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COMPARING EFFECT OF SERRATUS ANTERIOR STRENGTHENING AND RHOMBOIDS STRENGTHENING IN DENTAL STUDENTS WITH MECHANICAL NECK PAIN & DISABILITY USING NUMERIC PAIN RATING SCALE & NECK DISABILITY INDEX.

[1]Dr.Priyal Shah, [2]Dr. Dhaval Patel, [3]Dr. Gaurav Patel

[1]Master of Physiotherapy, [2]Principal I/c &Associate professor

[1]Department of physiotherapy

[1]Ahmedabad physiotherapy college, Parul University, Ahmedabad, India.

BACKGROUND & PURPOSE: In Musculoskeletal problems are common in dental students, which lead to increases the occurrence of mechanical neck pain. There are several therapeutic interventions to improve mechanical neck pain. There are no evidences found comparing the effect of both. the purpose of the study is to compare the effect of serratus anterior strengthening versus rhomboid strengthening to improve mechanical neck pain & disability in dental students. **METHODOLOGY:** An Experimental study design, with 2 groups: "Group A" & "Group B", 30 dental students with mechanical neck pain were recruited for the study & distributed into groups: GROUP A: Serratus anterior strengthening exercise (n=15) GROUP B: Rhomboid strengthening exercise (n=15).Neck pain & disability was assessed by using Neck disability Index & Numeric pain rating scale before and after 4 weeks of intervention to evaluate & compare the effectiveness of the treatment protocol. **RESULT:** Result were statistically analyzed using paired and unpaired t-test by using, Microsoft Excel XLSTAT 2021.1 , there was significant improvement in NPRS & NDI with $p<0.05$ in group A and group B, but there was more significant improvement in NPRS & NDI in group A rather than group B. **CONCLUSION:** The study concluded that serratus anterior strengthening exercise training shows significant effect on improvement of pain & disability in dental students with mechanical neck pain. However, greater percentage of improvement was found in serratus anterior strengthening exercise training compared with rhomboid strengthening. **KEY-WORDS:** Serratus anterior strengthening, rhomboid strengthening, mechanical neck pain, neck disability index, Numeric pain rating scale.

INTRODUCTION:

Neck pain is an ache or discomfort in anatomical area between occiput and 3rd thoracic vertebra and laterally between middle margins of scapula. People with mechanical neck pain lack an identifiable path anatomic root for symptoms.

Mechanical neck pain is increased with movements of neck. It is nonspecific in nature Affected area is generally of the cervico-thoracic junction. There is pain & restriction in cervical range of motion due to mechanical dysfunction 6. The ICD-10-CM of neck pain is M54.2

Mechanical neck pain generally arises gradually with multiple cause of origin. Neck pain is the leading cause of physical disability .The prevalence of neck pain in the general population has been reported to be 15% for men and 23% for women, with nearly half of these individuals experiencing constant unremitting symptoms.1 It has been estimated that as many as 70% of individuals report experiencing neck pain during lifespan. After 5-year follow-up, 78% of men and 85% of women report full recovery.2,3 The economic burden with neck pain is high, and one third of people who experience a first-time onset of neck pain will continue to report health care utilization for their neck pain at a 5-year follow-up.4 About 25% of all visits in OPD based physiotherapy are for neck pain.7

Long term stooping with continuous little bit of neck flexion can lead to hypertonning of posterior muscles of cervical spine7.Occupational activities, which involve continuous static loading of cervical spine & shoulder girdle leads to Postural neck pain.8 Common determinant for the cause of neck pain is bad posture. Due to bad postural habits, there is disturbance is surrounding tissues around neck which produce pain. In forward head, pain produces due to abnormally stretched muscles around the neck. There is a co-relation between neck pain and disability & altered posture 9 Rather than only neck, scapular muscle is also responsible for mechanical neck pain.2

The serratus anterior is one of the main scapular stabilizing muscle. It originates from 1-8 ribs & travel along the rib cage. It inserts in ventro-medial aspect of scapula. It is innervated by long thoracic nerve. It arises from the ventral rami of the 5th & 7th cranial nerves. It has multiple attachments. Serratus anterior acts to protract.(scapular abduction) & stabilize the scapula. It helps is rotating the scapula upwards. In pushing and punching type activities there is protraction of scapula. The rhomboids are main movers for scapular adduction or retraction. Origination of Rhomboid minor is from spinous process of the C7-T1 and insertion is in the medial border of the scapula near the base of the scapular spine. The rhomboid major originates from the 2-5th thoracic vertebrae and inserts into the medial border of the scapula just below the insertion of the rhomboid minor. Rhomboids are innervated by dorsal scapular nerve. Rhomboid plays important role in Activities that involve a pulling motion 11

The scapula connects the neck and shoulder. It plays vital role in stabilization of the neck and shoulder complex. 8 In transferring the loads between upper limb & spine, muscles around scapula plays vital role 3.The axio - scapular muscles are attached to the scapula and can attribute to movement of the neck and shoulder complex.

Altered activity of axioscapular muscles may result in increased load on the cervical spine12 Increased tension in muscle through its attachment to the upper four cervical segments may directly induce compressive, rotational and shear forces on cervical motion segments .Altered stability of the scapula causes symptomatic mechanical dysfunction in the cervical spine, and induce neck pain 13 Imbalanced scapular muscle function may leads to neck pain. There is a close connection between scapular and neck region.

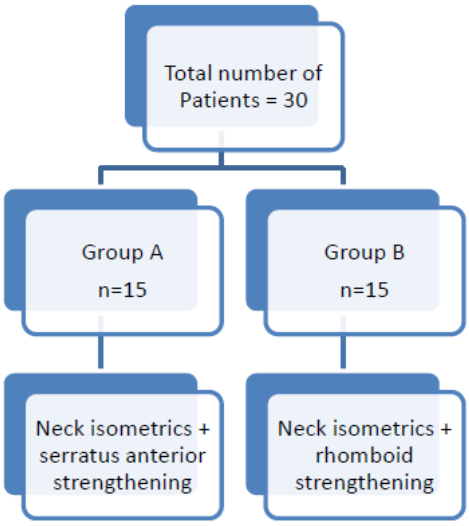
Altered scapular orientation most frequently occurs because of altered activity or poor neuromuscular patterns in the serratus anterior (scapular stability muscles) as well as altered activity and extensibility of the rhomboids that may compromise the muscle balance (scapular mobility muscles) The activity of the main stabilizers of the scapula, the serratus anterior depends on force production, on neuromuscular control and recruitment that requires particular co-ordinate activity occurring at the right moment, creating the right amount of force, maintained for the right length of time. Coupling of serratus anterior & trapezius does perfect firing and recruits that results in ‘‘force couples’’ which is vital for normal scapular orientation. Proper activity of these muscles depends on proprioception which is the sensation of position and movement.

METHODOLOGY:

After obtaining the ethical approval the study was carried out forward.

Methods of Data Collection

Source of Data: College Of Dental Sciences & Research Centre
Study Design: An Experimental Study (Comparative)
Sample Size: 30
Sampling Design Convenient
Duration of the study: 1 Year
Treatment Duration: 4 Weeks



Materials/ tools used:

- Consent form
- Pen and Paper
- Theraband
- Treatment couch/mat
- One chair/Stool
- NPRS
- NDI

Inclusion Criteria:

- Diagnosed with mechanical neck pain
- A primary complaint of neck pain
- Age greater than 18
- Gender- Male and female both
- Neck disability index (NDI) score 10 points
- Patients possess sufficient English language.

PROCEDURE

The conventional isometric training regimen consisted of a conventional isometric training program for the neck, in this training the dentist will be asked to sit straight; the exercise will be performed in comfortably sitting on chair/stool, with dentist in proper alignment,. Subjects will be instructed to give maximal palm pressure against the head, in all 4 directions (Front, back and both the sides of head), without causing reproduction of their symptoms.
Dosage- 8-10 rep., 2 times per day for 4 week

Serratus anterior strengthening

Serratus Anterior strengthening exercises: in the quadruped position the subject assumed a quadruped position with the shoulder, knee, and hip at 90◦ flexion. Knee and hand width were the same as shoulder width. Subjects will be asked to continue to rise up by protracting the scapula in the quadruped position; the subject performed full scapular protraction while maintaining a quadruped position and full scapular protraction. When necessary, the performance of an exercise will be corrected by the principal investigator based on observation and palpation of the target muscle.

Repetition – 5 Repetition

Frequency - 4 times/week (for 4 weeks)

Set – 3

Rhomboids strengthening

Prone shoulder abduction: Diagonal pattern D2 flexion (Shoulder extension/adduction/internal rotation pattern) using tubing.

Subjects In standing position, the arm on the right side, which was about to perform the exercise, was positioned across the body & against the thigh of opposite leg (at the 5 o'clock position) to grip the theratube, and the arm on the left side was comfortably placed beside the trunk, and then Starting with the palm down rotate the palm up to begin. Flex the elbow & bring the arm up & over the involved shoulder with the palm facing inward. Turn the palm down & reverse to take the arm to starting position which is shoulder flexion-abduction lateral rotation occurred in the 11 o'clock. This is done bilaterally. The exercise should be performed in a controlled manner. The selection of the Thera-band is suitable for one's physical strength when it detects the tenth strength by pulling it 10 times with the same motion.

Frequency - 3 days / week (For 4 weeks)

Repetitions - 8–12 repetitions

Sets - 3 sets

At end of 4th week of clinical intervention all outcome measures were recorded and tabulated.

STATISTICALANALYSIS

The collected data were analyzed using Microsoft excel XcelStat version 2021.1. The parametric test was used in statistical analysis because the distribution of data was normal. Demographic values were compared within and between the groups using paired t-test & unpaired t-test. Statically significant was set at $p<0.05$.

RESULT:

In this study 30 dental students (minimum age was 24 year and maximum age was 27 year) having mechanical neck pain were included out of which 8 were male and 22 were female. In this study the dental students were taken who had fulfilled the inclusion criteria and randomly allocated in group A Serratus anterior strengthening and group B Rhomboid strengthening.

Table 1.1 Age distribution of group A (serratus anterior strengthening), Group B (Rhomboid strengthening)

Group	N	Mean age	SD
A	15	25.73	1.03
B	15	25.8	1.01
Total	30	25.77	1.01

The mean age and Standard deviation of Group A patients was 25.73±1.03.The mean age and standard deviation of Group B patients was 25.8±1.01.In thirty patients, mean age and standard deviation was 25.77 ± 1.01

Table 1.2: Gender distribution

GROUP	NUMBER	MEAN AGE	SD
MALE	8	25.43	0.975900073
FEMALE	22	25.82	1.006472559

TABLE 1.3 SHOWS WITHIN GROUP COMPARISON OF NDI AND NPRS IN GROUP A

OUTCOME	PRE MEAN	POST MEAN
NDI	18.93	9.67
NPRS	5.73	3.47

Table1.3 display the result of pre intervention mean score NDI = 18.93,NPRS = 5.73, and post intervention mean score NDI=9.67,NPRS=3.47 which shows that after intervention there were improved in Neck pain and disability

TABLE 1.4 WITHIN GROUP COMPARISON OF NDI AND NPRS IN GROUP B

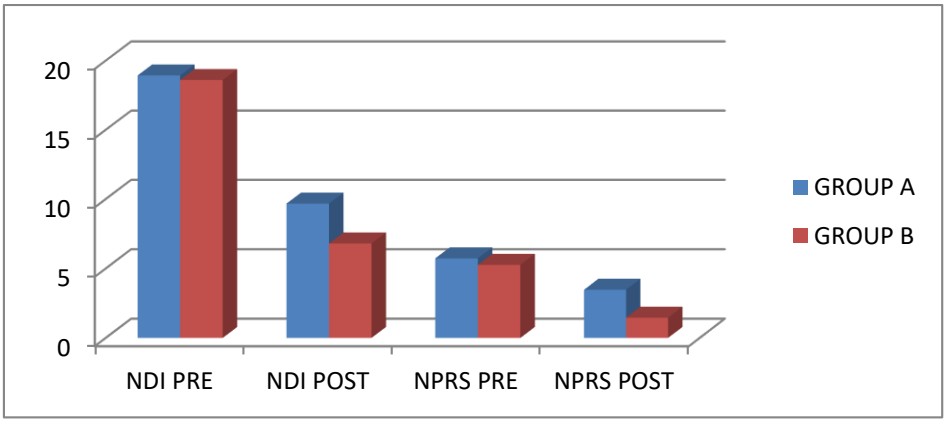
Outcome	Pre Mean	Post Mean
NDI	18.6	6.8
NPRS	5.26	1.46

Table1.4 display the result of pre intervention mean score NDI = 18.6,NPRS = 5.26, and post intervention mean score NDI=6.8,NPRS=1.46 which shows that after intervention there were improved in Neck pain and disability

TABLE 1.5 COMPARISON OF WITHIN AND BETWEEN GROUP A: SERRATUS ANTERIOR STRENGTHENING & GROUP B: RHOMBOID STRENGTHENING

Outcome	NDI PRE	NDI POST	NPRS PRE	NPRS POST
Group A	18.93	9.67	5.73	3.47
Group B	18.6	6.8	5.26	1.46

Graph 1.5 COMPARISON OF WITHIN AND BETWEEN GROUP A: SERRATUS ANTERIOR STRENGTHENING & GROUP B: RHOMBOID STRENGTHENING



DISUCSSION:

Mechanical neck pain is one of the conditions which can be treated by a wide variety of physiotherapy methods.17 It is still difficult to formulate all proof guidelines for the management of mechanical neck pain. Various methods of treatment exist with own claims of success without any attempts of comparing the maximal effective methods.18,19,25 The main agenda of the study is to determine the effects of Serratus anterior strengthening and rhomboid strengthening on pain and disability in subjects with mechanical neck pain.

In this study efforts were made to compare the effectiveness of serratus anterior strengthening versus rhomboid strengthening in the treatment of mechanical neck pain. The study was conducted on 30 subjects with mean age of 25.77±1.01 (mean ± SD) with mechanical neck pain. The patients were divided into 2 groups with the help of convenient sampling method; Group A(Serratus anterior strengthening), Group B (rhomboid strengthening with mean age (mean ± SD) of 25.73±1.03, and 25.8±1.01 respectively.

In this study Results indicate that there is significant improvement in pain & disability in patients with mechanical neck pain at the end of 4 weeks in both groups after serratus anterior strengthening with conventional physical therapy group A, rhomboid strengthening with conventional physical therapy group B. both treatment groups obtained successful outcomes as measured by significant reductions in NPRS score and significant decrease in NDI Scores after 4 weeks of intervention. But, clinically there was greater improvement in subjects who perform Serratus anterior strengthening as compared to rhomboid strengthening.

Taha IbrahimYildiz Et al, 2017 stated that group a received neck specific exercise and group b received scapular focused exercise. Treatment protocol is for 6 weeks. They concluded that neck-focused exercise and scapular stabilization training are effective in decreasing pain and disability level in patients with NNP. More comprehensive studies are needed to better understand the potential effects of scapular stabilization training in patients with NNP. 24,26,28

There is significant effect of Scapular Retraction Exercises in reducing Forward Head Posture. Due to forward head posture the deep flexor muscle gets overstretched and weak thus resulting over stretched to weak the rhomboid muscle. The purpose of this study was to investigate the effect of scapular retraction exercise on neck posture, muscle activity, pain and quality of life in individuals with neck pain and forward head posture.23,35,38 Here 30 subjects have received scapular retraction exercise. There is significant effect of Scapular Retraction Exercises in reducing Forward Head Posture. Patients with neck pain will demonstrate altered activity in rhomboid muscles

In this study group B was given 8–12 repetitions, after intervention Neck pain and disability was measure by using NPRS & NDI. The result of pre intervention mean score of NDI=18.6 & NPRS was 5.26. And post NDI was 6.8 NPRS was 1.46 .So, in NDI & NPRS was improvement in within group. In NDI $p < 0.001$.In NPRS $p<0.001$ So, significant difference in within group.

Yong gong seo concluded, it is difficult to generalize the results of that review study because the measured variables were not consistent among the four reviewed articles. Further studies are needed to gather additional strong evidence to identify the effectiveness of scapular exercise for pain, dysfunction, and Quality of life of patients with Neck pain.37,38,39

Study done by abichandani, et al, concluded that Strength training for Lower Trapezius and Serratus Anterior muscles along with conventional physiotherapy should be incorporated in treatment of Mechanical Neck pain patients.39

Finally this study illustrates that mechanical neck pain and disability decreases with serratus anterior strengthening compare to rhomboid strengthening, and it is measured bind &NPRS. So these strengthening exercise are recommended to dental students for improving in mechanical neck pain and disability.

CONCLUSION:

Our study leads to following conclusion serratus anterior strengthening is effective in the management of mechanical neck pain. Rhomboid strengthening is effective in the management of mechanical neck pain. Serratus anterior strengthening was found superior than Rhomboid strengthening in the management of mechanical neck pain.

LIMITATIONS AND FUTUTE RECOMMENDATIONS

LIMITATIONS:

The study consisted of a small quantity of subjects.

This was a short-term study of 4 weeks and no further follow up was taken.

No blinding was done.

FUTURE RECOMMENDATIONS:

With large size of sample in each group, study can be done further.

Study can be done by comparing the individual effect of serratus anterior strengthening and rhomboid strengthening with their combined effects on subjects with mechanical neck pain.

With longer term of follow up Study can be done further.

The study can be done to compare the other technique with serratus anterior strengthening and rhomboid strengthening.

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