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Comparing the effects of post-isometric relaxation and hold-relax technique for cervicogenic headache among computer users

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Abstract

Background & Objective: Cervicogenic headaches (CGH) can be caused by sedentary lifestyles and extended periods of time in fixed positions while using computers. Adapting to this sedentary lifestyle leads to neck and head pain, which is a prominent issue among adult computer users with a prevalence rate of 28%. Still, there is a lack of evidence on the effect of exercise and other physiotherapy treatments on cervical headaches. Therefore, the objective of this study was to compare the effects of Post-Isometric Relaxation (PIR) and the hold-relax technique on computer users suffering from CGH. *Method:* Forty-eight patients were randomly assigned to the PIR (n = 24) and Hold-Relax (n = 24) groups in this experimental study. Both groups received conventional physiotherapy in common. The total duration of the exercise the participants exposed was 4 weeks. The pre-test was conducted prior to the intervention, and the post-test was carried out 4 weeks after the completion of the intervention. The pre- and post-intervention outcomes were measured using the pain Numerical Rating Scale, Headache Disability Index (HDI), Copenhagen Neck Functional Disability Scale, Cervical Flexion Rotation Test, and neck range of motion. The data were analyzed with SPSS. *Result:* The CGH participants in the PIR and Hold-Relax groups had a significant improvement in the tested outcomes between their pre- and post-exercise values ($p < 0.0001$). However, the hold-relax technique found to have a significant reduction in HDI ($p < 0.01$) than post-isometric relaxation.
Conclusion: Both post-isometric relaxation and the hold-relax technique were beneficial in CGH. However, as compared to PIR, the hold-relax technique was more effective.

Keywords: Cervicogenic headache, neck pain, range of motion, unilateral headache, relaxation techniques.

INTRODUCTION

According to International Headache Society, cervicogenic headache (CGH) is defined as "any headache caused by a disorder of the cervical spine or its components, such as bone, disc, and/or soft tissue elements, usually, but not invariably, accompanied by neck pain".[1] Cervical pain is multifactorial in origin and is more common in office workers due to prolonged periods of inactivity, lack of exercise, poor posture management, and increased physical, mental, and psychological strains from work.

Cervicogenic pain frequently affects adult computer users between the ages of 18 and 40 with the prevalence rate of 28% in India.[2] The wrong orientation of the head and neck among smart device users causes the upper neck to extend and the head to be angled forward. Thus, it turned out that major pressure on the neck structures was the primary cause of the neck pain.[3]

CGH is a 'side-locked' or unilateral fixed headache that can be recognized by non-throbbing pain which originates from the neck to ipsilateral oculo-frontotemporal area. Patients with this illness may experience episodes or recurrent, variable periods of neck/head discomfort that are triggered by prolonged neck motions or stimulation of the ipsilateral painful point.[4] The radiating pain exchanges the pain signals through the nucleus of the 5th cranial nerve parts (ophthalmic and maxillary part), that is the reason to cause discomfort in patients' neck and is frequently radiated to forehead,

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orbital and temporal area of the head.[5] Migraine is also another type of headache, which is mostly confused with cervicogenic headache. In order to avoid misconceptions between them, the extent and location of the pain should be diagnosed. Migraine mostly demonstrates pain in the frontal and temporal regions, whereas CGH demonstrates pain in the suboccipital region.[6]

The Cervical Flexion Rotation Test (CFRT) is a reliable tool to diagnose CGH and is preferred over imaging techniques, which are frequently insufficient.[7,8.] The Neck Disability Index (NDI) and Numeric Rating Scale (NRS) are effective self-report measures for assessing pain and disability in people with neck problems.[9] The Copenhagen Neck Functional Disability Scale (CNFDS) is also valid and useful for evaluating neck disability.[10] Together, these tools help in understanding and diagnosing CGH and related conditions.

Several manual therapy approaches were used for CGH, including trigger points manual therapy and/or cervical manipulations, which have proven effective. Numerous research studies demonstrate that exercise therapy, including neck endurance and strength exercises, leads to a considerable reduction in headache severity when compared to aerobic exercises and manual therapy.[11] Manual therapy is being used in various studies. Nevertheless, there is still a shortage of evidence supporting the usefulness of relaxation therapy in treating CGH. Relaxation techniques such as Post Isometric Relaxation (PIR), hold-relax, contract relax, hold-contract relax and others have proven to be helpful in reducing neck pain, but no study has focused on the role of PIR and hold-relax in treating CGH.[12] PIR is touted as a good treatment for sudden connective tissue issues that cause acute muscle spasm, as it reduces pain and extends the tightened muscles in the neck to re-establish typical coarse neck range of motion (ROM).[13] On the other hand, the hold-relax PNF method is often employed to loosen up muscles, alleviate discomfort, & improve ROM.[14] Hence, intense relaxation techniques such as PIR and hold-relax techniques need to be compared to identify the better technique to benefit the management of CGH.

METHOD

In this study, 52 participants have been chosen from an industry camps and referred to Saveetha Medical Centre and Hospital, Thandalam, Chennai, India. The inclusion criteria include single sided headache without shifting to the other side or both sided headache with increased headache on the affected side, headache with cervical stiffness and pain, computer users who have sedentary lifestyle and have altered posture, positive flexion-rotation test, and restriction greater than 10° and age – 18 to 40 years, both male and female. The exclusion criteria include history of head and neck trauma, patient with psychiatric disorders such as depression, temporomandibular dysfunction, inherited disorders such as scoliosis, torticollis, headache not of cervical origin and known history of dizziness, vertigo, vomiting. However, four participants who were unwilling to participate were excluded from the study. This randomized control trial in total involves 48 participants and was randomly allocated into two groups by drawing lots, PIR (n=24), and Hold-Relax (n=24) Group (Figure 1). Neither the assessor nor the participants were blinded. The recruited participants were assessed by a clinical therapist at the Saveetha physiotherapy out-patient department, Chennai. The study was approved by International Review Board (IRB Number: 01/031/2023/ISRB/SR/SCPT).

The patients were clearly explained about the assessment and intervention procedure and were given consent before group division. The pretest and posttest outcome measures were assessed by NRS, HDI, CNFDS, and neck range of motion by goniometer. The pain NRS is widely used by clinicians and is said to be a valid, responsive, and reliable scale to measure pain. Likewise, the Headache Disability Scale and the CNFDS are also frequently used to diagnose disability in patients with CGH and are said to have high internal consistency, reliability, and construct validity.[9,10] The universal goniometer is used to assess neck range of motion in participants as it is considered to be a valid tool.

The cervical flexion rotation test was used to assess CGH in participants. CFRT has good construct validity and good to exceptional reliability when it comes to measuring C1-C2 rotation.[7] The participants were clearly explained about the safety measures and precautions of the procedure, and consent was obtained. The patient was asked to lie down on the couch. With this position, patient's head is maximally flexed. After that, the participants' necks were rotated to the left and to the right until they reached the end-range, which is usually reached at an average of 44° in healthy individuals. A positive test indicates ROM limitation with firm resistance at 10-degrees and pain induction. This reveals the confirmation of a

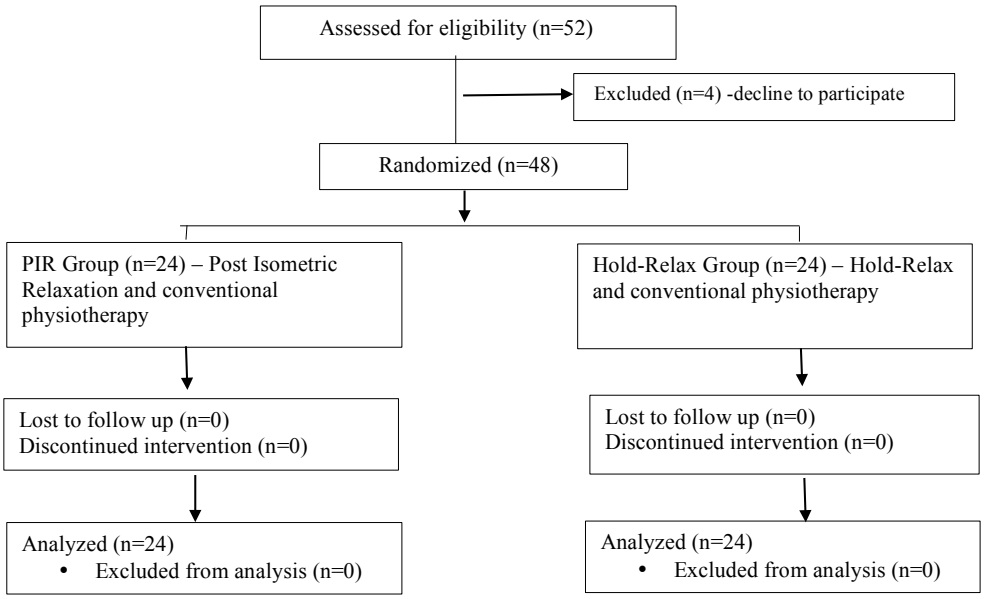

Figure 1. CONSORT flowchart

CGH and considered as participants of the study. The selected participants were randomly allocated into two groups: the PIR and Hold-Relax groups. Both groups received conventional physiotherapy in common. The pre-test was conducted prior to the intervention, and the post-test was carried out 4 weeks after the completion of the intervention. The intervention was given for a total duration of 4 weeks.

Intervention

Post Isometric Relaxation Group (PIR) (n=24)

The participants in this group were managed with PIR along with conventional therapy. The technique was applied thrice a week for four weeks (twelve sessions). At first, the patients were clearly explained about the procedure of the intervention. Before the PIR, Interferential Therapy (IFT) was given to the patient for 15 mins with a frequency of 20 to 30Hz. After that, PIR was given and the treatment was carried out for all the cervical motions- flexion, extension, lateral flexion, and rotation. The patient was made to sit comfortably and in a relaxed manner. At first, The participant's neck was bent in flexion's motion without stretch. The individual was told to contract their flexors of the upper neck against the physiotherapist's submaximal resistance in the opposite motion and were asked to breathe for 5 to 7 seconds. This isometric contraction was held for five to ten seconds while in this position. After this they were asked to relax the muscles and exhale and then the head was taken to a new barrier. With this new barrier, this cycle was repeated for 3 times progressively. In the same way this procedure was carried out for extension, lateral flexion, and rotation. For lateral flexion and rotation, treatment was given for left and right sides. After completion of procedure, patients were taught active neck exercises such as chin tucks, cervical extension, cervical lateral flexion, cervical rotation, shoulder shrugging, scapular squeeze. All the exercises were done for 5 repetitions 2 sets.

Hold-Relax Group (n=24)

The participants in this group were managed with hold-relax along with conventional therapy. The technique was applied thrice a week for four weeks (twelve sessions). The procedure was completely explained to the participants. Similar to PIR, the participants in this group received IFT for 15 mins with a frequency of 20 to 30Hz initially. After that, hold-relax technique was given and the treatment was carried out for all the cervical motions- flexion, extension, lateral flexion, and rotation and the position of the patient and therapist is same as the PIR group. Initially, the therapist placed one of his hands below the occipital region and another beneath the chin. The participant's neck was stretched passively in flexion motion. The participant was instructed to undergo contraction of their flexors in the

Table 1: PIR Group- Pre and post test values of NRS, HDI, CNFDS & neck range of motion

Outcome measures	Pretest	Posttest	Z value	P value
	Mean ± D	Mean ± SD		
NRS	7.04 ± 0.80	2.91 ± 0.77	-4.330	<0.0001
HDI	64.08 ± 5.85	25.41 ± 5.84	-4.296	<0.0001
CNFDS	75.24 ± 8.89	34.28 ± 9.14	-4.291	<0.0001
Flexion	48.79 ± 4.89	70.38 ±6.73	-4.289	<0.0001
Extension	41.42 ± 3.99	61.79 ± 3.22	-4.290	<0.0001
Lateral flexion	18.13 ± 2.69	35.33 ± 4.18	-4.288	<0.0001
Rotation	55.46 ± 4.53	77.04 ± 4.29	-4.293	<0.0001

NRS- Numerical Rating Scale, HDI- Headache Disability Index, CNFDS- Copenhagen Neck Functional Disability Scale, SD- Standard Deviation, PIR- Post Isometric Relaxation

Table 2: Hold-Relax Group- Pre and post test values of NRS, HDI, CNFDS & neck range of motion

Outcome measures	Pretest	Posttest	Z value	P value
	Mean ± SD	Mean ± SD		
NRS	7.08 ± 0.65	2.46 ± 0.66	-4.361	<0.0001
HDI	64.33 ± 7.09	21.33 ± 6.02	-4.288	<0.0001
CNFDS	73.58 ± 9.36	30.67 ± 8.95	-4.290	<0.0001
Flexion	50.08 ± 6.20	74.62 ± 5.12	-4.288	<0.0001
Extension	41.33 ± 4.84	63.21 ± 3.05	-4.289	<0.0001
Lateral flexion	18.04 ± 2.79	37.67 ± 2.57	-4.293	<0.0001
Rotation	54.63 ± 4.44	79.47 ± 3.16	-4.291	<0.0001

NRS- Numerical Rating Scale, HDI- Headache Disability Index, CNFDS- Copenhagen Neck Functional Disability Scale, SD- Standard Deviation

Table 3: Mean values of PIR & Hold-Relax Group for NRS, HDI, CNFDS & neck range of motion

Outcome measures	PIR Group	Hold-Relax Group	U value	P value
	Mean ± SD	Mean ± SD		
NRS	2.92 ± 0.78	2.46 ± 0.66	205.000	0.06
HDI	25.42 ± 5.85	21.33 ± 6.02	166.500	0.01
CNFDS	34.28 ± 9.14	30.67 ± 8.95	233.000	0.25
Flexion	70.37 ± 6.73	74.62 ± 5.12	185.500	0.03
Extension	61.79 ± 3.22	63.21 ± 3.05	211.000	0.11
Lateral flexion	35.33 ± 4.18	37.67 ± 2.57	190.500	0.04
Rotation	77.04 ± 4.29	79.42 ± 3.16	190.500	0.04

NRS- Numerical Rating Scale, HDI- Headache Disability Index, CNFDS- Copenhagen Neck Functional Disability Scale, SD- Standard Deviation, PIR- Post Isometric Relaxation

upper neck against the therapist's submaximal resistance in the opposite direction in the forehead. While in this position, this isometric contraction was held for 5 to 10 seconds. They were then instructed to undergo relaxation of their muscles. Following total relaxation, the participant was stretched furthermore in the flexion motion. This process was carried out for 3 times separately. In the same way, the procedure was carried out for extension, lateral flexion, and rotation. For lateral

flexion and rotation, treatment was given for the left and right sides. After completion of procedure patients were taught active neck exercises such as chin tucks, cervical extension, cervical lateral flexion, cervical rotation, shoulder shrugging, scapular squeeze. All the exercises were done for 5 repetitions 2 sets as same as PIR.

Statistical analysis

Due to the nature of outcome measures, non- parametric statistical analysis was used as the results were non-significant of the two interventions. Wilcoxon signed rank test was used for within group analysis and Mann-Whitney test was used for between group analyses. The significance level set for this study was $p < 0.05$. The software program used for the data analysis was SPSS version 27.

RESULT

A total of 48 participants were selected for this study which includes 28 females and 20 males with mean age value 25.29 ± 4.42 in PIR group and 25.67±3.48 in Hold-Relax group.

Within group analysis: Significant decline in pain was seen in both PIR and Hold-Relax groups as measured in NRS before and after the treatment. Notably, HDI significantly improved in both PIR and Hold-Relax groups after the treatment. Similarly, there was also improvement in CNFDS in both PIR and Hold-Relax group before and after treatment ($p <0.0001$). There is also a difference in Cervical Range of Motion. When analyzing the groups, there is a significant variation between pretest and posttest values of ROM. Significant improvement in both PIR and Hold-Relax group was seen before & after the treatment ($p <0.0001$).

Between group analysis: In both the groups, there is a statistically significant difference between pretest and posttest scores of NRS, NDI and CNFDS with a p value of <0.0001. Both groups have shown statistically significant improvement in NRS, HDI & CNFDS. The mean improvement in both groups was determined to be statistically significant in terms of range of motion as well. Hence this study conveys that in aspects of pain, disability and range of motion, both PIR and Hold-Relax group have shown greater improvement. When comparing PIR group with Hold-Relax group, Hold-Relax group has shown significant improvement than PIR group in terms HDI ($p<0.01$).

DISCUSSION

The purpose of this study was to find if the PIR and Hold-Relax method of treatment were useful in increasing range of motion and decreasing pain and disability for CGH over the course of 4 weeks. Over the years, there has been very little evidence about the effect of exercises in treating CGH, and still, the prevalence is increasing.[2] Hence, the objective was to compare these two treatments as there were no studies comparing them for CGH.

A recent randomized control trial with 30 participants was conducted in Pakistan to compare Muscle Energy Technique (MET) and Proprioceptive Neuromuscular Facilitation (PNF) for neck pain. The study's outcome measures were pain and ROM. Total duration of the intervention was for four weeks. After four weeks, it was determined that both techniques were efficient in treating neck discomfort, although PNF was found to be more beneficial than MET in terms of pain reduction.[12] The current study employed PIR, which is a type of MET, and Hold-Relax, which is a type of PNF, and found significantly similar improvements in terms of pain and range of motion. Additionally, the current study has used disability (NDI and CNFDS) as another outcome measure and included only computer users with CGH. Many studies have used PIR and hold-relax. There were only a few studies that compared these two treatments.

Furthermore, another study between PIR and Deep Neck Flexor (DNF) exercises was carried out. The aim of this study was to compare the effects of two therapies, PIR with DNF training and DNF exercise alone, on pain, functional impairment, and cervical ROM in people with sub-acute mechanical neck pain. The study revealed that the PIR group experienced less pain. PIR works on the principle of autogenic inhibition, which can be explained that if the muscle stretches more than its desired length then this will be sensed by Golgi Tendon Organ and prevents the further contraction of the muscle. It acts as a protective mechanism.[16] Similarly, the current study has also obtained similar results as PIR as an effective treatment. Many studies used PIR for neck pain, but only a few studies have implemented the PIR technique for CGH. Hence, PIR was taken as an intervention in the current study as there was a lack of evidence. Additionally, another randomized control trial with 66 participants was conducted to find the effect of the hold-relax technique and cranio-cervical flexor training. The outcome measures

used were similar to those in the current study. There was a reduction in pain, disability, and improvement in ROM in both groups following the intervention, but when the groups were compared, it was discovered that patients undergoing hold-relax experienced less discomfort than patients receiving cranio-cervical flexor training.[21] The findings were similar to the current study. Despite the fact that many studies have employed hold relax for neck pain, there is still a lack of evidence for its use for CGH.

In addition, a recent randomized control trial compared PIR with Myofascial Release (MFR) for non-specific neck pain for a total of 60 patients. Pain, disability, ROM, and quality of life were the outcomes used in this study. The study concluded that PIR showed better results than MFR. Similarly, the current study also revealed that PIR is an effective treatment in treating cervical pain.[22] MFR has been widely used by clinicians recently to treat neck pain, but there is less evidence for PIR. Additionally, another study compared static isometric neck exercise and hold-relax. The study concluded that both techniques were effective, and many patients had negative results in the cervical flexion rotation test after receiving the treatment.[23] The findings were similar to the current study as many patients had received negative results in CFRT after receiving intervention. Also, the current study revealed Hold-Relax group showed better results than PIR group post-treatment. Hold-relax often allows for a higher stretch intensity than PIR. The initial contraction in hold-relax causes tension in the muscle, preparing it for a more intense stretch during the relaxation phase. This can result in longer-term improvements in flexibility and range of motion. Numerous studies have employed PIR and hold-relax for neck pain, but there is a lack of evidence on the effect of these treatments on CGH. No studies compared these two treatments for CGH. Hence, PIR and hold-relax were taken as interventions and compared.

The limitations of this study was that people with CGH who are computer users were only included in this study. It is advised that future research should focus on populations with other aspects of CGH and also from other occupations. Also, age and gender specific study can be done. Further studies can include other measurement tools such as pain pressure threshold and also with large sample size.

We conclude that both PIR and hold-relax were effective in the treatment of CGH. But the patients in Hold-Relax technique group showed greater improvement in terms of HDI than the PIR group. Hence we conclude that the hold-relax technique has more effective than PIR technique in improving ROM and reducing pain and disability in CGH among computer users.

DISCLOSURE

Conflict of interest: None

REFERENCES

1. Xiao H, Peng B, Ma K, *et al*. The Chinese Association for the Study of Pain (CASP): expert consensus on the cervicogenic headache. *Pain Res Manag* 2019;2019(1):9617280. https://doi.org/10.1155/2019/9617280.
2. Jain H, Pachpute S. Prevalence of cervicogenic headache in computer users. *AIJR Abstracts* 2022:56. https://doi.org/10.21467/abstracts.130.
3. McDonnell MK, Sahrmann SA, Van Dillen L. A specific exercise program and modification of postural alignment for treatment of cervicogenic headache: a case report. *J Orthop Sports Phys Ther* 2005;35(1):3-15. https://doi.org/10.2519/jospt.2005.35.1.3
4. Martelletti P, van Suijlekom H. Cervicogenic headache: practical approaches to therapy. *CNS drugs* 2004:793-805. https://doi.org/10.2165/00023210-200418120-00004
5. Biondi DM. Cervicogenic headache: mechanisms, evaluation, and treatment strategies. *J Osteopath Assoc* 2000;100(s9):7-14. https://doi.org/10.7556/jaoa.2000.20035
6. Uthaikhup S, Barbero M, Falla D, Sremakaew M, Tanrprawate S, Nudsasarn A. Profiling the extent and location of pain in migraine and cervicogenic headache: a cross-sectional single-site observational study. *Pain Med* 2020;21(12):3512-21. https://doi.org/10.1093/pm/pnaa282
7. Anarte-Lazo E, Carvalho GF, Schwarz A, Luedtke K, Falla D. Differentiating migraine, cervicogenic headache and asymptomatic individuals based on physical examination findings: a systematic review and meta-analysis. *BMC Musculoskel Disord* 2021;22:1-8. https://doi.org/10.1186/s12891-021-04595-w
8. Antonaci F, Inan LE. Headache and neck. *Cephalalgia* 2021 Apr;41(4):438-42. https://doi.org/10.1177/0333102420944878
9. 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(12):1328-35. https://doi.org/10.1080/09593985.2018.1471763
10. Angilecchia D, Mezzetti M, Chiarotto A, Daugenti A, Giovannico G, Bonetti F. Development, validity and reliability of the Italian version of the Copenhagen neck functional disability scale. *BMC Musculoskel Disord* 2018;19:1-9. https://doi.org/10.1186/s12891-018-2332-z

11. Demont A, Lafrance S, Gaska C, Kechichian A, Bourmaud A, Desmeules F. Efficacy of physiotherapy interventions for the management of adults with cervicogenic headache: A systematic review and meta-analyses. *PM R* 2023;15(5):613-28. https://doi.org/10.1002/pmrj.12856
12. Page P. Cervicogenic headaches: an evidence-led approach to clinical management. *Int J Sports Phys Ther* 2011;6(3):254-66.
13. Gupta S, Jaiswal P, Chhabra D. A comparative study between postisometric relaxation and isometric exercises in non-specific neck pain. *J Exercise Sci Physiother* 2008;4(2):88-94. https://doi.org/10.18376/%2F2012%2Fv8i2%2F67588
14. Mahajan R, Kataria C, Bansal K. Comparative effectiveness of muscle energy technique and static stretching for treatment of subacute mechanical neck pain. *Int J Health Rehabil Sci* 2012;1(1):16-21. DOI:10.5455/ijhrs.00000004
15. Victoria GD, Carmen EV, Alexandru S, Antoanela O, Florin C, Daniel D. The PNF (Proprioceptive Neuromuscular Facilitation) stretching technique-A brief review. Ovidius University Annals, Series Physical Education & Sport/Science, Movement & Health. 2013 Jul 2;13. https://doi.org/10.2478%2Fv10078-012-0011-y
16. Suganthirababu P, Srinivasan V, Kumar P, Dhanusia S, Kumaresan A, Vishnuram S. Effectiveness of postural correction versus soft tissue techniques along with neural mobilization in management of pain and disability associated with cervicogenic headache: A comparative study. *Indian J Physiother Occupational Ther* 2024;18. http://dx.doi.org/10.37506/djq1e364
17. Shamim M, Abbas H, Jamil K. Comparing muscle energy technique and hold relax in the management of neck pain and upper trapezius tightness. *Pak J Rehabil* 2015;4(2):45-51. http://dx.doi.org/10.36283/pjr.zu.4.2/010.
18. Chauhan P, Attrey P, Singh AK. Effect of post isometric relaxation with deep neck flexor exercise in subacute mechanical neck pain. *Int J Health Sci Res* 2021;11(10):46-59. https://doi.org/10.52403/ijhsr.20211008
19. Nugraha MH, Antari NK, Saraswati NL. The efficacy of muscle energy technique in individuals with mechanical neck pain: a systematic review. *Sport Fit J* 2020;8:91-8. http://dx.doi.org/10.24843/spj.2020.v08.i02.p12
20. Abaspour O, Akbari M, Rezasoltani A, Ahmadi A. The effect of muscle energy technique on headache, upper cervical rotation and deep upper cervical muscle thickness in cervicogenic headache (randomized clinical trial). *Iranian Red Crescent Med J* 2020;22(4):e96982. http://dx.doi.org/10.5812/ircmj.96982
21. Suresh V, Venkatesan P, Babu K. Effect of proprioceptive neuromuscular facilitation and cranio-cervical flexor training on pain and function in chronic mechanical neck pain: A randomized clinical trial. *Physiother Res Int* 2024;29(1):e2058. https://doi.org/10.1002/pri.2058
22. Khan ZK, Ahmed SI, Baig AA, Farooqui WA. Effect of post-isometric relaxation versus myofascial release therapy on pain, functional disability, rom and qol in the management of non-specific neck pain: a randomized controlled trial. *BMC Musculoskel Disord* 2022;23(1):567. https://doi.org/10.1186/s12891-022-05516-1.
23. Chaliawala R, Anandh S. Efficacy of the static isometric neck exercises and hold- relax (PNF) technique to relive cervicogenic headache among college students: A comparative study. *Int J Health Sci* 2022; 6(S8):942-9. https://doi.org/10.53730/ijhs.v6nS8.9954
24. Jeevakani V, Ramalingam V, Kameswaran R. Compare the effectiveness of ultrasound versus trigger point release on cervicogenic headache. *Indian J Physiother Occupational Ther* 2024;18. https://doi.org/10.37506/tbdfrz05