International Journal Dental and Medical Sciences Research
Volume 3, Issue 6, Nov-Dec 2021 pp 530-536 www.ijdmsrjournal.com ISSN: 2582-6018

Effect of Myofascial Release and Dryneedling on Neckpain and Hand Grip Strength in Sewing Machine Operators

Prajakta Shah[(1)] Dr Mahendra Shende [(1)] Dr Neha Ghugare (PT)[(2)]
Dr Neeraja Deshmukh[(3)]

[1] *Intern, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune-37*
[1]*Principal and professor, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune-37*
[2]*Assistant professor, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune-37*
[3]*Assistant professor, Department of Physiotherapy, Tilak Maharashtra Vidyapeeth, Pune-37*

Submitted: 10-12-2021 Revised: 22-12-2021 Accepted: 25-12-2021

ABSTRACT: **Background**: Work related musculoskeletal disorder usually occurs when there is mismatch between physical capacity of human body and job requirements it depends upon characteristics of physical movement, mechanical design of work task and ergonomics. [1] Two-third of the population experiences neck pain in their entire lives. Neck pain is the most common problem. [2] According to studies the sewing machine operators experience high prevalence of musculoskeletal disorders. The musculoskeletal disorders in sewing machine operators mostly occur due to poor working postures that have to be maintained for long period of time during whole working period as well as due to repetitive hand and work movements.[3] Previous study has shown that hand grip strength is affected by various factors including age, body mass index, sex, occupation, upper- extremity muscular strength, pain, leisure activities, sensory loss or cognitive decline.[4]Many studies have shown the significant effect by Dry needling and MP both in the treatment of myofascial neck/shoulder pain.[5]

Method: In this study 30 samples were selected between age group 25-40 years both male and female according to simple random sampling method. Samples were selected who had neck pain and neck disability index score more than 10, work experience more than 3 months. Samples who are diagnosed with any neurological problem, injury caused by trauma (spine or upper limb) or any upper limb fracture (<6 months), any ongoing neck treatment at same time, any skin conditions/ allergies to stainless steel, Trypanophobia (fear of needles), Hemophilia, Pregnancy, Cancer and tumor were excluded. Numeric Pain Rating Scale (NPRS) was used to measure general pain experience, Disability was evaluated using neck disability index, Hand grip strength measurement was measured using hand dynamometer, Cervical ranges using universal goniometer.

Conclusion: The study concluded that there is equal effect of both myofascial release and dry needling on reducing neck pain, reducing neck disability, increasing cervical range of motion and increasing hand grip strength.

KEYWORDS: Neck pain, hand grip strength, myofascial release, dry needling, neck disability.

I. INTRODUCTION

Work related musculoskeletal disorder usually occurs when there is mismatch between physical capacity of human body and job requirements it depends upon characteristics of physical movement, mechanical design of work task and ergonomics. It has been seen that work-related musculoskeletal disorders, pattern vary in different occupational groups. [1] Two-third of the population experiences neck pain in their entire lives. Neck pain is the most common problem. [2] According to studies the sewing machine operators experience high prevalence of musculoskeletal disorders. The musculoskeletal disorders in sewing machine operators mostly occur due to poor working postures that have to be maintained for long period of time during whole working period as well as due to repetitive hand and work movements.[3] Sewing machine operation is very precision profession and requires highly repetitive movement for which sewing machine operators need to bend forward to see point of operation , at the same time continuously operate using hands to manage fabric feed to the needle. If machine is not used properly by the operator it may lead to major health problems. One of the main problems which is face by the operator is neck pain which adversely affects the worker's quality of life, efficiency of work, and result in decreasing products. [6]

The studies have shown that maximum muscle that is affected is upper trapezius with 84.28% and 71.42% pectoralis major is affected.[5] The study showed that in sewing machine operators

the prevalence of lower back pain is 88%, knee pain is 86%, 76% have neck pain, 56% suffered from shoulder pain, 49% have wrist/hand pain, 46% have elbow pain, 38% suffered from upper back pain, 26% suffered from hip/thigh pain and 12% have ankle/foot pain.[2]

If an individual has neck pain for less than 3 months it is considered as acute and more than that is considered as chronic. [4] Causes of neck pain can be spondylosis, disc herniation, spinal stenosis, poor posture, prolonged posture, stress. Symptoms of neck pain are neck soreness and headache, pain around shoulder blades, arm complaints (pain, numbness, or weakness). [4]

Previous study has shown that hand grip strength is affected by various factors including age, body mass index, sex, occupation, upper-extremity muscular strength, pain, leisure activities, sensory loss or cognitive decline. It is also affected by any cervical pathology like cervical radiculopathy or carpal tunnel syndrome. Some studies have shown that there is lower hand grip strength in workers who are exposed to more physically demanding repetitive activities than workers who have non-manual work due to repetitive monotonous movements having impact on musculoskeletal system and subsequently causing strength deficit. [4]

"Injury pool theory" says when predisposing factors combined with a triggering stress event, activation of a trigger point occurs. It is hypothesized that the myofascial trigger points develop due to sustained postures and/or repetitive low-level tasks.Myofascial trigger points may develop after an initial injury to muscle fibers. Injuries such as traumatic events or repetitive microtrauma to the muscles. It causes pain and stress in muscle or muscle fibres. Additional trigger points are caused when muscles get fatigued when stress on muscle increases. Presence of myofascial trigger points in neck and shoulder for long period of time can lead to headache, neck and shoulder pain, dizziness or vertigo, abnormal sensation, autonomic dysfunction, limited neck and shoulder range of motion and disability. [5,7,8]

Symptoms of myofascial trigger points are muscle weakness, local and referred pain, and restricted range of motion. When trigger points are press they cause effect at target, the zone of reference or referral zone. The differentiation on myofascial pain syndrome from fibromyalgia can be done by area of referred pain.[5,7,8]

Treatment of myofascial trigger points include stretches, TENS, ultrasound, massage, ischemic compression therapy, dry needling, wet needling (e.g., lidocaine injection and some local anaesthetic injections), ischemic compression, laser. [8,9]

Treating the trigger point by Myofascial release involves applying sustained pressure to the trigger point holding for 30-60 seconds with sufficient force to slow down the blood supply and then gradually release. [10] This pressure locally lengthens sarcomeres and creates the flushing of cellular metabolic by-products commonly associated with myofascial trigger points, which can assist in reestablishing normal metabolic functions of the involved tissues [11].

Dry Needling involves the insertion of solid fill form needle directly into the myofascial trigger points. Needling on myofascial trigger points provokes a local twitch response and a brief muscle contraction. In needling the needle is moved up and down with or without withdrawal from the muscle tissue to elicit local twitch response. Dry Needling are of two types: superficial dry needling and deep dry needling. [5]

Few studies have shown the use of cryotherapy to be useful in reducing soreness after dry needling and myofascial release which help in reduction of pain. [10] Various studies have shown that after cryotherapy there is decrease in tissue blood flow due to vasoconstriction, reduces tissue metabolism, inflammation, oxygen utilization and muscle spasm. Different methods for application of cold are ice packs, ice massage, cold whirlpool, vapo-coolant spray. Cryotherapy reduces the temperature to the depth of 2-4 cm due to which there is reduction in activation of nociceptors and painful nerve conduction velocity. [12]

Methodolgy:

STUDY DESIGN **:** Experimental study
TARGET POPULATION **:** Sewing machine operators
STUDY DURATION :6 months
SAMPLING METHOD**:** Simple random sampling
SAMPLE SIZE (n) :30
STUDY SETUP **:** In and Around Pune

INCLUSION CRITERIA:

1. Age Group: 25-40 yrs.
2. Both male and female.
3. Those who have neck pain with Neck disability index score >10/50
4. Work experience >3 months.
5. Those who are willing to participate.

EXCLUSION CRITERIA

1. Diagnosed with neurological problem
2. Injury caused by trauma (spine or upper limb) or any upper limb fracture(<6 months)

International Journal Dental and Medical Sciences Research
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3. Any ongoing neck treatment at same time
4. Any skin conditions/ allergies to stainless steel.
5. Trypanophobia (fear of needles)
6. Hemophilia
7. Pregnancy
8. Cancer and tumor

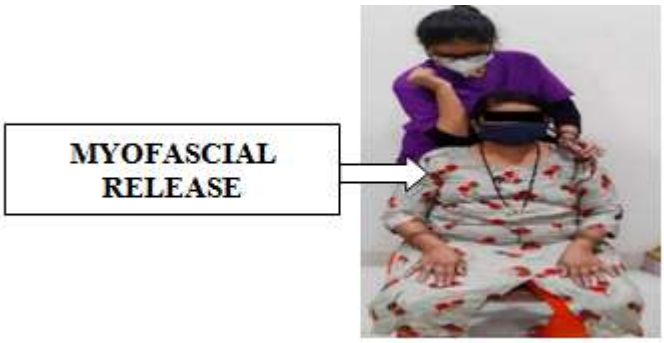
Outcome measures:

1. Numerical Pain Rating Scale (NPRS)
2. Neck disability index.
3. Universal Goniometer
4. Hand dynamometer

Intervention

➢ MYOFASCIAL RELEASE: -

Patients was asked to sit on chair with back supported and hands resting on the thighs to relax the neck/ shoulder muscles. Manual pressure was given on the myofascial trigger points (MTrP). Then the pressure was increased slowly until the subjects reports their highest tolerable level. The pressure was maintained for 30 seconds. Total 4 sessions were given i.e. twice a week for 2 weeks. Icing for 10-15 minutes was advice.



➢ DRY NEEDLING

Patients was asked to sit on chair with back supported and hands resting on the thighs to relax the neck/ shoulder muscles. Dry needling was performed using sterile acupuncture needles of 0.25*25mm with guiding tube. The palpation of myofascial trigger points (MTrPs) was done and then the needle was inserted through skin at 90-degree angle. The needle was manipulated by moving up and down (thrusting manipulation) from the muscle to elicit Local twitch response (LTRs). The needle was present for 10 minutes. Total 4 sessions was given in i.e twice a week for 2 week .Icing for 10-15 minutes was advised.

II. RESULTS

Microsoft excel office 2007 and Instat software version 3.0 used for statistical analysis.Average values for various parameters were calculated**.** Data was tested for normality using Shapiro wilk test. Data did not pass normality hence non parametric test was done for comparison of pre and post intervention. Level of significance was set at 5% (i.e. $p<0.05$).

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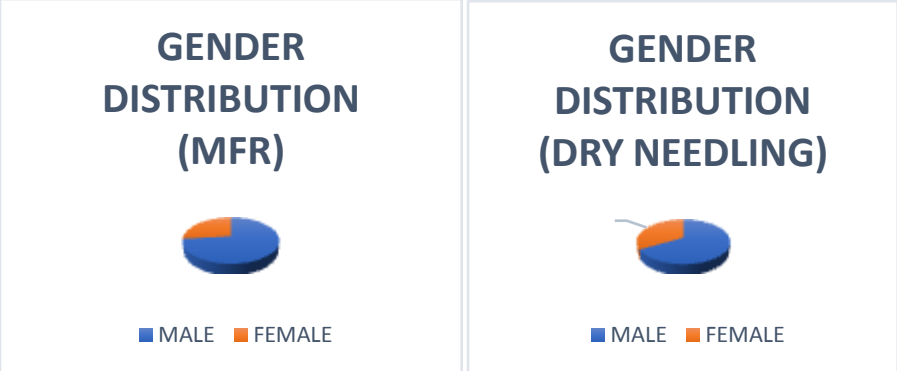
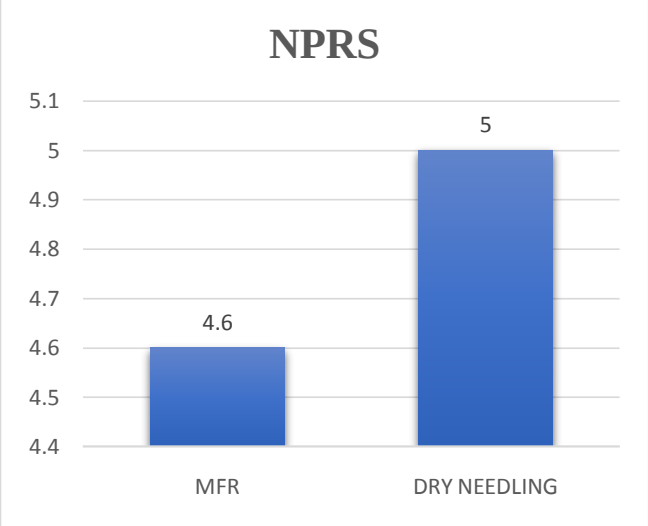
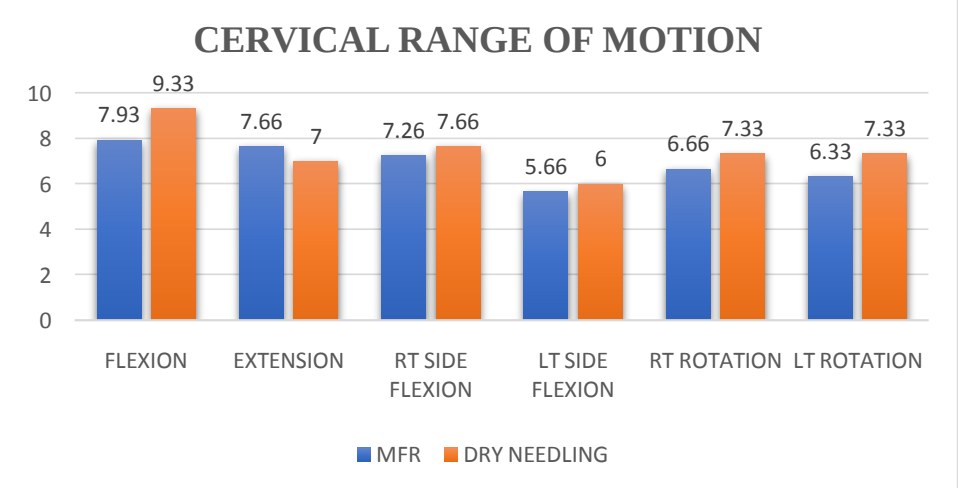
GRAPH NO. 1:GENDER DISTRIBUTION



GRAPH NO. 2: NPRS SCORE



GRAPH NO. 3: CERVICAL RANGE OF MOTION



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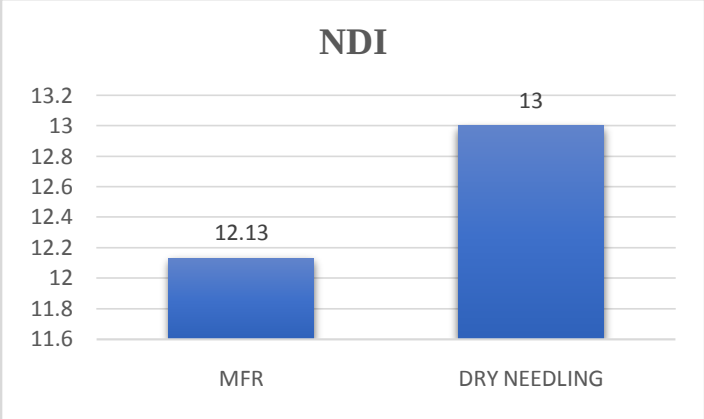
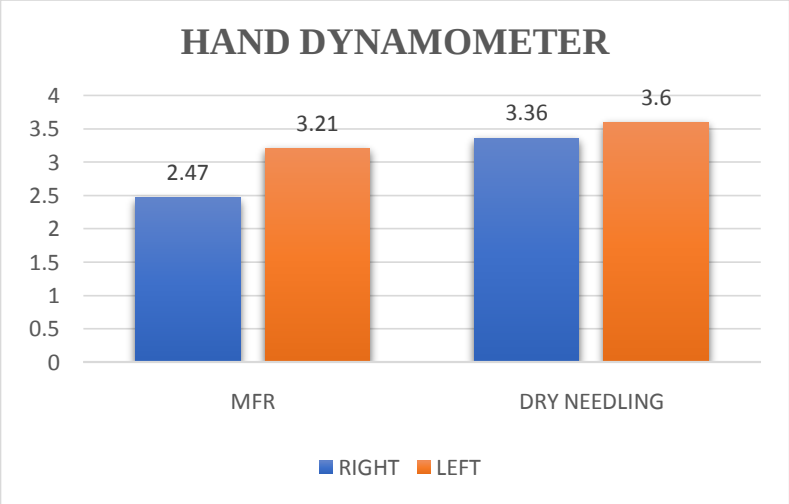
Volume 3, Issue 6, Nov-Dec 2021 pp 530-536 www.ijdmsrjournal.com ISSN: 2582-6018

GRAPH NO. 4: NECK DISABILITY INDEX



GRAPH NO. 5: HAND DYNAMOMETER



III. DISCUSSION

Table no 1 and Graph no 1 shows the gender distribution which shows that Group A(MFR) had 11 male sewing machine operators and 4 female sewing machine operators which in total are 15 sewing machine operators. While Group B (Dry needling) had 10 male sewing machine operators and 5 female sewing machine operators i.e. 15 sewing machine operators. The study done by Kayleigh E. De Meulemeester, MSc et.al on "Comparing Trigger Point Dry Needling and Manual Pressure Technique for the Management of Myofascial Neck/Shoulder Pain: A Randomized Clinical Trial" had only 42 female office workers. However, in the present study both male and female participants were selected, but the number of female participants was less compared to the number of male participants. [8].

Table no 2 and Graph no 2 shows the comparison of difference between Group A (MFR) and Group B (Dry needling) for pain reduction on NPRS which shows that the pain was reduced in Group B (Dry needling) slightly more with mean value (4.6 ± 1.43) than in Group A (MFR) with mean value (5 ± 0.894). There was no significant difference between both Group A (MFR) and Group B (Dry needling) when compared with p value. This result shows that both treatments have almost same effect on neck pain when compared with one another. This study can be supported by a previous study by Kayleigh E. De Meulemeester, MSc et.al on "Comparing trigger point dry needling and manual pressure technique for management of myofascial neck/shoulder pain: A Randomized Clinical Trial" which showed that the pain was reduced by both MP and Dry needling on NPRS [8] Another article which supports our study was done by Rocio Llamas-Ramos, et.al, on "Comparison of short term outcomes between trigger point dry needling and trigger point manual therapy for the management of chronic mechanical neck pain: A Randomized Clinical Trial" which found that 2 sessions of dry needling or 2 sessions of trigger point manual therapy both showed equal effect on

pain intensity on NPRS.[22] There was reduction in pain intensity by both treatments due to chemical. Neurological and mechanical changes in muscle fibers which helps in reduction of pain intensity. [13,12]

Table no 3 and Graph no 3 shows the comparison of difference between Group A (MFR) and Group B (Dry needling) for cervical range of motion .This graph shows that that the cervical ranges were increased in both Group A (MFR) with mean value for flexion (7.93 ± 2.40), extension (1.866 ± 3.480), right side flexion (7.266 ± 4.327), left side flexion (5.66 ± 3.59), right rotation (6.66 ± 2.357), left rotation (6.33 ± 2.867) to mean value for flexion (9.33 ± 2.599), extension (2.533 ± 4.224), right side flexion (7.66 ± 4.42), left side flexion (6 ± 4.54), right rotation (7.33 ± 3.09), left rotation (7.33 ± 3.091) in Group B (Dry needling). There was no significant difference when both groups were compared with p value. Hence these study shows that both groups have shown increased cervical ranges post-intervention. Above readings are supported by the study by Rocio Llamas-Ramos, et.al, on "Comparison of short-term outcomes between trigger point dry needling and trigger point manual therapy for the management of chronic mechanical neck pain: A Randomized Clinical Trial" which concluded that 2 sessions of dry needling or 2 sessions of trigger point manual therapy both showed equal effect on cervical ranges and it also increased the function. They also stated that the effect of both treatments was same due to neurophysiology (i.e., due decrease of peripheral nociception and activation of central pain pathways) and mechanical changes (i.e., disruption of the contraction knot and increase in sarcomere length) in both treatments. [14]

Table no 4 and Graph no 4 shows the comparison between Group A(MFR) and Group B (Dry needling) for Neck Disability Index score. This shows that in Group B (Dry needling) disability on NDI was slightly more reduced with mean value (13 ± 2.476) than in Group A (MFR) with mean value (12.13 ± 3.32). There was no significant difference between both groups when compared with p value. This result shows that there was reduction in neck disability index score after both treatments. Above study is supported by previous study done by Kayleigh E. De Meulemeester, MSc et.al on "Comparing trigger point dry needling and manual pressure technique for management of myofascial neck/shoulder pain: A Randomized Clinical Trial" which found that the disability score was reduced on neck disability index in both short term and long-term duration. [8] Various studies have assumed that the neck disability score reduces due to reduction in pain which improves the function of neck. From removal of impairments present in tissue like tension in tissue, reduction of pain increasing range of motion can ultimately lead to reduction in disability.[15]

Table no 5 and Graph no 5 shows the comparison between hand grip strength for right and left hand in Group A (MFR) and Group B (Dry needling) this shows that shows that there is slight increase in hand grip strength in Group B (Dry needling) with mean value (3.36 ± 4.55) than in group A (MFR) with mean value (2.473 ± 2.622) for right side with non-significant p value and for left side in Group B (Dry needling) with mean value (3.6 ± 2.602) more than in group A (MFR) with mean value (3.213 ± 2.79) for right side with non-significant p value. This concludes that the hand grip strength were increased in both groups after treatment. Above readings can be supported by the previous study of Jyoti Kiran Kohli and Himanshu Thukral, on "relationship between neck pain and handgrip strength in dentists as an occupational hazard, they conducted a study on Indian dentist to check the correlation of neck pain and hand grip strength", they found that there is negative correlation between neck pain and hand grip strength. As the neck pain increases the hand grip strength reduces which supports our study which shows that as the neck pain in sewing machine operators reduces on NPRS post-intervention there is increased in hand grip strength post-intervention when checked by an objective measure hand dynamometer. [16] A study conducted by Sweta V. Gaunus on "A randomized controlled trial to study the effect of gross myofascial release on mechanical neck pain referred to upper limb" said that the occurrence of pain referral was more on dominant side probably due to the difficult working posture , overuse of dominant hand and repetitive precision – demanding hand grips.[17]

Our study can be supported by a study done by Sheetal Kalra, et.al, on "Correlational study of chronic neck pain and hand grip strength in physiotherapy practitioners" which concluded that there is negative correlation of neck pain on hand grip strength on VAS, neck disability and hand strength. They also concluded that this is due to awkward posture of physiotherapist during working. [18]

IV. CONCLUSION

The study on effect of myofascial release and dry needling on neck pain and hand grip strength in sewing machine operators concluded that there is equal effect of both myofascial release

and dry needling on reducing neck pain, reducing neck disability, increasing cervical range of motion and increasing hand grip strength.

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