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Original Article

Comparative Effects of Manual Cervical Traction and Natural Apophyseal Glides on Pain and Disability among Patients with Cervical Radiculopathy

Mariam Ghazanfar[1], Jawad Ahmad[2], Shazia Rafiq[3], Shahzada Iftikhar Hussain[4], Tooba Amin[5], Muhammad Rizwan[1], Umme Kalsoom[6] and Ayesha Razzaq[7]

[1]Physiotherapy Department, The University of Lahore, Lahore, Pakistan
[2]Physiotherapy Department, GCU Faisalabad, Faisalabad, Pakistan
[3]Physiotherapy Department, Jinnah Hospital, Lahore, Pakistan
[4]Physiotherapy Department, Social Security Hospital, Lahore, Pakistan
[5]Physiotherapy Department, Fatima Memorial Hospital, Lahore, Pakistan
[6]Physiotherapy Department, Gulab Devi hospital, Lahore, Pakistan
[7]Physiotherapy Department, Mayo Hospital, Lahore Pakistan

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***Corresponding Author:**

Ayesha Razzaq
Physiotherapy Department, Mayo Hospital, Lahore Pakistan
drayesharazzak@gmail.com

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ABSTRACT

Cervical radiculopathy is a clinical condition that affects the nerve roots and is frequently brought on by inflammatory or compressive disease. Although many alternative techniques have been proposed for reducing patients' pain and disabilities, manual therapy has been proven to be an efficient method. The goal of the current study was to compare how well the Manual Cervical Traction and Natural Apophyseal Glides treated individuals with cervical radiculopathy for pain and impairment. **Methods:** The physiotherapy department of Mayo Hospital Lahore conducted a parallel design, randomized controlled experiment on 72 patients. Following baseline testing, participants were divided into two groups randomly. Natural apophyseal glides and baseline therapy were given to group A, whereas manual cervical traction and baseline treatment were given to group B. Three weeks of treatment were spent receiving three weekly sessions on a rotating basis. A neck disability index and a numeric pain rating scale were used for assessment at the baseline and second and third weeks of therapy. The data was examined using SPSS version 25. **Results:** Data was analyzed for 72 participants. Mean and standard deviation scores for pain in group A were 3.14 ± 0.601 and of group B were 3.34 ± 0.482 before treatment. The post treatment score for group A were 1.57 ± 0.502 and of group B were 1.63 ± 0.490 with P value 0.632. P value for disability was 0.11. **Conclusion:** Natural Apophyseal Glides is equally effective to manual cervical traction for relieving pain but found to be more effective for improving functional mobility.

INTRODUCTION

Cervical radiculopathy is a neurological marvel where dysfunction of the cervical spinal nerve, the root of the nerve, or of both happens [1]. Radicular pain is only a symptomatic representation of ectopic impulse origin whereas in radiculopathy the neurological signs of both sensory, motor dysfunction are also included [2]. This radicular pain radiates from neck towards posterior shoulder, into arm, sometimes into the hand. This clinical issue is because of the provocative or the compressive changes brought about by space occupying lesion that can be a disc herniation, spondylitic spur or cervical osteophytes [3]. An examination gave that the prevalence

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is 83 for each 100,000 for the populace completely, and an expanding rate in fifth life decade (203 for every 100,000) [4]. Many epidemiological studies report raised incidence of spondylitic changes for cervical radiculopathy [5]. Nerve-root compression does not always produce pain unless the dorsal-root ganglion is also compressed [6]. Certain inflammatory mediators provoked by the disc herniation also provoke the symptoms. These stimuli alters the structure and function and produce hypoxia, edema, ischemia, inflammation, fibrosis, lessened gliding movement and raised mechano-sensitivity of neural tissue [7]. Manual therapy intervention restore these neural alterations to lessen pain, disability originated by cervical radiculopathy [8]. The pattern and location of symptoms depends by the root level influenced, and can be sensory and/or motor by the dorsal and/or additionally ventral root involvement. Presenting complaints of patients are numbness, pain, anesthesia, and weakened upper extremity leading to significant functional limitations and often disability [9]. Yet, broad history, physical examination and explicit tests help to detail a finding. Further neurological examination done by sensation, strength and tendon reflex testing [10]. In 75% cases, treatment is conservative and rehabilitation based [11]. Cervical radiculopathy intervened by different approaches including pharmacological (NSAIDs and Oral steroids), injections (cervical epidurals), surgeries (anterior cervical discectomy with fusion) and rehabilitation [12]. Physical therapy management may include postural education, exercises (cervical retraction, extension, strengthening of neck, scapular muscles), the cervical traction, the manual therapy [13]. In our investigation we assessed the helpfulness of the manual cervical traction, the natural apophyseal glides (NAGS). NAGS are from the Mulligan's treatment techniques of mobilization/manual therapy [14]. Manual treatment is a high speed, low amplitude manipulation or mobilization [15]. The use of hands applied directly with high velocity, and with less amplitude thrust directed at cervical joints appreciated by an audible crack, called as cervical manipulation. (A meta-analysis on manual) There is some risk for injury in manipulation, whereas mobilization is a safer technique [16]. Mulligan's concept stated on Kaltenborn's principle for restoring accessory physiological joint movement [17]. According to this concept spinal mobilization in weight bearing spine position is done by applying a parallel force to facet planes of spine [18]. NAGs Mulligan is expressed as passive oscillatory procedures performing parallel the facet joint planes of the cervical, upper thoracic spine [19]. NAGs is effective in increasing the range of motion, reducing the pain intensity, and improving the neck functional mobility in patients with cervical radiculopathy [20]. Manual cervical traction is a decompression treatment that diminishes pain through widening and stretching of neural foramina by applying force directly through hands of the clinician. Cervical traction provides instant analgesic effect in cervical radiculopathy [21]. A systematic review and meta-analysis has found that cervical manual traction can decrease pain in cervical radiculopathy patients and have less effects on functional mobility. There comes a lot of techniques under the umbrella of manual therapy. Manual cervical traction and natural apophyseal glides are two of them. The available literature has only identified the effects of cervical manual traction and natural epiphyseal glides alone or in conjunction with conventional treatment but did not compare them with each other. Although different studies have been conducted by adding these intervention with routine physical therapy but there is still need to determine the comparative effectiveness of these approaches along with their right dosage and method [22]. The comparative effectiveness of cervical traction and mobilization has been identified in other cervical diseases (cervicogenic headache [23] and non-specific neck pain [24]) but not in patients with cervical radiculopathy. The treatment techniques applied previously do not satisfactorily address the usefulness of manual therapy in treatment of cervical radiculopathy [21]. So, it demands the need of future researches to be directed on this topic. The goal of this research was to fill the gap of past studies. This study aimed to determine the comparative effects of manual cervical traction and natural apophyseal glides on pain and disability among patients with cervical radiculopathy**.** This research would be useful for both clinicians, researchers and for community in general.

METHODS

In 2018, the Mayo Hospital Lahore's Physiotherapy Department conducted a randomised controlled experiment. In this study, 72 patients who met the inclusion criteria were included. The sample size of 72 patients (36 in each group) was calculated using a 5% threshold of significance, 95 percent power of test, and predicted mean values of 1.50 0.877 for Natural Apophyseal Glide and 2.30 1.0177 for Manual cervical traction [25]. Every participant in the research signed a written informed consent form. The study was ethically authorized by the Institution Review Board of King Edward Medical University Lahore. The study comprised both male and female patients between the ages of 20 and 60 who had clinically and radiological confirmed unilateral or bilateral cervical radicular illness. Mechanical cervical discomfort or nonspecific neck pain, cervical myelopathy, any spine surgery or malignancy, and pain due to postural imbalances were all ruled out of the research. Prior to the randomization, the therapist

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determined eligibility. Following a baseline examination, eligible patients were randomly allocated to one of two groups (group A or group B) in a 1:1 ratio. The fish bowl approach was used for randomization. The researchers retained the randomization assignments in opaque, sealed envelopes and opened them after baseline testing. For three weeks, Group A got traditional treatment as well as Natural Apophyseal Glides (NAGs) less than 6 repetition (three sets). Manual Cervical Traction (MCT) was used in combination with standard treatment in Group B. Three meetings per week were scheduled for three weeks of treatment. MCT was applied in a way similar to intermittent traction. A 20 to 25 degree angle from horizontal was used to provide a force of 8 to 10 kg. There were five sets of cervical traction. Every set includes 1 minute of traction followed by a 20-second rest break. The session lasted 10 minutes in total. Both groups were given traditional treatment as well as manual approaches. Hot packs, exercises for range of motion, neck strengthening and stability trainings were all part of the traditional treatment. Throughout the trial, the usual or baseline treatment was used. The Numeric Pain Rating Scale was used to determine the severity of the pain (NPRS). The numeric scale spans from 0 to 10 on an 11-point scale. 0 indicates no discomfort and 10 indicates the most severe agony. A higher score implies that the pain is more intense. Neck Disability Index was used to assess functional abilities (NDI). The NDI is divided into ten categories, each having a score of 50. The NDI may also be calculated as a percentage by multiplying the resulting score by 2. The maximum percentage allowed is 100. A higher score suggests that the patient is more disabled. At baseline, post 2nd week, and post 3rd week of intervention, all data was obtained using a standardized NPRS and NDI questionnaire. To avoid bias, all treatments were provided by a single person. The statistical programmed SPSS version 21 was used to analyze the data. The qualitative data was provided in frequency and percentages, whereas the quantitative data was presented in mean and standard deviation. For qualitative data, the chi square test was used to establish baseline similarity. The Shapiro Wilk test was performed to assess the data's normality. Non-parametric tests were used on the NPRS and NDI to establish the significant mean difference because the p value was less than 0.05. Mann Whitney is a character in the film Mann Whitney, The Wilcoxon Signed Rank test was used to evaluate within-group differences and the U test was used to compare two groups at various intervals. Statistical significance was defined as a p-value of less than 0.05.

RESULTS

Data were analyzed for 70 participants; relevant statistics were taken out and presented in tabular form. Table 1 shows that the mean ±SD age, weight and height of patients was 40.26 ± 10.30, 71.36 ± 4.83 and 172.54 ± 10.18 respectively in group A while in group B it was 41.23 ±11.45, 74.49 ± 3.02 and 170.25 ± 12.17 respectively. In group A, 4 (11.4%) participants were male and 31 (88.6%) were female whereas in group B, 5 (14.3%) were male and 30 (85.7%) were female. Thirty-four (97.1%), 4 (11.4%), 16 (45.7%) patients reported numbness, swelling and hypertension in group A, respectively. While in group B 33 (94.3%), 6 (17.1%), 12 (34.3%) patients reported numbness, swelling and hypertension respectively.

Variables	Group A (NAGS) (Mean ± SD)n (%)	Group B (MCT) (Mean ± SD)n (%)	p-value
Age (Years)	40.26±10.30	41.23± 11.45	0.865
Weight (kg)	71.36±4.83	74.49± 3.02	0.814
Height (cm)	172.54±10.18	170.25±12.17	0.913
Gender			
Male	4 (11.4%)	5 (14.3%)	0.721
Female	31 (88.6%)	30 (85.7%)	
Numbness	34 (97.1%)	33 (94.3%)	0.555
Swelling	4 (11.4%)	6 (17.1%)	0.495
Hypertensive	16 (45.7%)	12 (34.3%)	0.329

Table 1: Descriptive Statistics

Table 2 shows that in terms of pain the pre-treatment pain mean and standard deviation were 5.80 ± 1.828 in NAGS and post 3rd week pain mean and standard deviation were 1.1 ± 1.105. After 3 weeks application of MCT the mean and standard deviations were 1.83 ± 1.317 which is less than the mean and standard deviation of pre-treatment that was 6.26 ± 1.421. In terms of NDI the pre-treatment mean and standard deviation for NAGS group were 57.54 ± 22.440and post 3 weeks treatment mean and standard deviation were 6.23 ± 6.394. In MCT group the pre-treatment mean and standard deviation for NDI were 59.49 ± 22.209 and post 3 weeks treatment were 10.29±7.262. The results showed that both pain and NDI was improved after application of treatment. The p value was statistically significant 0.019 and 0.021 after 3 weeks of treatment for pain and NDI respectively.

Parameter		NAG (Mean ±SD)	MCT (Mean ±SD)	P value
Pain	Pre	5.80±1.828	6.26±1.421	0.378
	Post 2nd week	2.86±1.089	3.40±1.063	0.078
	Post 3rd week	1.11±1.105	1.83±1.317	0.019*
	P value	0.000*	0.000*	
Neck Disability Index	Pre	57.54±22.440	59.49±22.209	0.663
	Post 2nd week	20.40±9.503	24.11±10.209	0.161
	Post 3rd week	6.23±6.394	10.29±7.262	0.021*
	P value	0.000*	0.000*	

(*): p value < 0.05: Significant

Table 2: Comparison of Pre and Post Treatment readings for Pain and Disability

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DISCUSSION

The purpose of the research was to compare the effects of natural apophyseal glides and manual cervical traction to relieve pain and decrease or eliminate disability in cervical radiculopathy patient. Results of this study showed that patients' pain and functional mobility improve after application of natural epiphyseal glide and manual cervical traction. But natural epiphyseal glide was superior to manual cervical traction in improving both pain and functional mobility after 3 weeks of treatment. The superior effect of sustained natural epiphyseal on pain and functional mobility can be linked to the neurophysiological effects which includes increased pain pressure threshold and decrease pain rating [26]. Moreover, normal articular surface movement is required to maintain the flexibility of adjacent nerves, and modified biomechanics may impact the nervous outgrowth. As a result, restoring normal joint mechanics may normalise negative neuron-names that appear as a result of limited joint movement [27]. The findings of current research are consistent to previous studies. Similarly, Zhu et al., showed better effects of manual therapy in the treatment of cervical radiculopathy. SNAGs were useful in treating cervical radiculopathy [16]. In comparison to our findings that NAGs are superior to manual cervical traction Farhad et al., found that both intervention were equally effective in improving cervicogenic headache [23]. These inconsistencies can be related to change in population because we focused on cervical radiculopathy patients instead of cervicogenic patients. Moreover, they only enrolled 30 patients while our results were based on 70 patients. Difference in sample size number can also yield to different findings. A study was done to see the comparative effects of Keltenborn segmental traction and mechanical cervical traction for the treatment of cervical spondylosis [25]. This study looks at the use of manual therapy in the treatment of cervical pain, but it doesn't look at the benefits of manual cervical traction; instead, it looks at the effects of mechanical cervical traction on neck pain. Manual traction was shown to be effective in lowering pain and impairment in patients with cervical radiculopathy in this investigation. Another research looked into the usefulness of mechanical traction in the treatment of cervical radiculopathy [28]. There was a high risk of biasness in that study and quality of evidence was low. Another comprehensive review and meta-analysis of randomized controlled trials was conducted to compare the effectiveness of cervical traction combined with traditional physical therapy vs traditional physical therapy alone in patients with cervical radiculopathy in terms of pain and impairment [22]. There was a lack of homogeneity in cervical radiculopathy diagnostic criteria. The present study addressed comparative effects of cervical mobilization and manual cervical traction which were not studied before in the cervical radiculopathy patients. Moreover, we decrease the chance of selection biasness by randomization and concealed allocation. However, we couldn't blind the patients because of the nature of treatment in both groups as one was receiving NAGs while the other group received the cervical manual traction. Same therapist treated all the patients therefore it also decreased the chance of producing different effects when treated by a different therapist. The chance of producing different effects is actually attributed to the manual nature of the technique as both of the treatments have to be applied through hands. The above mentioned strengths make it a unique study and provide insightful information for the clinicians and general public about the effects of natural epiphyseal glides and manual cervical traction in cervical radiculopathy patients.

CONCLUSION

Both techniques are helpful in treating cervical radiculopathy. However, a Natural apophyseal glides (NAGS) is more effective than manual cervical traction (MCT) to treat pain and disability in these patients. This study concluded that Natural apophyseal glides depicts more satisfactory results than manual cervical traction in subjects of cervical radiculopathy for decreasing their pain and disability in terms of the NPRS and NDI.

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