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SHORT TERM EFFECT OF STRETCHING VS MEDIAN NERVE MOBILIZATION ON MECHANICAL NECK PAIN AMONG DENTAL STUDENTS

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Abstract

Background: *Neck pain is a commonly overlooked among for dental students. Prolonged Static postures, repetitive tasks and poor ergonomics during clinical work contributing to neck pain. Early practical interventions can help prevent pain from becoming a lasting problem. Simple approaches such as Stretching and Nerve mobilization are both safe, inexpensive, and easy to integrate into a busy schedule. Even if both the methods are widely used, their direct evidence comparing the short-term effect on mechanical neck pain still remains limited.*

Methods: *This Interventional study was conducted on 30 undergraduate dental students (aged 18–25 years) with moderate mechanical neck pain. Participants were assigned to either a Stretching group (Bilateral Upper Trapezius and Levator Scapulae Stretches) or a Median Nerve Mobilization group (ULNT1 sliding technique). Interventions were performed once daily, four days a week, for two weeks (8 sessions). The Neck Disability Index (NDI) was used to record pre- and post-intervention data. This data was analysed using Mann–Whitney U and Wilcoxon matched-pairs tests.*

Result*: Both groups showed significant within-group improvement in NDI scores (Stretching: 70.89% reduction,* p *= 0.0007; ULNT1: 45.56% reduction,* p *= 0.0031). Post-test scores were significantly better in the Stretching group (*p *= 0.0058), with greater gains in pain intensity, work, driving, and recreation domains.*

Conclusion*: Stretching and median nerve mobilization both effectively reduced neck pain, but Stretching consistently showed greater improvements, particularly in Pain relief and Functional activities, making it a potentially more effective primary intervention for this population.*

Index Terms: Mechanical Neck Pain, Dental Students, Stretching Exercises, Median Nerve Mobilization, ULNT1, Neck Disability Index, NDI, Physiotherapy Intervention

I. INTRODUCTION

Mechanical neck pain is the most common musculoskeletal disorder affecting the general population. It is also known to as axial neck pain or nonspecific neck pain because it does not radiate and very sudden in onset, often without an identifiable cause and is usually presented as local discomfort in the neck, which can worsen with poor posture, tightness of cervical muscles or during movement. Some of the risk factors that lead to mechanical neck pain are repetitive tasks, incorrect posture, physical overload, psychological stress, smoking and poor management of mental health. Moreover, problems with oxidative metabolism and the built up of pain-causing substances in the neck muscles leads to reduced local muscle blood circulation causing accumulation of metabolic waste products [1].

Dental professionals are more vulnerable to musculoskeletal disorders (MSDs) due to the demands of their occupation. Poor ergonomic conditions in almost every dental clinics such as inadequate equipment, poorly designed workplace and prolonged sitting in same posture can lead to abnormal posture due to repetitive strain [2]. Dentists often require them to work in flexed for extended periods, increasing their risk for neck and low back pain. This all leading to Work-related Musculoskeletal Disorders (WMSDs), that are defined as injuries resulting from work-related activities that might be because of lost work time, job limitations or if severe might even the need to change careers. Studies have shown that dentists have reported a high prevalence of musculoskeletal pain in neck regions, making it a prominent occupational health concern. Prevalence of neck pain among dental students is 42%, out of which 37% being mild disability and 5% being moderate disability [3].

Preventive protocol such as Stretching exercises are becoming popular as it has been assumed to decrease muscular stiffness, improve flexibility and reduce strain caused by prolonged static loading and awkward postures. There have been researches that states, workplace stretching regimens can prevent WMSDs and promote musculoskeletal health [4].

A variety of intervention strategies apart from Stretching are available for managing the symptoms of musculoskeletal conditions. Among these, non-pharmacological approaches are often preferred to reduce dependence on medication. The Musculoskeletal system consists of three interconnected subsystems: the muscular, articular (joint), and nerve system. Any change or injury in one part of these subsystems affects the other two, showing how interconnected the musculoskeletal system is [5].

Physiotherapist commonly use neural mobilisation technique as a part of their treatment. These techniques involve coordinated joint movements set to either slide or add tension in the neural structures, including peripheral nerves and central neural tissues. When neural tissue is stretched at one point, it is counterbalanced by a reduced tension at other joint, this is called Sliding technique. Sliding allows for gentle nerve movement and can restore motion of the nervous system in ways that disrupts established pain patterns. This approach may reduce kinesiophobia (fear of movement) and help reorganize the altered cortical representations. Assessing normal neural tissue compliance should also account for abnormal responses to mechanical stress. For this reason, our study will use the Upper Limb Neurodynamic Test 1 (ULNT1), which focuses on median nerve, to assess and apply neural mobilisation [6].

In conclusion, the combination of Stretching and Median Nerve Mobilization technique holds promising future in managing and preventing mechanical neck pain, opening opportunities for further exploration into effective, practical solutions for enhancing work related musculoskeletal health in dental students.

II. METHODOLOGY

An Interventional Based study among 30 dental students with the Inclusion Criteria of Age Group 18 to 25 years, having Moderate level of Pain on NDI and pain history present within duration of 6 months was done and exclusion criteria being Students who had taken any physiotherapy treatment for neck pain earlier, History of Fractures or Surgeries in Cervical Spine over past 12 months, Students who showed signs of serious pathology or were diagnosed with Malignancy, Inflammatory disorder, Infection, Cervical Radiculopathy, Vertigo, Vascular Syndromes such as Vertebrobasilar insufficiency, bilateral upper limb symptoms, History of whiplash injury over past 24 months and Diminished or absent sensation to pinprick in upper limb.

There were 22 were Female students and 8 were Male students distributed equally among both groups. Team A (group one) were taught Neck Stretches (Bilateral Upper trapezius and Levator Scapulae) 3 REPETIONS with 30 sec hold each and Team B (group two) was educated about Median Nerve Sliding Technique (ULNT1) 3 sets of 10 cycles each; 30 sec rest in between bilaterally. The sessions were conducted for 4 days a week with frequency of once a day for total 2 WEEKS concluding with total 8 Sessions.

The study was conducted in primary tertiary health care setup in Navi Mumbai and was properly explained, written and informed consent along with Demographic data of participant and medical history were taken. The subjects were approached with Neck Disability Index (NDI) before the study was started and were told to practice their respective exercise protocol. The NDI is a self-report questionnaire with 10-items: pain intensity, personal care, lifting work, headaches, concentration, sleeping, driving, reading, and recreation. The response to each item is rated on a 6-point scale from 0 (no disability) to 5 (complete disability). The numeric responses for each item are summed for a total score ranging between 0 and 50. Higher scores represent increased levels of disability [7]. Further classification was done to fit the Moderate Intensity of Pain and scores upto 20 on 50 score were considered. Post 2 weeks, a follow up on the pain was taken and was compared to their pre session. Data was analysed using Mann Whitney U test and Wilcoxon matched pair tests.

III. STATISTICAL ANALYSIS AND RESULTS

Data of 30 participants (8 males, 22 females) with mean Age of 23 years showed no correlation between age and severity of symptoms.

It showed that No significant difference was observed between Stretching group and MNT1 group with pre-test neck disability index scores ($Z=-0.9540$, $p=0.3401$) at 5% level of significance. It means that, the pretest neck disability index scores are similar in Stretching group and MNT1 group. A significant difference was observed between Stretching group and MNT1 group with post-test neck disability index scores ($Z=-2.7583$, $p=0.0058$) at 5% level of significance. It means that, the post-test neck disability index scores are significantly higher in Stretching group as compared to MNT1 group. No significant difference was observed between Stretching group and MNT1 group with changes in neck disability index scores from pretest to post-test ($Z=0.9125$, $p=0.3615$) at 5% level of significance. It means that, the changes in neck disability index scores from pretest to post-test are similar in Stretching group and MNT1 group.

Table 1: Comparison of Stretching group and MNT1 group with pretest and post-test Neck Disability Index scores by Mann-Whitney U test

Time point	Stretching group				MNT1 group				Effect size	Z-value	p-value
	Mean	SD	Median	IQR	Mean	SD	Median	IQR			
Pretest	10.5	4.1	11.0	7.0	12.0	3.5	12.0	5.0	-0.38	-0.9540	0.3401
Post-test	3.1	1.8	3.0	3.0	6.5	3.7	6.0	7.0	-1.26	-2.7583	0.0058*
Difference	7.5	3.5	7.0	6.0	5.5	4.9	6.0	7.0	0.48	0.9125	0.3615

***p<0.05**

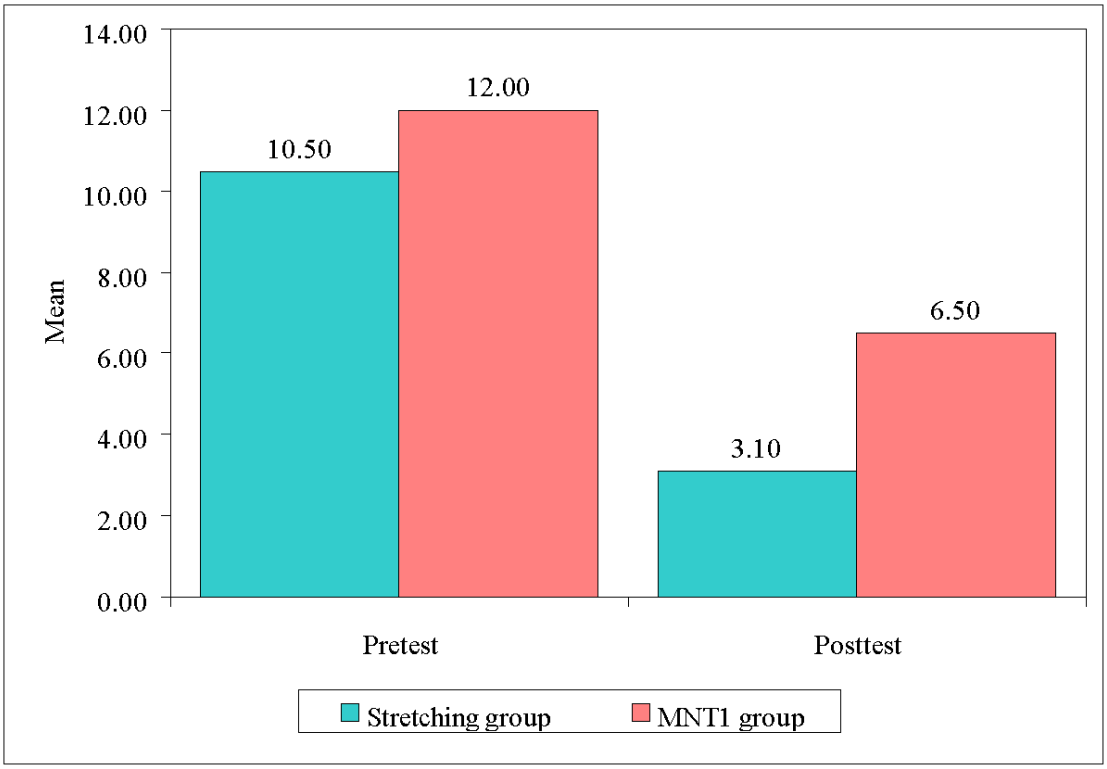

Figure 1: Comparison of Stretching group and MNT1 group with pretest and post-test neck disability index scores

There was also a significant difference observed between pretest and post-test neck disability index scores in Stretching group (Z=3.4078, p=0.0007) at 5% level of significance. It means that, a significant of 70.89% (with 1.80 effect size) decrease in neck disability index scores after post-test in Stretching group. A significant difference was observed between pretest and post-test neck disability index scores in Stretching group (Z=2.9534, p=0.0031) at 5% level of significance. A significant of 45.56% (with 1.56 effect size) decrease in neck disability index scores after post-test in MNT1 group. Therefore, we concluded that, the changes of NDI is after post-test test is higher in Stretching group as compared to MNT1 group.

Table 2: Comparison of pretest and post-test neck disability index scores in Stretching group and MNT1 group by Wilcoxon matched pairs test

Group	Changes from	Mean change	% of change	Effect size	Z-value	p-value
Stretching group	Pretest to post-test	7.47	70.89	1.80	3.4078	0.0007*
MNT1 group	Pretest to post-test	5.47	45.56	1.56	2.9534	0.0031*

***p<0.05**

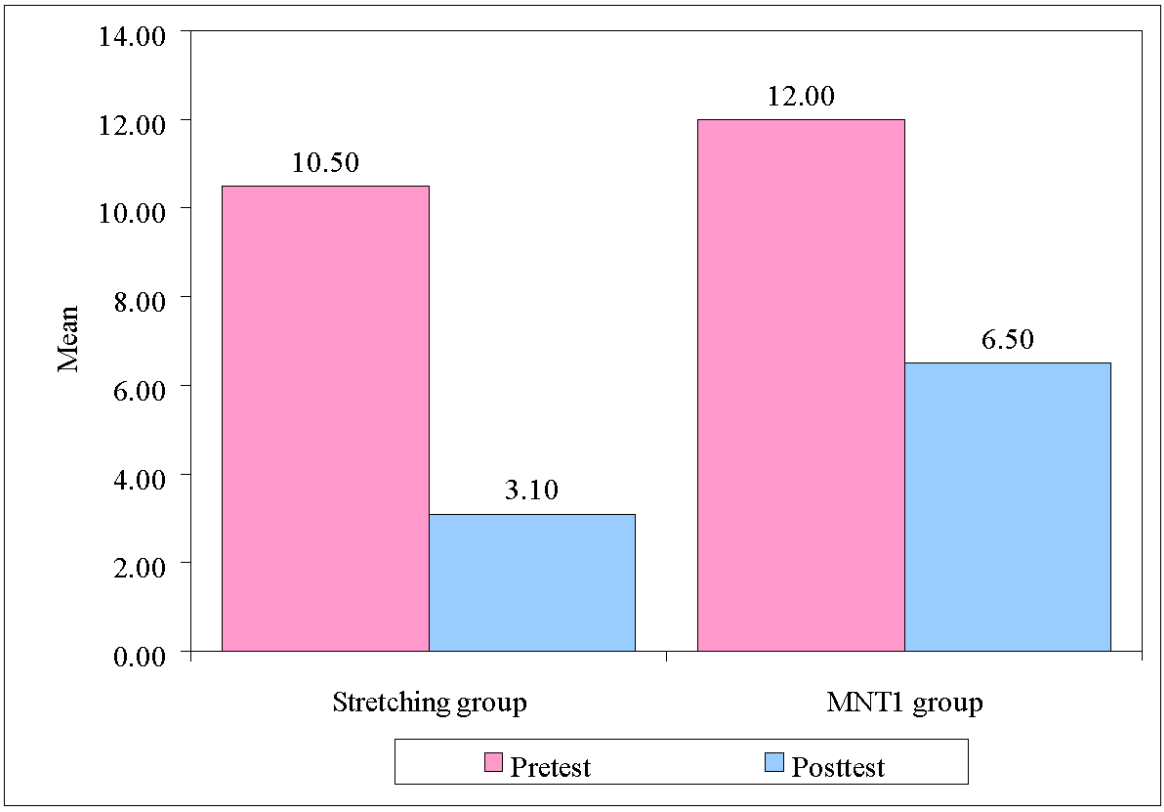

Figure 2: Comparison of pretest and post-test neck disability index scores in Stretching group and MNT1 group

There was No significant difference was observed between Stretching group and MNT1 group with pretest and post-test scores of all components of NDI at 5% level of significance, except post-test scores of Pain Intensity using Mann-Whitney U test as seen in Table 3.

Table 3: Comparison of Stretching group and MNT1 group with pretest and post-test scores of all components of neck disability index by Mann-Whitney U test

Components	Time points	Stretching group				MNT1 group				Effect size	Z-value	p-value
		Mean	SD	Median	IQR	Mean	SD	Median	IQR			
Pain Intensity	Pretest	2.1	0.6	2.0	1.0	2.4	0.5	2.0	1.0	-0.46	-0.9747	0.3297
	Posttest	0.8	0.6	1.0	1.0	1.5	0.6	1.0	1.0	-1.22	-2.5302	0.0114*
	Difference	1.3	0.5	1.0	1.0	0.9	0.7	1.0	0.0	0.76	1.5347	0.1249
Personal Care	Pretest	0.6	0.5	1.0	1.0	1.1	0.6	1.0	0.0	-0.85	-1.7836	0.0745
	Posttest	0.1	0.4	0.0	0.0	0.5	0.5	0.0	1.0	-0.77	-1.5347	0.1249
	Difference	0.5	0.5	0.0	1.0	0.6	0.5	1.0	1.0	-0.26	-0.6014	0.5476
Lifting	Pretest	0.7	0.7	1.0	1.0	0.9	0.6	1.0	1.0	-0.29	-0.7881	0.4306
	Posttest	0.2	0.4	0.0	0.0	0.5	0.5	0.0	1.0	-0.57	-1.2236	0.2211
	Difference	0.5	0.6	0.0	1.0	0.4	0.6	0.0	1.0	0.10	0.0000	1.0000
Reading	Pretest	1.1	0.7	1.0	1.0	1.2	0.4	1.0	0.0	-0.24	-0.4148	0.6783
	Posttest	0.4	0.5	0.0	1.0	0.5	0.6	0.0	1.0	-0.12	-0.1037	0.9174
	Difference	0.7	0.5	1.0	1.0	0.7	0.7	1.0	1.0	-0.11	-0.3940	0.6936
Headaches	Pretest	1.1	0.6	1.0	1.0	1.3	0.6	1.0	1.0	-0.22	-0.4770	0.6334
	Posttest	0.5	0.5	0.0	1.0	0.7	0.5	1.0	1.0	-0.40	-0.9125	0.3615
	Difference	0.7	0.8	1.0	1.0	0.6	0.6	1.0	1.0	0.09	0.2903	0.7716
Concentration	Pretest	0.9	0.7	1.0	1.0	0.9	0.6	1.0	0.0	-0.10	-0.2696	0.7875
	Posttest	0.1	0.4	0.0	0.0	0.4	0.5	0.0	1.0	-0.62	-1.2236	0.2211
	Difference	0.7	0.6	1.0	1.0	0.5	0.8	0.0	1.0	0.28	0.7466	0.4553
Work	Pretest	1.1	0.7	1.0	0.0	0.9	0.6	1.0	1.0	0.39	0.7881	0.4306
	Posttest	0.1	0.3	0.0	0.0	0.3	0.5	0.0	1.0	-0.71	-1.2236	0.2211
	Difference	1.1	0.7	1.0	0.0	0.5	0.6	1.0	1.0	0.79	1.6384	0.1013
Driving	Pretest	1.1	0.7	1.0	1.0	1.1	0.3	1.0	0.0	0.00	0.0378	0.9699
	Posttest	0.0	0.0	0.0	0.0	0.6	0.7	0.5	1.0	-1.72	-1.8520	0.0640
	Difference	1.0	0.8	1.0	2.0	0.5	0.8	0.0	1.0	0.68	1.3790	0.1679
Sleeping	Pretest	1.3	0.7	1.0	1.0	1.5	0.7	2.0	1.0	-0.27	-0.7881	0.4306
	Posttest	0.7	0.5	1.0	1.0	1.0	0.7	1.0	0.0	-0.48	-0.9747	0.3297
	Difference	0.6	0.8	0.0	1.0	0.5	0.7	1.0	1.0	0.08	-0.0830	0.9339
Recreation	Pretest	0.9	0.5	1.0	0.0	1.1	0.4	1.0	0.0	-0.61	-1.0992	0.2717
	Posttest	0.1	0.4	0.0	0.0	0.8	0.6	1.0	1.0	-1.46	-2.8205	0.0048*
	Difference	0.7	0.5	1.0	1.0	0.3	0.7	0.0	1.0	0.68	1.7006	0.0890

***p<0.05**

Table 4: Comparison of pretest and posttest scores of components of neck disability index in Stretching group and MNT1 group by Wilcoxon matched pairs test

Components	Group	Changes from	Mean change	% of change	Effect size	Z-value	p-value
Pain Intensity	Stretching group	Pretest to posttest	1.33	62.50	2.08	3.4078	0.0007*
	MNT1 group	Pretest to posttest	0.87	36.11	1.71	2.7605	0.0058*
Personal care	Stretching group	Pretest to posttest	0.47	77.78	0.92	2.3664	0.0180*
	MNT1 group	Pretest to posttest	0.60	56.25	1.01	2.6656	0.0077*
Lifting	Stretching group	Pretest to posttest	0.47	70.00	0.64	2.2014	0.0277*
	MNT1 group	Pretest to posttest	0.40	46.15	0.63	1.8904	0.0587
Reading	Stretching group	Pretest to posttest	0.67	62.50	0.95	2.8031	0.0051*
	MNT1 group	Pretest to posttest	0.73	61.11	1.77	2.5887	0.0096*
Headaches	Stretching group	Pretest to posttest	0.67	58.82	1.04	2.3444	0.0191*
	MNT1 group	Pretest to posttest	0.60	47.37	1.01	2.5205	0.0117*
Concentration	Stretching group	Pretest to posttest	0.73	84.62	0.99	2.8031	0.0051*
	MNT1 group	Pretest to posttest	0.53	57.14	0.90	2.0304	0.0423*
Work	Stretching group	Pretest to posttest	1.07	94.12	1.44	3.1798	0.0015*
	MNT1 group	Pretest to posttest	0.53	61.54	0.83	2.2424	0.0249*
Driving	Stretching group	Pretest to posttest	1.00	90.91	1.36	2.5205	0.0117*
	MNT1 group	Pretest to posttest	0.45	41.32	1.44	1.5724	0.1159
Sleeping	Stretching group	Pretest to posttest	0.60	45.00	0.83	2.3664	0.0180*
	MNT1 group	Pretest to posttest	0.53	34.78	0.72	2.1325	0.0330*
Recreation	Stretching group	Pretest to posttest	0.73	84.62	1.42	2.9341	0.0033*
	MNT1 group	Pretest to posttest	0.33	29.41	0.95	1.5724	0.1159

***p<0.05**

Based on the table 4, the changes in all components after post-test is higher in Stretching group as compared to MNT1 group when analyzed with Wilcoxon Matched Pair Tests.

Stretching group showed 70.89% improvement (Z = 3.4078, p = 0.0007, effect size = 1.80) whereas MNT1 group showed 45.56% improvement (Z = 2.9534, p = 0.0031, effect size = 1.56). Stretching also showed significant difference in Pain Intensity (p = 0.0114) with Greater Improvements in Work (94.12% vs. 61.54%), Driving (90.91% vs. 41.32%) and Recreational Domain (84.62% vs. 29.41%) of NDI scale. Both

Interventions showed almost similar effectiveness but Stretching showed better results in improvements of Daily functional and Pain domain.

IV. DISCUSSION

This research aims to study and compare short term effect of Upper Trapezius Stretching to Median Nerve Mobilization (MNT1) interventions across domains of the Neck Disability Index (NDI). The findings revealed domain-specific responses to each intervention. According to the data, we had total 30 participants; 8 Male and 22 Females with average age being 23 years in both study groups, of which majority of students belonged to INTERNS position in their respective university. However, there was NO correlation found between Age and Severity of symptoms or incidence of pain.

In the Beginning, both groups were similar, as there was no notable difference in the pre-test NDI scores ($Z = -0.9540$, $p = 0.3401$). This indicated that both groups had similar levels before the intervention. After the intervention, Post-test data showed that the Stretching group had shown greater improvement (mean = 3.1) compared to the MNT1 group (mean = 6.5), with a p-value of 0.0058. However, when comparing the change in scores from pre-test to post-test, there was no significant difference between them ($Z = 0.9125$, $p = 0.3615$). This suggests that in both groups interventions help improve the specific domain, the difference in improvement was almost similar.

The analysis within each group showed that both Stretching and MNT1 resulted in significant improvements in NDI scores. The Stretching group had a 70.89% reduction in disability ($Z = 3.4078$, $p = 0.0007$, effect size = 1.80), while the MNT1 group showed a 45.56% reduction ($Z = 2.9534$, $p = 0.0031$, effect size = 1.56). These results confirm that both interventions were effective, but the Stretching group showed more improvement.

Further study in NDI components showed more significant difference in post-test scores that was found only in the "Pain Intensity" component ($p = 0.0114$), favouring the Stretching group. The analysis of all components showed significant improvements in both groups, but the percentage changes and effect sizes were greater in the Stretching group. For example, the Stretching group showed a 94.12% improvement in work-related domain, while the MNT1 group had a 61.54% improvement. Similarly, the Stretching group improved by 90.91% in the driving component, whereas the MNT1 group had a 41.32% change, which was not significant. In recreational activities, again the Stretching group improved by 84.62% compared to 29.41% for the MNT1 group. These findings suggest that both interventions help those with neck pain, but Stretching being better choice in comparison.

Even if the change in total NDI scores between the groups was not statistically significant, the trends and levels of improvement consistently favoured the Stretching interventional group. This indicates a potentially greater clinical impact of the Stretching protocol, especially in daily function and quality of life components. The results suggest that Stretching may be a more effective method for reducing Mechanical Neck pain and improving overall function compared to MNT1. Therefore, while both interventions are helpful, Stretching appears to produce better outcomes and could be recommended as a primary treatment for individuals with mechanical neck pain.

V. CONCLUSION

Both Upper Trapezius Stretching and Median Nerve Mobilization effectively reduced neck disability in the short term. However, Stretching showed consistently greater improvements, especially in pain intensity and daily activities. Therefore, Stretching may be seen as the more effective way to manage mechanical neck pain.

VI. LIMITATIONS

During the Intervention phase, two of the participants in the median nerve mobilization group reported in experiencing post-session stiffness in the upper trapezius region. This stiffness was associated with restricted cervical mobility and discomfort, particularly during head movements, which persisted following the completion of the intervention period. It was reported that their pain post intervention was increased 11.1% and 6% respectively. The deep cervical fascia and thoracic outlet structures are functionally connected. Tension placed through neural pathways may cause mechanical drag on fascial layers affecting nearby muscles, including the trapezius and scalene group. If the fascia is not sufficiently moving, the stress may be directed towards surrounding muscles, contributing to tightness and motion restriction due to muscle guarding.

VII. FUTURE SCOPE

Further studies may look into connection between Screen time use and occurrence of Mechanical Neck Pain among Dental Students. Muscle Tightness assessment can be added in Methodology before starting with Interventional based protocol to minimise the cause of Post Study Neck Pain due to muscle spasm. Postural Assessment can also be done to exclude ergonomic issues that may contribute to neck pain.

VIII. ACKNOWLEGMENT

We would like to thank our participants for contributing their time and efforts to participate along with honest responses.

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