



Original Article

Compare the Effectiveness of Mulligan (Nags & Snags) and McKenzie (Self-Stretching) On Improving the Pain and Functional Ability in Patient with Chronic Neck Pain

Sania Naz¹, Nargis Jamali², Arooj Iftikhar², Hira Nawaz³, Touseef Iqbal⁴ and Faisal Ghafoor⁵

¹Department of Physiotherapy, Government College University Faisalabad, Layyah, Pakistan

²Department of Physiotherapy, University of Lahore, Lahore, Pakistan

³Department of Physiotherapy, Afro-Asian Institute, Lahore, Pakistan

⁴Punjab University, Lahore, Pakistan

⁵Department of Physiotherapy, Superior University, Lahore, Pakistan

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***Corresponding Author:**

Sania Naz

Department of Physiotherapy, Government College University Faisalabad, Layyah, Pakistan
saniaab495@gmail.com

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ABSTRACT

Neck pain is Consider the major problems and the prevalence of this musculoskeletal disorders are very common in people. **Objective:** To compare the effectiveness of mulligan and McKenzie on improving pain and functional ability in chronic neck patient. **Methods:** This trial was registered with Iranian trail registry with reference no: IRCT20220414054537N4. It's a Double-Blind Randomized Clinical Trial that was conducted in DHQ Hospital Shadrah a affiliated teaching hospital attached with Afro-Asia University Lahore from 1 May 2022 to 30 June 2022. The sample size was calculated and total 26 patients were divided into two groups. The ages of the patients were around 20-55 years old. The entire patient having the mechanical neck pain was included in this study. Patients were selected from DHQ hospital in May to June 2022 duration. In group A we applied the mulligan technique of manual therapy treatment that included the Natural apophyseal glides, sustained natural apophyseal glides and Self SNAGs in sitting position of the patient. The second group of 13 patients had applied the Mackenzie exercises in seven motions like 4 movement of neck extension, 2 movements in lateral flexion and rotation and one movement in flexion direction. **Results:** Overall the post Numeric pain rating scale and Neck Disability index was significantly improved in group A which received the NAGs & SNAGs Mobilization technique. **Conclusion:** Mulligan (NAGs SNAGs) is effective than Mackenzie (self-stretching) treatment technique to improve the functional ability and reducing pain in chronic neck patient.

INTRODUCTION

Neck pain is Consider the major problems and the prevalence of this musculoskeletal disorders are very common in people. Due to technology and differential professional job role it is considered that a lot of people spend their maximum time in sitting position now a days at work It is estimated that out of 3,1 person is affected by this neck problem now a day's specifically in middle age [1]. Total burden of the neck pain was calculated by available

statistics, and it was concluded that it ranks among the 4th position in worldwide disease 4th highest in terms of disability as measured by years lived with disability (YLD), and 21st in terms of overall burden. Cervical pain that is originated from mechanical in nature relatively different from the pain due to anatomical and structural cause. Patient with mechanical neck pain or chronic neck pain having no specific reason in disturbance of structure like

capsular, cartilaginous and ligament level. There are many factors that lead to the symptom chronicity that included poor body positioning during work that apply more stress on the body, psychological stress, Sports related activity and Occupational related task. Pain in the neck area can be take place at the any level from First thoracic spine inferiorly toward nuchal line superiorly and till the lateral level of the neck [2]. It is the second most occurring musculoskeletal problem after Low back pain. The prevalence of the neck pain in most recent research show the result range from 43-66.7% and the age is the major factor that cause the neck pain. The nature of the pain is wide ranged and it different in different musculoskeletal condition it may be traumatic, recurrent and it may be persistence [3]. Major reason of developing neck pain due to the Disc related pathologies like heriation, buldge, sequestration, Radiating pain of the cervical, and the myofascial pain syndrome. Neck pain may be initiated due to muscle strain or due to maintaining any abnormal body posture and using poor ergonomics environment in their workplace. Sometimes this pain may go away in 1-3 weeks or sometimes it takes much longer duration and become chronic [4]. The result of a met analysis also showed some concern that these manipulations put some extra stress on the soft tissue and leads to the injury so mobilization simple is quite safe as compare with the manipulation [5]. The concept of Mulligan's is based on the Kaltenborn principle for recovering and restoring accessory physiological joint movement [6]. By applying a parallel force to the facet joint of spine it helped to mobilize the spinal joint in weight bearing position by using the concept of Kaltenborn [7]. The mulligan technique expressed as passive oscillatory treatment process that apply the parallel force on the facet joint planes of the cervical, upper thoracic spine. Both NAGs and SNAGs considered best treatment protocol in increasing the range of motion, reducing the pain intensity, and improving the neck functional mobility in patients with cervical radiculopathy [8]. Mackenzie exercise, stretching exercises and traction therapy are being applied in clinical practice [9]. In particular, the Mackenzie exercise is one of the self-stretching exercises. Posture correction by relaxing the tense muscles by the patient himself. As an effective intervention method to improve neck alignment [10]. The forward head posture causes the superficial muscles to exert excessive muscle activity and because it supports the head in the wrong posture together, daily life You will experience discomfort during your life. These symptoms in order to treat it, various interventions have been methods have been reported so far. Therefore, the patient is actively Self-stretching exercise mediated by a therapist and a therapist or machine Manual stretching exercise for 4 weeks to intervene in anterior head posture

Muscle activity and neck alignment in patients with chronic neck pain accompanied by Analyze the factors affecting the function and verify the effect related to functional recovery and to provide clinical basic data for this [11]. Our focus in this study was to analyze the best way to treat the neck pain due to abnormal posture of the neck. The aim of the study to understand the effectiveness of the SNAGs versus self-stretching.

METHODS

This is double-blind randomized controlled trial. This trial was registered with Iranian trail registry with reference no: IRCT20220414054537N4. The sample size was calculated by the mean value of the referenced article using the epitool method for sample size calculation and total 26 patients were divided into two groups [12]. The ages of the patients were around 20-55 years old. The entire patient having the mechanical neck pain and pain due abnormal posture of neck like forward head posture were included in this study. Patients were selected from DHQ hospital in May to June 2022 duration. All the patients that were Included for the study should base on Biondi questionnaire [13]. All the patients should have greater than 20% neck disability index score and the score of Numeric pain rating will be more than 2-3 points. All participants were excluded from this study if they had any hearing problem, vision disorder, smell issues or any kind of taste related problem. All participant those were having any systematic problems, like tension headache, Rheumatic arthritis, several viral and bacterial infection, Inflammatory disease, migraine, any neurological problem, and fracture in neck region were excluded from this study [12, 14]. The examiner of the study was also blind. The consent form from the patient were taken at the start of the study and patient after reading the form showed their availability and consent for this trail study [12]. The Experimental group applied with the mulligan technique of manual therapy treatment that included the Natural apophyseal glides, sustained natural apophysial glides and Self SNAGs in sitting position of the patient. NAGs movements are the oscillatory Movement and these mobilizations tend to be provided in antero-cranially direction of the selected cervical joint. The movement of the force is in parallel direction toward the restricted cervical facet joints. We have applied 3 sets of 6 repetitions each and the intensity of dosage was maintained in 2-3 hertz. The procedure of the movement as per the following instruction of the mulligan in which we had applied the sustained glide and asked the patient to move its neck in several direction like Flexion, Extension, Side flexion and rotation and these movement was maintained in pain free direction and range [15]. The second group of 13 patients with chronic neck pain was

given the following treatment strategies in which we had applied the Mackenzie exercises in seven motions like 4 movement of neck extension, 2 movements in lateral flexion and rotation and one movement in flexion direction. The pre and post value was monitored by performing the Mackenzie technique in the patient and its effect on the body was also monitored as well especially in soft tissue area of the neck in the body. Both sides of the body were measured and compared with each other. The time to take the new reading is 10 second. The Body skin of the neck area was pushed by 0.18 N force and after the pre-load a force of 0.58N was applied to the neck skin at the interval of 15 ms. Thereafter, the vibration on the skin surface was triggered by Myoton PRO (Myoton AS, Estonia), a muscle tone measurer, which was used to examine the bio mechanic indices [16,17]. The Numeric pain rating scale and Neck disability Index as an outcome measuring tools. Statistical analysis was performed to analyze the effect of the treatment applied to the subjects of both control and experimental groups. It was done by using the IBM SPSS Inc.25.0 version. For this, the data were incorporated in MS excels spreadsheet. Out of 26 subjects 13 were randomized into Group 1 and 13 are randomized into Group 2. All the 26 subjects complete the entire protocol as defined by 2 months of treatment and pre and post value were taken by using the Numeric pain rating scale and Neck disability scale. The outcomes of the study were neck pain and Functional Ability. The following treatment applies with the frequency of 4 times a week and the whole treatment session was continued for 8 weeks. Total 32 sessions were given to both groups and the follow-up were taken after the 8 weeks and evaluated after this. Statistical tools were applied, and data were normally distributed to between group comparison calculated by paired t-test and for the in between groups and independent sample t-test for between both groups post value. Descriptive measures like mean, the standard deviation was reported along with the p-value.

RESULTS

The study was conducted on 26 subjects. The diagnose Chronic Neck Pain from both genders included in this study. Overall, 26 populations were divided into two groups of 13,13. Out of 26 patient 16 were the male patient and 10 were the female. Out of 26 the 6 patients where BMI underweight and 20 were containing the normal BMI. All the subjects were a mean age of 25.27 ± 3.29 of experimental group and conventional group. Mean and standard deviation of BMI for experimental group and for conventional group was 1.77 ± 0.43 . Table 1 Showed the mean and standard deviation of Numeric pain value in Experimental group and control in between group (independent sample t test value). The mean and standard

deviation of Numeric Pain rating scale in pre value in group A was 7.38 ± 0.65 and Group B was this 7.46 ± 0.8 . The post value of Numeric pain rating scale in group A was 1.07 ± 0.64 and in group B was this 4.00 ± 1.08 . The mean difference between pre and post Numeric pain rating scale value in group A was calculated 6.31 ± 0.01 and group B was 3.46 ± 0.21 . The p value between pre and post value within group (<0.05) show significant difference.

Table 1: Showed the mean and standard deviation of Numeric pain value in Experimental group and control in between group (independent sample t test value)

Numeric Pain Rating scale	Experimental Group	Control Group	p-value
Pre-Numeric Pain rating scale	7.38 ± 0.65	7.46 ± 0.87	0.802
Post Numeric Pain rating scale	1.07 ± 0.64	4.00 ± 1.08	0.000
Mean Difference	6.31 ± 0.01	3.46 ± 0.21	

Table 2 Showed the mean and standard deviation of neck disability index in Experimental group and control in between group (independent sample t test value) The mean and standard deviation of Neck Disability scale in pre value in group A was 7.38 ± 0.65 and Group B was 7.46 ± 0.87 the post value of Neck Disability scale group A was 1.07 ± 0.64 group B was 7.46 ± 0.87 . The mean difference between pre and post Neck Disability scale value in group A was 6.31 ± 0.01 and group B was 3.46 ± 0.21 . The p value between pre and post value within group (<0.05) show significant difference.

Table 2: Showed the mean and standard deviation of neck disability index in Experimental group and control in between group (independent sample t test value).

Neck Disability Index	Experimental Group	Control Group	p-value
Pre Neck-Disability Index	37.15 ± 4.23	36.84 ± 3.80	0.847
Post Neck Disability Index	13.53 ± 6.32	23.69 ± 7.50	0.001
Mean Difference	23.62 ± 2.09	13.15 ± 3.70	

DISCUSSION

There was no significant difference between the pre-treatment values of two groups according to numeric pain rating scale and neck disability index (p value <0.05) Overall the post Numeric pain rating scale and Neck Disability index was significantly improved in group A which received the NAGs & SNAGs Mobilization technique. The p value while comparing the post value of group A and group B was significant. The Overall post Numeric rating scale and disability index values improved in both groups and the p value had been significant. It had observed that significant improvement had seen because the p value was significant while comparing the post value in Numeric Pain rating and neck disability index of both groups A and B. The result of our study has shown the improvement in the neck disability score and pain scale but when we compare the effect it has showed that SNAGs has given better result as compared to

the mulligan techniques. But in group A Both the Pain scale and the neck disability in chronic neck pain showed the improvement in the symptoms and other Activities by applying the mulligan techniques these result has given the same result as we received in some previous result by Ali et al, They concluded that Patient with chronic neck pain has given the better outcomes and improvement in the neck disability scale and pain scale by Applying The NAGS & SNAGs [18]. The result of our study has shown the improvement in the neck disability score and pain scale but when we compare the effect it has showed that SNAGs has given better result as compared to the mulligan techniques. Our study result is coherent with the result we received by the study of Lopez et al. He Concluded that SNAGs Showed better result as compare to other Manual therapy techniques[19], We have applied both SNAGs NAGs combined to received better outcomes in term of improving neck function, Range of motion, Pain and other neck related functional movement. IN group A we have received the better significant outcomes in improving neck disability scale and pain scale. This study is coherent with the result of study conducted by Put et al. The concluded the result in their study that Mulligan technique showed superior result in improving the Range of motion, pain and neck function as compared to the other group which received multimodal therapy which included the Massage in cervical spine area, Ultrasound and electrotherapy [20]. We have received the significant improvement in Group A in the neck function and improvement in all aspect of neck movement because when we calculated the result of both group A(Mulligan) and Group B(Mackenzie). This study is coherent because one of the study of few year back also has done the same procedure by applying Mulligan technique and Maitland technique to compare these techniques. They received that after applying the 1-month period of treatment in both groups Maitland and mulligan that NAGs & SNAGs showed the better clinically significant improvement as compared to the Maitland technique. Gautum concluded that Mulligan is better treatment protocol than other treatment techniques [21]. In group A Both the Pain scale and the neck disability in chronic neck pain showed the improvement in the symptoms and other Activities by applying the mulligan techniques these result has coherent with the Ahmad et al in 2013 concluded the same result after taking the measurement in pre and post value in both groups applying the mulligan and Kaltborn. They found that after giving the mulligan techniques in patient with neck pain shoed the better result as compare to the Kaltborn mobilization group [22]. There was no significant difference between the pre-treatment values of two groups according to numeric pain rating scale and neck disability index(p value <0.05)Overall the post Numeric pain

rating scale and Neck Disability index was significantly improve in group A which received the NAGs & SNAGs Mobilization technique. The P value while comparing the post value of group A and group B was significant. The study result is coherent with the study of abdelgalil et al in which he concluded that mulligan with exercise showed better result but when we compare the Mulligan with exercise and without exercise this showed non-significant result. But as we have received the clue that both groups show same level of improvement hence, we found the significant improvement has seen in SNAGs & NAGs (Mulligan technique)[23]. The result of our study has shown the improvement in the neck disability score and pain scale but when we compare the effect it has showed that SNAGs have given better result as compared to the mulligan techniques. This study has given the same research base result we found in the study of El Sodany et al in 2014 in which he explained the application of mulligan techniques, exercises and mobilization with exercises and alone exercise. They concluded that SNAGs Group has given the better result as compared to the others group [24].

CONCLUSIONS

Mulligan (NAGs SNAGs) is effective than Mackenzie (self-stretching) treatment technique to improve the functional ability and reducing pain in chronic neck patient. Limitation of this research was low sample size and extensive scale that was unable to fill appropriate.

Authors Contribution

Conceptualization: SN, NJ

Methodology: SN, AJ

Formal Analysis: AI, AJ, TI

Writing-review and editing: SN, TI, FG

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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REFERENCES

- [1] Binder AI. Cervical Spondylosis and Neck Pain. *Bmj*. 2007 Mar; 334(7592): 527-31. doi: 10.1136/bmj.39127.608299.80
- [2] Misailidou V, Malliou P, Beneka A, Karagiannidis A, Godolias G. Assessment of Patients with Neck Pain: A Review of Definitions, Selection Criteria, and Measurement Tools. *Journal of Chiropractic Medicine*. 2010 Jun; 9(2): 49-59. doi: 10.1016/j.jcm.2010.03.002

- [3] Zhou C, Luo ZD. Electrophysiological Characterization of Spinal Neuron Sensitization by Elevated Calcium Channel Alpha-2-Delta-1 Subunit Protein. *European Journal of Pain*. 2014 May; 18(5): 649-58. doi: 10.1002/j.1532-2149.2013.00416.x
- [4] Cohen SP. Epidemiology, Diagnosis, and Treatment of Neck Pain. In *Mayo Clinic Proceedings* 2015 Feb; 90(2): 284-299. Elsevier. doi: 10.1016/j.mayocp.2014.09.008
- [5] Zhu L, Wei X, Wang S. Does Cervical Spine Manipulation Reduce Pain in People with Degenerative Cervical Radiculopathy? A Systematic Review of the Evidence, and a Meta-Analysis. *Clinical Rehabilitation*. 2016 Feb; 30(2): 145-55. doi: 10.1177/0269215515570382
- [6] McDowell JM, Johnson GM, Hetherington BH. Mulligan Concept Manual Therapy: Standardizing Annotation. *Manual Therapy*. 2014 Oct; 19(5): 499-503. doi: 10.1016/j.math.2013.12.006
- [7] Said SM, Ali OI, Abo Elazm SN, Abdelraoof NA. Mulligan Self Mobilization Versus Mulligan Snags on Cervical Position Sense. 2017. doi: 10.15621/ijphy/2017/v4i2/141947
- [8] Ojoawo A, Nihinlola B. Effects of Sustained Natural Apophyseal Glides in the Management of Cervical Radiculopathy. *International Journal of Medical Reviews and Case Reports*. 2019; 1(0): 1. doi: 10.5455/IJMRCR.Management-Cervical-Radiculopathy
- [9] Wickstrom BM, Oakley PA, Harrison DE. Non-Surgical Relief of Cervical Radiculopathy Through Reduction of Forward Head Posture and Restoration of Cervical Lordosis: A Case Report. *Journal of Physical Therapy Science*. 2017; 29(8): 1472-4. doi: 10.1589/jpts.29.1472
- [10] Warude T, Shanmugam S. The effect of Mckenzie Approach and Mulligan's Mobilisation (SNAGS) in Lumbar Disc Prolapse with Unilateral Radiculopathy. *International Journal of Science and Research*. 2014; 39(4.89): 38-93.
- [11] Kang JI, Jeong DK, Park SK, Yang DJ, Kim JH, Moon YJ, Baek SY. Effect of Self-Stretching Exercises on Postural Improvement in Patients with Chronic Neck Pain Caused by Forward Head Posture. *Journal of the Korean Society of Physical Medicine*. 2020; 15(3): 51-9. doi: 10.13066/kspm.2020.15.3.51
- [12] Zemadani K. The Short and Mid-term Effects of Mulligan Concept in Patients with Chronic Mechanical Neck Pain. *Journal of Novel Physiotherapy and Rehabilitation*. 2018; 2: 022-35. doi: 10.29328/journal.jnpr.1001018
- [13] Hurwitz EL, Carragee EJ, van der Velde G, Carroll LJ, Nordin M, Guzman J, Peloso PM, Holm LW, Côté P, Hogg-Johnson S, Cassidy JD. Treatment of neck pain: noninvasive interventions: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Journal of manipulative and physiological therapeutics*. 2009 Feb; 32(2): S141-75. doi: 10.1016/j.jmpt.2008.11.017
- [14] Nobari M, Arslan SA, Hadian MR, Ganji B. Effect of Corrective Exercises on Cervicogenic Headache in Office Workers with Forward Head Posture. *Journal of Modern Rehabilitation*. 2017; 11(4): 201-8.
- [15] Exelby L. The Locked Lumbar Facet Joint: Intervention Using mobilizations with Movement. *Manual therapy*. 2001 May; 6(2): 116-21. doi: 10.1054/math.2001.0394
- [16] Boonstra MC, Malefijt MD, Verdonchot N. How to Quantify Knee Function After Total Knee Arthroplasty?. *The Knee*. 2008 Oct; 15(5): 390-5. doi: 10.1016/j.knee.2008.05.006
- [17] Viir R, Laiho K, Kramarenko J, Mikkelsen M. Repeatability of Trapezius Muscle Tone Assessment by a Myometric Method. *Journal of Mechanics in Medicine and Biology*. 2006 Jun; 6(02): 215-28. doi: 10.1142/S0219519406001856
- [18] Ali A, Shakil-ur-Rehman S, Sibtain F. The Efficacy of Sustained Natural Apophyseal Glides With and Without Isometric Exercise Training in Non-Specific Neck Pain. *Pakistan Journal of Medical Sciences*. 2014 Jul; 30(4): 872. doi: 10.12669/pjms.304.5148
- [19] Lopez-Lopez A, Alonso Pérez JL, Gonzalez Gutierrez JL, La Touche R, Lerma Lara S, Izquierdo H, Fernández-Carnero J. Mobilization Versus Manipulations Versus Sustain Apophyseal Natural Glide Techniques and Interaction with Psychological Factors for Patients with Chronic Neck Pain: Randomized Controlled Trial. *Eur J Phys Rehabil Med*. 2015 Apr; 51(2): 121-32.
- [20] Put M, Huber J, Pieniżek M, Gądek-Michalska A, Szczygieł A. A Randomized Clinical Trial of Multimodal Therapy and Mulligan's Concept of Manual Therapy for Patients with Chronic Pain Syndrome Caused by Upper Cervical Spine Disorders. *Int J Orthop Rehabil*. 2016; 3: 40-6. doi: 10.12974/2313-0954.2016.03.01.6
- [21] Gautam R, Dhamija JK, Puri A, Trivedi P, Sathiyavani D, Nambi G. Comparison of Maitland and Mulligan Mobilization in Improving Neck Pain, ROM and Disability. *Int J Physiother Res*. 2014 June; 2(3): 561-6.
- [22] Ahmad R, Asim H, Nasir R. Comparison of Mulligan Manual Therapy Techniques with Kaltenborn Manual Therapy Techniques in Patients with Nonspecific Neck Pain in Improvement on Neck Disability Index. *Int J Sci Res*. 2015; 4: 1-4.
- [23] Ganesh GS, Mohanty P, Pattnaik M, Mishra C.

Effectiveness of Mobilization Therapy and Exercises in Mechanical Neck Pain. *Physiotherapy Theory and Practice*. 2015 Feb; 31(2): 99-106. doi: 10.3109/09593985.2014.963904

- [24] El-Sodany AM, Alayat MS, Zafer AM. Sustained Natural Apophyseal Glides Mobilization Versus Manipulation in the Treatment of Cervical Spine Disorders: A Randomized Controlled Trial. *Int J Adv Res*. 2014; 2(6): 274-80.