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Efficacy of Dry Needling in Dentists with Non-Specific Shoulder Pain

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Abstract

Background:A large number of studies suggests that dentists are more susceptible to musculoskeletal disorders and associated pain in upperlimb than the general population.A different explanationfor the pathophysiological mechanisms causing shoulder pain maybe contributed by myofascial trigger points. The goal of dry needling, which entails repeatedly inserting needles, is to mechanically disrupt the trigger site, which has accumulated a large number of hypersensitive nociceptors after eliciting a local twitch response.

Aims and Objectives:- The study's goals were to assess the effectiveness of dry needling for dentists with generalized shoulder pain as well as the impact of dry needling combined with therapy activities on functional improvement in dentists with generalized shoulder pain.

Methods: The participants were assessed for the outcome measures using NPRS for Pain and Constant-Murley score for Functional activities. The treatment period was for 2 weeks with 3 sessions of dry needling and therapeutic exercises daily for Group A and therapeutic exercises for Group B. participants were again assessed post 2-week protocol.

Results: In the group receiving dry needling plus therapeutic exercise, the patient reported an immediate pain decrease, an increase in range of motion, and functional improvement.

Conclusion: This study showed that how dry needling along with therapeutic exercise is beneficial in treating non-specific shoulder pain in dentists who use their upper limb at work for prolonged period of time.

Keywords: Non-specific shoulder pain, myofascial trigger point, dry needling, dentists, therapeutic exercise.

1. Introduction

A large number of studies suggests that dentists are more susceptible to musculoskeletal disorders and associated pain than the general population. The musculoskeletal system is put under strain during the dental examinations and procedures that require uncomfortable body positions.[5] Dental professionals typically use their upper bodies while at work. Muscle strain in the upper extremities is becoming more common, especially during patient care and office work, which together make up around 70% of dental tasks. Because of this, dental professionals are more likely than others to get musculoskeletal diseases, shoulder pain, and hand/wrist pain.[6] A common musculoskeletal disorder called shoulder pain can impair the function of the entire upper limb. Between 7 and 26% of the general population had shoulder pain, and the frequency increased with age. The majority of shoulder pain sufferers describe their symptoms as troublesome discomfort. The need for medical consultation rises as these symptoms become recurring and persistent.[7]

The initial therapeutic choice for managing shoulder pain in patients is conservative treatment; however, the ideal course of action is yet unknown. In fact, as stated in expert guidelines, a wide range of interventions, including injections, drugs, exercise, manual therapy, electrotherapy, or cognitive therapy are all recommended with differing degrees of evidence. According to multiple systematic reviews looking at the outcomes of conservative therapies for shoulder pain, exercise and manual therapy (as additional therapy) are strongly indicated for the management of subacromial shoulder discomfort.[8]A different explanationfor the pathophysiological mechanisms causing shoulder pain maybe contributed by myofascial trigger points. Hypersensitive, irritable points over a taut band of muscle are known as myofascial trigger points (MTrPs). They are palpable, and mechanical stimulation causes localised and referred pain to other regions.[9]

Pressure on the MTrPs causes referred symptoms such as pain, muscular dysfunction, and sympathetic hyperactivity. MTrPs are local points and are very sensitive to pressure. When compressed within the patient's level of pain tolerance, active MTrPs produce referred motor phenomena, frequent sympathetic hyperactivity, and frequently tenderness in the pain reference zone. Latent MTrPs, in contrast are clinically dormant and are only painful when touched. However, the specific pathophysiology of MTrPs is still not entirely known. In clinical practise, MTrPs are typically identified through palpation. In clinical practise, MTrPs are typically identified through palpation. Myofascial trigger points may contribute to shoulder pain and functional impairments, according to certain research.[10] There are many different pharmaceutical and non-pharmacological treatments available for myofascial pain syndrome. Examples of conservative physical therapy methods for MTrPs include deep pressure massage, surface heat, and myofascial release. Invasive treatments for MTrPs include dry needling procedures, which seem to be more successful.[11]

Trigger point dry needling is now a well-known and effective method of treating MTrPs. The goal of dry needling, which entails repeatedly inserting needles, is to mechanically disrupt the trigger site, which has accumulated a large number of hypersensitive nociceptors after eliciting a local twitch response.[12] In order to interfere with the MTrP's pathogenic pathways, the mechanical effect of therapy is achieved through connective tissue remodelling and plasticity as well as a decrease in inflammatory mediators.[13] The majority of dry needling occurs at active MTrPs. It is thought that treating the trigger point can lessen mechanical hyperalgesia and allodynia by lowering the peripheral source of nociceptive impulses.[14]

Despite the fact that Needling Myofascial trigger points is a common procedure for practitioners who specialize in treating musculoskeletal pain, there are minimal clinical evidences of its effectiveness because of limited research studies have examined its impact on shoulder pain for a significant amount of time.

Therefore, the study's goals were to assess the effectiveness of dry needling for dentists with non-specific shoulder pain as well as the impact of therapeutic exercises and dry needling on functional improvement in dentists with non-specific shoulder pain.

2. Material and Methodology

The participants were chosen from Pimpri, Pune's Dr. D. Y. Patil Dental College and Dr. D. Y. Patil College of Physiotherapy. Following institutional ethical committee approval, the study was carried out. Dentists who met the inclusion and exclusion requirements were chosen as participants. The participants were split into two groups, Group A (dry needling plus therapeutic exercise), and Group B (therapeutic exercises), with a sample size of 30. The participants were asked for their signed consent. The participants were assessed for the outcome measures using NPRS for Pain and Constant-Murley score for Functional activities. The treatment period was for 2 weeks with 3 sessions of dry needling and therapeutic exercises daily for Group A and therapeutic exercises for Group B. participants were again assessed post 2-week protocol.

INCLUSION CRITERIA:

1. Age 20-40 years of age
2. Non-specific shoulder pain in one or both shoulders
3. At least 1 myofascial trigger point in the muscles ipsilateral to the painful shoulder

EXCLUSION CRITERIA:

1. Prior surgeries of shoulder
2. Prior myopathies or neuropathy diagnosis
3. Cognitive deficits

OUTCOME MEASURES

1. NPRS
2. Constant-Murley score

The following interventions were made: The control group underwent a clinical evaluation that included a thorough review of their medical history and a physical examination of their shoulders. For the shortened peri-articular muscle tissue that was either directly or indirectly responsible for shoulder joint movement, therapeutic exercise consisted of isometric exercises, range-of-motion exercises, and postural counseling for two weeks of everyday activities. In addition to the aforementioned physical treatment, the intervention group received dry needling of the active MTrPs found by the physiotherapists in the deltoid (anterior, medial, and posterior) muscles in the supraspinatus, infraspinatus, and subscapularis muscles.

It was evaluated whether the muscles had any MTrPs that were active. the presence of a hypersensitive patch inside a palpably taut band, a palpable or visible local twitch in response to a palpatory stimulus, and the reproduction of referred pain caused by palpation. All of these localizations were based on the name and localization work of Travell and Simons.15 The Hong method ("quick in, fast out") was used to execute the needling, and if necessary, a cold pack was applied to reduce any discomfort that might have arisen. With the aid of a guide tube and acupuncture needles, measurements of 0.25 mm x 25 mm and 0.30 mm x 40 mm were taken.[13] Three separate needling sessions were carried out. After 2 weeks the post treatment measurements were taken and the values were compared for both the groups.

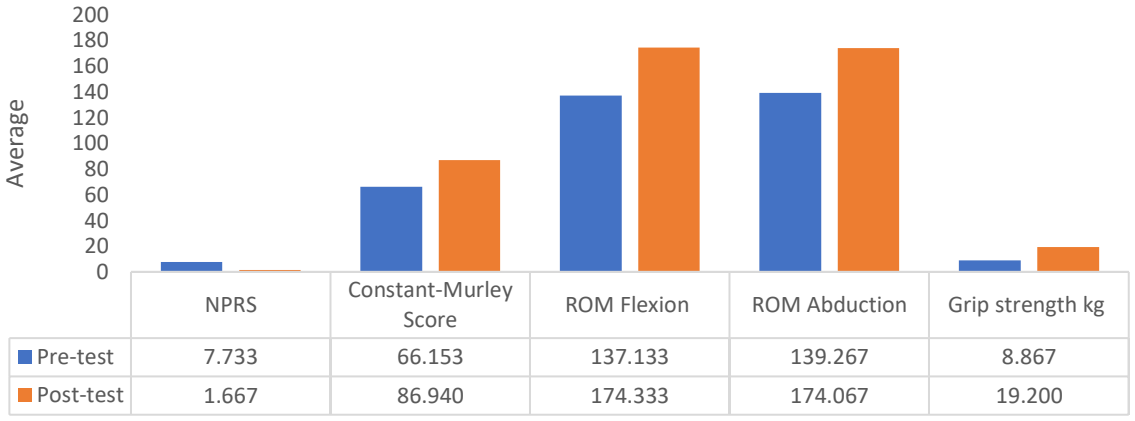
3. Results

The statistical program IBM SPSS Statistics 26.0 was used for the statistical analysis. The outcome indicates a considerable post-treatment change in both groups. However, the Constant-Murley score and the Numerical Pain Rating scale for pain indicated more substantial improvements in group A (dry needling + therapeutic activity) than in group B (therapeutic exercise alone).

Table 1. Study parameter comparison between pre-test and post-test within the intervention group

Study Parameter		Mean	N	SD	SEM	Mean difference	t-stat	p-value
NPRS	Pre	7.733	15	1.033	0.267	6.07	22.75	<.001**
	Post	1.667	15	0.617	0.159			
Constant-Murley Score	Pre	66.153	15	2.359	0.609	-20.79	-24.923	<.001**
	Post	86.940	15	4.162	1.075			
ROM Flexion	Pre	137.133	15	7.453	1.924	-37.20	-19.175	<.001**
	Post	174.333	15	3.352	0.866			
ROM Abduction	Pre	139.267	15	8.614	2.224	-34.80	-14.933	<.001**
	Post	174.067	15	4.131	1.067			
Grip strength kg	Pre	8.867	15	0.581	0.150	-10.33	-71.935	<.001**
	Post	19.200	15	0.592	0.153			

Figure 1. Pre-test and Post-test comparison of study prameters (Intervention group)



Pre-test and post-test comparisons of study parameters in the intervention group are shown in Table 1 and Figure 1.

Table 2. Comparison of research parameters between pre- and post-tests within groups (Control group)

Study Parameter		Mean	N	SD	SEM	Mean difference	t-stat	p-value
NPRS	Pre-test	7.667	15	0.816	0.211	4.13	19.199	<.001**
	Post-test	3.533	15	0.640	0.165			
Constant-Murley Score	Pre-test	66.700	15	1.342	0.346	-6.51	-14.288	<.001**
	Post-test	73.207	15	1.519	0.392			
ROM Flexion	Pre-test	137.867	15	8.725	2.253	-24.13	-13.316	<.001**
	Post-test	162.000	15	3.873	1.000			
ROM Abduction	Pre-test	134.067	15	7.860	2.029	-24.47	-14.502	<.001**
	Post-test	158.533	15	4.779	1.234			
Grip strength kg	Pre-test	8.633	15	0.581	0.150	-7.70	-45.938	<.001**
	Post-test	16.333	15	0.488	0.126			

Figure 2. Pre-test and Post-test comparison of study prameters (Control group)

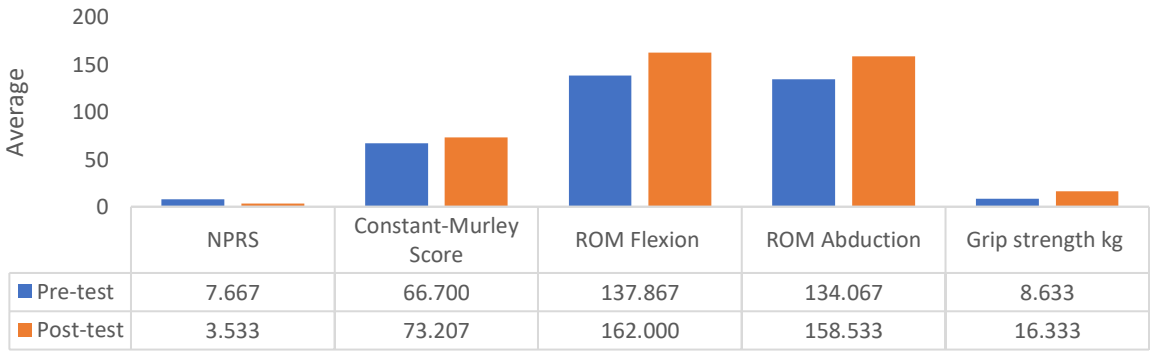


Table 2 and figure 2 indicates pre-test and post-test comparison of study parameters in control group.

Table 3. Between group comparison of pre-post differences

Study parameter	group	N	Mean	SD	SEM	Mean difference	t-stat	p-value
NPRS	Interventional group	15	6.067	1.033	0.267	1.933	5.641	<.001**
	Control group	15	4.133	0.834	0.215			
Constant Murley Score	Interventional group	15	-20.787	3.230	0.834	-14.28	-15.028	<.001**
	Control group	15	-6.507	1.764	0.455			
ROM Flexion	Interventional group	15	-37.200	7.514	1.940	-13.067	-4.922	<.001**
	Control group	15	-24.133	7.019	1.812			
ROM Abduction	Interventional group	15	-34.800	9.025	2.330	-10.33	-3.592	<.001**
	Control group	15	-24.467	6.534	1.687			
Grip Strength	Interventional group	15	-10.333	0.556	0.144	-2.63	-11.929	<.001**
	Control group	15	-7.700	0.649	0.168			

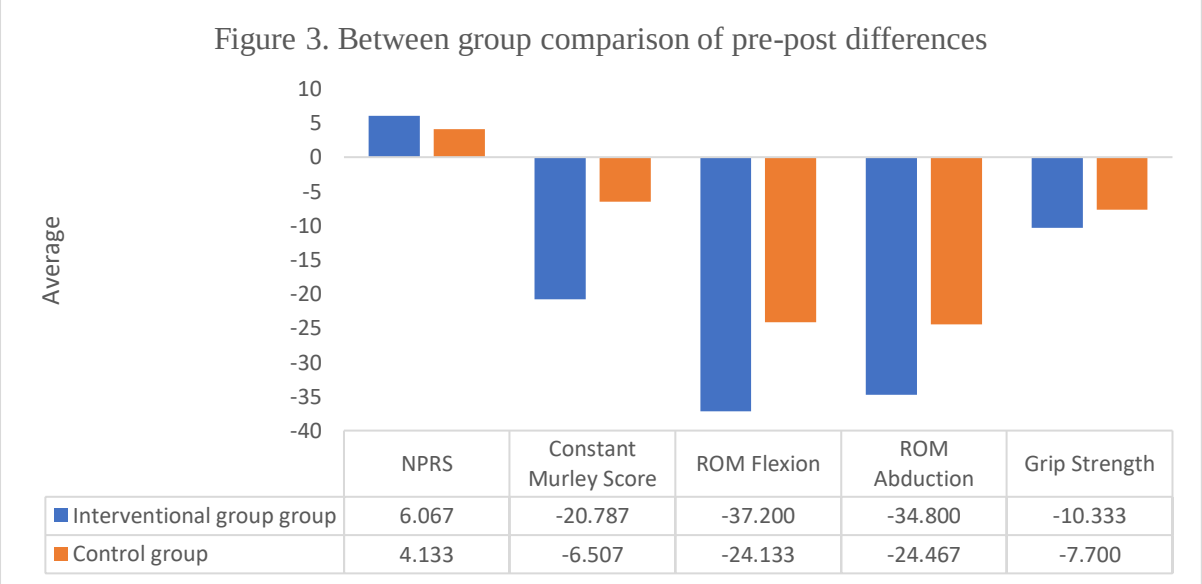


Table 3 and figure 3 indicates between group comparison of pre-test and post-test differences in study parameters.

NPRS: In intervention group,the mean decrease in the NPRS was 6.067 (SD=0.267) and in control group it was 4.133 (SD=0.834). The between group comparison of mean decrease in NPRS was done using independent sample t-test. The outcome shows that the reduction in the intervention group was substantially greater than that in the control group (t=5.641, p.001).

Constant-Murley Score: In intervention group,the mean increase in constant-Murley score was -20.787 (SD=3.320) and in control group it was -6.507 (SD=1.764). The between group comparison of mean increase in constant-Murley score was done using independent sample t-test. The outcome shows that the intervention group's mean rise in constant-Murley score was higher than the control group's (t=-15.028, p.001), which was a significant difference.

ROM Flexion: In intervention group,the mean increase in the ROM flexion was –37.200 (SD=7.514) and in control group it was -24.133 (SD=7.019). The between group comparison of mean increase in ROM flexion was

done using independent sample t-test. The outcome shows that the intervention group's mean increase in ROM flexion was higher than that of the control group by a considerable margin (t=-4.922, p.001).

ROM Abduction: In intervention group,the mean increase in the ROM abduction was –34.800 (SD=9.025) and in control group it was -24.467 (SD=6.534). The between group comparison of mean increase in ROM abduction was done using independent sample t-test. The finding shows that the intervention group's mean increase in ROM abduction was substantially higher than that of the control group (t=-3.592, p.001).

Grip strength (kg): In intervention group,the mean increase in the Grip strength (kg) was -10.333 (SD=0.556) and in control group it was -7.700 (SD=0.649). The between group comparison of mean increase in Grip strength (kg) was done using independent sample t-test. The findings show that the intervention group's mean gain in grip strength (kg) was higher than that of the control group (t=-11.929, p.001) by a substantial margin.

4. Discussion

The aim of the study was to check the effectiveness of dry needling in dentists with non-specific shoulder pain. In this study both the groups i.e the intervention group and control group revealed significant changes post intervention for NPRS, Constant-Murley score, shoulder Flexion and Abduction ROM along with significant changes in the grip strength as well.In intervention group,the mean decrease in the NPRS was 6.067 and in control group it was 4.133. According to the study's finding, the intervention group's NPRS significantly decreases, and when compared to the intervention group, the control group showed significant minimal detectable reduction after2-week protocol. For functional changes in the Constant-Murley Score, although a statistical significance was seen in the pre and post total score for both the treatment groups. The mean constant-Murley score for the intervention group increased from 66.153 before the test to 86.940 after the test. The mean constant-Murley score for the control group increased from 66.700 to 73.207 after the test.

Comparing the control group to the interventional dry needling group, it can be seen that the range of motion for mean flexion and abduction was not as great in the control group. The mean pre-test ROM Flexion was 137.867 and post-test it increased to 162.000. The mean pre-test ROM abduction was 134.067 and post-test it increased to 158.533. In terms of the grip strength values, the experiment group's results have been higher to those of the control group**.** The mean pre-test Grip strength kg was 8.867 and post-test it increased to 19.200 in experiment group. The mean pre-test Grip strength kg was 8.633nand post-test it increased to 16.333 in control group. Celik and Yelden reported in 2011 that people with latent myofascial trigger points in the shoulder had significantly less muscle strength on both sides compared to healthy individuals, despite the fact that there are no discernible changes in strength between the dominant and non-dominant sides. In contrast, Dhara et al. found that patients with diverse orthopedic abnormalities to the upper limbs had manual grip strength variations of 42.17% from healthy patients.**[16].** Bohannon however discovered that having weak grips was consistently linked to a higher chance of early mortality and a higher risk of secondary impairments or a longer length of stay following hospitalization or surgeries**.**[1,17.18]

For myofascial trigger points associated with shoulder and neck discomfort, Lin Liu et al.'s research identified a total of 20 RCTs that compared dry needling with a placebo or alternative treatments in various criteria. Comparing the dry needling group to the control/sham group resulted in a considerable improvement, especially in the short and medium terms. In the medium and long term, wet needling was superior than dry needling for treating MTrPS with neck and shoulder pain, but in addition, in comparison to dry needling, the other therapies had noticeable clinical effects in different ways.[18,19]

After just one session of dry needling to the shoulder, Arias Buria et al. found that patients recuperating from postoperative shoulder surgery displayed a better recovery and quicker return to function. Similar to the previous trials, the acute shoulder pain and disability changes were the main focus, and since there were no credible long-term follow-ups, it was impossible to conclude that these effects remained indefinitely. High level data suggests that using dry needling in conjunction with a shoulder pain exercise protocol can result in pain alleviation and decrease in disability. In comparison to exercise alone, the combination of Dry Needling with an exercise routine led to a noticeably larger reduction in impairment after 12 months, per the study by AeiasBuria et al. However, there were no differences in the reduction of chronic pain between the groups. When dry needling and exercise

were combined for 8 months with 8 patients, Saylor Pavkovich et al. did a retrospective case series and discovered that both pain and functional level had significantly improved.[20]At a 3-month follow-up, ParezPalomares found no difference in pain alleviation or functional status between those who underwent dry needling and exercise compared to those who received only exercise.. However, it should be mentioned that both the group's NPRS and functional score increased in trials conducted by Arias Buria and ParezPalomares. The therapy appears to have relatively little side effects, with the exception of post-needling pain, and it may be a highly useful addition to a patient's high-quality therapeutic exercise program. [21,22]

5. Conclusion

This study demonstrated the effectiveness of dry needling and therapeutic exercise in relieving generalized shoulder pain in dentists who utilize their upper limbs for extended periods of time at work. There was decrease in pain score and also improvement in the functional score. In this study both the groups had significant improvement in pain and function but when between group comparison was done showed more statistical improvement in dry needling and therapeutic exercise group compared to exercise group alone. These changes were statistically and clinically significant and can be applied in clinical use for the treatment purposes.

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