and physiotherapy treatment of myofascial pain syndrome. 19 Dec 2013, Volume 33, pgs 859- 864.
 20. Cerezo- Téllez, Ester Torres- Lacomba, María Fuentes-Gallardo, Isabel Perez-Muñoz, Milagros Mayoral-del-Moral, Orlando Lluch -Girbés, Enrique Prieto- Valiente, Luis; Falla,

Deborah - Effectiveness of dry needling for chronic nonspecific neck pain: a randomized, single-blinded, clinical trial. Journal of international association for study of pain, sept 2019

21. Leonid Kalichman and Simon Vulfsons- Dry Needling in the Management of Musculoskeletal Pain, September–October 2010 Vol. 23 No. 5
22. James Dunning, Raymond Butts, Firas Mourad, Ian Young, Sean Flannagan & Thomas Perreault (2014) Dry needling: a literature review with implications for clinical practice guidelines, Physical Therapy Reviews, 19:4, 252-265.

