Original Article

Effect of Suboccipital Release Technique in Forward Head Posture: A Comparative Study

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Submission: 29-11-2020,
Decision: 28-05-2021,
Acceptance: 28-05-2021,
Web Publication: 01-03-2022

ABSTRACT

Background: Forward head posture is a postural malalignment. It can lead to increased neck pain and decreased neck mobility. **Objective:** The purpose of this study was to find added effect of suboccipital release technique with conventional treatment on neck pain, disability, mobility, and craniovertebral angle (CVA) in forward head population. **Materials and Methods:** Fifty subjects with forward head posture and neck pain were randomly allocated in two groups. Experimental group (Group A) was given myofascial release to suboccipital group of muscles along with conventional treatment and control group (Group B) received conventional treatment. Subjects received treatment three times a week, for 2 weeks. By the end of session, pre- and post-comparison was done for neck pain, disability, range of motion, and CVA. **Statistical Analysis:** Data were analyzed with Winpepe software and Primer software using Wilcoxon signed-rank sum test, Paired *t*-test, and Mann–Whitney rank sum test. **Results:** Statistical significance was found between and within the group with respect to pain, disability, and cervical range of motion ($P < 0.05$). CVA had shown significant results only for within the group. **Conclusion:** This study concluded that suboccipital release technique along with conventional treatment significantly improve neck pain, disability, and range of motion in forward head posture.

Keywords: *Craniovertebral angle, fascia release, neck mobility, neck pain*

Introduction

Forward head posture is defined as the malalignment of head that is caused due to the translation of head anteriorly with respect to the trunk.[1] Incidence rate of forward head is 66% among 20–50 years.[2] In forward head posture, weakness of muscles occurs in deep cervical flexors and opposing cervical extensor muscles get shortened.[3] Due to forward head posture, lordosis increases in lower cervical spine which leads to increased extension over the upper cervical spine and flexion over the lower cervical spine.[3] When there is forward head then there is decreased craniovertebral angle (CVA).[4] 49.9° are considered as normal CVA.[5] Causes for forward head posture are poor posture, tight muscles, use of high pillow, studying with low desk height, prolonged computer and smartphone use.[6] Problems associated with the forward head posture are increased neck pain,[7] headaches, temporal mandibular joint dysfunction,[8] decreased neck mobility, increase in kyphosis, and decrease in vital capacity (30%).[6]

Access this article online

Quick Response Code:

Website: www.mjdrdypv.org

DOI: 10.4103/mjdrdypu.mjdrdypu_665_20

There is a soft tissue component that infiltrates the human body known as fascia, which is a fibrous collagen tissue that runs throughout the body. Suboccipital muscles, dura mater, and C2 vertebrae are connected to each other through the fascia. If there is any facial restriction in one part then other part will also get involved. As the fascia runs throughout the body, when undue stress is applied over one part then other parts also gets affected. Fascial restriction can cause the inadequate movement of the muscles.[9]

Hyperirritable point along with tense band of muscle is known as trigger points. During palpation, compression or during stretch, it produces pain and these pains are

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How to cite this article: Aggarwal A, Nair A, Palekar TJ, Bhamare D. Effect of suboccipital release technique in forward head posture: A comparative study. Med J DY Patil Vidyapeeth 2022;15:534-7.

usually referred pain. There are two types of trigger points. When there is a spontaneous referred pain and when typical radiating pain is produced is known as active trigger point and when there is no immediate pain, it is referred as latent trigger points. Latent trigger point can lead to reduced range of motion and fatigue.[10] When there are triggers point in suboccipital muscles pain radiated toward the sides of the head typically over the occipital and temporal sides, due to which it is typically professed as headache. The reason for activation of trigger points over these muscles might be due to abnormal posture of the cervical spine.[11]

Myofascial release (MFR) technique is a manual therapy that emphasize the application of sustained pressure to release facial restrictions, tightness, and adhesions in any plane responsible for causing pain and reduced range of motion.[12] Goals of MFR are to change the course of bodily functions, to reset imbalances and progress in a balanced state by relieving facial restrictions thus normalizing health, tension, and movement of the body. The present study was undertaken to find added effect of suboccipital MFR in forward head posture.

Materials and Methods

After the Institutional Ethical Committee approval (DYPCPT/ISEC/32/2019) dated September 26, 2019, 50 participants who gave written informed consent and fulfilled the inclusion criteria (20–35 years,[13] male or female, neck disability index (NDI) >5,[14] CVA <49.9° and tenderness over the suboccipital region) participated in the study. The interventional study was conducted in. Any patient with recent injuries or surgeries in and around the neck region, vertigo, radiating pain in upper limb, spinal deformities, and malignancy in and around the neck region were excluded. The subjects were randomized into Group A (Experimental) and Group B (Control) by chit method. Group A was given conventional treatment (Hydrocollator pack [10 min] followed by scapular setting, neck isometrics, chin tucks [five sets each for three repetitions] and ergonomic advice along with postural care)[14] along with suboccipital release (one set of three repetitions with 3 min hold for 2 weeks). Group B was given only conventional treatment.

Procedure of suboccipital release technique: While the subject was in supine lying, therapist was positioned along head end. The elbows of therapist were supported with forearm supinated. The subject was asked to place his head on palm of therapist. Therapist placed the fingers on the inferior nuchal line and then gently gave stroking. Long axis distraction was applied once the suboccipital muscles were relaxed.[15]

Pre- and post-values for neck pain, disability, and mobility were assessed using numerical pain rating scale,[14] NDI and cervical range of motion using universal goniometer.[16] Furthermore, CVA was recorded using photography analysis.[14] After entering data into Microsoft excel, Winpepi and Primer software were used for data analysis. Wilcoxon signed-rank test and paired *t*-test were used for comparison within the groups and Mann–Whitney rank sum test was used for between the groups. The level of significance was kept at $P < 0.05$.

Results

Out of the 50 samples, either group had 25 subjects. Five were males and forty-five were females.

Table 1 reports neck pain and disability in experimental and control groups. The *P* value was statistically significant within group for both outcomes. Table 2 shows mean difference of neck pain and disability comparison in experimental and control group. The *P* value was statistically significant showing experimental group was statistically better in improving neck pain and disability.

Table 3 reports neck mobility for all movements. The *P* value was statistically significant in either group. Table 4 shows mean difference of neck mobility comparison in experimental and control groups. The experimental group was statistically more significant in improving neck ranges in all planes.

Table 5 reports CVA for within group and had statistically significant result. On comparison [Table 6], no significant result was seen in the experimental group.

Table 1: Intragroup comparison of pre post measures for neck pain and disability index

	Experimental group		Control group	
	Mean±SD (median)	*P*	Mean±SD (median)	*P*
NPRS				
Pre	5.68±1.24 (6)	0.000*	5.8±1.15 (6)	0.000*
Post	2.56±1.12 (2)		3.88±1.23 (4)	
NDI				
Pre	10.52±5.74 (9)	0.000*	8.6±2.5 (8)	0.000*
Post	5.6±4.49 (4)		6.52±2.14 (6)	

*Statistically significant. NPRS: Numerical Pain Rating Scale, NDI: Neck disability index, SD: Standard deviation

Table 2: Intergroup comparison of mean difference of neck pain and disability index

Variable	Mean difference	*Z*	*P*
NPRS	1.2	5.44	0.000*
NDI	2.84	4.234	0.000*

*Statistically significant. NPRS: Numerical Pain Rating Scale, NDI: Neck disability index

Table 3: Intragroup comparison of pre post measures of cervical range of motion in degrees

	Experimental group			Control group		
	Mean±SD (median)	*P*	For difference 95% CI	Mean±SD (median)	*P*	For difference 95% CI
Flexion						
Pre	39.88±7.65 (40)	0.000*		43.04±9.46 (43)	0.000*	
Post	51.12±7.41 (50)			47.48±8.83 (47)		
Extension						
Pre	46.64±8.10	0.000*	14.09-10.71	50.04±8.40 (50)	0.000*	
Post	59.04±7.04			54.76±7.99 (55)		
Lateral flexion (right)						
Pre	34.64±4.77 (35)	0.000*		34.92±5.07	0.000*	4.891-3.829
Post	42.96±2.62 (45)			41.28±4.48		
Lateral flexion (left)						
Pre	34.04±4.56	0.000*	10.272-7.81	36.36±3.82 (35)	0.000*	
Post	43.08±3.20			40.72±3.02 (40)		
Side rotation (right)						
Pre	66.4±6.52 (65)	0.000*		66.4±5.76 (67)	0.000*	
Post	75.48±5.75 (75)			70.08±5.62 (70)		
Side rotation (left)						
Pre	67.52±6.84	0.000*	10.45-7.633	67.56±5.78 (69)	0.000*	
Post	76.56±6.41			71.76±5.67 (72)		

*Statistically significance. SD: Standard deviation, CI: Confidence interval

Table 4: Intergroup comparison of mean difference of cervical range of motion in degrees

Variables	Mean difference	*Z*	*P*
Flexion	6.8	5.42	0.000*
Extension	7.68	5.560	0.000*
Side rotations (right)	5.4	5.570	0.000*
Side rotations (left)	4.84	4.958	0.000*
Lateral flexion (right)	3.96	4.610	0.000*
Lateral flexion (left)	4.68	5.084	0.000*

*Statistically significant

Table 5: Intragroup comparison of pre post measures of craniovertebral angle in degrees

CVA	Experimental group		Control group	
	Mean±SD (median)	*P*	Mean±SD (median)	*P*
Pre	36.16±6.18 (34.1)	0.000*	34.81±7.52 (35.1)	0.000*
Post	40.11±5.59 (39.2)		38.14±5.74 (38.6)	

*Statistically significant. SD: Standard deviation, CVA: Craniovertebral angle

Table 6: Intergroup comparison of mean difference of craniovertebral angle in degrees

Variable	Mean Difference	*Z*	*P*
CVA	0.61	0.543	0.58

CVA: Craniovertebral angle

Discussion

In the present study, we compared the effect of adding suboccipital release technique to neck isometric exercises along with chin tucks in forward head posture. The result showed that adding MFR helps in improving neck pain intensity, disability, ranges but not CVA statistically.

Forward head posture is caused due to the imbalance of muscles which produces undue pressure in the posterior neck muscles. This produces a hyperirritable point called as trigger points.[13] These trigger points result in tenderness and pain. The aim of MFR is to remove barriers in the fascia. This is achieved by stretching the elastic component of the fascia due to this viscosity of the ground substance of the fascia changes. Due to restrictions there is weakness of muscles. Gentle and sustained stretching is believed to release the tightened fascia which in return softens and lengthen the fascia.[17]

In the experimental group, suboccipital release technique was implemented in forward head posture. In a related study conducted by Kim *et al*.,[1] stated that suboccipital release technique causes decompression of the vagus nerve which runs through the jugular foramen. Tissue stretching and tension over the foramen are relieved when traction along with pressure is applied by the fingers of the therapist over the posterior aspect of the neck and suboccipital muscles. This leads to decrease pain and increased cervical range of motion. When slow and sustained stretching is provided over time, it allows elongation and relaxation of the fascia. Thus, increases range of motion, flexibility, and decreases pain.

In the control group, different physiotherapeutic exercises were given in addition to hydrocollator packs. Results achieved were statistically significant. According to Malanga *et al* (2015)[18] when hot

pack is applied physiological effects occur such as decrease pain, increase blood flow, metabolism, and connective tissue elasticity also increases. When tissue temperature is increased vasodilation occurs, which leads to increased blood flow to the region which ultimately leads to healing that is achieved by increased supply of oxygen and nutrition. Viscoelastic changes occur in collagen tissue due to the application of heat. There is increase in range of motion due to elongation of the tissue. Furthermore, there is improvement in CVA. Kachanathu *et al* (2015)[19] stated that neck isometric exercises reduce pain because of increase endorphins which usually occurs after training and good neuromuscular control. Muscle stretch receptors get activated when strong muscular contraction occurs during isometric exercises. Chin tucks mainly focuses on the deep flexor muscles of the upper cervical region. It is a low load exercises which involves performing and holding inner range position of craniocervical flexion. This activates and trains deep cervical flexors. Deep cervical flexors are longus capitis and longus colli which are usually weak in forward head posture. This exercise helps to promote strengthening of weak muscles thus improves the cervical range of motion.[20]

Conclusion

Suboccipital release technique along with conventional treatment significantly improves neck pain, disability, and range of motion in forward head posture.

Acknowledgment

We would like to thank all the participants and our colleagues for their co-operation during the entire process. Special thanks to the departmental chair of Physiotherapy and Orthopedics department of Dr. D.Y. Patil Vidyapeeth, Pune.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Kim BB, Lee JH, Jeong HJ, Cynn HS. Effects of suboccipital release with craniocervical flexion exercise on craniocervical alignment and extrinsic cervical muscle activity in subjects with forward head posture. J Electromyogr Kinesiol 2016;30:31-7.
2. Thakur D, Motimath B, Raghavendra M. Forward head posture correction versus shoulder stabilization exercises effect on scapular dyskinesia and shoulder proprioception in athletes: An experimental study. Int J Physiother 2016;3:197-203.
3. Contractor ES, Shah S, Dave P. To study the immediate effect of suboccipital muscle energy technique on craniovertebral angle and cranio-horizontal angle on subjects with forward head posture. Int J Health Sci Res 2019;9:83-7.
4. Vaghela N, Ganjiwale D. Effect of postural correction on neck pain in computer operators. Int J Curr Res Rev 2014;6:63.
5. Worlikar AN, Shah MR. Incidence of forward head posture and associated problems in desktop users. Int J Health Sci Res 2019;9:96-100.
6. Singla D, Veqar Z. Association between forward head, rounded shoulders, and increased thoracic kyphosis: A review of the literature. J Chiropr Med 2017;16:220-9.
7. Kim DH, Kim CJ, Son SM. Neck pain in adults with forward head posture: Effects of craniovertebral angle and cervical range of motion. Osong Public Health Res Perspect 2018;9:309-13.
8. Talati D, Vardhrajulu G, Malwade M. The effect of forward head posture on spinal curvature in healthy subjects. Asian Pac J Health Sci 2018;5:60-3.
9. Ramezani E, Arab AM. The effect of suboccipital myofascial release technique on cervical muscle strength of patients with cervicogenic headache. PTJ 2017;7:19-28.
10. Fernández-de-Las-Peñas C, Alonso-Blanco C, Cuadrado ML, Pareja JA. Myofascial trigger points in the suboccipital muscles in episodic tension-type headache. Man Ther 2006;11:225-30.
11. Fernández-de-las-Peñas C, Alonso-Blanco C, Cuadrado ML, Gerwin RD, Pareja JA. Trigger points in the suboccipital muscles and forward head posture in tension-type headache. Headache 2006;46:454-60.
12. Aggarwal A, Shete SV, Palekar TJ. Efficacy of suboccipital and sternocleidomastoid releasee technique in forward head posture patients with neck pain: A randomized control trial. Int J Physiother 2018;5:149-55.
13. Mamania JA, Anap DB. Prevalence of forward head posture amongst physiotherapy students: A cross sectional study. International Journal of Education and Research in Health Sciences 2018;1:125-7.[doi: 10.5005/jp journals 10056 0105].
14. Young IA, Dunning J, Butts R, Mourad F, Cleland JA. Reliability, construct validity, and responsiveness of the neck disability index and numeric pain rating scale in patients with mechanical neck pain without upper extremity symptoms. Physiother Theory Pract 2019;35:1328-35.
15. Arab AM. Ramezani sub occipital myofascial release technique for the treatment of cervicogenic headache. J Bodyw Mov Ther 2018;22:859.
16. Farooq MN, Mohseni Bandpei MA, Ali M, Khan GA. Reliability of the universal goniometer for assessing active cervical range of motion in asymptomatic healthy persons. Pak J Med Sci 2016;32:457-61.
17. Shah S, Bhalara A. Myofascial release. Inter J Health Sci Res 2012;2:69-77.
18. Malanga GA, Yan N, Stark J. Mechanisms and efficacy of heat and cold therapies for musculoskeletal injury. Postgrad Med 2015;127:57-65.
19. Kachanathu SJ, Philip S, Nuhmani S, Natho M, Melam G, Buragadda S. A comparative study on effect of different positional isometric neck exercises training on neck pain and functional ability in patients with neck pain. Sch J App Med Sci 2014;2:91-5.
20. Ruivo RM, Pezarat-Correia P, Carita AI. Effects of a resistance and stretching training program on forward head and protracted shoulder posture in adolescents. J Manipulative Physiol Ther 2017;40:1-10.