Combination of neural mobilization with hot packs Vs traction(ict) with isometric neck exercise in case of cervico-brachial pain syndrome (an RCT)

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***Abstract*—Background: Neck-related pain is a common physical problem with high recurrence and chronicity rates. Smoking, bad posture, anxiety, depression, neck strain, and occupational activity are among the controllable elements that contribute to its multifactorial genesis, which often manifests subtly. NP is a major social burden that is especially common among people who use computers and office professionals.**

Objective: The present investigation compared the efficacy of traction with intermittent neck exercises and neural mobilization with hot packs in treating physical neck discomfort.

Methods: Purposive sampling was used to pick 40 volunteers, ages 25 to 50, from AdvancedNeurology and Surgery Hospital in Jaipur for this experimental analysis. Two groups of twenty participants each were formed. While Group B got traction through isometric neck exercises, Group A underwent neural mobilization using hot packs. For four weeks, both groups received therapy once a day. The Neck Disability Index (NDI) and Numeric Pain Rating Scale (NPRS) were used to assess pain and functional performance. JASP version 16.0 was used for statistical analysis, and the "T" test was used for both within-group and between-group comparisons.

Results: Descriptive statistics were used to analyse data. Of 40 participants, 21 were males and 19 were females. In Group 1 (neural mobilization with hot packs), NPRS scores

improved from a mean of 6.8 (SD=0.951) to 4.35 (SD=0.671) to 2.1 (SD=0.718)(t=21.466, t=22.650, p<0.05), and NDI scores improved from a mean of 27.95 (SD=3.663) to 17.75 (SD=2.673) to 8.5 (SD=1.147) (t=25.842, t=24.15 p<0.05). In Group 2 (traction with isometric neck exercise), NPRS scores improved from a mean of 6.25 (SD=0.91) to 4.1 (SD=0.641) to 1.9 (SD=0.718) (t=19.648, t=23.947, p<0.05), and NDI scores improved from a mean of 27.8 (SD=2.353) to 18.35 (SD=1.843) to 8.75 (SD=1.251) (t=38.453, t=52.303 p<0.05). Between-group comparisons indicated that Group A had significantly greater improvements in NPRS (p<0.05) and NDI scores (p<0.05).

Conclusion: In individuals with physical neck discomfort, neural mobilization with hot packs and traction with isometric neck exercise both successfully decreased pain and enhanced function. However, there were noticeably more gains in pain alleviation and functional results when neural mobilization was combined with hot packs.

***Index Terms*—radiating neck pain, isometric neck exercise, intermittent cervical traction, moist heating, Numeric Pain Rating Scale, Neck Disability Index**

I. INTRODUCTION

Cervicobrachial pain syndrome (CBPS) is defined as neck pain accompanied with tingling, numbness, or irritation in the arm, upper back, or upper chest, with or without a headache [1]. Pain often travels either unilaterally or bilaterally from the neck to the forearm. Neurogenic or nonneurogenic origins are the cause. The main cause of neck and upper extremity pain symptoms in cervico brachial pain syndrome is increased mechanosensitivity of the neural tissue (2). The global organization for Standardization of Pain classifies neck pain into three categories: acute (lasting less than three months), chronic (lasting more than three months), and subacute (lasting under three months or at least six weeks). In addition to supporting the head, the cervical serves as a passageway for blood vessels and nerves. A bent or overworked neck position causes exhaustion in the neck muscles, which exacerbates discomfort. Maintaining a single head posture throughout the day strains the discs, joints, and muscles, resulting in discomfort (3). The cervical canal may narrow in cervicobrachial pain syndrome because to osteophytes sliding facets or concovertebral joints, central disc herniation, thickening of the ligamentum flavum, or even local cervical vertebral subluxation linked to ligamentum laxity. Neural mobilization using the median nerve slider method, lateral cervical glide mobilization of the lower cervical vertebra, and neck isometric exercise resulted in greater gains in function and discomfort in manual treatment (4). This kind of neck discomfort is typically complex in origin and frequently develops subtly. Physical neck discomfort has been linked to risk factors that can be altered including posture issues, depressive disorders, anxiety, neck muscle strain, and vocational activities, especially those requiring extended computer usage. Muscle snugness, spasms, reduced range of motion, headaches, and localized pain that may be directed to the head and upper limbs are all signs of physical neck discomfort. Keeping the head still for prolonged periods of time, such when

driving or using a computer, frequently makes these sensations worse. The causes for physical neck pain include overuse-induced muscular strain, age-related joint deterioration, herniated discs, bone spurs that compress nerves, and injuries to the cervical region(5). The most common cause of neck radiculopathy is physical or inflammatory triggers surrounding the cervical nerve roots, which can be caused by tumors, trauma, synovial cysts, meningeal cysts, dural arteriovenous fistula, or tortuous vertebral arteries. These stimuli can also result from disc herniation or osteophytes formation, which can cause nerve root compression, inflammation, or both (6). 21.9% of Cervical Radiculopathy instances are caused by a herniated disc. Both mechanical and chemical mechanisms might result in nerve injury from a ruptured disc. Localized ischemia results from the force of compression of the nerve using a soft disk. Pro-inflammatory factors are triggered by disc degeneration and local ischemia. These factors are mediated by matrix metalloproteinases, interleukin factor-6, and tumor necrosis factor-alpha. This proinflammatory factor makes the region more sensitive and painful (7). One therapeutic approach for nervous system disorders is neural mobilization. Neural mobilization has been proposed as a successful therapeutic approach, however there is mostly informal proof to back this claim. Any disease that decreases nerve motion and normal strain may result in aberrant tension in the corresponding nerve in normal posture and during extremities mobility; neural mobilization exercises aid in the restoration of longitudinal motion of the damaged nerve (8). The most popular and traditional neck strengthening exercise for neck discomfort is isometrics, which patients may do on their own (9).

II. MATERIAL & METHODS

In this Interventional study, we enrolled 50 patients both male and female, aged between 20 and 50 years with chief complain of radiating pain from neck to hand complications were recruited at the advanced neurology and neurosurgery Hospital, jaipur, rajsthan during sept 2025 to February 2026. In this study, there were 28 male and 22 females. The Medical Ethical Committee gave its approval to the trial. Based on clinical evaluation and radiography of x-rays and MRIs, they were diagnosed with cervicobrachial pain syndrome; ten of these patients were excluded from the research due to time constraints. The study's patients were split into two groups using a random selection technique. Patients make up Groups A (N = 20) and B (N = 20), respectively. A history of severe neck trauma, including fractures, congenital cervical spine diseases, neurological impairments, malignancies, spinal surgery, rheumatoid arthritis, spondylolisthesis, psychiatric disorders, cardiac difficulties, or vertebrobasilar insufficiency, was one of the exclusion criteria.

Out come measures:

NDI: Cervical radiculopathy does not have any particular implications. The most used practical results measure for disability connected to the cervical region is the Neck Disability Index (NDI). The Oswestry Disability Index was modified to generate this very dependable outcome assessment instrument. The NDI measures activity restrictions brought on by neck pain and

impairment and assesses the degree of disability. A common method for assessing self-rated impairment brought on by neck discomfort is the Neck impairment Index (NDI) (10).

NPRS: The Numerical Pain Rating Scale (NPRS) is a single-dimensional assessment of adult pain intensity. The 11-numeric point scale's baseline values run from "0" to "10," which represents one extreme of pain, such as "no pain" (11).

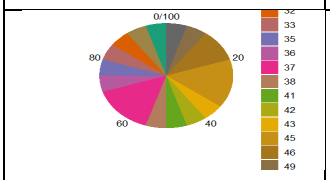
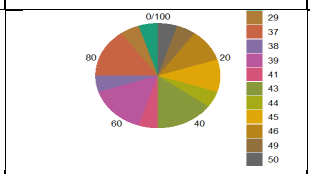
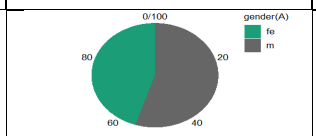
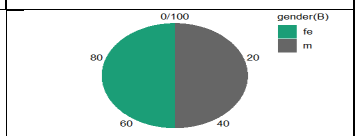
Procedure: Individuals were divided into two groups of twenty at random, with Group B receiving traction through isometric neck exercises and Group A receiving neural mobilization with heat packs. Prior to each session, both groups had baseline therapy, which included five minutes of calm posture. Neural mobilization entailed applying heat packs for 8 to 10 minutes, then stretching for 10 seconds. This process was performed 10 times a day for four weeks. In a similar vein, isometric neck exercises (hold-relax) were performed in conjunction with intermittent cervical traction for ten minutes every day for four weeks with the goal of centralizing discomfort and enhancing function. A data collecting proforma was used to capture demographic data, including age, gender, employment, and medical history. Applying the NPRS, individuals were asked to score their degree of pain on a scale from 0 (no pain) to 10 (worst possible pain). The Neck impairment Index (NDI), a questionnaire with ten questions ranging from 0 to 5 and a total score of 50, was used to assess neck impairment. Pre (day 0), intermediate (day 14), and post-intervention (day 28) data were gathered.

Statistical analysis: Mean ± SD is used to display the descriptive data. In order to ascertain if the treatment impact varied substantially across groups, this investigation used a t-test on the change outcomes (post-intermediate and intermediate-pre) with two groups. JASP and Microsoft Excel were used for all analyses, with an a priori statistical significance criterion of $p < .05$.

III. RESULTS

	age (A)	age (B)	gender(A)	gender(B)	NPRS day 0(A)	NPRS day 0(B)	NPRS day14(A)	NPRS day14(B)	NPRS day28(A)	NPRS day28(B)	NDI day 0(A)	NDI day 0(B)	NDI day14(A)	NDI day14(B)	NDI day28(A)	NDI day28(B)
Valid	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Missing	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Mean	39.750	40.750			6.800	6.250	4.350	4.100	2.100	1.900	27.950	27.800	17.750	18.350	8.500	8.750
Std. Error of Mean	1.423	1.372			0.213	0.204	0.150	0.143	0.161	0.161	0.819	0.526	0.598	0.412	0.256	0.280
Median	39.5	42.0			7.000	6.000	4.000	4.000	2.000	2.000	28.00	28.00	18.50	18.00	9.000	9.000

Mode	37.00	37.00			7.000	6.000	4.000	4.000	2.000	2.000	30.00	30.00	20.00	18.00	9.000	10.000
Std. Deviation	6.365	6.138			0.951	0.910	0.671	0.641	0.718	0.718	3.663	2.353	2.673	1.843	1.147	1.251
MAD	5.500	3.500			1.000	1.000	1.000	0.000	0.500	0.500	2.500	2.000	1.500	2.000	1.000	1.000
Variance	40.513	37.671			0.905	0.829	0.450	0.411	0.516	0.516	13.418	5.537	7.145	3.397	1.316	1.566
Range	22.0000	25.0000			3.000	3.000	2.000	2.000	2.000	2.000	14.000	8.000	10.000	6.000	5.000	4.000
Minimum	28.0000	25.0000			5.000	5.000	3.000	3.000	1.000	1.000	20.000	23.000	10.000	15.000	5.000	6.000
Maximum	50.0000	50.0000			8.000	8.000	5.000	5.000	3.000	3.000	34.000	31.000	20.000	21.000	10.000	10.000

age(A)	age(B)	gender(A)	gender(B)
			

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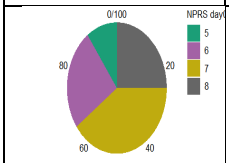	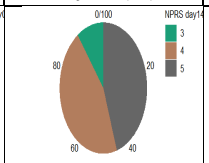	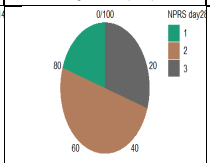	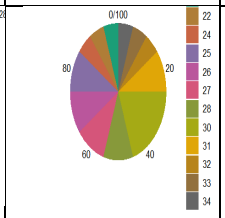	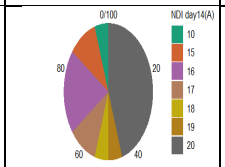	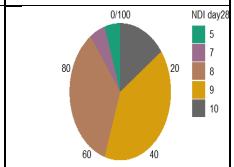
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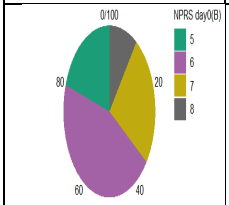	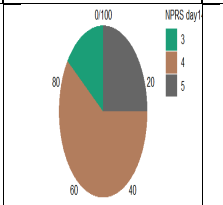	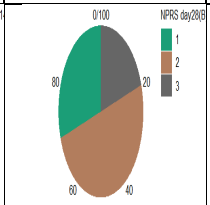	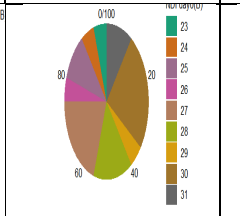	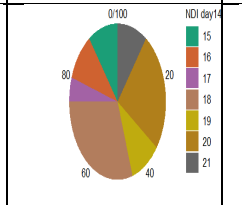	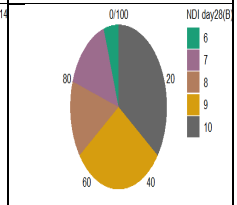

Paired Samples T-Test												
								95% CI for Mean Difference			95% CI for Cohen's d	
Measure 1		Measure 2	t	df	p	Mean Difference	SE Difference	Lower	Upper	Cohen's d	Lower	Upper
age(A)	-	age(B)	0.531	19	0.602	1.000	1.883	4.942	2.942	0.119	0.557	0.323
NPRS day0(A)	-	NPRS day14(A)	21.466	19	0.045	2.450	0.114	2.211	2.689	4.800	3.219	6.370
NPRS day14(A)	-	NPRS day28(A)	22.650	19	0.044	2.250	0.099	2.042	2.458	5.065	3.403	6.715
NDI day0(A)	-	NDI day14(A)	25.842	19	0.031	10.200	0.395	9.374	11.026	5.779	3.900	7.647
NDI day14(A)	-	NDI day28(A)	24.150	19	0.043	9.250	0.383	8.448	10.052	5.400	3.637	7.152
NPRS day0(B)	-	NPRS day14(B)	19.648	19	0.051	2.150	0.109	1.921	2.379	4.393	2.935	5.840
NPRS day14(B)	-	NPRS day28(B)	23.974	19	0.041	2.200	0.092	2.008	2.392	5.361	3.610	7.101
NDI day0(B)	-	NDI day14(B)	38.453	19	0.0328	9.450	0.246	8.936	9.964	8.598	5.849	11.254
NDI day14(B)	-	NDI day28(B)	52.307	19	0.03	9.600	0.184	9.216	9.984	11.696	7.980	15.287
NPRS day0(A)	-	NPRS day0(B)	1.814	19	0.086	0.550	0.303	0.085	1.185	0.406	0.056	0.857
NPRS day14(A)	-	NDI day14(B)	37.138	19	0.039	14.000	0.377	14.789	13.211	8.304	10.872	5.646
NPRS day28(A)	-	NPRS day28(B)	0.748	19	0.0464	0.200	0.268	0.360	0.760	0.167	0.276	0.606
NDI day0(A)	-	NDI day0(B)	0.248	19	0.038	0.150	0.604	1.114	1.414	0.056	0.384	0.493
NDI day14(A)	-	NDI day14(B)	1.270	19	0.0219	0.600	0.472	1.589	0.389	0.284	0.728	0.167
NDI day28(A)	-	NDI day28(B)	0.865	19	0.0398	0.250	0.289	0.855	0.355	0.193	0.633	0.252

from above analysis the “p” value shows the significant changes in among the group study as well as between the group study i.e($p < 0.05$)

IV. DISCUSSION

For cervico-brachial pain, neural mobilization (NM) with hot packs generally produces better pain and disability outcomes than intermittent cervical traction (ICT) plus isometric neck exercise alone, especially when NM is combined with cervical and scapular-stabilizing exercises. Neural mobilization with hot packs: NM targets mechanosensitive nerve tissues (brachial-plexus and upper-limb nerves) to reduce neurogenic pain, improve neurodynamics, and centralize

symptoms; hot packs augment this by reducing muscle spasm and improving tissue extensibility. Systematic reviews show NM is more effective than traction, standard exercise, or usual care alone for nerve-related cervicobrachial pain, with greater reductions in pain and disability. This effects as improves nerve sliding, Reduces intraneural edema, Decreases mechano-sensitivity, Improves axoplasmic flow, Increases local circulation, Reduces muscle spasm and Decreases pain before mobilization.

ICT traction with isometric neck exercise: ICT reduces intervertebral and foraminal compression, while isometric neck exercises improve deep-neck-flexor and global-neck strength, thus reducing pain and disability in chronic neck pain. Studies comparing ICT with neural mobilization or NM-combined protocols usually find that ICT with exercise is beneficial but inferior to protocols that include NM, unless NM is itself added to the traction-based regimen. This effects as Increases intervertebral space, Reduces nerve root compression, Decreases disc pressure, Strengthen deep neck flexors, Improve cervical stability and Prevent recurrence.

V. CONCLUSION

This research concluded that both the procedures are beneficial for management of cervico-brachial pain syndrome, still neural mobilization with hot packs shows significant improvement in pain and disability as compared with ICT with isometric neck exercises in sub-acute or chronic CBPS. However ICT gives good short-term relief in disc-related radiculopathy. Hence group -A putting a better result than group- B. Exercise is essential in both groups for long-term benefit.

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