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A comparision of palmar kneading versus passive stretching for the treatment of trapezius spasm patient in normal individuals

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Abstract
The aim of this is a comparative study was to compare the effects of palmar kneading versus passive stretching for the treatment of trapezius spasm patient in normal individual with regards to pain, disability and cervical spine range of motion. These effects were based on a questionnaire consisting of a VAS and NDI questionnaire and on cervical spine ROM readings taken using an analogous cervical spine ROM goniometer. The questionnaire was completed and the ROM readings taken prior to treatment at the first and last consultation. Musculoskeletal disorders are tissue dysfunctions in the musculoskeletal system that develop as a result of repeated, steady movements that cause pain and injury throughout the body, particularly in the neck and shoulder. These movements can occur while working or while at rest or as a result of exposure to abnormal, harmful physical conditions. When compared to pain in other parts of the body, musculoskeletal pain in the neck and shoulder region is ranked first by a prevalence of more than 50% and is thought to be caused by occupational accidents. Given the significance of the problem, delaying effective treatment may result in postural abnormalities, lower performance in everyday activities and quality of life, and eventually increase work absences and medical costs, placing a significant financial burden on the person and society.

Keywords: Neck pain, normal individuals, palmar kneading, ultrasound

Introduction
Neck pain is a common musculoskeletal disorder in the general population. Although probably not as frequent and disabling as low back pain, neck pain still constitutes a major burden on patients in terms of pain, disability and time of work.
Neck pain is common in the general population. It constitutes approximately 30% of the population of individuals suffering from chronic pain. Hasvold and Johnsen reported that the life-time prevalence of neck pain was 26% in Finland. About two third of people will experience neck pain at some time. Prevalence is highest in middle age, with women being affected more than men. The prevalence of neck pain varies widely between studies, with a mean lifetime prevalence of 48.5% (range 14.2-71.0%).Neck pain is very commonly shown by most people to be in the region of the shoulder, primarily indicating the region of trapezius muscle. Neck pain may arise due to muscular tightness in both the neck and upper back (Cynthia Norkin 3rd edition).
The muscle problem associated with pain in the posterior neck is of two types, one associated with muscle tightness and the other with muscle strain. Neck pain associated with tightness in the posterior neck muscles are found most often in patients who have a forward head and round upper back. The faulty mechanics associated with this condition chiefly of undue compression posterior on the articulating facets and posterior surfaces of the bodies of the vertebrae, stretch weakness of anterior vertebral neck flexors, and tightness of neck extensors including the upper trapezius, splenius capitis, and semispinalis capitis. Mechanical neck pain is a result of muscular or ligamentous factors related to postures, poor ergonomics, and stress.
The objective of this study is the effectiveness of palmar kneading, ultrasound, the comparative effectiveness of passive stretching on trapezius spasm in normal healthy individuals.

Review of Literature

Howard Vernon 2008 [14] studied on Neck Disability Index this article reviews the history of NDI and the current state of the research into its psychometric properties- reliability, validity and responsiveness as well as its translations. Focused reviews are presented into its use in studies of the prognosis of whiplash injured patients as well as its use in clinical trials of conservative therapies for neck pain. It is concluded that the current state of the art of the NDI has been reviewed here.

Young, Walker *et al.* 2009 [15] Study was done to determine the reliability of questionnaire. A study was to compare the test-retest reliability of questionnaire, and was considered to be decidely reliability.

Karen JSherman *et al.* 2010 [31] studies the effectiveness of therapeutic massage randomized controlled trial was conducted to evaluate whether the therapeutic massage is more beneficial than a self-care book for patients with chronic neck pain. 64 such patients were randomized to receive up to 10 massages over 10 weeks or a self-care book.

Whitcroft *et al.* 2010 [17] studied was concluded to compare the reliability and accuracy of visual estimation, tape measurement and the universal goniometer (UG) with that of cervical range of motion (CROM) goniometer in measuring active cervical range of motion in healthy volunteers. The study concluded that universal goniometer aligned on a fixed landmark is most reliable method of measuring neck movement clinically.

Richa Mahajan *et al.* 2012 [18] studied was done on comparative effects of muscle energy technique and static stretching for treatment of sub-acute mechanical pain. In the study they compared the effectiveness of muscle energy technique and static stretching on pain and active cervical range of motion (ROM) in subacute mechanical neck pain.

A Kumaresan *et al.* 2012 [19] studied the effectiveness of Positional release therapy in treatment of trapezitis. Thirty subjects with unilateral upper trapezius spasm were randomly allocated into two groups namely Group A and Group B and treated with therapeutic ultrasound and isometrics which were common to both the groups. Positional release therapy as an added intervention was given to the Group A respectively for 7 consecutive days for obtaining informed consent. This study showed statistically significant improvement in lateral flexion (P = 0.0012), Rotation (p<0.0001) reduction in pain intensity (P = 0.0010) and improvement in functional ability (P = 0.0002).

Agrawal Mridu, Kalra Sumit *et al.* 2012 [16] study was to compare the immediate effect on pain threshold and range of motion which follows a single treatment of tender points in the upper trapezius muscles among ischemic compression and picking up with ultrasound therapy ischemic compression + ultrasonic therapy (1.2 w/cm square * 5 minutes).

Ling Jun Kong *et al.* 2013 [20] studies to evaluate the effectiveness of massage therapy (MT) for neck pain.

Rajalakshmi A *et al.*. 2013 [21] studied the effectiveness of Transcutaneous Electrical Nerve Stimulation with stretching in the treatment of trapezitis. The aim of this study is to find which parameters of TENS is more effective to relieve trigger point as well as pain for acute stage of trapezitis.

Sweety Charles Carvalho *et al.*. 2014 [22] studied the effectiveness of Positional Release techniques in subject with subacute trapezitis.

Karen J Sherman *et al.* 2014 [23] studied to evaluate the optimal dose of massage for individuals with chronic neck pain.

Material and Methodology

The methodically describe the design to the study, the participant recruitment procedure and the treatment protocol that followed. It further describes the assessments performed and type of measurements recorded.

Study Design: The study was designed to be a randomized, comparative study.

Participant recruitment: Any individual presenting to the JMC Institute of Medical Sciences with trapezius spasm was considered a potential for this study.

Selection Criteria

Sample Size

45 participants were informed of the nature of the study, and screened to ensure that they were applicable according to the inclusion and exclusion criteria. They were required to read and sign the information and consent form specific to this study.

Inclusion Criteria

Inclusion Criteria for prospective participants included

- Age 20-30 year (both males and females).
- Unilateral neck spasm.
- Neck pain on VAS > 4 (moderate case).
- Neck Disability Index: 15-24 = moderate.
- Fractures of cervical spine.
- Infectious and metabolic diseases around the cervical spine.
- Any congenital abnormalities.
- Vertigo.
- Dizziness.

Tools used in the study: Universal Goniometer, Stop watch.

Method of study

45 subjects presenting with upper trapezius muscle spasm (Male/Female). Age 20-30 years old participated in the study then the subjects will be randomly divided into 3 groups:

Group A: Palmar kneading.

Group B: Passive stretching.

Group C: Ultrasound Therapy (UST).

Moist heat pack will be common for all the 3 groups before any treatment protocol.

Firstly signing an informed consent form (Appendix A) then completion of a case history and full physical examination should be done by the researcher. The Visual Analogue Scale and Neck Disability Index (Appendix B). All cervical spine ranges of motion were measured with the Universal Goniometer by the researcher. The treatment was then applied to the participants according to the group they were allocated.

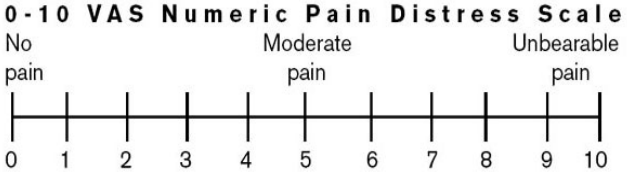
A total 12 treatments took place to their, allocated group over a maximum 4 week period. Participants were asked to complete a Visual Analog Scale (VAS) as well as a Neck Disability Index Questionnaire (NDI) again before the first

and twelve consultations. Cervical spine ranges of motion were reassessed before the first consultation and at the twelve consultation by the researcher using the goniometer. Treatment was then applied according to their allocated group.

Pre-post data measurements will be collected before giving ant treatment to the patients so, as to have a baseline. Post test data collection will be done on the 12th day of study completion.

Techniques of measuring Visual Analogue Scale (VAS)

Visual Analogue Scale (V AS) was used to measure the intensity of pain. A10cm.long horizontal line was drawn on a paper. The end point of the line were locked with numeric term i.e. 0 and 10. 0 represent no pain and 10 represent most severe pain. The were asked to bisect the line at a point represent self = Assessed most severe pain. The score was the obtained was then obtained by measuring from the zero mark to the mark bisecting the scale.



Technique of measuring Neck Disability Index (NDI)

The Neck Disability Index is designed to give the researcher an understanding and indication of how neck pain affects the subject ability to perform their daily activities. It consists of ten categories with six possible answers to each category. The participant was asked to mark the most applicable answer for them. Each question allows a maximum score of five and minimum of zero. The points per section are then added to get a final score out of a possible fifty. If the participant marked more than one option in a category, the worse of the two options was used. The obtained score is multiplied by two to produce a percentage score. Disability is then presented as a percentage, a lower score (ten percent or less) represents 'minimal disability' with higher scores (fifty percent or more) representing a 'higher disability'. If a section was left out the final calculation was adapted to calculate only nine out of the answered sections (Vernon, 2008) [14], (Appendix B).

Technique of measuring of Cervical Spine Range of Motion (ROM)

Technique of measuring Lateral Flexion

Testing Position: Place the subject sitting, with the thoracic and lumbar spine well supported by the back of a chair. Position the cervical spine in 0 degrees of flexion, extension and rotation.

Stabilization: Stabilize the shoulder girdle to prevent lateral flexion of the thoracic and lumbar spine.

Testing Motion: Grasp the subject's head at the top and side (opposite to the direction of the motion). Pull the head toward the shoulder. Do not allow the head to rotate, forward flex, or extend during the motion. The end of the motion occurs when resistance to motion is felt and attempts to produce additional motion cause lateral trunk flexion.

Goniometer Alignment

1. Center the fulcrum of the goniometer over the spinous process of the C7 vertebra.
2. Align the proximal arm with the spinous processes of the thoracic vertebrae so that the arm is perpendicular to the ground.
3. Align the distal arm with the dorsal midline of the head, using the occipital protuberance for reference.
4. At the end of the lateral flexion range of motion, the examiner maintains alignment of the proximal goniometer arm with one hand. In practice, the examiner would have one hand on the subject's head to maintain lateral flexion; the examiner is using only one hand so that the goniometer alignment is visible.

Techniques for measuring Rotation

Testing Position: Place the subject sitting, with the thoracic and lumbar spine well supported by the back of the chair. Position the cervical spine in 0 degrees of flexion, extension, and lateral flexion. The subject may hold a tongue depressor between the front teeth for reference.

Stabilization: Stabilize the shoulder girdle to prevent rotation of the thoracic and lumbar spine.

Testing Motion: Grasp the subject's chin and rotate the head by moving the head toward the shoulder .The end of the ROM occurs when resistance to movement is felt and further movement causes rotation of the trunk.

Goniometer Alignment

1. Center the fulcrum of the goniometer over the center of the cranial aspect of the head.
2. Align the proximal arm parallel to an imaginary line between the two acromial processes.
3. Align the distal arm with the tip of the nose. If a tongue depressor is used, align the arm of the goniometer parallel to the longitudinal axis of the tongue depressor.
4. To align the goniometer at the starting position for measuring cervical rotation range of motion, the examiner stands in back of the subject, who is seated in a low chair.
5. At the end of the range of right cervical rotation, one of the examiner's hands maintains alignment of the distal goniometer arm with the tip of the subject's nose and with the tip of the tongue depressor. The examiner's other hand keeps the proximal arm aligned parallel to the imaginary line between the acromial processes.

Technique of moist hot packs

- I have taken size of hot packs 24 inches.
- Duration of applying hot packs is 10-20min for 3 weeks per day.
- Hot packs or hydro collator packs contain silicate gel in a cotton bag.
- These packs are placed in a hot water tank, which is thermostatically controlled at 71.1-79.4 degree Celcius.
- The silicate gel absorbs a large quantity of water and has a high heat capacity.
- Hot packs are applied over layers of towels.
- Most of the heat transfer from the hot pack to the patient is by conduction.

- Increasing the towel thickness reduces the heat flow and produces an intentional slowing in the temperature rise.
- Acceleration of heat transfer occur if the hot pack leaks into the towel.
- The patient nerve should lie on the hot packs as the body weight squeeze hot water out of the pack into the towel and potentially cause a burn.

Home Advice

I have given home advice to the patient, dip the towel in warm water, soak the water after that apply it over the neck region for 10 min, use this technique for twice a day for 3 weeks.

Technique of ultra sound therapy

Therapeutic ultrasound is given to the patients in pulse mode with intensity 1.2 watts/cm square treatment time is 5 minutes and the patient is in high sitting position.

Techniques of palmar kneading

The right hand, reinforced by the left hand is placed with the palm above the spine of the right scapula and the thumb lateral to the spinous processes of the upper dorsal vertebra. The palm kneads in a clockwise circle over the scapular region. Then glides to make a second circle over the lateral border of the scapula. (Do this movement three times). Transistion is made from one side to the other with no break in contact. The hand glides with a superficial strokes. Duration: 20-30min [24].

Technique of passive stretching

The patient's position should be in supine lying and the therapist should stand at the patient's head end with one hand underneath patient's occiput.

To stretch the upper trapezius muscles fibres, the patient's head and neck will be slowly and carefully brought into pain free forward flexion, contralateral side flexion, and ipsilateral rotation with other hand inferior pressure to the shoulder will be applied, drawing the scapula inferiorly.

Then holding the stretch for 7-15 sec and then gradually releasing the stretch, Patient's head, neck and Shoulder will be returned back into the neutral position.

Relax the muscles for 20 sec. The stretch will be repeated three times.

Focus will be on a pain free stretch and it will be gently and in sustained manner. The patient will be asked to relax and breath freely. The patient will be advised not to hold breath while stretching.

Result

The result obtained during the course of the clinical trial are presented. All participants presented with trapezius spasm and were divided into three groups of fifteen participants each. The Group A received palmar kneading group B received passive stretching and group C received ultrasound therapy. The results obtained from all the three groups were compared. Due to the small sample groups which the statistical data represents, no assumptions can be made about the population as a whole. The probability level (P-Value) for all tests was set at 0.01 and represents the level of significance of the results.

The researchers collected the subjective and objective data from the clinical trials. All the data was analysed by a statistician. The results were based on the cervical spine range of motion readings taken by the researcher and the Visual Analogue Scales and Neck Disability Index.

Data analysis included a comparision of mean cervical spine range of motion, Visual Analogue Scale values, Neck disability Index taken at the first and last consultations.

All participants presented with trapezius spasm and were divided into three groups of fifteen participants each. The Group A received palmar kneading group B received passive stretching and group C received ultrasound therapy. The results obtained from all the three groups were compared. Due to the small sample groups which the statistical data represents, no assumptions can be made about the population as a whole. The probability Level (P-Value) for all tests was set at 0.05 and represents the level of significance of the results.

The analysis included

Subjective Measurements: Visual Analogue Scale and Neck Disability Index.

Objective Measurements: Cervical spine range of motion (ROM), including lateral flexion (right and left) and rotation (Right and Left).

Visual Analog Scale

In Visual Analog scale the comparision between pre and post VAS score in the three groups. The probability of Paired t-test between pre and post VAS scores is 0000* ($p<0.01$) Significant. It shows a significant difference at .01 level of significance between pre and post scores and the % difference between pre and post scores in the improvement of VAS in Group A is 64.21% and in group B is 67.67% and group C is 63.16% this shows the maximum improvement between pre and post scores in three groups.

Neck Disability Index

In Neck Disability Index the comparision between pre and post NDI score in the three groups the probability of Paired T-Test between pre and post NDI scores is 0.0000* ($p<0.01$) Significant. It shows a significant difference at 0.01 level of significance between pre and post scores and the improvement of NDI in Group A is 41.49% and in group B is 42.21% and group C is 32.21% this shows the maximum improvement between pre and post scores in three groups.

Cervical spine range of motion

Cervical spine lateral flexion: In lateral flexion of cervical spine the comparision between pre and post lateral flexion ROM scores in the three groups for left and right sides by paired t-test and the probability of paired t-test between pre and post lateral flexion form scores in Group A left side is 0.0002* ($p<0.01$) significant and right side is 0.0011*($p<0.01$) significant and in group B left side is 0.0001* ($p<0.01$) significant and in right sided 0.0000* ($p<0.01$) significant and in group C left side is 0.0000* ($p<0.01$) significant and right side is 0.0010* ($p<0.01$) significant. This shows a significant difference at 0.01 level of significance between pre and post scores. The percentage difference between pre and post scores in the improvement of lateral flexion ROM in Group A left side 59.79% and right sided is 59.76% and in Group B left sided 62.93% and right sided is 63.23% and in group C left sided is 59.85%

and right sided is 59.85%. This shows the maximum improvement between pre and post scores in three groups.

Cervical spine rotation: In rotation of cervical spine the comparision between pre and post rotation ROM scores in the three groups for left and right sides by paired t-test and the probability of paired t-test between pre and post rotation form scores in group A left side is 0.0000* ($p<0.01$) significant and right side is 0.0004* ($p<0.01$) significant and in group B left side is 0.0003* ($p<0.01$) significant and in right sided 0.0005* ($P<0.01$) significant and in group C left side is 0.0022* ($P<0.01$) significant and right side is 0.0001* ($p<0.01$) significant. This shows a significant difference at .01 level of significance between pre and post scores. The percentage difference between pre and post scores in the improvement of rotation ROM in Group A left side 42.43% and right sided is 42.07% and in group B left sided 46% and right sided is 46% and in group C left sided is 33.03% and right sided is 37.44%. This shows the maximum improvement between pre and post scores in three groups.

Discussion

Visual analogue scale

Clinical interpretation: We can see that all the three group demonstrated clinically significant improvement over the course of the study. The group that underwent passive stretching demonstrated clinically significant improvement which has significant bearing with regards to pain perception.

Statistical analysis

Intragroup analysis: A paired samples t-test was used to determine and reveal any statistically significant intragroup changes in VAS over time. Group A, B and C demonstrated statistically significant changes over the course of the study indicating a decrease in pain perception in all the three groups.

Intergroup analysis

An independent samples t-test was used to determine and reveal any statistically significant intergroup changes in VAS between Group A, B and C at the first consultation and at the last consultation. This shows that group B shows progression as compare with group A and group C.

Neck disability index

Clinically interpretation: We can see that group 2 demonstrated a more clinically significant improvement over the course of the study. Along with the VAS, this has a large impact with regards to neck pain and disability in a clinically setting.

Statistical analysis

Intragroup: A paired samples t-test was used to determine and reveal any statistically significant intragroup in VAS and disability value over time. Group B indicating a decrease in neck pain and disability during the duration of the study over time.

Intergroup: As independent samples t-test was used to determine and reveal any statistically significant intergroup changes in VAS and NDI between all the three Groups. This means that although all the three groups were similar at the begin with but by the end of the study participants perception of pain has decreased and both groups were different from each other.

Cervical spine range of motion

Cervical spine left lateral flexion

All the three group demonstrated a clinically significant increase in cervical spine left lateral flexion. Over the course of the study, left lateral flexion values increased in all the three group but group B demonstrated the most clinically significant improvement over the course of the study.

Statistical analysis

A paired samples T-Test was used to determine and reveal any statistically significant intragroup changes in lateral flexion value over time.

Cervical spine right lateral flexion

All the three group demonstrated a clinically significant increase in cervical spine left lateral flexion. Over the course of the study, left lateral flexion values increased in all the three group but group B demonstrated the most clinically significant improvement over the course of the study.

Statistical analysis

A paired samples T-Test was used to determine and reveal any statistically significant intragroup changes in lateral flexion value over time.

Cervical spine left rotation

All the three group demonstrated a clinically significant increase in cervical spine left lateral flexion. Over the course of the study, left lateral flexion values increased in all the three group but group B demonstrated the most clinically significant improvement over the course of the study.

Statistical analysis

A paired samples t-test was used to determine and reveal any statistically significant intragroup changes in lateral flexion value over time.

Conclusion

The aim of this is a comparative study was to compare the effects of palmar kneading versus passive stretching for the treatment of trapezius spasm patient in normal individual with regards to pain, disability and cervical spine range of motion. These effects were based on a questionnaire consisting of a VAS and NDI questionnaire and on cervical spine ROM readings taken using an analogous cervical spine ROM goniometer. The questionnaire was completed and the ROM readings taken prior to treatment at the first and last consultation.

On completing the study, statistically significant and clinically significant changes were noted in VAS and NDI in all the three groups. All the three groups revealed clinically and statistically significant improvements in both forms of subjective data over time. Group B (passive stretching) shows a greater decrease in clinically significant percentage value than group A and C in the VAS and NDI values. In addition, when comparing VAS and NDI values between all the three groups at the first consultation and the last consultation, a statistically significant difference was found at the last consultation. This suggests statistically that passive stretching is more effective than palmar kneading.

As a result, the aim of this study showed that both treatment protocols have beneficial effects with regards to pain, disability and range of motion in trapezius spasm. Statistically and clinically, palmar kneading and passive stretching is preferred to decrease perceived pain. Clinically and statistically passive stretching stretch is preferred in VAS and NDI and in increase range of motion. This suggests possibly that it is the common factor of passive stretching that is most effective.

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