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Research Article

Soft Tissue Inhibition Technique And Neurodynamics For Headaches

Effectiveness of Suboccipital Soft Tissue Inhibition Technique Versus Neurodynamics On Tension Type Headache for Female Physiotherapy Students

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Abstract: The intent of the study is to establish the effectiveness of suboccipital soft tissue inhibition technique versus neurodynamics on tension type headache for female physiotherapy students**.** Tension-Type Headache (TTH) is a symptom with a greater impact on quality of life and with a significant socioeconomic impact. Tension-Type Headache and stress are common in student. Long term headache can progress to chronic headache, which has a great impact on the daily life of patients, for instance; aspects of emotions, daily work, and general life activities and so on. Suboccipital Soft tissue mobilization reduces muscle tension and neural tension in tension type headache. The purpose of this study was to explore the application of sub-occipital soft tissue inhibition technique and neurodynamics to compare its effect on Tension-Type Headache. This experimental study included 30 female subjects with headache for more than 1 month and divided into three groups. Group A received suboccipital soft tissue inhibition. Group B received neurodynamics technique, Group C Received both suboccipital soft tissue inhibition and neurodynamic technique. Pre and Post test were taken using VAS, NDI, HDI, Cervical ROM after 4 weeks. On comparing mean values of Group A, Group B & Group C on Visual Analogue Scale score for pain intensity, it showed a significant decrease in the post test Mean values, but Suboccipital soft tissue inhibition and Neurodynamic Techniques (Group C) showed 2.63 which has a lower mean value and is more effective than Suboccipital soft tissue inhibition Technique (Group A) 3.61 and followed by Neurodynamic Technique (Group B) 3.86 at P = 0.001. Hence Null Hypothesis is rejected. This study and our study concludes that both suboccipital soft tissue inhibition and neurodynamics showed a positive impact on headache and quality of life among adults. Although results showed a clinical improvement, there is no clear evidence that one technique is superior to another, combination of both techniques is the most effective treatment.

Keywords: Tension Type Headache, VAS, Suboccipital Soft Tissues Technique, Neurodynamic.

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1. INTRODUCTION

Tension type headache (TTH) is the most prevalent type of primary headache in adults and it is a health problem with great socio economic impact[1]. Tension-type headache is the most prevalent form of headache, and the estimated lifetime prevalence rates were from 35% to 78% of the adult population[2]. The most common tension type headache is Episodic Tension-Type Headache (ETTH), and its frequency is less than 15 days per month and Chronic Tension-Type Headache (CTTH), frequency is more than 15 days per month. Neck and shoulder pain were mentioned significantly more often by students with migraines, than by those with tension-type headache [3]. There are conflicting datas over the association of depression or anxiety disorders with headaches, but the majority of publications indicate that adolescents with headaches are at greater risk for these problems as well as for psychopathological disturbances[4]. Neck and head trigger points in TTH patients score higher in pain intensity and frequency than in healthy people[5]. The exact mechanism of tension-type headache was not known. Peripheral pain mechanisms are most likely to play a role in Infrequent episodic tension-type headache and frequent episodic tension-type headache, whereas central pain mechanisms play a more important role in Chronic tension-type headache[6].Tension-type headaches were primarily due to the muscle contractions, which occur due to an interaction of different factors that involve pain sensitivity and perception. Genetic factors are likely to be involved in chronic tension-type headache, whereas physical and psychological stress play a role in the physiologic processes that involved with episodic tension-type headache. A study on students indicates that examinations, fear of failing, shortage of clinical time, decrease in self-esteem and prompt reduction in time spent in recreational activity have been associated with higher stress levels. Association with exposure to stressors in adolescents have been reported with Tension-Type Headache but the pathogenesis of TTH is not yet clear[7]. Many methods including medication have been applied to treat TTH, but treating with painkillers for a long period of time can cause side effects such as drug addiction, weight gain, drowsiness as well as secondary headaches and drug overdose[8]. Impairment of the musculoskeletal function of the head and neck has been observed, as well as forward head posture, impaired neck mobility, or activation of myofascial trigger points in the muscles of suboccipital region[9]. Tension in suboccipital and neck muscles probably involves limitation of movement in the cervical region and therefore, knowing the range of motion should be assessed in patients with headache to better know the pain sensation experienced by the patient, as this can alter their quality of life. Suboccipital muscle inhibition belongs to the group of manual therapy techniques aimed at myofascial areas compromised by restrictions. There are evidences of the presence of active trigger points in suboccipital muscles in subjects compared with CTTH compared with healthy subjects[10]. Neural mobilization techniques intends to improve adaptability, reduce mechanosensitive, and activate analgesic mechanisms by mechanically stimulating the nerves with palpation, elongation and sliding [11]. The application of suboccipital soft –tissue inhibition produces an inhibition of suboccipital soft tissues. This tissue can respond to local stimuli produced by tension and messages from higher control centers that are probably activated by pain or emotional stress. Neurodynamics in the sense implied here is the cervical exercises. The treatment or an assessment relies on influencing pain physiology via the mechanical treatment of neural tissues and non-neural structures surrounding the nervous system. This activates a range of mechanical and physiological responses in nervous tissue. OLIVA-PASCUAL-VACA A (2012) to evaluate the frequency and intensity of the pain that employed a visual analogue scale which reported improved scores on the visual analogue scale on tension-type headache[29]. To quantify the impact of headache of daily living, developed by G P JACOBSON (1994) revealed that reliability was acceptable for the total score and functional and emotional subscale scores. [30] Headache disability index is useful in assessing the impact of headache. Neck disability index was used to evaluate neck pain that has affected the ability to manage in everyday life.

2. MATERIALS AND METHODS

The study was approved by the institutional review board of ACS medical college and Hospital; 30 subjects based on the inclusion and exclusion criteria were selected. Subjects included were only female with headache more than 1 day in month, age between 18 to 25, ETTH or CTTH diagnosed. Subjects excluded were those who had any trauma of head and spine, patients undergoing pharmacological adaptation, neurological disorder, pregnancy. A detailed explanation about the treatment protocol was given to the patient. Demographic data like name, age, sex, chief complaints were collected and they were selected by random sampling method. 30 subjects were included in this study and they were divided into Group A, Group B, Group C. Subjects were assessed by the VAS, NDI, HDI and cervical ROM and pre-test measurements were taken. All the patients received interventions for 4 weeks. The patients were assessed at baseline and after 4 weeks. GROUP A- Suboccipital Soft Tissue Inhibition10 subjects were treated with soft tissue inhibition technique to release suboccipital muscle spasm that determines the occiput-atlas-axis joint dysfunction. Subjects were asked to be at supine on the couch. Hands were placed under the patient's head making contact with the suboccipital muscles in the region of the posterior arch of the atlas, where pressure was progressively and deeply applied. This technique was administered for 10 min to produce an inhibitory effect[12]. Group B- Neurodynamic Technique 10 subjects were treated with neurodynamic technique. The 4 techniques followed in this study were .1 Exercise: Subjects were asked to sit with arms supported at a comfortable angle, and straight the elbow and bend fingers back, Tilt the head towards your hand. 2 Exercise: Subjects were asked to bend arm and wrist while tilting head towards the other side, Perform 5-10 movements, Repeat 3-5 times for 1 set, Subjects were asked to repeat it for 3-4 sets. 3 Exercise: Subject were instructed to stand by a wall, the opposite hand was placed on the front of the shoulder, on the soft tissues just above the collar bone, on the same side of the problem, the shoulder is hold down firmly and applied pressure to the tissues with the side of the thumb. The hand of the affected side was placed on the wall at shoulder height, keeping their arm straight and hand in a fist. 4. Exercise: Subjects were instructed to stand by a wall and placed their opposite hand on the front of the shoulder, on the soft tissues just above the collar bone, on the same side as your problem. The shoulder is hold down firmly and applied pressure to the tissues with the side of their thumb. The hand is placed at the affected side on the wall at shoulder

height, keeping arm straight and hand in a fist[13]. GROUP C Both soft tissue inhibition and neurodynamic technique were used , wherin 10 subject were treated with combined intervention of both soft tissue inhibition and neurodynamic technique to find the effectiveness. After the completion of the session, subjects were assessed for post-test using VAS, Headache disability index and neck disability index and cervical ROM and recorded. The recording were analyzed and interpreted and the results were reported.

3. DATA ANALYSIS

The collected data were tabulated and analyzed using both descriptive and inferential statistics. All the parameters were assessed using the statistical package for social science (SPSS) version 24. Paired t-test was adopted to find the statistical difference within the groups & Independent t-test (Student t-Test) was adopted to find the statistical difference between the groups.

TABLE- 1 Comparison of Pre & Post Visual Analogue Scale values using One Anova Test between Group A , Group B and Group C

TEST	GROUP A		GROUP B		GROUP C		df		F value	significance
	MEAN	S.D	MEAN	S.D	MEAN	S.D	df1	df2		
PRE	6.92	0.066	6.90	.054	6.90	.066	2	27	.362	.699*
POST	3.61	.087	3.86	.117	2.63	.115	2	27	363.41	.000***

(- P > 0.05), (***- P ≤ 0.001)*

TABLE- 2 Comparison of Pre & Post Headache Disability Inventory using One Anova Test between Group A , Group B and Group C

TEST	GROUP A		GROUP B		GROUP C		df		F value	significance
	MEAN	S.D	MEAN	S.D	MEAN	S.D	df1	df2		
PRE	68.50	2.36	67.20	3.29	69.00	2.70	2	27	2.81	.378*
POST	29.50	1.26	36.70	1.56	20.00	1.49	2	27	334.70	.000***

(- P > 0.05), (***- P ≤ 0.001)*

TABLE – 3 Comparison of Pre & Post NDI score using One Anova Test between Group A , Group B and Group C

TEST	GROUP A		GROUP B		GROUP C		df		F value	significance
	MEAN	S.D	MEAN	S.D	MEAN	S.D	df1	df2		
PRE	65.80	6.30	66.80	5.07	68.00	6.32	2	27	.345	.711*
POST	29.50	1.26	37.00	1.49	20.00	1.49	2	27	359.10	.000***

(- P > 0.05), (***- P ≤ 0.001)*

TABLE – 4 Comparison of Pre & Post Cervical flexion ROM using One Anova Test between Group A , Group B and Group C

TEST	GROUP A		GROUP B		GROUP C		df		F value	significance
	MEAN	S.D	MEAN	S.D	MEAN	S.D	df1	df2		
PRE	40.50	4.37	39.50	5.98	38.00	4.83	2	27	.606	.533*
POST	62.50	2.63	60.10	4.22	69.50	4.37	2	27	16.26	.000***

(- P > 0.05), (***- P ≤ 0.001)*

Table 5 Comparison of Pre & Post Cervical Extension ROM using One Anova Test between Group A , Group B and Group C

TEST	GROUP A		GROUP B		GROUP C		df		F value	significance
	MEAN	S.D	MEAN	S.D	MEAN	S.D	df1	df2		
PRE	43.50	3.37	43.00	3.49	43.50	2.41	2	27	.085	.919*
POST	66.50	2.41	52.50	2.63	68.50	2.41	2	27	122.05	.000***

(- P > 0.05), (***- P ≤ 0.001)*

4. RESULTS

On comparing mean values of Group A, Group B & Group C on Visual Analogue Scale score (Table-1) for pain intensity, shows a significant decrease in the post test Mean values, but Suboccipital soft tissue inhibition and Neurodynamic Techniques (Group C) showed 2.63 which has a lower mean value and is more effective than Suboccipital soft tissue inhibition Technique (Group A) 3.61 and followed by Neurodynamic Technique (Group B) 3.86 at P ≤ 0.001. Hence Null Hypothesis is rejected. On comparing mean values of Group A, Group B & Group C on Headache Disability Inventory score (Table-2) showed a significant decrease in the post test Mean values, but Suboccipital soft tissue inhibition and Neurodynamic Techniques (Group C) showed 20.00 which has a lower mean value and is more effective than Suboccipital soft tissue inhibition Technique (Group A) 29.50 and followed by Neurodynamic Technique

(Group B) 36.70 at P ≤ 0.001. Hence Null Hypothesis is rejected. On comparing mean values of Group A, Group B & Group C on Neck Disability Inventory score (Table-3), it showed a significant decrease in the post test Mean values, but Suboccipital soft tissue inhibition and Neurodynamic Techniques (Group C) showed 20.00 which has a lower mean value and is more effective than Suboccipital soft tissue inhibition Technique (Group A) 29.50 and followed by Neurodynamic Technique (Group B) 37.00 at P ≤ 0.001. Hence Null Hypothesis is rejected. On comparing mean values of Group A, Group B & Group C on Cervical flexion (Table-4) and Extension ROM (Table-5) in degrees, it showed a significant increase in the post test Mean values, but Suboccipital soft tissue inhibition and Neurodynamic Techniques (Group C) shows 69.50 & 68.50 degrees which has a higher mean value is more effective than Suboccipital soft tissue inhibition Technique (Group A) 62.50 & 66.50 degrees and followed by Neurodynamic Technique (Group B) 60.10 & 52.50 degrees at P ≤ 0.001. Hence Null Hypothesis is rejected.

5. DISCUSSION

The purpose of this study was to compare the effectiveness of suboccipital soft tissue inhibition and neurodynamics on tension type headache. This study brought a significant difference between suboccipital soft tissue inhibition and neurodynamics in patients with tension type headache. The data showed with 4 weeks protocol on both suboccipital soft tissue inhibition and neurodynamics The visual analogue scale used to measure the intensity of pain; goniometry used to measure the range of motion of joints. It was evident from the Mean score that both the groups showed improvement in reducing pain. Group C showed greater improvement in the post test values of the VAS,HDI,NDI and CROM. The data analysis and statistical inference have brought to check the effectiveness of sub occipital soft tissue inhibition versus neurodynamics in Tension type headaches. The result of our study showed that, Group C had beneficial effect or improvement in pain reduction and CROM. Hong-jin sui 2019 reviewed a study on the effectiveness of physical therapy on the suboccipital area of patients with Tension-Type Headache. A meta-analysis of randomized controlled trials with a total of 505 participants was included. Suboccipital soft tissue inhibition technique and occiput atlas axis global manipulation. Physical therapy in the suboccipital region is very effective for TTH. The advantages of using SIT and OAA to treat TTH as follows; reduction in the intensity of headache, relieve in psychological stress and increase in craniocerebral activity. The use of SIT only in THE treatment can improve cervical mobility. In conclusion, it is necessary to use combination therapy for patients with TTH[14]. Del blanco muniz 2018 reviewed a study on narrative review of physiotherapy treatment. The RCT showed that massage achieved less pain and frequency, as well as better quality of life, perceived clinical sensation and range of movement; pain improved with suboccipital inhibition and aerobic exercises; and the range of movement with cervical manipulation, massage of soft tissues and mobilization [15]. Gemma V Espi Lopez 2014 reviewed a study on the treatment of tension type headache with articulatory and suboccipital soft tissue therapy; a double-blind, randomized, placebo-controlled clinical trial. The treatment with suboccipital soft tissue inhibition, despite producing less significant results, also has positive effects on different aspects of headache[16] Natalia oliveria-campelo 2010 reviewed a study on the immediate effects of atlanto-occipital joint manipulation and suboccipital muscle inhibition technique on active mouth opening and pressure pain sensitivity over latent myofascial trigger points in the masticatory muscles. The application of an atlanto-occipital thrust manipulation or soft tissue technique targeted to the suboccipital muscles led to an immediate increase in pressure pain thresholds over latent TrPs in the masseter and temporalis muscles and an increase in maximum active mouth opening. Nevertheless, the effects of both interventions were small and future studies are required to elucidate the clinical relevance of these changes[17]. Gemma – victoria espi lopez 2018 reviewed a study on Effect of Soft Tissue Techniques on Headache Impact, Disability, and Quality of Life in Migraine Sufferers: A Pilot Study. Soft tissue techniques based on MTrP therapy and stretching were helpful for improving certain aspects of migraine, such as the impact and disability caused by the headache, and the frequency and intensity of headache; however, when combined with suboccipital soft tissue inhibition, the treatment effect was larger[18] Juan Jose Arjona retamal 2021 reviewed a study on Effects of Instrumental, Manipulative and Soft Tissue Approaches for the Suboccipital Region in Subjects with Chronic Mechanical Neck Pain. A Randomized Controlled trial concluded that effective in order to improve ROM, PPT, VAS and disability in patients aged between 18 and 40 years old with chronic mechanic cervical pain[19]. Albert morasa 2015 reviewed a study on Myofascial trigger point-focused head and neck massage for recurrent tension-type headache: a randomized, placebo-controlled clinical trial concluded that no difference detected between massage and placebo. Patient report of perceived clinical change was higher in reduction of headache pain.[20] Sung-hak cho 2021 reviewed study on the effect of suboccipital muscle inhibition and posture correction exercises on chronic Tension-Type Headaches. There was a significant improvement in the HIT-6, the headache pressure pain threshold, the soft tissue pressure pain threshold, the type and number of myofascial trigger points and the posture group A and B to whom Suboccipital muscle inhibition and SMIx were applied. According to this study , the SMIx group both suboccipital soft tissue inhibition and forward head posture exercises can be effective intervention for patients with chronic tension-type headache[21]. Alejandro Ferragut – Garcias 2017 reviewed a study on Effectiveness of a Treatment Involving Soft Tissue Techniques and/or Neural Mobilization Techniques in the Management of Tension-Type Headache: A Randomized Controlled Trial concluded that the application of soft tissue and neural mobilization techniques to patients with FETTH or CTTH induces significant changes in PPT, the characteristics of pain crisis, and its effect on activities of daily living as compared with the application of these techniques as isolated interventions[22] Leandro Caamano barrios 2019 reviewed a study on evaluation of neurodynamic responses in women with frequent episodic tension type headache concluded that women with FETTH demonstrated and significantly reduced range of motion in all the test and also higher sensory responses in the LSS and LST compared to healthy women. The current study observed generalized lower mechanical pain thresholds to different provocation tests of the nerve tissues in women with FETTH supporting the presence of heightened nerve sensitivity to mechanical stimuli in this population. Future trials should investigate the efficacy of neurodynamic techniques in the clinical evolution of TTH[23] Sarah Stuhr 2014 reviewed a study on use of orthopedic manual physical therapy to manage chronic orofacial pain and tension-type

headache in an adolescent concluded that positive outcomes in conjunction with significant patient education on pain science, to treat patients with primary headaches and TMD.[24] Van Ettekoven 2006 reviewed study on efficacy of physiotherapy including a craniocervical training program for Tension-type headaches, A Randomized clinical trial. At 6 months follow up the craniocervical training group showed significantly reduced headache frequency, intensity and duration, reducing symptoms of tension-type headache significantly over a prolonged time frame[25]. Cesar fernandez de las penas 2006 reviewed a study on methodological quality of randomized controlled trials of spinal manipulation and mobilization in tension-type headache, migraine, and cervicogenic headache concluded that there is a need for high qualify randomised controlled trails assessing the effectiveness of these interventions in these headache disorders[26] C Lozano Lopez 2016 reviewed a study on efficacy of manual therapy in the treatment of tension-type headache. A systematic review from 2000-2013 concluded that study showed positive results, including reduction of medication consumption, and improvement in quality of life[27] Luca Falsiroli Maistrello 2018 reviewed a study on effectiveness of Trigger Point Manual Treatment on the Frequency, Intensity, and Duration of Attacks in Primary Headaches: A Systematic Review and Meta-Analysis of Randomized Controlled Trials Concluded that manual treatment of head and neck muscles may reduce frequency, intensity, and duration of attacks in Tension type headache and migraine headache, but quality of evidence according to grade approach was very low for the presence of few studies, high ROB and imprecision of results.[28]

6. CONCLUSION

Tension type headaches are more common in adolescent age. This study concluded that, for tension headaches both suboccipital soft tissue inhibition and the neurodynamics individually showed a significant improvement in reducing the pain in tension type headache. But, when we compared with individual techniques, like suboccipital soft tissue inhibitors along with neurodynamics were very much effective in reducing pain and increasing the CROM in tension headaches.

7. AUTHOR CONTRIBUTION STATEMENT

This Study was designed, directed and coordinated by V.Rajalaxmi as the principal investigator and provided conceptual and technical guidance for all the aspects of the study.. Shady Abdullah Alshewaier & L.Nazrin performed and analyzed the collected data and inputs were given. Radhakrishnan Unnikrishnan & Omana Shinuja contributed to discuss the methodology, results and contributed to the research work.

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9. CONFLICT OF INTEREST

Conflict of interest declared none.

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