ijlpr 2022; doi 10.22376/ijpbs/lpr.2022.12.4.L47-55

International Journal of Life science and Pharma Research

ISSN 2250-0480

Research Article

Sub-Occipital Release Technique For Neck Pain

Effectiveness of Sub – Occipital Release Technique for Non-Specific Neck Pain

K. Kirupa[1*], S.M. Divyamary[2], R. Nithyanisha[3], G. Vaishnavi[4], V. Pavithralochini[5], K. Aarthi[6] and M. Priyanka[7]

[1,2,3,4] *Assistant professor,Faculty of physiotherapy, Dr.M.G.R Educational & Research Institute University ,Velappanchavadi, Chennai-77Tamilnadu,India.*
[5] *Faculty of physiotherapy, Dr.M.G.R Educational & Research Institute University, Velappanchavadi, Chennai-77Tamilnadu,India.*
[6] *Intern Student, Faculty of physiotherapy, Dr.M.G.R Educational & Research Institute University , Velappanchavadi, Chennai-77Tamilnadu,India.*
[7] *MPTStudent , Faculty of physiotherapy, Dr.M.G.R Educational & Research Institute University, Velappanchavadi, Chennai-77Tamilnadu,India*

Abstract: The main objective of the study is to find the effectiveness of sub occipital release technique in neck pain reduction, improving range of movement of neck and improving quality of life. Neck pain has a greater prevalence and is increasing globally because of various causes such as faulty posture, biomechanical causes in cervical, thoracic and scapular region. Tightness in the muscle leads to pain and decreased range of movements. This would reduce the performance of the person in day to day life and slowly will become partially dependent, and this has to be rectified in earlier stage itself. Even though, many research has been performed, they were performed only in the older age group, but not in adult age group. Variability in tension produces impact on structure and functions of cervical muscles. When there is an increased tension in cervical group of muscles, it produces imbalance in tone of the cervical muscles, which leads to neck pain and disturbed daily activities. There are various studies which had proved different methods of treatment involving various modalities, medications, exercises for treating non-specific neck pain, but the effect of sub-occipital release technique is little understood and practiced. Hence an intervention with low time consuming and evidence based technique is needed. Sub occipital release technique helps to reduce tension in the muscles, thereby helping to perform daily activities effectively. This was an experimental study with pre-post test 20 samples selected from 30 volunteers based on the inclusion criteria. Group A is treated with sub-occipital release technique for 4 weeks, 3 days / week 2 sessions / day (Frequency: 3 times in one session). Control group performs isometric exercise for 4 weeks, 3 days / week 2 sessions / day (Frequency: 3 times in one session). At the end of 30 days of treatment session, there was a significant reduction of neck pain and increased range of motion of neck Flexion from 31.9 to 36.6, Extension from39.2 to45.0, side flexion from13.8 to 18.2, rotation from39.7 to 45.5(mean values), the mean values of VAS and NDI of pretest is 1.4 and 4.94; post test value is1.6 and 2.41.The result concluded that Group A who underwent sub-occipital release technique had more effective treatment in reducing pain and improving range of movements and functional abilities for non-specific neck pain.

Keywords: Neck pain, Goniometry, Visual analog scale, Neck disability index, Sub-occipital release technique range of motion of neck.

***Corresponding Author**

K.Kirupa , Assistant professor,Faculty of physiotherapy, Dr.M.G.R Educational & Research Institute University ,Velappanchavadi, Chennai-77Tamilnadu,India.

Received On 22 July 2021
Revised On 27 April 2022
Accepted On 18 May 2022
Published On 01 July 2022

Funding This research did not receive any specific grant from any funding agencies in the public, commercial or not for profit sectors.

Citation K.Kirupa, S.M.Divya mary, R.Nithyanisha, G.Vaishnavi, V.Pavithralochini, K.Aarthi, and M. Priyanka , Effectiveness of Sub – Occipital Release Technique for Non-Specific Neck Pain.(2022).Int. J. Life Sci. Pharma Res.12(4), L47-55 http://dx.doi.org/10.22376/ijpbs/lpr.2022.12.4.L47-55

1. INTRODUCTION

Neck pain is a common musculoskeletal problem. Neck pain is a serious problem that can prevent subjects from performing everyday task.[1] It can also cause loss of range of motion in neck and it may be the source of pain for shoulder, arm and hand.[2] In an early study "the effect of therapeutic exercise and vegan diet on pain and quality of life in young female patients with chronic nonspecific neck pain", reported by Mustafa.S.Torlak et al, stated that, Neck pain is the 4th leading cause of disability, because it limits the activities of daily living, leads to poor productivity at work and eventually affecting the quality of life of an individual. Neck pain may arise due to muscular tightness in both the neck and upper back or pinching of the nerve emanating from the cervical vertebrae.[3] Non-specific neck pain has a postural or mechanical basis and it affects about two third of people at some stage, especially in the middle age. Non-specific neck pain is most often caused by continuous forward head posture leading to suboccipital muscle tightness, decreased cervical mobility. [4, 5] In the study, "Muscle energy technique in the rehabilitative treatment for acute and chronic non specific neck pain", reported by Silvia sbardella et al., stated that, nonspecific neck pain may also occur due to other factors such as work stress, depression, anxiety, headache, sedentary lifestyle, deskjob eg: sitting for long work hours in front of computers as in online classes during the covid pandemic, poor ergonomically posture in work place, sleep disorders and smoking etc. The prevalence increases with longer periods and generally women have more neck pain than men. For prevalence, Scandinavian population reported higher mean estimates than in the rest of Europe and Asia. [6] Surprisingly, young and middle aged people reported chronic pain more than elderly. However, 5 to 10% of patients with non-specific neck pain will develop chronic pain disorder. Neck pain is higher in urban areas compared with rural areas. Stress and emotional tension can cause the muscle to become tight and get contracted for a prolonged period of time. This results in pain and stiffness over the neck.[7] There are many treatment protocols in the management of the non-specific neck pain, like McKenzie exercises, Ultrasound, active release technique etc. Suboccipital release helps to reduce tension in the upper cervical and sub occipital part of the spine. In the study "The effects of sub occipital release technique on the Autonomic nervous system in healthy subjects" by RobSillevis et al., concluded that, there is decreased muscle tone and increased diameter of the pupil. In the study, "Sub-occipital myofascial release technique in subjects with cervicogenic head ache" by Ebrahim Ramezani et al., stated that sub occipital release technique is effective in decreasing pain, in relieving movement restrictions caused due to stress, repetitive overuse etc, improve soft tissue extensibility and joint biomechanics. In addition to this treatment, a current study focused on the treatment of non-specific neck pain by sub occipital release technique. [9, 10] Early intervention of neck pain using the sub occipital release technique helps greatly in avoiding further complications and prevent from degenerative conditions like cervical spondylosis, as the patient have been treated and educated at an early age. Previous researches have not used sub occipital release technique to relieve non specific neck pain. This technique is an effective add-on to the treatment protocol apart from electrical modalities. Only few researches have been done on sub-occipital release technique, and so this study introduce sub occipital release technique as an effective tool in treating non-specific neck pain. Sub-occipital release helps to soften the fascia and muscle tissue in the sub occipital area. [11] This helps to open up the area between the C1(atlas) and C2 (axis) vertebrae at the top of the neck and base of the head, or occiput.[12] The Sub-occipital release may be considered in the treatment of neck pain, shoulder pain, and upper back pain. Sub-occipital release is also known as "cranial base release." Sub occipital release technique is very effective in reducing pain/ pressure over head, shoulder, and also gives the whole body relaxation. It is indicated, when there is pain over neck, occipital, shoulder and contraindicated when there is a history of stroke, recent head injury, skull fracture, shoulder fracture, tumors in brain or neck/shoulder. This technique is performed by positioning the patient in supine, finger pads are placed over the sub occipital muscles bilaterally, finger pads supports the occiput region by lifting the patient's head and traction is applied in cephalous, anterior and lateral direction, but should not produce movements of cervical region or shoulder region and hold it for10-15 seconds[13] . It is also called as "inhibitive cervical manual traction".[13] Muscles of the neck and upper back often contain many hyperactive trigger points.[14] A mild manual traction is applied to the posterior cervical musculature and direct pressure is applied at the musculotendinous junction of cervical muscle at the base of skull, which facilitate relaxation of cervical and upper back muscles.[15] The aim of the study is to determine the effect of sub occipital release technique for non-specific neck pain in reducing pain, range of movement and functional abilities.

2. METHODOLOGY

The sample size required is 40. The sample size was estimated based on the pain intensity, with 8.8, level of significant at 5% and power at 80% calculated using N master software, considering 10% attrition rate, the final sample size is 20. The calculated data were analyzed using shapiro wilk test to find the distribution of data. In the study, the data were normally distributed at P value >0.05. Hence the parametric test was adopted. After getting Ethical clearance from the Institutional ethical committee, Control group performed isometric exercise for 4 weeks, 3 days / week 2 sessions / day (Frequency: 3 times in one session). 20 male and female participants were randomly selected by block randomization from the Physiotherapy outpatient department of A.C.S medical college, Dr.M.G.R. Educational and research institute and they were recruited based on the inclusion and exclusion criteria. Universal full circle goniometer manufactured by jullundhar surgical enterprises 2020 were used. Inclusion criteria included subjects within the age group of (20-30) years, subjects with10% restricted range of motion of neck flexion, extension, lateral rotation, rotation on both sides -due to pain, pain more than 1 week, but less than three months (i.e, acute), stiffness in neck, subjects with acute neck pain who are willing to participate. Subjects with systemic illness such as RA (Rheumatoid arthritis), Grave's disease, and recent surgical interventions to the neck, neurological illness such as cervical radiculopathy, recent corticosteroid injection, and vertebrobasilar insufficiency were excluded in the study. The subjects were subjected to sub occipital release technique for 4 weeks and then pre-test and post-test values were measured by using Goniometer, VAS (Visual analog scale) and neck disability scale.

2.1 *Treatment*

Patients aged between 20 and 30 years, who fulfilled inclusion and exclusion criteria were selected by simple random sampling method and were involved in the study. [16] Before treatment, all patients were assessed with visual analogue scale, neck functional disability index scale and goniometry for pain, range of movement and functional abilities. Patients were treated by sub-occipital release technique for 4 weeks, 3 days / week 2 sessions / day (Frequency: 3 times in one session). After treatment the patients were assessed with visual analogue scale, neck functional disability index and goniometry.

Sub-occipital release technique

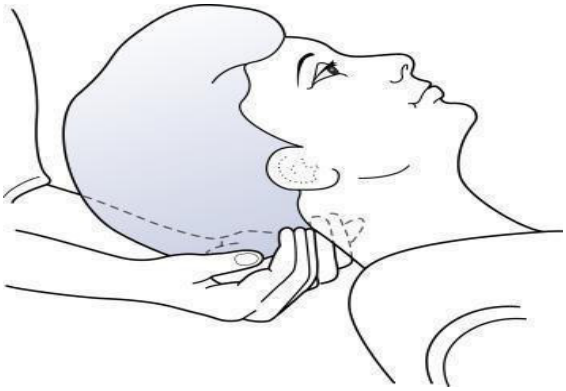

Fig: 1 Therapist performing sub occipital technique to the patient with non-specific neck pain. [1]

2.2 Patient

Patient were made at Supine lying on the couch with thier head placed at the edge of the couch.

2.3 Position of therapist

Standing behind the head of the patient.

2.4 Procedure

Therapist finger pads should be placed over the sub-occipital muscles of the neck bilaterally, just inferior to the superior nuchal line down to approximately the level of C2. [17] The patient's head should be lifted, so that weight is supported upon the pad of the fingers causing stretch and distraction for 30 seconds, until the tissue relaxation has been achieved and maintain pressure over sub occipital space for a few minutes (As in FIGURE: 1).

Duration : 5 minutes in one session
Frequency: 3 times in one session
Repetition: 2 session / day
3 days /week.

2.5 *Mechanism of sub-occipital release technique*

Tension in this musculature may result from sympathetic reflex activity from organs innervated by the cervical sympathetic ganglia. The action of sub-occipital release technique is by manual traction with applying finger pressure over the sub-occipital space reducing tension in the soft tissues of the cervical spine, in particular the upper cervical, sub-occipital aspect of the spine.

Table 1: Comparison Of Pre And Posttest values Of Vas And Ndi

	Mean		S.D		Variance		Df	T-Test	P-Value	Significance
	PRE	POST	PRE	POST	PRE	POST				
VAS	7.35	4.15	1.18	1.27	1.4	1.6	20	13.5	2.093	0.000***
NDI	23.9	19.1	2.22	1.55	4.94	2.41		15.7		

Table 1 shows the significance in the mean value of pre and posttest of VAS and NDI p value: 0.000. Changes are occurred in VAS andNDI scores in both groups, though the improvement is more in 3rd and 4th week of treatment. The change is more effective in experimental group than control group. The table shows the result of the Pretest and posttest values.

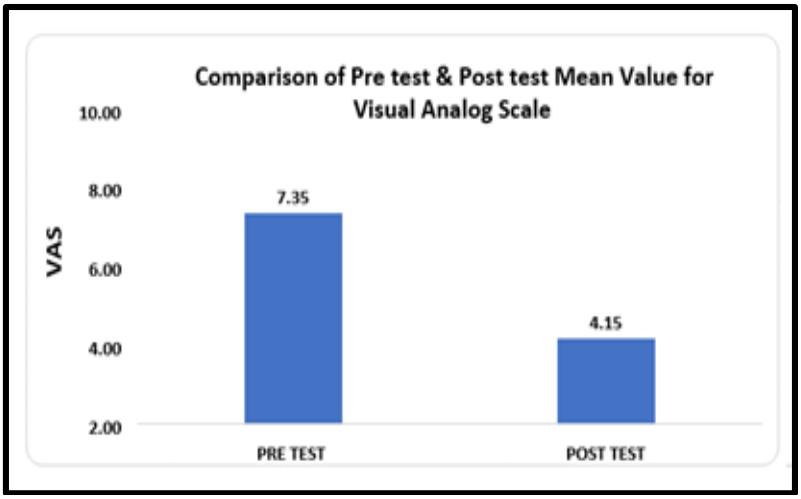

Fig: 2 shows the decrease in the post value in VAS scale in the non- specific neck pain.It Shows the number of patients and VAS scores and compares the score before and after the intervention. The figure compares and summarizes the effect of sub occipital release technique and shows improvement in the experimental group.

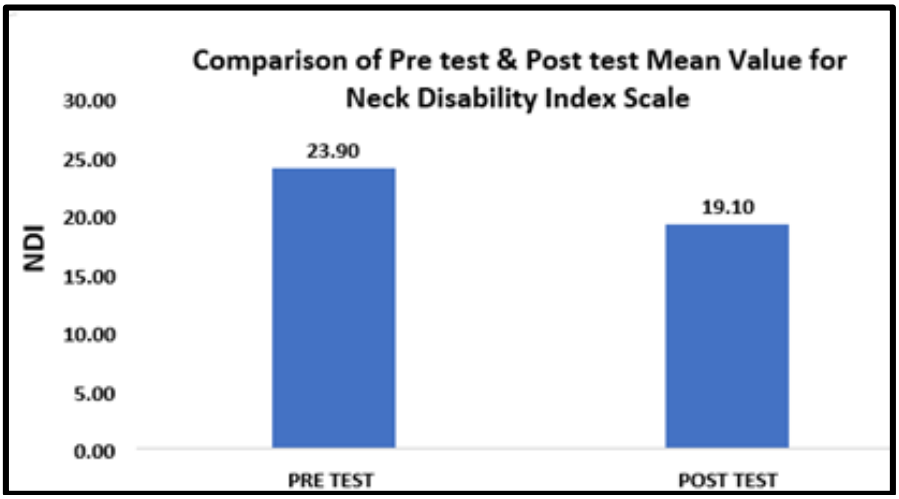

Fig: 3 shows the decrease in the post value in NDI scale in the non- specific neck pain Shows the number of patients and NDI scale scores and compares the score before and after the intervention. The figure compares and summarizes the effect of sub occipital release technique and shows improvement in the experimental group.

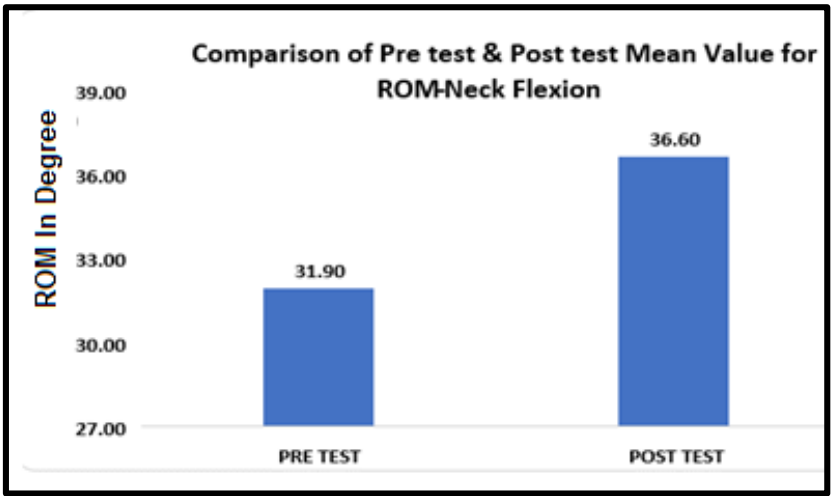

Fig :4 shows the increase in the post value in ROM- neck flexion in the non- specific neck pain. It Shows the number of patients and ROM scores of neck flexion. and compares the score before and after the intervention. The figure compares and summarizes the effect of sub occipital release technique and shows improvement in the experimental group.

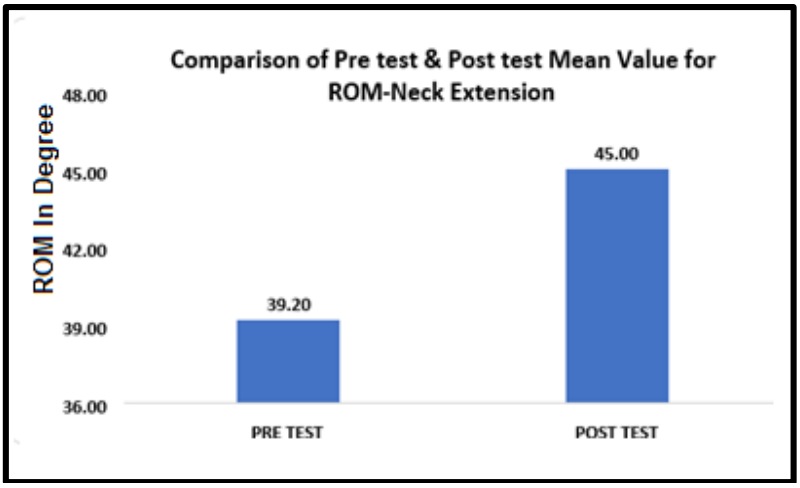

Fig:5 shows the increase in the post value in ROM- neck extension in the non- specific neck pain It Shows the number of patients and ROM scores of neck extension and compares the score before and after the intervention. The figure compares and summarizes the effect of sub occipital release technique and shows improvement in the experimental group.

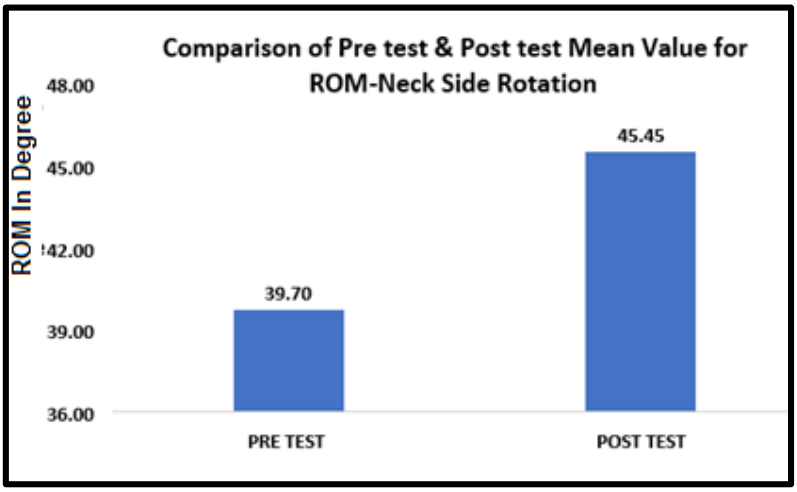

Fig: 6 shows the increase in the post value in ROM- neck side rotation in the non- specific neck pain. It Shows the number of patients and ROM scores of neck side rotation and compares the score before and after the intervention. The figure compares and summarizes the effect of sub occipital release technique and shows improvement in the experimental group.

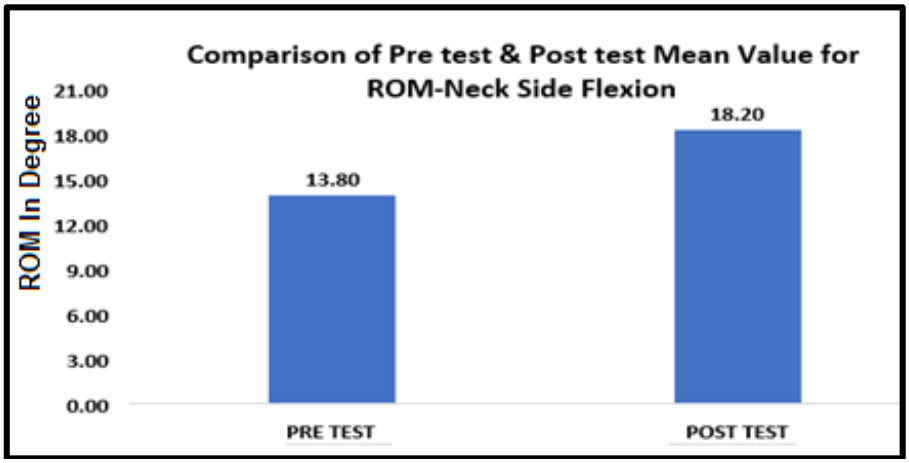

Fig:7 shows the increase in the post value in ROM- neck side flexion in the non- specific neck pain. It Shows the number of patients and ROM scores of neck side flexion and compares the score before and after the intervention. The figure compares and summarizes the effect of sub occipital release technique and shows improvement in the experimental group.

Table 2 Comparison Of Pre And Post Values Of Rom In Cervical Region										
Rom (Cervical)	Mean		S.D		Varience		Df	T-Test	P-Value	Significance
	PRE	POST	PRE	POST	PRE	POST				
Flexion	31.9	36.6	3.42	2.91	11.67	8.46				
Extension	39.2	45.0	3.21	3.63	10.27	13.76	19	1.7	1.9	0.000***
Side Flexion	13.8	18.2	3.04	2.26	9.22	5.12				
ROTATION	39.7	45.5	3.67	3.91	13.4	15.31				

Table 2 shows the significance in the mean value of pre and posttest of ROM of cervical region p value: 0.000 . Changes are occurred in the range of movement of cervical spine or neck region in both groups ,though the improvement is more in 3rd and 4th week of treatment. The change is more effective in experimental group than control group. The table shows the result of the Pretest and posttest values.

3. STATISTICAL ANALYSIS

The data obtained were analyzed using SPSS-Software. Paired "t" was used for analysis of comparison. The data were presented as mean±standard deviation(SD). Probability value(P) of less than 0.05 was considered statistically significant

4. RESULT

All variables in the sub occipital release technique showed significant change after treatment ($p < 0.05$).The mean of pain intensity, Neck Disability Index were reduced ($p<0.05$)(Table.1).The mean of Range of movement shows significant change ($p<0.05$) in Table.2 .It means, that there is decrease in pain intensity of neck or cervical region , improved Neck Disability Index (in terms of reduction of pain and increased range of movement of neck or cervical spine, in performing function of daily activities.) , Range of movement of cervical spine in the intervention group when compared with Control Group as described in Table 1, Table 2 and in the Figure 1 to 6. Comparing the mean of all variables between two groups before intervention did not showed significant differences (i.e., $p>0.05$). This implies that, two groups matched in respect of variables under study. Comparing the mean of all variables before and after treatment, the control group did not showed significant change ($p<0.05$) (Table.1 and Table.2 and in the Figure 1 to 6). The changes in the pain score.i.e. VAS Score and Neck Disability Index shows significant change ($p< 0.005$) in the experimental group which was found to be statistically significant (Table.1 and 2.)

5. DISCUSSION

The main aim of the study was to find the effectiveness of sub-occipital release technique for non-specific neck pain. The Sub-occipital release helps to soften the fascia and muscle tissue in the sub occipital area. This helps to open up the area between the C1 (atlas) and C2 (axis) vertebrae at the top of the neck and base of the head, or occiput.[18] The Sub-occipital release may be considered in the treatment of neck pain, shoulder pain, and upper back pain[19].The sub-occipital release technique showed a significant difference (Table-1) with mean value in VAS scale (7.35-4.15), where Figure-1 showed the decrease in pain on post-test values. In the study conducted by Cristina Perez-Martinez et.al., 2020 concluded that, Myofascial release therapy and self myofascial release therapy on sub occipital muscle reduces pain over neck. Restoration of myofascial tissue strength and length will relieve pressure on the pain sensitive structures and thereby improving performance. Reduction of pain was due to relief of tension, and the tissues were targeted specifically and reduced pain threshold. There was significant differences in the NDI mean value of about (23.9-19.1), Figure 2 shows the decrease of Neck disability Index in post-test values. Table-2 shows that cervical region range of motion was improved by Flexion (31.9-36.6), Figure-3 illustrates an increase in cervical flexion ROM in post-test. Extension ranges from 39.2 to 45.0. Figure 4 illustrates an increase in cervical extension. In ROM in post-test, Side flexion ranges from (13.8-18.2), figure 5 illustrate increase in side flexion ROM in post-test. Rotation ranges from (39.7- 45.5). Figure 6 illustrates increase in cervical rotation ROM in post-test. Improvement in range of movements of cervical region was due to improvement in flexibility of cervical muscles and restoration of muscle strength. Ebrahim et al., reported myofascial release technique was effective in reducing pain and restoring muscle strength for patients with cervicogenic headache.[22] Amita agarwal e .al ., reported suboccipital release was more effective than conventional therapy in reducing pain and improving postures for patients with neck pain.[20] Suboccipital release and exercises can be effective in strengthening the cervical muscles and increasing the cervical rotation ROM.[21] It is effective in treating nonspecific neck pain as it significantly reduces neck pain, functional disability[22]and tender points in the neck[23]. Further, sub occipital release technique along with cranio cervical flexion exercises improved the cranio-vertebral angle and the cervical flexion and extension ROM[24].Sub occipital release technique along with spinal stabilization exercises produced significant decrease in symptoms such as head ache, spreading neck pain, dizziness and balance disorder in patients after decompression surgery due to Chiari malformation type 1[25]. Sub occipital inhibition technique significantly improves hamstring flexibility and effective than retro walking technique[27].In the present study, sub occipital release technique showed clinically improvement in functional ability and reducing pain. Sub occipital release technique was effective in terms of reducing functional disability, pain and tender point.[28] Patients were treated by sub-occipital release technique for 4 weeks, 3 days / week 2 session / day (Frequency: 3 times in one session). After treatment ,patients were assessed with visual analogue scale, neck functional disability index and goniometry.

3. CONCLUSION

Application of sub occipital release technique to the patients with non-specific neck pain decreases pain, improves the range of movement of cervical spine and Neck Disability Index. These changes increases the flexibility of the muscle around the cervical spine or neck, gives relaxation, and improves circulation. Daily activities demand flexibility of

muscles; sudden change in direction. These demands were effectively fulfilled by sub occipital release technique for patients with nonspecific neck pain. Sub occipital release technique was proved to be very effective and safe intervention which effectively reduces pain, improves Range of movement and Neck Disability Index in patients with nonspecific neck pain.

4. AUTHOR CONTRIBUTION STATEMENT

Kirupa.K (corresponding author): Designed the purpose of the study, conception, Collection of samples. SM Divya Mary (Second author): Supervised the subject's details, inclusion and exclusion criteria. R. Nithyanisha and G. Vaishnavi (Third and fourth author): Done the Data analysis. Pavithiralochani. V (Fifth author): Analyzed the patient's conditions pre and post study. K. Aarthi and M. Priyanka (sixth and seventh author): Performed the treatment technique under the supervision of Physiotherapists.

5. CONFLICT OF INTEREST

Conflict of interest declared none.

6. REFERENCES

1. Cunha Ana CláudiaViolino, Burke ThomazNogueira, França Fabio Jorge Renovato, Pasqual Marques Amelia. Effect of global posture re-education and static stretching on pain, range of motion, and quality of life in women with chronic neck pain. Clinics. 2008;63(6):763-70.
2. Shin Young Junand seventh author): Performed the treatment technique under the supervision of Physiotherapists., Kim Won Hyo, Kim Seong Gil. Correlations among visual analogue scale, neck Disability index, shoulder joint range of motion, and muscle strength in young women with forward head posture. J ExerRehabil. 2017;13(4):413-7. doi: 10.12965/jer.1734956.478, PMID 29114506.
3. Silva AG, Sharples Paul, Johnson Mark I. Studies comparing surrogate measures for head posture in individuals with and without neck pain. PhysTher Rev. 2010;15(1):12-22. doi: 10.1179/174328810X12647087218631.
4. Harman K, Hubley-Kozey Cheryl L, Butler Heather. Effectiveness of an exercise program to improve forward head posture in normal adults: A randomized, controlled 10-week trial. J Man ManipTher. 2005;13(3):163-76. doi: 10.1179/106698105790824888.
5. LevangiePK, Norkin CC. Joint structure and function: A Comprehensive Analysis, 5thed; 2011.
6. Dalton Eric. Strategies to improve forward head posture. Massage Mag. 2006:2-9.
7. Jull Gwendolen, Trott Patricia, Potter Helen, Zito Guy, Niere Ken, Shirley Debra, Emberson Jonathan, Marschner Ian, Richardson Carolyn. A randomized controlled trial of exercise and manipulative therapy for cervicogenic headache. Spine. 2002;27(17):1835-43; discussion 1843. doi: 10.1097/00007632-200209010-00004, PMID 12221344.
8. McDonnell MK, SahrmannSA, Van DillenL. A specific exercise program and modification of postural alignment for treatment of cervicogenic headache: a case report. J Orthop Sports PhysTher. 2005;35(1):3-15. doi: 10.2519/jospt.2005.35.1.3.
9. Kage Vijay, Patel Nishita Y, PaiMangala P. To compare effects of deep neck flexors strengthening exercise and McKenzie neck exercise in subjects with forward neck posture. Int J Physiother Res. 2016;4(2):1451-8. doi: 10.16965/ijpr.2016.117.
10. Lee Joon-Hee. Effects of forward head posture on static and dynamic balance control. J PhysTher Sci. 2016;28(1):274-7. doi: 10.1589/jpts.28.274, PMID 26957773.
11. Hertling Darlene, Kesseler Randolph M. Management of common musculoskeletal disorders, physical therapy principles and methods, 4thed; 2006.
12. González-Iglesias Javier, Fernández-de-las-PeñasC, Cleland JA, del Rosario Gutiérrez-Vega M. Thoracic spine manipulation for the management of patients with neck pain: A randomized clinical trial. J Orthop Sports PhysTher. 2009;39(1):20-7. doi: 10.2519/jospt.2009.2914.
13. Carlesso Lisa C, MacDermid Joy C, Gross Anita R, Walton David M, LinaSantaguidaP. Treatment preferences amongst physical therapists and chiropractors for the management of neck pain: results of an international survey; Chiropractic and manual therapy. 2014;22(22 (11)):1-15.
14. Salvi Shah, AktaBhalara. Myofascial release. Int J Health Sci Res. 2012;2(2):69-7ChaitowL; Cranial manipulation.Theory and practice.London; Churchill Livigtone;1999,pp 49-52.[Google Scholar]16. Kim Bo-Been, Lee Ji-Hyun, JeongHyo-Jung, CynnHeon-Seock. Effects of suboccipital release with craniocervical flexion exercise on craniocervical alignment and extrinsic cervical muscle activity in subjects with forward head posture. J ElectromyogrKinesiol. 2016;30:31-7. doi: 10.1016/j.jelekin.2016.05.007, PMID 27261928.
17. ShaghayeghFardB, Ahmadi Amir, MaroufiN, SarrafzadehJ. Evaluation of forward head posture in sitting and standing positions. Eur Spine J. 2016;25(11):3577-82. doi: 10.1007/s00586-015-4254-x, PMID 26476717.
18. Ruivo Rodrigo M, Pezarat-Correia Pedro, Carita Ana I. ICervical and shoulder postural assessment of adolescents between 15 and 17 years old and association with upper quadrant pain. Braz J PhysTher. 2014;18(4):364-71. doi: 10.1590/bjpt-rbf.2014.0027, PMID 25054381.
19 Sung-Hak Cho, PhD, PT,1 Soo-Han Kim, PhD, PT,2 and Du-Jin Park, PhD, PT2,*The comparison of the immediate effects of application of the suboccipital muscle inhibition and self-myofascial release techniques in the suboccipital region on short hamstring Journal of Physical Therapy science 2015 Jan; 27(1): 195–197.
20. Manheim CJ:The myofascial release manual.Thorofare: slack,2001,pp23-28[Google scholar]21. Alireza M. Prevalence of forward head posture and its relationship with activity of trigger points of shoulder

region in high school students of shiraz. Int J Physiother Res. 2016;4(2):1451-8.
21. 1 Amita Aggarwal ²Sanika V Shete ³Tushar J Palekar efficacy of sub occipital and sternocleidomastoid release technique in forward head posture patients with neck pain. Int J Physiother. 2018;5(4), August:149-55.
22. RameaniEbrahim, Arab Amir Massoud. The Effect of Sub occipital myofascial Release Technique On Cervical Muscle Strength of Patients with cervicogenic head ache. Phys Treat. 2017;7(1):19-28.
23. Basil JebaslinD, Dr, Shaju MK Franklin. Efficacy of suboccipital release versus mckenzie exercise in reducing pain and disability in patients with nonspecific neck pain. Int J Appl Res. 2019;5(5):219-28.
24. Kage Vijay, Joshi Pavan. Immediate effects of Triplanar myofascial release vs suboccipital release in subjects with non-specific neck pain: A Clinical Trial. Int J Physiother Res. 2017;5(3):2056-60. doi: 10.16965/ijpr.2016.204.
25. Kim BB, Lee JH, Jeong HJ, Cynn HS. Can sub occipital release followed by cranio cervical flexion exercise improve shoulder ROM, pain and muscle activity of scapular upward rotators in subjects with forward head posture? Physical therapy korea. Korean Res SocPhysiother. 2016;23(2):57-66.
26. Efficacy of suboccipital release and stabilization exercise training in type I Chiari malformation Patient undergoing surgical treatment:A Case Report.
27. SeffingerM, Hruby R Evidence-based manual medicine. A study to compare retro walking (backward walking) and sub occipital muscle inhibition technique in hamstring muscle flexibility in collegiate students: an experimental study. Int J Physiother Res. 7th ed, 2007. 2019;7(3):3085-89.