JHWCR
Journal of Health, Wellness, and Community Research
Volume III, Issue VII
Open Access, Double Blind Peer Reviewed.
Web: https://jhwcr.com, **ISSN**: 3007-0570
https://doi.org/10.61919/dency405

Article

Comparative Effects of Autogenic and Reciprocal Inhibition Techniques on Range of Motion, Pain and Disability Among Smartphone Users with Trapezitis

Muhammad Awais Hassan[1], Humera Mubashar[2], Tarteel Kouser[3], Faiza Altaf[4], Muhammad Sarfraz[5], Fiza Bukhari[6], Anam Hamid[2]

1 Recovery Rehab Resistance Fitness, Dubai, United Arab Emirates
2 Riphah International University, Lahore, Pakistan
3 BPP University, London, United Kingdom
4 University of Management and Technology Sialkot, Pakistan
5 Dow University of Health Sciences, Karachi, Pakistan
6 University of Baluchistan, Quetta, Pakistan; Tor Vergata University, Rome, Italy

Correspondence
avihomelahore08@gmail.com

Cite this Article

Received	2025-05-20
Revised	2025-06-16
Accepted	2025-06-18
Published	2025-06-23

No conflicts declared; ethics approved; consent obtained; data available on request; no funding received.

Authors' Contributions
Concept: MH; Design: HM; Data Collection: TK, AA; Analysis: MS, FB; Drafting: AH

ABSTRACT

Background: Trapezitis, a condition characterized by inflammation and pain in the trapezius muscle, is increasingly prevalent among smartphone users due to sustained poor posture and muscle strain. Non-pharmacological interventions such as muscle energy techniques have been explored for improving pain, range of motion (ROM), and functional disability, yet comparative evidence regarding their relative efficacy remains limited. **Objective**: To compare the effects of autogenic inhibition and reciprocal inhibition techniques on range of motion, pain, and disability among smartphone users with trapezitis. **Methods**: This randomized clinical trial was conducted at Nusrat Rasheed Medical Complex, Lahore, over eight months from July 2023 to December 2024. Forty participants diagnosed with trapezitis were randomly allocated into two groups: Group A (autogenic inhibition) and Group B (reciprocal inhibition). Each group received treatment three times per week, consisting of 2 sets of 10 repetitions, over a six-week period. Outcome measures included Numeric Pain Rating Scale (NPRS), Neck Disability Index (NDI), and goniometric assessment of cervical ROM, evaluated at baseline and post-intervention. Data normality was assessed using the Shapiro-Wilk test, and parametric tests were applied accordingly. **Results**: The mean age of participants in both groups was 27.24±4.007 years. Independent T-test revealed no significant difference between groups at baseline ($p>0.05$). However, paired T-test within-group analysis indicated significant improvements in both groups post-treatment ($p<0.05$), with Group B exhibiting greater improvements in pain reduction, ROM, and disability scores. **Conclusion**: Reciprocal inhibition technique is more effective than autogenic inhibition in improving pain, range of motion, and functional disability among patients with trapezitis associated with smartphone use.

Keywords: trapezitis, autogenic inhibition, reciprocal inhibition, neck pain, disability

INTRODUCTION

Neck pain is one of the most common non-traumatic musculoskeletal complaints, affecting approximately 75.7% of the population (1). The trapezius muscle, located in the posterior region of the neck, is essential for elevating the head and performing shoulder shrugging movements. Trapezitis, an inflammatory condition of the trapezius muscle, typically presents with symptoms such as posterior neck pain, muscle spasms, shoulder discomfort, and sensations of numbness or tingling in one or both upper limbs (1). This condition is often accompanied by a reduction in cervical and shoulder range of motion. Given that nearly two-thirds of individuals are likely to experience neck pain at some point in their lives, the clinical and functional implications of trapezitis are significant, particularly in relation to the complex neuromuscular coordination of the cervical and shoulder regions (2).

Among the contributing factors to neck pain, upper trapezitis remains a frequent diagnosis. It is commonly seen in individuals maintaining prolonged static neck positions, such as habitual smartphone users, making them more susceptible to developing inflammation in the trapezius muscle. A comprehensive rehabilitation approach is crucial for managing this condition, as it can lead to debilitating pain, limited cervical motion, and compromised performance in daily activities (3). Notably, the tendency of the upper

trapezius fibers to remain shortened due to suboptimal ergonomic postures contributes to muscle overactivity and pain generation (4). Importantly, neck pain may present without a prior history of trauma or radiographic abnormalities (5), and prior research by Cagnie et al. has reinforced the relationship between poor seated posture and the onset of neck pain (6).

The widespread adoption of smartphones for communication, entertainment, and professional tasks has introduced new biomechanical stressors on the cervical spine. The placement of devices below shoulder level, particularly when users are seated, encourages a forward head posture that increases cervical spine load and may contribute to the development of muscular strain and discomfort (7).

Muscle Energy Techniques (METs) have emerged as a valuable therapeutic modality in the management of myofascial neck pain (MNP), employing voluntary muscle contractions to facilitate relaxation and restore normal ROM. The two commonly applied MET variants are Autogenic Inhibition (AI) and Reciprocal Inhibition (RI), each based on distinct neuromuscular principles. AI involves a submaximal contraction followed by passive stretching of the same (agonist) muscle, leveraging the inhibitory response mediated by Golgi tendon organs. In contrast, RI relies on contracting the agonist muscle to inhibit the antagonist through spinal reflex mechanisms mediated by muscle spindles (8,10,12). These techniques are reported to alleviate pain, improve muscle strength and tone, enhance circulation, and increase joint mobility and muscle extensibility (8).

Trigger point identification through palpation remains a key diagnostic step, where Simons described the presence of hypersensitive nodules that elicit referred pain upon sustained pressure (9). METs harness the body's intrinsic neuromuscular reflexes, aiming to normalize muscle tone and facilitate movement. Despite growing interest, comparative evidence regarding the effectiveness of AI and RI in clinical practice is limited. A notable study assessed the short-term outcomes of AI and RI combined with static stretching in individuals with MNP, yet broader evidence remains scarce (11). Challenges in current literature include small sample sizes, homogeneous populations, and short follow-up durations, which constrain the external validity and applicability of findings (8).

Given the substantial socioeconomic burden of neck pain—second only to back pain in occupational settings—and its impact on productivity and healthcare expenditure (8), there is a pressing need for robust clinical investigations. The present study aims to expand the current understanding of trapezitis-related pain and disability and offer evidence-based recommendations for intervention strategies. By evaluating the comparative efficacy of AI and RI techniques, this study intends to assist clinicians in selecting optimal treatment approaches, thereby enhancing the quality and individualization of care for patients with mechanical neck pain.

MATERIALS AND METHODS

This study employed a randomized clinical trial design, conducted over an eight-month period from July 2023 to December 2024 at the Nusrat Rasheed Medical Complex, Lahore. Ethical approval was obtained from the Research Ethics Committee of Riphah International University, Lahore, prior to commencement. The study adhered to the Consolidated Standards of Reporting Trials (CONSORT) guidelines for clinical research reporting. Participants were recruited through non-probability convenience sampling and subsequently randomized into two intervention groups using a lottery method.

Sample size estimation was performed using Epitool software, based on the primary outcome variable—pain—measured using the Numeric Pain Rating Scale (NPRS). A minimum of 34 participants (17 per group) was required, and after accounting for a 20% attrition rate, the final sample size was determined to be 40.

Inclusion criteria encompassed male and female smartphone users aged 20–40 years, reporting neck pain (NPRS score >3), restricted cervical range of motion (ROM) (13), and moderate disability as defined by a Neck Disability Index (NDI) score of 15–24 (30–48%). Exclusion criteria included individuals with neck pain attributed to whiplash or headache, diagnosed neurological disorders, prior surgical history involving the head, neck, cervical spine, or shoulders, presence of infection or inflammatory arthritis of the cervical spine, identified myopathies or fibromyalgia (8), history of cervical radiculopathy, upper trapezius trigger points, or malignancy.

Participants in Group A received Autogenic Inhibition (AI) techniques in conjunction with conventional therapy. AI, a subset of Muscle Energy Techniques (METs), utilizes submaximal isometric contractions followed by passive stretching of the same muscle to promote reflex-mediated relaxation. Patients were treated in a seated position after providing informed consent. The protocol included an isometric contraction of the target muscle for 7–10 seconds, followed by a relaxation phase and a passive stretch of 20–30 seconds duration (14).

Participants in Group B received Reciprocal Inhibition (RI) techniques alongside conventional therapy. RI involves the isometric contraction of the antagonist muscle to induce relaxation in the agonist muscle. Following explanation and consent, patients performed submaximal isometric contractions of the antagonist muscle for 7–10 seconds, followed by passive stretching of the agonist muscle for 20–30 seconds (14).

All participants received conventional treatment, consisting of moist heat therapy via hot packs for 10 minutes and Transcutaneous Electrical Nerve Stimulation (TENS) for 15 minutes. Each participant attended three 45-minute sessions per week on alternate days, continuing for a total of six weeks. Pain intensity was assessed using the Numeric Pain Rating Scale (NPRS), an 11-point scale ranging

from 0 (no pain) to 10 (worst imaginable pain), noted for its strong reliability (0.95–0.96) and validity (0.86–0.95) (15). Cervical ROM was measured using a goniometer, a validated instrument for quantifying joint angles during flexion, extension, lateral flexion, and rotation of the neck (16). Functional disability was evaluated using the Neck Disability Index (NDI), comprising 10 items scored from 0 to 5 each, with a maximum score of 50 indicating severe disability. The NDI demonstrates a reliability range of 0.50–0.98 (17,18).

Data were analyzed using SPSS version 26. The significance threshold was set at $p \leq 0.05$. Normality of data distribution was assessed using the Shapiro-Wilk test, appropriate for sample sizes under 50. Both NPRS and NDI scores yielded $p > 0.05$, indicating normally distributed data. Accordingly, parametric tests were employed. Independent Samples t-tests were used to compare intergroup differences, while Paired Samples t-tests assessed intragroup (pre- and post-treatment) differences. Descriptive statistics were presented through frequency tables, bar charts, and pie charts as appropriate.

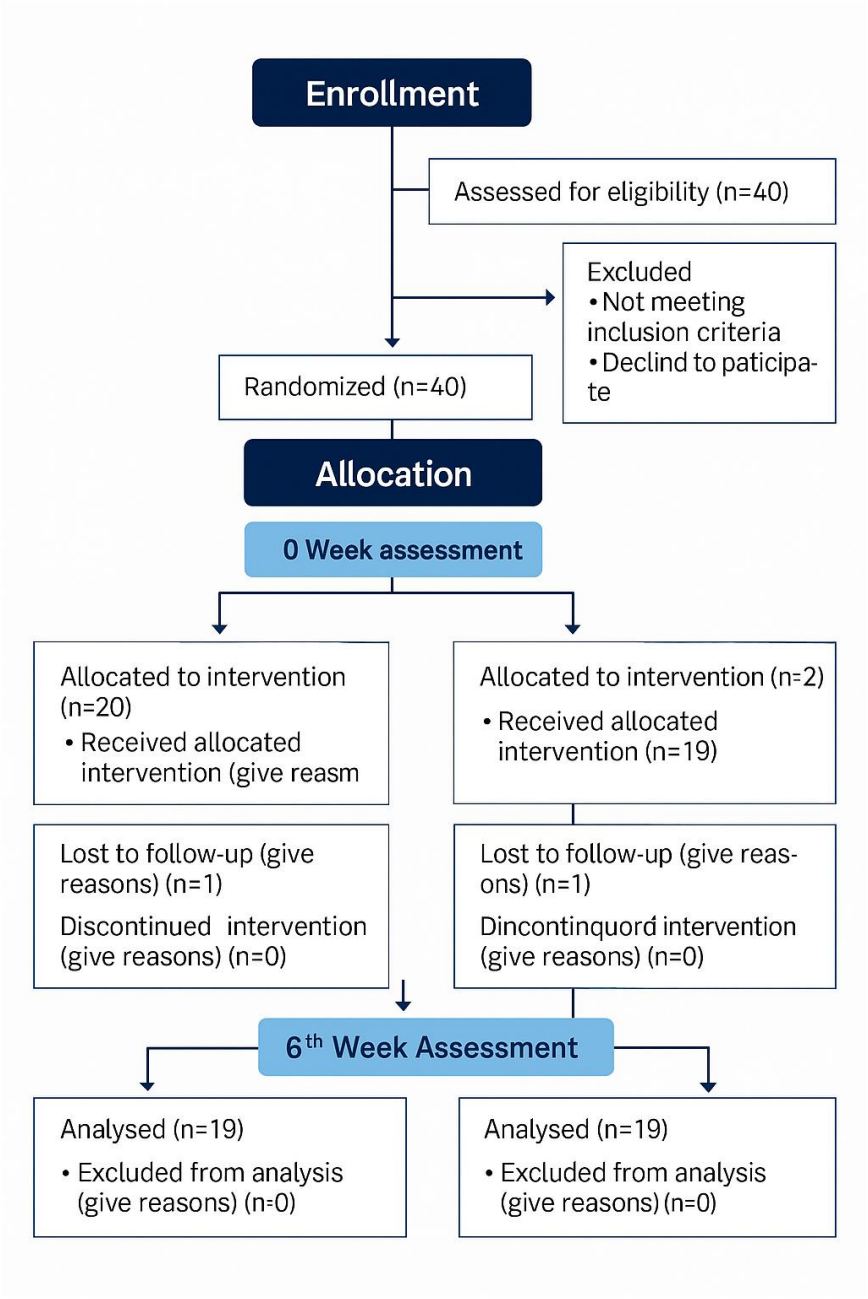

Figure 1 CONSORT Flowchart

RESULTS

The total calculated sample size was 40, accounting for a 20% attrition rate. Although 40 participants were initially recruited, only 38 individuals met the inclusion criteria and completed the follow-up, and thus were included in the final analysis. Using the lottery method, 19 participants were randomly allocated to Group A (Autogenic Inhibition) and 19 to Group B (Reciprocal Inhibition). All participants underwent a standardized 6-week intervention protocol comprising three treatment sessions per week on alternate days. Data analysis was performed using SPSS version 25.

Table 1. Baseline Demographics of Both Groups

Baseline Characteristics	Autogenic Inhibition (Group A)	Reciprocal Inhibition (Group B)
Number of Participants	19	19
Gender	Male = 42.1%, Female = 57.9%	Male = 42.1%, Female = 57.9%
Mean Age (years)	27.24 ± 4.01	27.24 ± 4.01

Table 2. Within-Group Analysis of Group A and Group B

Variable	Group	Time Point	Mean ± SD	p-value
NPRS	Group A	Pre-treatment	7.05 ± 0.77	0.46
		Post-treatment	4.89 ± 0.65	
	Group B	Pre-treatment	6.84 ± 0.95	0.46
		Post-treatment	3.31 ± 0.94	
NDI	Group A	Pre-treatment	3.26 ± 0.73	0.69
		Post-treatment	1.42 ± 0.69	
	Group B	Pre-treatment	3.15 ± 0.89	0.69
		Post-treatment	1.10 ± 0.99	
Cervical Extension	Group A	Pre-treatment	23.05 ± 3.03	0.35
		Post-treatment	37.73 ± 4.58	
	Group B	Pre-treatment	23.89 ± 2.51	0.35
		Post-treatment	29.73 ± 1.59	
Cervical Right Side Bending	Group A	Pre-treatment	26.42 ± 4.18	0.47
		Post-treatment	30.73 ± 3.50	
	Group B	Pre-treatment	27.21 ± 2.34	0.47
		Post-treatment	33.15 ± 2.43	
Cervical Left Side Bending	Group A	Pre-treatment	25.78 ± 3.29	0.49
		Post-treatment	29.47 ± 2.98	
	Group B	Pre-treatment	26.63 ± 4.12	0.49
		Post-treatment	32.26 ± 3.34	

Table 3. Between-Group Comparisons (Group A vs. Group B)

Outcome Measure	Time Point	Group A (Mean ± SD)	Group B (Mean ± SD)	p-value
NPRS	Pre-treatment	7.05 ± 0.77	6.84 ± 0.95	0.46
	Post-treatment	4.89 ± 0.65	3.31 ± 0.94	0.00
NDI	Pre-treatment	3.26 ± 0.73	3.15 ± 0.89	0.69
	Post-treatment	1.42 ± 0.69	1.10 ± 0.99	0.26
Cervical Extension	Pre-treatment	23.05 ± 3.03	23.89 ± 2.51	0.35
	Post-treatment	37.73 ± 4.58	29.73 ± 1.59	0.45
Cervical Right Side Bending	Pre-treatment	26.42 ± 4.18	27.21 ± 2.34	0.47
	Post-treatment	30.73 ± 3.50	33.15 ± 2.43	0.01
Cervical Left Side Bending	Pre-treatment	25.78 ± 3.29	26.63 ± 4.12	0.49
	Post-treatment	29.47 ± 2.98	32.26 ± 3.34	0.01

Demographic analysis revealed that 42.1% of participants were male and 57.9% were female. The mean age across both groups was 27.24 ± 4.01 years. Table 1 provides a summary of the baseline demographic characteristics of both groups, showing homogeneity with respect to age and gender distribution. To assess data normality, the Shapiro-Wilk test was employed. Since the p-values for all variables were greater than 0.05, normal distribution was assumed, allowing for the application of parametric tests. Intra-group comparisons between pre- and post-treatment values were conducted using the Paired Samples t-test, while inter-group comparisons were analyzed using the Independent Samples t-test. Within-group analyses (Table 2) demonstrated improvements in pain (NPRS), disability (NDI), and cervical range of motion (extension and side bending) for both groups following intervention. However, when comparing post-treatment outcomes between groups (Table 3), Group B (Reciprocal Inhibition) showed significantly greater improvement in NPRS scores ($p < 0.001$), as well as in cervical right and left side bending ($p = 0.01$ for both), while differences in NDI and cervical extension were not statistically significant.

DISCUSSION

The present study evaluated the efficacy of Autogenic Inhibition (AI) and Reciprocal Inhibition (RI) techniques, integrated with conventional therapy, in improving neck pain, disability, and cervical range of motion (ROM) among patients diagnosed with trapezitis. Both the Neck Disability Index (NDI) and goniometric measurement of cervical ROM were employed to objectively assess treatment outcomes over a six-week randomized controlled trial. Participants received interventions three times weekly, and outcome measures were analyzed for both groups. All subjects underwent a baseline regimen of conventional therapy, which included heat application and muscle stretching and strengthening prior to the implementation of AI and RI techniques. Substantial improvements

were noted in both groups across all clinical measures; however, while both interventions were effective, the RI group demonstrated greater improvements in pain relief, reduction of disability, and enhancement of cervical ROM, as reflected by statistically significant within-group changes ($p<0.05$).

These findings align partially with previous literature, although some discrepancies exist. For example, Siddiqui et al. (2022) conducted a comparative trial on myofascial neck pain and reported that both AI and RI, when combined with standard treatment, produced significant improvements, with AI demonstrating a greater effect size (0.887) and statistical significance compared to RI (8). In contrast, the present results indicate that RI may be superior to AI in reducing pain and disability, as well as improving ROM in trapezitis, suggesting a possible variation in response depending on the clinical population and study parameters. Similarly, the trial by Gayathri K (2022) comparing muscle energy techniques to myofascial release among smartphone users with trapezitis showed that METs are more efficacious than myofascial release, further substantiating the value of muscle energy approaches in this demographic (3). The mean differences in NPRS and NDI observed in the current research reinforce that RI can offer more pronounced benefits compared to AI for this population.

Further, Sai Vispute's (2022) study compared myofascial release and positional release techniques in college students with trapezitis, reporting significant improvements in pain, ROM, and NDI within both intervention groups, but no significant difference between them (4). The current study, however, demonstrates that RI yielded superior outcomes over AI, possibly due to the unique neuromuscular mechanisms underlying reciprocal inhibition. Similarly, Muhammad Osama (2020) investigated multiple stretching techniques for mechanical neck pain, finding differences in pain, disability, and ROM outcomes between groups, with significant improvements during both immediate and short-term follow-ups (11). In the present study, RI also resulted in a statistically significant improvement over AI, particularly for pain, disability, and ROM, underscoring the clinical utility of reciprocal inhibition techniques in this context.

Contrasting findings were observed by Mohamed Serag E (2018), who studied spastic hemiplegic children and found AI to be more effective than RI in reducing muscle spasticity and improving muscle function (19). This divergence may be attributed to differences in study population, underlying pathology, and outcome measures. The comparative study by Aneri Jhaveri (2018) demonstrated that muscle energy techniques outperformed myofascial release in reducing pain and disability in chronic trapezitis, yet the current study uniquely contributes by directly comparing the two primary MET variants (AI and RI), identifying RI as the more effective strategy in the context of smartphone-related trapezitis (9).

The current investigation is subject to several limitations. Data collection was limited to a single geographic location (Lahore) and clinical center (Nusrat Rashid Medical Complex), with most participants originating from rural backgrounds, which may have influenced their understanding and compliance with exercise protocols. The absence of long-term follow-up precludes conclusions regarding the durability of treatment effects, and the study's single-center design restricts generalizability. Future research should explore the impact of both techniques in broader and more diverse populations, consider extending interventions to additional muscle groups, and incorporate blinding and longer follow-up to robustly evaluate sustained clinical outcomes.

CONCLUSION

In conclusion, this study suggests that Reciprocal Inhibition technique is more effective than Autogenic Inhibition for alleviating pain, reducing disability, and improving cervical ROM among individuals with trapezitis, particularly in populations with high rates of smartphone use. Further multicenter trials with larger sample sizes and extended follow-up are warranted to confirm and expand upon these findings.

REFERENCES

1. Jawade S, Chitale Jr N, Phansopkar P, Chitale NV. The Effect of Reciprocal Inhibition Techniques on Pain, Range of Motion, and Functional Activities in Patients With Upper Trapezitis. Cureus. 2023;15(2).

2. Seju Y, Rajput V. Efficacy of Theragun and surge faradic stimulation in subjects with trapezitis: a randomized controlled trial. Int J Sci Res. 2021;10(4):46-9.

3. Gayathri K, Senthil P, Swathi S, Nainar M, Haribabu L. Effectiveness of Myofascial Release Technique and Muscle Energy Technique on Pain and Physical Function among Smartphone Users with Trapezitis. Chettinad Health City Medical Journal (E-2278-2044 & P-2277-8845). 2022;11(4):37-41.

4. Vispute S, Kumar N. A Comparative Study of Immediate Effects of Myofascial Release Technique and Positional Release Technique on Trapezitis among the College Student. Int J Physiother Res. 2022;10(3):4243-49.

5. Wakde P, Anap D. Effectiveness of Integrated neuromuscular inhibitory technique in sub-acute trapezitis: a single case study. VIMS Physiother J Case Reports 2016; 1: 11.15.

6. Chorsiya V. Strain-Counterstrain Technique for Immediate Relief of Trapezitis in Sitting Job Professionals.

7. Kim M-S. Influence of neck pain on cervical movement in the sagittal plane during smartphone use. Journal of physical therapy science. 2015;27(1):15-7.

8. Siddiqui M, Akhter S, Baig AAM. Effects of autogenic and reciprocal inhibition techniques with conventional therapy in mechanical neck pain–a randomized control trial. BMC Musculoskeletal Disorders. 2022;23(1):704.

9. Jhaveri A, Gahlot P. Comparision Of Effectiveness Of Myo Facial Release Technique Versus Muscle Energy Technique On Chronic Trapezitis-An Experimental Study. Int J Innovative Res Adv Studies. 2018;5:89-94.

10. Velappanchavadi C. Effectiveness of muscle energy technique versus stretching in subjects with piriformis syndrome. Int J Physiother Res. 2019;7(5):3252-56.

11. Osama M, Rehman S. Effects of static stretching as compared to autogenic and reciprocal inhibition muscle energy techniques in the management of mechanical neck pain: A randomized controlled trial. Journal of the Pakistan Medical Association. 2020;70(5):1.

12. El MS, Mostafa DMM, Elshafey MA. Autogenic inhibition versus reciprocal inhibition techniques on spastic children. 2018.

13. Alonazi A, Daher N, Alismail A, Nelson R, Almutairi W, Bains G. The Effects Of Smartphone Addiction On Childrens Cervical Posture And Range Of Motion. International Journal of Physiotherapy. 2019:32-9.

14. Batool SA, Shakil-ul-Rehman S, Tariq Z, Ikram M. Effects of fasciatherapy versus fascial manipulation on pain, range of motion and function in patients with chronic neck pain. BMC Musculoskeletal Disorders. 2023;24(1):789.

15. Kahl C, Cleland JA. Visual analogue scale, numeric pain rating scale and the McGill pain Questionnaire: an overview of psychometric properties. Physical therapy reviews. 2005;10(2):123-8.

16. Khan AR, Aafreen, Khan A, Ahmed H, Shaphe MA, Qasheesh M. Test–retest reliability and validity of cervical range of motion measurement using a smartphone clinometer and compass application among individuals with and without neck pain. International Journal of Therapy and Rehabilitation. 2023;30(2):1-13.

17. Vernon H, Mior S. The Neck Disability Index: a study of reliability and validity. Journal of manipulative and physiological therapeutics. 1991.

18. Xu Y, Liu S, Wang F, Wu X. Cervical sagittal parameters were closely related to Neck Disability Index score after anterior cervical decompression and fusion. Journal of Orthopaedic Surgery and Research. 2020;15:1-12.

19. Mostafa MSE, Elshafey MA. Autogenic inhibition versus reciprocal inhibition techniques on spastic children. 2018.