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Effect of dry needing and IASTM in chronic upper trapezitis: A Randomised controlled trial.

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ABSTRACT:

BACKGROUND:

Trapezitis is an inflammation of the trapezius muscle leads to formation of myofascial trigger points which will get aggravated by forward head posture which causing pain and reduced range of motion. Dry needling and instrument assisted soft tissue mobilization will help to release myofascial trigger points to restoring the muscle structure and function.

METHOD AND METHODOLOGY:

Forty-eight patients with pain in neck and with positive jump sign were randomly assigned into 3 groups by group A dry needling + conventional therapy, group B instrument assisted soft tissue mobilization + conventional therapy, group C conventional therapy. All three groups were treated for 3 sessions in 10 days. For all three groups IFT, hot pack and self-trapezius stretching exercise were given

RESULT:

All the three groups showed statistical significant improvement but IASTM group was more effective in improving ROM, normalizing CVA angle and reducing functional disability and dry needling was more effective in decreasing pain.

DISCUSSION:

On the basis of results of present stud, dry needling, IASTM and conventional therapy all three are effective in upper trapezitis but dry needling is more effective in treating pain so, we can say that it will be more helpful to as latent trigger point (as it is using in muscle belly), IASTM reduces local pain, increases range of motion and alters neuronal activity. It affects soft tissues by creating microtrauma which will improve tissue repair by stimulating fibroblast proliferation.

CONCLUSION:

Dry needling is more effective in faster pain relief than IASTM than conventional therapy and IASTM. Along with this both the techniques showed improvement in postural correction but IASTM will be more effective than dry needling.

KEY WORDS:

Dry needling, Instrument assisted soft tissue mobilization, Myofascial trigger point, Trapezitis.

Introduction

Among the pain, musculoskeletal pain is more common, mostly neck pain.[1,2] In present generation about 60%-90% people are having bad postural habit which carries head in forward direction with rounded shoulders. This is mostly seen in person who on desk job. This faulty posture will increase unnecessary burden on upper trapezius on which denoted by forward head posture (FHP).[3- 5]

Trapezitis is an inflammation of trapezius muscle leading to pain, where it is present even during rest and will be aggravated by activity, inflammation in muscle cause spasm and tightness of trapezius muscle[6]. So in there is formation of descrit nodules within the band of skeletal muscle these are spontaneously painful and referred as myofascial trigger points. The trigger points are hyperirritable and spontaneously painful nodules. Trigger points causing pain at rest called active trigger pints while trigger points causing pain on palpation called latent trigger point. [7] When such repetitive microtrauma occurs with predisposing factors like FHP then muscle goes in spasm and tightness and there is formation of activated trigger points.[8]

Symptoms of upper trapezitis are pain in posterior region of neck, collar line. This pain may have referred in neck, occiput, shoulder, back and full hand.[9]Trigger points are always present in taut bands and found by palpation. Most common frequent trigger points occur in upper region of trapezius and shoulder about half way between spine and scapula and tip of shoulder.[10]While doing the palpation trigger points it causes severe pain that patient winces or withdraws the shoulder called jump sign.[11]

The main physical therapy program for pain and trigger points consist of, electro analgesics such as IFT, TENS, ultrasound, laser, stretching exercises, IASTM, deep friction massage, dry needling. [12-15]

Dry needling is non-pharmacological invasive technique used to reduce the pain and trigger point in taut muscles.[16]In which a sterile acupuncture needle is used along with plastic guide and inserted in the trigger point in different angles such as 30degree, 45 degrees. There are various techniques of dry needling such as Travell and Simon's technique, hongs technique, guns technique, baldrys technique. Dry needling of these myofascial trigger points causes analgesic effect. The mechanical stimulation causes local twitch response; it is an involuntary spinal cord contraction of muscle fibers in taut band. Triggering local twitch response has been shown to reduce the collection of nociceptive substance in chemical environment near myofascial trigger points. [17]

The needle may cause a small focal lesion which triggers satellite cell migration to the area which repair or replace damaged myofibers and a localised stretch to the cytoskeletal structures. This stretch may allow sarcomeres to resume their resting length, Electrical polarization of muscle and connective tissue. The mechanical pressure causes collagen fibers to intrinsically electrically polarize which triggers tissue remodelling. [18] It generates the action potential that helps to release the actin –myosin filament so it helps to increase length of muscle, decrease in pain, and increase in range of motion after the treatment. Studies shows that dry needing improve ROM, decrease in pain than other conventional therapy methods in trapezitis. [19, 20]

Recently practitioners have begun to use an instrument assisted soft tissue mobilization. It is based on the principles of James Cyrix cross frictional massage. It is a specially designed instrument to manipulate skin, myofascial, muscles and tendons by various direct compressive strokes techniques. [21] It causes myofacial release which decrease pain and tightness and also stress on

therapist hand while using instrument, gel should be used for lubrication. Instrument consists of different treatment planes. The introduction of controlled microtrauma to affected soft tissue structure via instrument causes the stimulation of local inflammatory response. Microtrauma initiates reabsorption of inappropriate fibrosis or excessive scar tissue and facilitates a cascade of healing activities resulting in remodelling of affected soft tissue structures. It stimulates normal physiological oscillations that helps to lengthen fascia results in breaking adhesions hence it decreases the pain. [22,23] Studies have shown that IASTM improves ROM, decreases pain than other conventional therapy methods in trapezitis. There are some studies on dry needling, IASTM which shows effectiveness in improving range of motion, decrease in pain in patients with upper trapezitis but, none of them are compared those with basic conventional group.

The previous studies have used neck disability index to evaluate % of disability but none of the study used Northwick park index to evaluate the functional disability and also none of the previous studies took changes in CVA angle which is reliable measure of FHP. [24]

Hence, the present study is designed to compare effectiveness of dry needling, IASTM in pain, range of motion, CVA angle in patients with upper trapezitis. And there by to determine efficacy of these 2 treatment techniques in term of subjective and objective functional outcome using Northwick park index. [25]

Objectives

To compare the effect of dry needling and IASTM on pain, ROM, CVA angle, functional impairment and conventional group in chronic upper trapezitis.

Review of literature

A study done by Dr. Basvraj et al. Immediate effect of instrument assisted soft tissue mobilization with m2t blade technique in upper trapezitis: The conclusion of the study is instrument assisted soft tissue mobilization with MT blade is an effective tool in immediate reduction of pain in subjects with trapezitis.

An another study by ashwini s. bulbuli in 2017 on comparison of myofacial release and IASTM M2T technique is more effective than myofacial in reducing heel pain, IJAR vol-7, page no 75.

A study done by Haytham on instrument assisted soft tissue mobilization v/s stripping massage for myofacial trigger points in upper trapezius in 2020 on 40 participants with active trigger points in right upper trapezius shows significant relief of pain using IASTM instrument

In 2015 lynn h. et.al proved that dry needling is more effective and alters trigger point in subject with chronic upper trapezitis.

Recently in May 2021 a comparative study between dry needling and IASTM were done by zeinab ahmadpour emashi, farad okhovatian but it shows no significant difference in both treatments but the present study shows comparison of DN and IASTM with a controlled group. But in this present study we are taking the different outcome measures and comparing the effectiveness of both group with each other and with conventional therapy and also noticing the changes in pain, range of motion, craniovertebral angle and percentage of disability via Northwick park index.

Materials and methodology

The study was randomised controlled trial, conducted to know effectiveness of dry needling and IASTM in patients with chronic upper trapezitis.

The research is done at a physiotherapy clinic for the duration of 6 months from December 2021 to June 2022. Ethical clearance is taken from Oyster College of physiotherapy, Aurangabad submitted to Maharashtra University of Health Science Nashik in July 2022.

In the study 48 participants are taken from a physiotherapy clinic by using following formula,

$$n = \frac{(r+1)}{r} * \frac{\sigma^2 (Z_\beta + Z_{\alpha/2})^2}{d^2}$$

The clinical diagnosis of upper trapezitis is done by pain history given by participant and with positive "jump sign". All the subjects were given clear explanation of the both of treatment before taking part in this research and a written consent form was taken from the subject. Screening of subjects done on the basis of inclusion criteria were assigned into 3 groups. Group allocation is done by simple convenience method of sampling and patient allocated to group by envelope method. Blinding of the participants has not done. Baseline data i.e. Pain, ROM, CVA, NPI was recorded prior to 1st session post treatment values of outcome measure was recorded after 2nd session (day 5), 3rd session (day 10). Group "A" received dry needling, IFT, hot pack and stretching exercises. Group "B" received IASTM, IFT, and hot pack and stretching exercises Group "C" received IFT, hot pack and stretching exercises.

Inclusion criteria:	**Exclusion criteria:**
1. Age 20 to 60 year 2. Patients willing for treatment. 3. Male and female with positive "jump sign". 4. Chronic pain more than 3 months.	1. Any recent cervical surgery. 2.spinal pathology 3. history of cervical fracture 4. allergy 5.sever diabetes mellitus 6. Any hematological problems.

Intervention

DRY NEEDLING:

Position of patient – sitting on chair hand supported on table and head resting on hand.

Position of therapist- behind the patient towards involved side.

Technique: Treatment area exposed properly, hot pack was given 15 min prior to treatment, and a 0.25 gauze acupuncture sterile needle is used. the exposed area is wiped with spirit, then nodules will be palpated then keeping the needle along with plastic guide tube over a myofacial trigger point, then tapping movement performed to get twitch response which is aim of dry needling. When a needle is inserted in trigger point penetrated at angle of 30 degrees the fanning technique was performed, needle kept for few seconds then removed out successfully. [26]

IASTM:

Position of patient – sitting on chair hand supported on table and head resting on hand.

Position of therapist- behind the patient towards involved side.

Technique: hot pack was given 15 min prior to treatment, treatment area exposed

properly then gel was used for lubrication then instrument used at angle of 45 applied slow strokes on the muscle from origin to insertion (sweeping technique) for 3 min [27]

PHOTOGRAPH : IASTM FOR UPPER TRAPEZITIS.


PHOTOGRAPH : DRY NEEDLING FOR UPPER TRAPEZITIS


CONTROL GROUP:

HOT THERAPY**:** The treatment commenced with the hot therapy for all three groups. Patient in sitting position, hands supported on the table and neck resting on hand. hydro collator packs were used wrapped in 2-3 layer of Turkish towel. Hot pack therapy was given for period of 20 min/session/day for 10 sessions. [28]

IFT: Base-20 and Sweep-40 used in 2 pole mode for 15 min per session. IFT is used as an electro-analgesic for pain reduction as one of treatment method of control group.

STRECHING EXERCISES**:** Self trapezius stretch – lift your hand up and over the head, resting your other hand on back or holding the chair. Then laterally flex your head and apply over pressures by hand over head hold this for 30 secs then release 3 reps thrice a day. [29]

The treatment of control group was given to all the 3 groups.

Statistical analysis

The statistical data analysis of intra group was done using student t test. Equal distribution of patients in each group is by using normality test using Shapiro Wilk test, data is normally distributed so parametric tests did as show in results.

Result

In the study there were 16 subjects in each group, group A was having 5 males and 11 females. In group B 5 male and 11 females and in group C there was 4 males and 12 females (table1). The test of normality is in table 2. The NPRS Value measured after treatment was significantly lower than before the treatment in every group with $p<0.001$ but group A (dry needling) showed much more reduction of pain than group B(IASTM) which in comparison showed more reduction of pain to group C (conventional)(table-3). Lateral flexion ROM of neck increased significantly after treatment in each group with $p<0.001$ but ROM in group receiving IASTM showed more significantly more improvement than the other groups receiving dry needling or conventional group (table-4)

Similarly, CVA angle and NPI in both the outcome measures showed increased significantly after treatment in each group with $p<0.001$ but ROM in group receiving IASTM showed more significantly more improvement than the other groups receiving dry needling or conventional group. (table-5,6).

The result from statistical analysis of present study supportive alternative hypothesis which stated that there will be difference in pain, range of motion in chronic trapezitis patients treated with dry needling and instrument assisted soft tissue mobilization.

In the present study the mean age of participants in group A was 40.13 that in group B was 39.94 were as in group C it was 37.63 the statistical analysis of age distribution showed no difference in the group which represents homogeneity of participants.

TABLE-1: Distribution of Gender in all three groups

Particular		Group			Total	p-value
		Group A	Group B	Group C		
Gender	Male	5	5	4	14	0.904
	Female	11	11	12	34	
Total		16	16	16	48	

TABLE-2: Test of Normality for the Groups of the study

Variables	**Time**	**Group A**		**Group B**		**Group C**	
		Z-value	p-value	Z-value	p-value	Z-value	p-value
NPRS	Day 1	0.14	0.20	0.18	0.13	0.20	0.08
	Day 5	0.14	0.20	0.21	0.05	0.14	0.20
	Day 10	0.19	0.11	0.21	0.05	0.16	0.20
ROM	Day 1	0.18	0.13	0.15	0.20	0.14	0.20
	Day 5	0.21	0.05	0.15	0.20	0.20	0.07
	Day 10	0.23	0.01	0.21	0.05	0.18	0.17
CVA	Day 1	0.19	0.12	0.21	0.05	0.21	0.05
	Day 5	0.212	0.052	0.213	0.051	0.212	0.051
	Day 10	0.21	0.05	0.18	0.13	0.21	0.05
NPI	Day 1	0.207	0.066	0.145	0.200	0.218	0.050
	Day 5	0.13	0.20	0.21	0.05	0.16	0.20
	Day 10	0.14	0.20	0.13	0.20	0.13	0.20

TABLE-3: Within and between groups comparison of NPRS mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Day 1-5	2.94	0.48	2.94	1.06	2.22	0.88	**3.892**	**<0.028***
Day 1-10	5.34	0.68	5.78	0.95	4.31	0.95	**12.121**	**<0.001***
t- value	**18.393**		**10..425**		**10.202**			
p-value	**<0.001***		**<0.001***		**<0.001***			
Effect size	**4.60**		**2.61**		**2.55**			

TABLE-4: Within and between groups comparisons of ROM mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value	
	Mean	SD	Mean	SD	Mean	SD			
Day 1-5	6.81	3.06	6.75		1.77	3.50	1.26	12.224	<0.001
Day 1-10	11.50	4.16	11.63		2.94	7.06	2.08	10.695	<0.001
t-value	**9.934**		**10.442**			**9.938**			
p-value	**<0.001***		**<0.001***			**<0.001***			

TABLE-5: Within and between groups comparison of CVA mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Day 1-5	0.69	0.24	0.62	0.24	0.87	0.49	2.249	0.117
Day 1-10	1.44	0.36	1.15	0.32	1.67	0.91	3.054	0.057
t-value	**10.190**		**11.259**		**5.456**			
p-value	**<0.001***		**<0.001***		**<0.001***			
Effect size	**2.55**		**2.81**		**1.36**			

TABLE-6: Within and between groups comparison of NPI mean reduction scores from Day 1-5 and Day 1-10

Interval	Group A		Group B		Group C		f-value	p-value
	Mean	SD	Mean	SD	Mean	SD		
Day 1-5	23.94	4.02	20.56	5.77	27.06	5.53	6.331	<0.004
Day 1-10	47.00	5.87	44.13	6.35	49.19	6.98	2.506	0.093
t-value	**16.976**		**22.469**		**18.276**			
p-value	**<0.001***		**<0.001***		**<0.001***			
Effect size	**4.24**		**5.62**		**4.57**			

Discussion

The mean value of data present study indicates that both dry needling and IASTM could be beneficial in the management of upper trapezitis. There was statistical difference in intensity of pain, lateral flexion range of motion, craniovertebral angle and functional improvement in terms of NPI score in the both group from day1 to 10 but however between group comparison showed that dry needling is more effective in pain reduction and IASTM is more effective in increase range of motion, CVA angle and functional improvement than conventional group.

Superficial heating agents was given in all 3 groups, studies have shown that superficial heating agents increases the blood supply to that body part and causes vasodilatation which helps in removing of metabolic waste, it also decreases the excitation of nociceptive nerve endings in tern causing relaxation of soft tissue and relieving muscle spasm.

In the present study all the groups were given hot packs which are used as superficial heating agents. Both the study group along with control group were given hot pack at the start of the treatment. The result of our study showed that all groups showed reduction in pain, increase in range of motion this can be due to application of hot pack.

IFT is an electro analgesic modality which was used in all three groups for treating pain in study. From the results we can see that all the groups showed decrease in NPRS scoring. IFT can be one of the reason for reduction in pain.

Dry needing can cautiously be recommended for pain relief in myofascial trigger point in neck and shoulder. It shows acceptable efficacy in reducing pain from trigger point but its mechanism of effect is still unclear. It has been suggested that mechanism could be hyper stimulating analgesia through descending inhibitory system. other believe that treatment works by reducing spontaneous electrical of trigger point, pain gait theory by inhibiting transmission if C fibers and activating A-delta fibers. It also increases the length of shortened sarcomeres and reduce overlap between actin and myosin filament which would help the muscle to returns normal to its length and function. Also the evidence suggests that ISTM reduces local pain intensity, increases range of motion and alters neuronal activity. It is a unique method that based on evidence, enable therapists to effectively and efficiently identify soft tissue injury and Musculoskeletal involvements. It affects the soft tissue by creating microtrauma which some studies suggest will improve the tissue repair by stimulating fibroblast proliferation. There is clinical evidence supporting hypothesis that IASTM increases mobility of myofascial tissue and reduces effect of local ischemia by increasing blood flow to area. It also reduces the therapist hand pain and fatigue.

Pain relief and improvement in ROM, CVA which is found in both the groups could certainly have led to functional improvement because it is pain which restrict the range of motion and it limits daily activities causing functional impairment and disability.

Also in the study all three groups were given conventional exercise i.e. stretching of trapezius muscle. On the basis of results of present stud, dry needling, IASTM and conventional therapy all three are effective in upper trapezitis but dry needling is more effective in treating pain so, we can say that it will be more helpful to reduce / release the active myofacial trigger point which is cause of severe pain so, the dry needling is more effective in treating pain then IASTM and conventional therapy, IASTM is more effective in increase ROM than dry needling because the IASTM releases active as well as latent trigger point (as it is

using on muscle length) so, that helps to detached all actin myosin bridge and lengthening the length of sarcomeres so, it shows increase range of motion by lengthening sarcomeres than dry needling than conventional therapy.

Conflicts of interest

No conflict of interest.

Limitations

Small sample size. Longer study period. No-blinding of therapist to groups. No separate outcome evaluator.

Future recommendation

Large sample size. Blinding of therapist to groups or outcome evaluator would increase validity of study. Standardised equipment to measure amount of force during application of IASTM for desired effect. More studies can be done to see effect of IASTM on muscle length and increase in range of motion.

Conclusion

All three treatments that is conventional therapy, dry needing, instrument assisted soft tissue mobilization are effective in reducing pain, improving range of motion, increasing craniovertebral angle and reducing disability in patients with chronic trapezitis.

Further it was noticed that instrument assisted soft tissue mobilization group was more effective in improving range of motion, normalizing CVA angle and reducing functional disability and dry needling group was more effective in decreasing pain and hens should form a part of treatment plan in chronic trapezitis. So for short term symptom relief one may use dry needling and for long term symptom relief IASTM. Along with this both the techniques showed improvement in postural correction but IASTM will be more effective than dry needling.

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