



THE EFFECT OF THORACIC MANIPULATION VERSUS MOBILIZATION ON CHRONIC MECHANICAL NECK PAIN AMONG DENTISTS.

Physiotherapy

Rashmin Kaur Pruthi

Intern, Dr. APJ Abdul Kalam College Of Physiotherapy, Loni, India.

Dr. M Sangeetha*

Professor And HOD, Dr. APJ Abdul Kalam College Of Physiotherapy, Loni, India.

*Corresponding Author

ABSTRACT

BACKGROUND: Dentistry is a high- risk profession in terms of muscle and skeletal disorders. The study aims to prove the effect of Thoracic Mobilization versus Thoracic Manipulation in chronic mechanical neck pain in dentists.

MATERIALS AND METHODS: 30 participants of age group 22-30 years were selected. They were randomly allocated into two groups: Group I was given Thoracic Mobilization and Group II was given Thoracic Manipulation, 15 in each group. Thoracic Mobilization and Manipulation were performed for 4 weeks, 2 sessions/week. Postural correction exercises were also advised to both the groups. Cervical Flexion Range of Motion(CFROM), Visual Analog Scale(VAS) and Neck Disability Index(NDI) were assessed before and after 4 weeks of intervention.

RESULT: In group I, the pre and post intervention mean, SD of cervical flexion range of motion were 32.53 ± 2.44 and 39.20 ± 1.65 respectively. The pre and post intervention mean, SD of visual analog scale were 5.93 ± 1.38 and 1.80 ± 0.77 respectively. The pre and post intervention mean, SD of neck disability index were 16.31 ± 5.41 and 5.05 ± 2.34 respectively. In group II, the pre and post intervention mean, SD of cervical flexion range of motion were 33.20 ± 2.36 and 40.93 ± 1.28 respectively. The pre and post intervention mean, SD of visual analog scale score were 6.06 ± 1.10 and 2.20 ± 0.67 respectively. The pre and post intervention mean, SD of neck disability index were 17.75 ± 6.59 and 5.65 ± 1.89 respectively. Post-intervention, the Mean difference, SD of ROM score of Group I was 39.28 ± 1.65 and in Group II was 40.93 ± 1.27 . After 4 weeks of intervention, the mean difference, SD of group I & group II were 6.66 ± 1.23 and 7.73 ± 2.37 respectively for cervical flexion range of motion. The mean difference, SD of visual analog scale were 4.13 ± 0.83 and 3.86 ± 0.82 respectively for group I & group II. The mean difference, SD of group I & group II were 11.25 ± 3.28 and 12.10 ± 4.87 respectively for neck disability index.

CONCLUSION: This study concluded that both the thoracic mobilization and thoracic manipulation can be effectively used in the treatment of chronic mechanical neck pain to reduce the pain intensity and improve the Cervical flexion range of motion and physical disability due to neck pain among dentists.

KEYWORDS

Chronic Mechanical Neck Pain , Dentists , Thoracic Mobilization , Thoracic Manipulation .

INTRODUCTION

Working has an important role in the health, social and economic development of a society. Work related physical disorders reduce productivity. Dentistry is a high-risk profession in terms of muscle and skeletal disorders. Dentist have repetitive movement, long term and poor work posture. The repetitive movement of the upper limb is the major cause of chronic mechanical neck pain¹. The International Association for the study of Pain(IASP) in its classification of Chronic Pain defines cervical spinal pain as "pain perceived anywhere in the posterior region of the cervical spine, from the superior nuchal line to the first thoracic spinous process"²

Amongst all the orthopedic disorders, neck pain is one of the most common disorder in dentists. The prevalence of mechanical neck pain among dentists in India is high, i.e 83%. Many studies have proved high prevalence of neck pain in dentists worldwide such as Iran(86.67%), Australia(85%), South Africa(70%), Brisbane(66.2%), Serbia(49.5%), Poland(47%) and Lebanon(31.6%)³

Mechanical neck pain commonly arises insidiously. It is generally multifactorial in origin. The causes of neck pain in dentists is due to faulty posture, working for long duration without changing position, repetition of movements, jerking of neck and over-exertion of cervical and thoracic spine. The working posture of the dentist is strongly influenced by the relationship between his body and the different elements of his workstation. So an incorrectly designed workstation or incorrectly used workstation affects the posture⁴.

Inaccurate posture for prolonged period can cause increased stress on the cervical spine, hyperflexion or hyperextension and reduced mobility. The forward flexion and rotation(the common movements in dentist) compromise the soft tissue around the neck, creating and developing imbalances due to excess workload. Normal anatomical structures of the neck become abnormal causing muscular weakness, tightness or stiffness. Other symptoms of chronic neck pain are general soreness, sharp pain, headaches, tingling or numbness, pain radiating down into the shoulders and arms. The cervical range of motion is also reduced which further causes difficulty in activities of daily living.

The treatment always varies from individual to individual. By

improving the strength and flexibility in the neck, the muscles are under reduced stress and are able to maintain a good posture. There are various modalities that are effective in the treatment of chronic neck pain such as Cervical Traction, Ultrasound, Transcutaneous Electrical Nerve Stimulation(TENS), Hydrotherapy etc. Therapeutic Exercises can be given individually or along with the modalities such as stretching and strengthening exercises of the weak and tight muscles, myofascial release(MFR), Positional Release Technique(PRT) etc.

Alternative methods of treatment such as manual therapy have become popular. Spinal mobilization and manipulation are becoming one of the most accepted therapy for the treatment of neck pain. There is growing evidence which demonstrates the benefits of mobilization and manipulation on chronic neck pain can result in tremendous and immediate improvement in the range of motion, pain intensity and physical disability.

MATERIALS AND METHODS

1.1 PARTICIPANTS RECRUITMENT:

Participants aged between 22-30 years and dentists of Pravara Rural Dental College, Deemed University, were invited to participate in this study after obtaining Ethical Clearance from Institutional Ethical Committee. Inclusion criteria were participants of both genders, with reduced cervical flexion range of motion with symptoms for more than 3 months, Visual Analog Scale(VAS) rating of greater than or equal to 4 points and Neck Disability Index(NDI) score of minimum 4 points. Exclusion criteria were individuals with presence of any vertebral bone disease, bony joint laxity, spinal osteoporosis, rheumatoid arthritis, cervical canal stenosis, multiple radiculopathies, spinal infection, two or more positive neurologic sign along with nerve root compression, cervical malignancy, history of underlying hypertension, whiplash injury, cervical or thoracic spine fractures or dislocation and pregnancy. Written informed consent was taken. Simple random sampling was done and they were divided into two groups. Participants were not informed about group assignment. The study duration was for 5 months.

1.2 PROCEDURE:

At the enrollment, pre-intervention assessment was done by measuring Cervical Flexion Range of Motion(ROM), pain Intensity was

assessed using Visual Analog Scale(VAS), physical disability was assessed using Neck Disability Index Questionnaire(NDI). Group I were given thoracic mobilization and Group II were given thoracic manipulation. Both the groups were advised postural correction along with the intervention

GROUP I-

Thoracic Mobilization to increase the Cervical Flexion Range of Motion(ROM). The patient position was prone lying with arms at the side of the plinth. A pillow was placed under the thoracic region for comfort and to promote a neutral cervical-thoracic curve. The therapist stands at the head end of the patient. The body of the patient was facing towards the head. The therapist used the hypothenar eminence to apply an anterior glide. 10-12 glides were applied every session.

GROUP II-

Thoracic Manipulation(central pressure). The patient position was prone lying with arms at the side with 60 ° of angulation was maintained for upper thoracic(T₁T₃). The therapist stands at the head end of the patient. The body of the patient was facing towards the head. Counter traction was applied by another therapist. The traction was applied, the barrier was reached and the thrust was applied. The thrust was applied over the spinous process. 2 thrust were given per session on the spinous process.

The participants were instructed to take short breaks for 2-3 minutes between the patients in order to leave the stool and walk for few minutes. They were asked to perform simple neck Range of Motion(ROM) exercises in between treating patients. An effective working program with long demanding treatment sessions alternating to short and easier ones.

2.3 OUTCOME MEASURES:

Cervical Flexion Range of Motion(ROM) was measured using goniometer. Pain Intensity was assessed using Visual Analog Scale(VAS). Visual Analog Scale(VAS) was used to self report pain to assess the participants experience of pain. It consists of a straight line with the endpoints defining extreme limits such as „no pain and „unbearable pain . The scale has 10 points. Physical disability was assessed using Neck Disability Index (NDI) which is the standard instrument for measuring self-rated disability due to neck pain. It has 10 items which includes pain, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. Each of the 10 items scores from 0 to 5. The maximum score is 50. The obtained score can be multiplied by two to produce a percentage score. The interpretation is as follows: 0 to 4 – no disability ,5 to 14 – mild disability ,15 to 24 – moderate disability ,25 to 34 – severe disability and above 34 – complete disability.

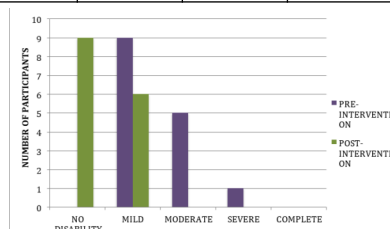
1.3 DATA ANALYSIS:

Effectiveness of both the treatments was analyzed after 4 weeks of

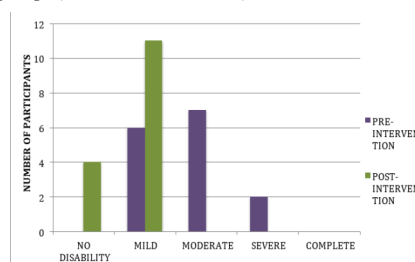
intervention. Descriptive and inferential statistics were used for analysis which was carried out using Graphpad Prism 8.

Number and percentage of participants in different scoring interval of Neck Disability Index in group I(thoracic mobilization) & group II(thoracic manipulation)

S. No	Scoring Interval of NDI	Group I		Group II	
		Number of participants		Number of participants	
		Pre-Intervention	Post-Intervention	Pre-Intervention	Post-Intervention
1	0-4 no disability	0	9 (60%)	0	4 (26.66%)
2	5-14 mild	9 (60%)	6 (40%)	6 (40%)	11 (73.33%)
3	15-24 moderate	5 (33.33%)	0	7 (46.66%)	0
4	25-34 severe	1 (6.66%)	0	2 (13.33%)	0
5	>34 complete	0	0	0	0



Number of participants in different scoring interval of neck disability index in group I(thoracic mobilization)

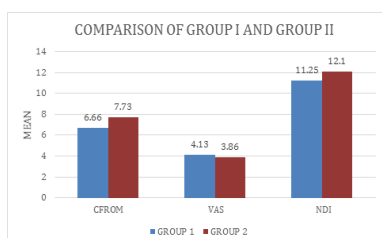


Number of participants in different scoring interval of neck disability index in group II(thoracic manipulation)

Comparison of Mean difference, SD, Student's Unpaired „t test and „p values of Cervical Flexion range of motion, Visual Analog Scale and Neck Disability Index between group I(THORACIC MOBILIZATION) AND group II(THORACIC MANIPULATION)

S. No	Outcome Measures	Group I (Thoracic Mobilization)	Group II (Thoracic Manipulation)	Students Unpaired „t test	„p value	Result
		Mean Difference Mean, SD	Mean Difference Mean, SD			
1	CFROM	6.66 + 1.23	7.73 + 2.37	1.544	0.1339	No significant difference
2	VAS	4.13 + 0.83	3.86 + 0.82	0.8759	0.3886	No significant difference
2	NDI	11.25 + 3.28	12.10 + 4.87	0.5552	0.5832	No significant difference

CFROM-Cervical Flexion Range of Motion,VAS-Visual Analog Scale, NDI-Neck Disability Index, SD-Standard Deviation.



RESULT

In total, 35 participants were tested, out of which 5 participants did not

match the selection criteria. A total of 30 participants were recruited in the study on the basis of inclusion and exclusion criteria and were randomly allocated into 2 groups. 15 participants were assigned to Group I which received Thoracic Mobilization and 15 participants were assigned to Group II which received Thoracic Manipulation. 30 participants completed the 4 weeks of intervention. Hence, the results of 30 participants were considered for statistical analysis.

DISCUSSION

Environmental and working conditions may be the cause of many acute or chronic musculoskeletal disorders. Dental profession is a high risk profession of musculoskeletal disorder related to incorrectly designed or used workstation. Neck pain is one of the most common musculoskeletal disorder in dentists. When a joint's mobility is limited, eventually the structure and function change. The cartilage nutrition

starts to decrease within the joint, and other joints begin to move excessively to compensate. The adjacent joints begin to deteriorate due to over use. The muscles surrounding a stiff joint lose their ability to contract and relax sufficiently and become tight over time. The whole region with time is involved in the dysfunction surrounding the stiff joint. Stiff neck, overuse and mechanical stress are the primary causes of headaches²⁵

Both, group I(Thoracic Mobilization) & group II(Thoracic Manipulation) showed significant improvement in the Cervical Flexion Range of Motion, pain intensity and physical disability after receiving 4 weeks of thoracic mobilization and thoracic manipulation. Contrary to the expectations, this research did not find a significant difference between the effect of thoracic mobilization and thoracic manipulation on the Cervical Flexion Range of Motion(ROM), pain intensity and physical disability in dentists with chronic mechanical neck pain. This effect can be explained by the restoration of the normal biomechanics of the thoracic spine, decreasing the mechanical stress and increasing the joint distribution forces in the cervical spine²⁴. Manual Therapy induces a reflex inhibition of muscle or pain relaxation reflex by modifying the discharge of proprioceptive Group I and Group II afferents, which reduces pain and improves the mobility of spine²².

All the 30 participants showed minimum 6 ° of improvement in cervical flexion range of motion. In thoracic mobilization group, the maximum improvement is 8 ° and in thoracic manipulation group, the maximum improvement is 12 °. Both the groups showed minimum 3 visual analog scale score improvement and maximum 5 visual analog scale improvement. This is supported by a study conducted by Thavatchai Suvarnato Et.al which concluded that thoracic manipulations significantly decreased Visual analog scale(VAS) pain ratings and increased Cervical range of motion(CROM) in all directions in immediate 24-hour follow up.

Neck Disability Index Questionnaire was used to assess the physical disability in dentists. As quoted by Vernon, H. and Minor, S., NDI has become a standard instrument for measuring self-rated disability due to neck pain. Neck Disability Index has 10 sections. Occasionally, a respondent will not complete one question or another. The average of all other items in the scale is then added to the completed items. In the present study, out of 30 participants, 9 participants did not fill the driving section of the questionnaire as they did not own a car. Hence, the data is adjusted by adding the average of all the other items to the completed items.

Vernon, H. and Minor, S. also quoted in their report that the minimum detectable score and minimal clinically important difference is 5 NDI points. It was observed in the study that all the 30 participants showed minimal clinical difference of 8 NDI points after 4 weeks of intervention, which states that both the interventions were clinically effective. In thoracic mobilization group, the maximum clinical difference of 17.78 NDI points was observed. In thoracic manipulation group, the maximum clinical difference of 23.33 NDI points was observed.

In group I(Thoracic Mobilization) at the baseline, 60% of the participants were in the mild disability group (5-14 NDI points), 33.33% in the moderate disability group(15-24 NDI points) and 6.66% in the severe disability group(25-34 NDI points). After 4 weeks of intervention, 60% of the participants were in the no disability group(0-4 NDI points) and 40% in the mild disability group(5-14 NDI points). There were no participants in the severe disability group(25-34 NDI points).

Similarly in group II(Thoracic Manipulation) at the baseline, 40% of the participants were in the mild disability group(5-14 NDI points), 46.66% in the moderate disability group(15-24 NDI points) and 13.33% in the severe disability group(25-34 NDI points). After 4 weeks of intervention, 26.66% of the participants were in the no disability group(0-4 NDI points) and 73.33% in the mild disability group(5-14 NDI points). There were no participants in the severe disability group(25-34 NDI points).

As stated by Vernon, H. and Mior, S., participants often do not score the items as zero, once they are in the treatment. But, the study proved that both the interventions were effective in many sections and reduced the physical disability where the dentists could perform the tasks without any pain(0 NDI points). In Group I(Thoracic Mobilization)

after 4 weeks of intervention, 26.66% participants showed no pain at the moment, 46.66% could look after themselves without causing extra pain, 6.66% could lift heavy weights without extra pain, 80% could read as much as they wanted without neck pain, 100% had no headaches at all, 66.66% could concentrate fully without any difficulty, 6.66% could work as much as they wanted, 73.33% could drive their car without any neck pain, 93.33% had no trouble sleeping and 13.33% were able to engage in all the recreation activities with no neck pain.

In Group II(Thoracic Manipulation) after 4 weeks of intervention, 33.33% could look after themselves without causing extra pain, 86.66% could read as much as they wanted, 100% had no headaches at all, 46.66% could concentrate fully without any difficulty, 13.33% could work as much as they wanted, 60% could drive their car without any neck pain, 100% had no trouble sleeping and 13.33% were able to engage in all the recreation activities with no neck pain.

Based on the above data, both thoracic mobilization and thoracic manipulation were 100% effective in reducing the physical disability due to neck pain among dentists following 4 weeks on treatment. Also, it was observed that all the participants showed 100% improvement in headache.

CONCLUSION

The study concluded that both the Thoracic Mobilization and Manipulation can be effectively used in the treatment of chronic mechanical neck pain to reduce the pain intensity and improve the Cervical flexion range of motion and physical disability due to neck pain among dentists.

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