ISSN (print) 2522-1906, ISSN (online) 2522-1914
FIZICNA REABILITACIA TA REKREACIJNO-OZDOROVCI TEHNOLOGII
Vol. 10 No. 5, 2025

Original Scientific Article DOI: 10.15391/prrht.2025-10(5).08

Randomized controlled trial on the effectiveness of ultrasound therapy with muscle relaxant gel versus aquasonic transmission gel combined with strengthening exercises protocol in treating text neck syndrome

Boopathy D., **Sathya Siva**, **Logeshwari V.**, **Dilip G.**, **Madhubala V.**

Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences (SIMATS), Chennai, Tamil Nadu, India

Corresponding author: Sathya Siva
e-mail: sathyasivakannan@gmail.com

Abstract

Purpose. The term "text neck" refers to an overuse or repetitive stress injury condition where a person is stooped down for extended periods of time at their phone or other electronic devices with their head drooping or flexed forward. The study aimed to find out the effectiveness of ultrasound therapy along with muscle relaxant gel and Aquasonic transmission gel combined strengthening exercise on text neck syndrome.

Material & Methods. A total of 52 subjects with text neck syndrome were randomly divided into 2 groups of 26 subjects in each group using a lottery method. The intervention group received ultrasound therapy along with a muscle relaxant gel and strengthening exercises, while the conventional group received ultrasound therapy with Aquasonic transmission gel combined with strengthening exercises. The NDI and NPRS were used to assess the results both before and after the intervention. The Mann-Whitney U test and the Wilcoxon signed rank test were used to assess the significance of changes observed before and after the intervention.

Results. The study indicates that both groups exhibited significant improvements following treatment. Moreover, ultrasound therapy along with a muscle relaxant gel demonstrated greater significance ($p<0.001$).

Conclusions. The study found that combining ultrasound therapy with muscle relaxant gel and strengthening exercises effectively reduces pain and improves function in individuals with Text Neck Syndrome, with no adverse effects observed. This approach offers a more efficient treatment and faster recovery compared to conventional therapy, making it a recommended addition to future physical therapy protocols.

Keywords: Mobile Phone, Muscle Relaxant, Rowing Exercise, Ultrasound Therapy, Y's exercise.

Introduction

"Text neck" is a condition caused by overuse or repetitive stress injuries in which a person's head droops or bends forward while they spend more time using their phones or other electronic devices (Shinde et al., 2023). First, the term "text neck" was coined by American Dr. Dean L. Fishman to mean the way looking down at a mobile phone while frequently flexing the neck at various angles may affect the normal curve of the cervical spine and result in neck pain and upper back muscle injury. The mobile phone is currently the most widely used device for a variety of daily activities, including social media use, gaming, movie viewing, internet access, information sharing, and many more. A survey found that 79% of adults in the 18-44 age range spend most of their time on their smartphones (Kumari et al., 2021). The forces on the neck increase to 27 pounds when the head tilts forward at 15 degrees, 40 pounds

ISSN (print) 2522-1906, ISSN (online) 2522-1914
PHYSICAL REHABILITATION AND RECREATIONAL HEALTH TECHNOLOGIES
Vol. 10 No. 5, 2025

at 30 degrees, 49 pounds at 450 degrees, and 60 pounds at 60 degrees. At 90 degrees, the model prediction was unreliable. Text neck syndrome directly affects the spine while the head position tilts forward at different degrees. Text neck syndrome can result in misalignment of the spine, Degeneration of spine, Disc hernia, compression of disc, damage of nerve, damage of muscles, and gastrointestinal issues loss of Lung volume capacity (Bhattacharya et al., 2021). Moreover, the text neck posture causes the muscles to become more activated, which results in the development of trigger points in the suboccipital and Upper trapezius muscles. This leads to headaches, neck pain, and eventually restrictions in the range of motion of the upper thoracic and cervical regions. The causes of Text Neck Syndrome are shown in the fish bone diagram (Figure 1). In McKenzie's approach, posture correction is the main focus, and exercises like the Y's and rowing exercises help to strengthen the scapular and neck muscles. Because prolonged use of hand-held mobile devices causes anatomical and bio-mechanical changes in the cervical and thoracic spine, text neck syndrome has been dubbed an adverse postural phenomenon (Bhende et al., 2024). Therapeutic ultrasound is a common therapeutic technique for enhancing connective tissue extensibility and reducing pain associated with musculoskeletal injuries. A type of acoustic energy known as ultrasound is transmitted by vibrating or mechanically deforming molecules. Ultrasound waves are absorbed by tissues, causing molecular friction and heat generation. The intensity of pain lessens as the tissue temperature rises by 2°C to 3°C (Qing et al., 2021). The transmission of drug molecules through the skin under the influence of ultrasound is known as phonophoresis. Using ultrasound, phonophoresis delivers the medication topically through the skin. In order to actively transport medication into the underlying target tissue through both thermal and non-thermal mechanisms, phonophoresis has been used to treat a variety of musculoskeletal disorders. Drugs can pass through the stratumcorneum and reach the underlying area with 10 phonophoresis, a painless and safe procedure. There is also a lower risk of overdosing and underdosing according to this transdermal drug delivery method (Monisha et al., 2018). Studies on the effectiveness of ultrasound therapy combined with muscle relaxants for text neck syndrome. The goal of the study was to determine how ultrasound therapy, both with and without the use of a muscle relaxant with strengthening exercise, reduces the pain and how these treatments influence the recovery time in individuals with text neck syndrome.

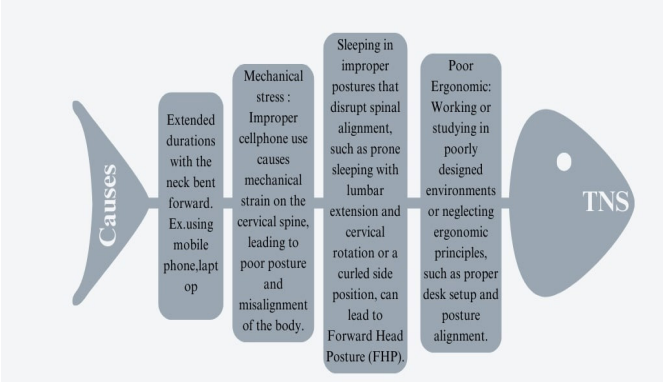

Figure 1. Fishbone Diagram of causes of Text Neck Syndrome (TNS) (Tsantili A-R et al., 2022).

FINER and PICO Criteria

The research question was confirmed with FINER Criteria (***F***easible: Achievable sample size, required expertise in ultrasound and physiotherapy, available resources (equipment, gels, facilities), and reasonable study duration, ***I***nteresting: Relevant to healthcare providers and patients, addressing the growing issue of text neck in the digital age, ***N***ovel: Limited studies comparing muscle relaxant gel vs. Aquasonic gel with strengthening exercises for this condition, ***E***thical; Non-invasive, safe interventions with ethical approval and informed consent, ***R***elevant: Contributes to clinical guidelines for effective, non-pharmacological management of text neck syndrome). Framed using PICO Criteria (P: Patients with Text Neck Syndrome, I: Therapeutic Ultrasound combined with strengthening exercise protocol, C: Comparing therapeutic ultrasound with muscle relaxant gel versus Aquasonic transmission gel, O: NPRS and NDI).

Research Question Statements:

1. How is the combination of therapeutic ultrasound and muscle relaxant gel with a strengthening exercise protocol effective in treating text neck syndrome?
2. In what ways is the combination of therapeutic ultrasound and Aquasonic transmission gel with a strengthening exercise protocol effective in treating text neck syndrome?

Material and methods

Study Design and Ethical Clearance

A Randomized Controlled Trial was conducted at the Saveetha Hospital, Chennai, India, from November 2024 (3rd week) to December 2024 (1st week). A total of 52 patients, aged between18-45 (Participants include College students and normal individuals), who met the inclusion criteria, were selected using a simple random sampling technique from the orthopedic department. The study approved from the Institutional Scientific Review Board (409/07/2024/ISRB/UGSR/SCPT).

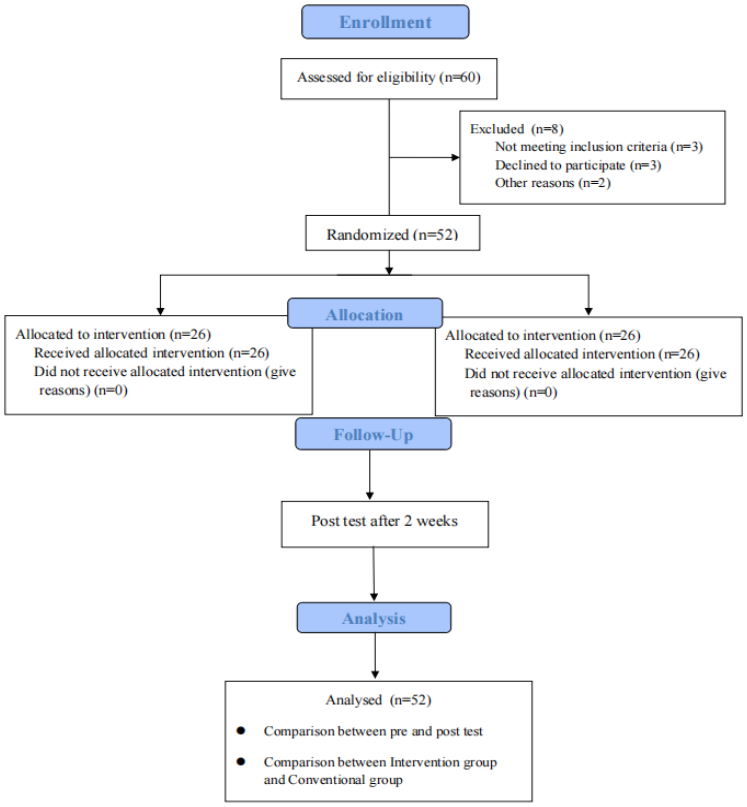

Figure 2. **CONSORT Flow chart of the study.**

Study Guideline

The research followed the CONSORT (Consolidated Standards of Reporting Trials) guidelines throughout the study (Figure 2).

Participants

Selection Criteria

This study included Patients with Text Neck syndrome (Diagnosis based on patient history and physical examination includes Restricted range of motion, Spasm with trigger points in suboccipital and upper trapezius muscle, X-ray revealing forward neck Posture), both Male and Female, both Acute and Chronic pain, Age between18-45 (Participants includes College students and normal individual), Patients with pain score between 5 to 8 in Numerical Pain Rating Scale and Using mobile phones for more than 3-4 hours per day. This study excluded Individuals with a recent history of neck or back surgery, a recent history of trauma or fracture, congenital disorders of the cervical spine, patients have any psychiatric diseases, patients with skin infections and patients suffering from any other condition that could cause myofascial or neuropathic pain in the Upper limb.

Sample Size Calculation

A Priori type of power analysis performed in G*Power (3.1.9.7). The total sample size required for a two-sample t-test with the selected parameters is 52 participants (26 in each group). This sample size ensures a balanced allocation (1:1 ratio) and sufficient power (0.80) to detect a meaningful difference between the two groups with an effect size of 0.80 at the α=0.05 significance level.

Group Allocation

A total of 52 patients, who were selected based on the inclusion criteria, were selected using a simple random sampling technique from orthopedic department. After obtaining informed consent from all participants, they were split into two groups of 26 subjects each at random using a computer-generated technique. The Group A referred to as the interventional group, received ultrasound therapy along with a muscle relaxant and strengthening exercises. The Group B referred to as the conventional group, received ultrasound therapy along with Aquasonic transmission gel combined with strengthening exercises. Demographic data were collected from each participant before treatment (Table 1).

Procedure

Study Intervention

The 26 patients in the interventional group received Therapeutic ultrasound with muscle relaxant Gel along with Strengthening Exercises for 3 sets of 10 repetitions at 10 RM with 2 min rest for each set, 4 sessions per week, conducted on two consecutive days, for a duration of 2 weeks. Total treatment times per session were 30 minutes. The 26 patients in the conventional group

ISSN (print) 2522-1906, ISSN (online) 2522-1914
PHYSICAL REHABILITATION AND RECREATIONAL HEALTH TECHNOLOGIES
Vol. 10 No. 5, 2025

Table 1. Demographic Data

Gender	Male	32
	Female	20
Age	18-25	18
	26-35	22
	36-45	12
Comorbidities	Diabetes mellitus	8
	Hypertension	7
	Thyroid	8
Body Mass Index	16.5 to 18.5 (Underweight)	15
	19.5 to 24.9 (Normal weight)	27
	25 to 29.9 (Overweight)	10
Hours of mobile phone & other electronic use per day	3-4 hours	24
	5-6 hours	18
	>6 hours	10

received Therapeutic ultrasound with Aquasonic transmission gel, along with strengthening exercise, has protocol followed in the interventional group.

Therapeutic Ultrasound for Conventional and Interventional Groups

Electroson 900, Technomed Electronics ultrasound, Mephenesin, Methyl nicotinate, and Capsicum oleoresin (Phonophoresis) gel were utilized using continuous mode to provide ultrasound into the tissue at a frequency of 1 MHz and 1.2 W/cm^2. The treating physical therapist will use slow, circular motions to place the transducer head over the back of the neck. The treatment lasted for 15 minutes in a session on interventional group, while the Conventional group utilized the Aquasonic transmission gel with the same dosage of the interventional group (Monisha et al., 2018).

Strengthening Exercises

Strengthening Exercises Protocol was 3sets of 10 repetitions at 10 RM. 2 min rest for each set.

Y's exercise (Bhende R et al., 2024):

Position: Prone with arms extended overhead, forming a "Y" shape with your body. Movement: While keeping your thumbs up and maintaining a straight spine, raise your arms in a controlled manner, focusing on squeezing your shoulder blades downward and inward. The Y's exercise improves posture and shoulder stability by strengthening the rotator cuff, upper back, and shoulders. It reduces the possibility of shoulder injuries by increasing scapular flexibility and mobility. It also improves general upper body strength and helps in rehabilitation (Figure 3).

Rowing exercise (Bhende R et al., 2024):

Position: sit or stand upright with chest open and shoulders back. With arms out in front, grip the TheraBand in both hands. Movement: Squeeze the shoulder blades together and draw your elbows back to pull the TheraBand towards the torso in a rowing motion. Rowing exercise improves posture and upper body strength by strengthening the arms, shoulders, and upper back. Through the maintenance of muscle balance, rowing reduces the risk of injury while also enhancing endurance and coordination (Figure 4).

Figure 3. Y's exercise- Position with thumbs up and straighten spine with squeezing shoulder blades downwards and inwards.

Figure 4. Rowing exercise with TheraBand Squeezing the shoulder blades together and pulling the TheraBand towards the torso.

Outcome Measure

All subjects were assessed using the Neck Disability Index and Numerical Pain Rating Scale

both before and after the intervention (on the 1st day and after 2 weeks of intervention).

The Neck Disability Index (NDI)

It is a self-reported scale of ten items that was used to assess disability. Every item responds to different grievances regarding neck pain that mostly manifests as restrictions on day-to-day activities. Six distinct statements, each representing an item, are graded on a scale of 0 to 5, where 5 represents severe disability and 0 indicates no disability at all. The overall score ranges from zero to fifty. The most widely accepted method for reporting neck pain in the literature is the NDI. The total possible score is 50, and it is then converted into a percentage by multiplying by 100 (Irmak et al., 2019).

Numerical Pain Rating Scale (NPRS)

It is a self-reported measure of 0 to 10 score. The score 0 represents no pain and 10 represents severe pain. It helps to assess the level of pain (Afzal et al., 2023).

Statistical Analysis

All data were analyzed using SPSS version 27. The Wilcoxon test was applied to Groups A and B, while the Mann-Whitney U test was used to compare the two groups. Age and Sex distribution of samples were illustrated in Table 2 and Table 3 illustrates the difference in Numerical Pain Rating Scale (NPRS) scores within Groups A and B, and Table 4 shows the difference in Neck Disability Index (NDI) scores within two groups. Table 5 illustrates the difference between group A and B for Numerical Pain Rating Scale, while the Table 6 shows the difference between the two groups for Neck Disability Index (NDI).

Results

The study noted that among the 26 patients in the interventional group, 10 (38.46%) were aged 18-25 years, 8 (30.76%) were aged 26-35 years, and 8 (30.76%) were aged 36-45 years. In contrast, in the conventional group, out of 26 patients, 8 (30.76%) were aged 18-25 years, 14 (53.84%) were aged 26-35 years, and only 4 (15.38%) were aged 36-45 years (Table 2).

Table2. Age and Sex distribution of samples

Age	Group A			Group B		
	Male	Female	Total	Male	Female	Total
18-25	6	4	10	4	4	8
26-35	6	2	8	10	4	14
36-45	2	6	8	4	0	4
Total	14	12	26	18	8	26

A Wilcoxon signed-rank test revealed that after a 2-week interventional treatment course, administered 4 times a week, produced a statistically significant reduction in the numerical pain rating scale (Fig. 5) for individuals with text neck syndrome (Z=–4.214, p=<0.001). For the Conventional treatment course, administered 4 times a week, produced a statistically significant reduction in numerical pain rating scale (Table 3) for individuals with text neck syndrome (Z=–2.003, p=0.045).

Table 3. Comparison of NPRS within Group A & Group B

Groups	Pre-Test Mean±SD	Post-Test Mean±SD	Z value	P-value
Group A (N=26)	7.38±1.359	5.12±1.751	–4.214	<0.001
Group B (N=26)	7.62±1.098	7.23±1.070	–2.003	0.045

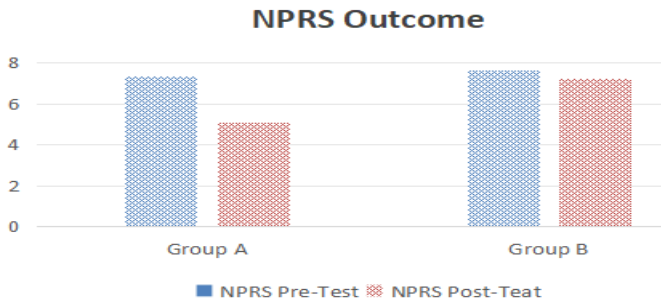

Figure 5. Graphical Representation of NPRS outcome for pre and post Test.

A Wilcoxon signed-rank test showed that over a 2-week interventional treatment course, given four times a week, resulted in a statistically significant decrease in the Neck Disability Index (Figure 6) for individuals with text neck syndrome (Z=–4.228, p<0.001). Similarly, the conventional treatment course, also administered four times a week, led to a statistically significant reduction in the Neck Disability Index (Table 4) for individuals with text neck syndrome (Z=-2.058, p=0.040).

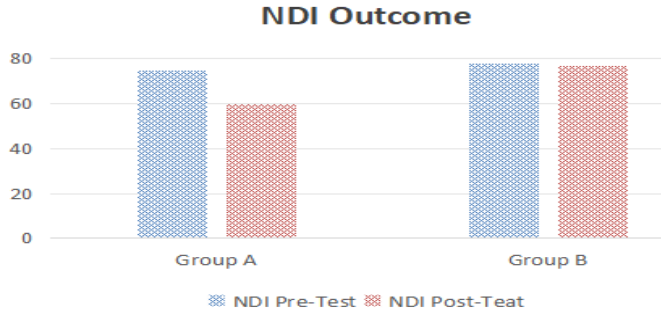

Figure 6. Graphical Representation of NDI outcome for pre and post Test.

The Mann-Whitney U test revealed a greater significant difference in posttest were as pretest exhibited insignificant difference on NPRS (Ta-

Table 4. Comparison of NDI within Group A & Group B

Groups	Pre-Test Mean±SD	Post-Test Mean±SD	Z value	P-value
Group A (N=26)	74.73±14.024	60±13.002	–4.228	<0.001
Group B (N=26)	77.81±13.799	77±14.083	–2.058	0.040

Table 5. Comparison of NPRS between Group A & Group B

Tests	Mean±SD	Z value	W	U	P-value	r-value
Pre-test	7.50±1.229	–0.369	669.50	318.50	0.712	0.05
Post-test	6.17±1.790	–4.578	442.50	91.50	<0.001	0.63

Table 6. Comparison of NDI between Group A & Group B

Tests	Mean±SD	Z value	W	U	P-value	r-value
Pre-test	76.27±13.862	–0.779	646.50	295.50	0.436	0.10
Post-test	68.50±15.929	–3.829	480.00	129.00	<0.001	0.53

ble 5) between two groups Group-A & Group-B (U=91.50, p=<0.001). Since the p-value is less than the alpha level of 0.05, the null hypothesis is rejected, suggesting that the treatment method had a significant impact on text neck syndrome. The calculated r value for pre-test is approximately 0.051, indicating a very small effect size, while calculated the posttest r value is approximately 0.635, indicating a large effect size.

The Mann-Whitney U test showed a significant difference in post-test scores on the NDI (Table 6) between Group A and Group B (U=129.00, p<0.001). Given that the p-value is smaller than the 0.05 alpha level, study reject the null hypothesis, indicating that the treatment method had a meaningful effect on text neck syndrome. The calculated r value for pre-test is approximately 0.108, indicating a small effect size, while the calculated posttest r value is approximately 0.531, indicating a large effect size.

Discussion

The study aimed to find out the effectiveness of ultrasound therapy along with muscle relaxant gel and Aquasonic transmission gel combined strengthening exercise on text neck syndrome. Text neck is spreading like wildfire and causing irreversible harm. Sixty-two percent of smartphone users report having shoulder or neck pain. Because text neck is not severe enough to require surgery, protective measures are advised (Sarraf et al., 2023). One of the most well-known poor sagittal plane postures is forward head posture, which results in overstretching and shortening of muscle fibers. Overuse syndrome may develop if text neck syndrome is not addressed or treated in a timely manner, which could cause irreversible harm (Sathya et al., 2020). Most smartphone activities involve users extending their arms forward or looking downward to view the screen. This posture places stress on the cervical spine and neck muscles by pushing the head forward, leading to increased anterior curvature in the lower cervical vertebrae and heightened posterior curvature in the upper thoracic vertebrae to maintain balance. One of the most prevalent bad sagittal plane postures is forward head posture. Chronic musculoskeletal pain has been linked to incorrect head and neck posture (Shah et al, 2018). Therapeutic Ultrasound is one of the most popular physical therapy modalities for treating soft tissue injuries. Therapeutic US can be administered in two ways: 1) Continuous mode 2) Pulsed mode. Thermal and non-thermal effects are the two categories of US therapeutic effects. The conduction velocity of nerve impulses, enzymatic activity, skeletal muscle contractile activity, the flexibility of collagen tissue, regional blood circulation, pain sensitivity, and muscle tension reduction have all been demonstrated to be impacted by this elevated temperature, also referred to as thermal effects (Abdel-aziem et al., 2014). A customized physiotherapy treatment plan is very successful in helping people who are addicted to smartphone use manage their TNS and SMS thumb. By carefully analyzing pain levels, hand discomfort, neck disability, and general well-being, our results highlight the notable gains made possible by customized interventions. To ensure long-term management of these common conditions in populations with smartphone addiction, more research is necessary to optimize treatment protocols (Nathani et al., 2024). Every member who has been identified as having issues with limited range of motion (ROM) should receive physiotherapy services. Members should be trained to carry out McKenzie exercises on their own. Assess this activity's progress on a regular basis (Kurniawati et al., 2021). According to available data, US therapy may have a major impact on MPS patients' pain but not their range of motion. The effects of US on pain and range of motion are inconclusive due to the high

risk of bias. Because of the extremely small sample sizes, incomplete patient-reported outcomes, and the extremely poor quality of some studies, the relevant evidence is very weak. However, large-scale, high-quality RCTs with bias-checking measures and key outcome assessments should validate the effects of US therapy on MPS (Xia et al., 2017). In individuals with chronic neck pain, incorporating static ultrasound or diadynamic currents on upper trapezius myofascial trigger points into a manual therapy program offered no additional benefits compared to manual therapy on its own (Dibai-Filho et al., 2017). Text neck is common among young people in Islamabad, and it is more common among those who use their phones for longer than three hours every day. To prevent more injuries and disability, it is important to regularly strengthen the neck muscles and maintain proper cervical spine alignment when using a cell phone (Purushothaman et al 2023). Finally, this study demonstrated how extended mobile phone use impacts JPE, which in turn causes musculoskeletal symptoms and changes in neck posture. Therefore, in order to maintain a healthy lifestyle, doctors, physical therapists, and smartphone users must be aware of these negative effects and health risks and take the necessary precautions (Nawaz et al., 2021). Research indicates that continuous ultrasound therapy is more effective than pulsed or sham ultrasound in alleviating pain at rest in individuals with MPS. Additionally, both continuous and pulsed ultrasound therapies outperform sham ultrasound in enhancing psychological well-being (Ilter et al., 2015). Although it's commonly believed that adults are more likely to experience this kind of issue, prolonged and excessive use of computers or smartphones can cause a number of physical issues during adolescence, which is marked by periods of rapid growth. The literature has recently drawn attention to problems that can develop into major health issues, like the rise in young people's excessive use of electronic devices and sedentary lifestyles (David et al., 2021). Physiotherapists providing personalized exercise and related programs should educate individuals of all ages on maintaining proper posture while using handheld mobile devices. Prolonged use of such devices can lead to Text Neck Syndrome, which may adversely impact the growth and development of children and adolescents (Tsantili et al., 2022). Text neck pain was common in female student with the usage of smartphones in daily life. The lack of knowledge about warm-up exercise, posture change and break-away while using smart-phone was lacking in most of the students (Khan et al., 2018). Using a smartphone while seated in a chair without back support significantly contributes to poor posture compared to other smartphone usage positions. Hence, it is essential to provide guidance and education on proper smartphone usage conditions to reduce head strain and minimize pressure on this area (Sarraf et al., 2023). The present study concluded that text neck has progressed and has not received enough treatment. Deformation of the cervical spine will result from prolonged neck flexion. It has been demonstrated that when cervical misalignment is corrected, radiographic and electromyological changes also improve neurologic symptoms (Chu et al., 2022).The neck pain caused by smartphones and related issues is chronic and progressive in nature, prompt diagnosis and the key to treating Text Neck Syndrome will be interventions and a thorough understanding of postural correction. When creating an evidence-based protocol, more clinical trials confirming the efficacy of current practice will be very helpful (Neupane et al., 2017, Sri Lekha et al., 2025, Balaji, 2025, M. K. et al.,2024).

Conclusion

The study concluded that ultrasound therapy combined with muscle relaxant and strengthening exercises is effective in reducing pain and improving functional activity in individuals with Text Neck Syndrome. No adverse effects were observed in either the interventional or conventional groups during the study. Therefore, ultrasound therapy with muscle relaxant and strengthening exercises offers a more effective treatment with a shorter recovery time for Text Neck Syndrome compared to conventional therapy. This intervention is thus recommended for inclusion in future physical therapy treatment protocols.

References

Abdel-aziem, A.A., Draz, A.H., Battecha, K.H., & Mosaad, D.M. (2014). Effect of ultrasound combined with conventional therapy on neck pain, function, and disability in patients with cervical spondylosis: A randomized placebo-controlled trial. *J Musculoskelet Pain*, 22(2), 199–205. https://doi.org/10.3109/10582452.2014.907853

Afzal, H., Noor, R., Mumtaz, N., Bashir, M.S., & Saqulain, G. (2023), Effects of Kendall exercise vs. Gong's mobilization on pain, range of motion, function, and strength in cases with text neck syndrome. *Iran Rehabil J*, 21(3), 411–20. https://doi.org/10.32598/irj.21.3.1335.12

Balaji, T., Ramalingam, V., & Santhana Lakshmi, S. (2025), Comparing the effects of post-isometric relaxation and hold-relax technique for cervicogenic headache among computer users. *Neurol Asia*, 30(1), 157-163. https://doi.org/10.54029/2025tmx

Bhattacharya, S., Saleem, S.M., Juyal, R., Kaur, R., & Singh, A. (2021). "texting neck" or "iNeck pain" syndrome – an emerging public health threat: In the era of NEW NORMAL. *J Prim Care Spec*, 2(1), 1–3. https://doi.org/10.4103/jopcs.jopcs_1_20

Bhende, R., Shinde, S., & Jain, P. (2024). Effect of integrated postural training in individuals with text neck syndrome. *Journal of Kinesiology and Exercise Sciences*, 34(106), 1–18. https://doi.org/10.5604/01.3001.0054.6840

Chu, E.C.-P. (2022), Preventing the progression of text neck in a young man: A case report. *Radiol Case Rep*, 17(3), 978–82. https://doi.org/10.1016/j.radcr.2021.12.053

David, D., Giannini, C., Chiarelli, F., & Mohn, A. (2021), Text neck syndrome in children and adolescents. *Int J Environ Res Public Health*, 18(4), 1565. https://doi.org/10.3390/ijerph18041565

Dibai-Filho, A.V., de Oliveira, A.K., Girasol, C.E., Dias, F.R.C., & Guirro, R.R. de J. (2017), Additional effect of static ultrasound and diadynamic currents on myofascial trigger points in a manual therapy program for patients with chronic neck pain: A randomized clinical trial. *Am J Phys Med Rehabil*, 96(4), 243–52. https://doi.org/10.1097/phm.0000000000000595

Ilter, L., Dilek, B., Batmaz, I., Ulu, M.A., Sariyildiz, M.A., Nas, K., et al. (2015), Efficacy of pulsed and continuous therapeutic ultrasound in myofascial pain syndrome: A randomized controlled study. *Am J Phys Med Rehabil*, 94(7), 547–54. https://doi.org/10.1097/phm.0000000000000210

Irmak, R. (2019), Relatively short term test re-test reliability of Neck Disability Index by long term test re-retest reliability method of Oswestry Disability Index in healthy office workers. *Work*, 64(3), 635–40. https://doi.org/10.3233/wor-193024

Khan, A.F., Gillani, S.F., & Khan, A.F. (2018), Are you suffering pain neck due to smart phone text neck syndrome. *Age*, 42(58.4), 1095-7.

Kumari, S., Kumar, R., & Sharma, D. (2021). Text neck syndrome: The pain of modern era. Int *J Health Sci Res*, 11(11), 161–5. https://doi.org/10.52403/ijhsr.20211121

Kurniawati, D. (2021). The Mckenzie Exercise Methods For Prevent Text Neck Syndrome Due to Gadget Overused. *Urban Health*, Nov 27, 3(1).

M. K., Josyula, S., S. J.A., et al. (2024), Comparative analysis of high-intensity interval training and traditional rehabilitation programs for accelerated recovery from musculoskeletal injuries. *J Back Musculoskelet Rehabil*, 37(2), 437-443. https://doi.org/10.3233/BMR-230146

Monisha, Manikumar, & Krishnakumar, A. (2018) Evaluating the effectiveness of phonophoresis by piroxicam and dimethyl sulfoxide for women's with osteoarthritis knee joint. *Asian J Pharm Clin Res*, 11(6), 329. https://doi.org/10.22159/ajpcr.2018.v11i6.24615

Nathani, H.R., & Phansopkar, P. (2024). *Effectiveness of tailor-made physiotherapy protocol in smartphone-addicted individuals with text neck syndrome and short message service (SMS) thumb*. Cureus. https://doi.org/10.7759/cureus.57453

Nawaz, U., Jamshaid, A., Rafi, M.A., & Hussain, H. (2021), Frequency of Text Neck Pain in Islamabad. *Pakistan Journal of Public Health*, 10(4), 252–5. https://doi.org/10.32413/pjph.v10i4.281

Neupane, S., Ali, U., & Mathew, A. (2017), Text neck syndrome-systematic review. *Imperial journal of interdisciplinary research*, 3(7), 141-8.

Purushothaman, V.K., Ramalingam, V., Wee Yao Xian, R., Gopala Krishna Pillai, S., Jabbar, M.A., Muniandy, Y., et al. (2023), The relationship between smartphone usage pattern and cervical proprioception in adults with text neck syndrome in Malaysia. *Natl J Community Med*, 14(12), 821–6. https://doi.org/10.55489/njcm.141220233346

Qing, W., Shi, X., Zhang, Q., Peng, L., He, C., & Wei, Q. (2021), Effect of therapeutic ultrasound for neck pain: A systematic review and meta-analysis. *Arch Phys Med Rehabil*, 102(11), 2219–30. https://doi.org/10.1016/j.apmr.2021.02.009

Sarraf, F., Abbasi, S., & Varmazyar, S. (2023), Self-management exercises intervention on text neck syndrome among university students using smartphones. *Pain Manag Nurs*, 24(6), 595–602. https://doi.org/10.1016/j.pmn.2023.04.005

Sathya, & Tamboli, S.A. (2020), Prevalence of text neck syndrome in young-adult population. *International Journal Medical and Exercise Science*, 06(02), 749–59. https://doi.org/10.36678/ijmaes.2020.v06i02.004

Shah, P.P., & Sheth, M.S. (2018), Correlation of smartphone use addiction with text neck syndrome and SMS thumb in physiotherapy students. *Int J Community Med Public Health*, 5(6), 2512. https://doi.org/10.18203/2394-6040.ijcmph20182187

Shinde, S., & Bhende, R. (2023), Evidence based treatment strategies for "Text Neck Syndrome": A review. *Int J Occup Saf Health*, 13(2), 245–57. https://doi.org/10.3126/ijosh.v13i2.48679

Sri Lekha, M., Vishnuram, S., K. R., Abathsagayam, K., & Sugan-thirababu, P. (2025). Efficacy of Dynamic Neuromuscular Stabilization Exercises on Balance and Fall Risk in Sub-jects with Diabetic Peripheral Neuropathy among Geriat-rics – A Pilot Study. *Physical & Occupational Therapy In Geriatrics*, 19, 1-5. https://doi.org/10.1080/02703181.2025.2467803

Tsantili, A.-R., Chrysikos, D., & Troupis, T. (2022), Text Neck Syndrome: Disentangling a new epidemic. *Acta Med Acad*, 51(2), 123–7. https://doi.org/10.5644/ama2006-124.380

Xia, P., Wang, X., Lin, Q., Cheng, K., & Li, X. (2017), Effectiveness of ultrasound therapy for myofascial pain syndrome: a systematic review and meta-analysis. *J Pain Res*, 10, 545–55. https://doi.org/10.2147/jpr.s131482

Supplementary Information

Author's contribution

Boopathy D.: Conceptualization, Methodology, Software, Check, Formal Analysis, Investigation, Resources, Data Curation, Writing – Rough Preparation, Writing – Review and Editing, Visualization, Supervision, Project Administration, Receiving Funding; **Sathya Siva:** Conceptualization, Methodology, Software, Check, Formal Analysis, Investigation, Resources, Writing – Rough Preparation, Writing – Review and Editing, Visualization, Supervision, Project Administration, Receiving Funding; **Logeshwari V.:** Conceptualization, Methodology, Software, Check, Formal Analysis, Investigation, Resources, Writing – Rough Preparation, Writing – Review and Editing, Visualization, Supervision, Project Administration, Receiving Funding; **Dilip G.:** Conceptualization, Methodology, Software, Check, Formal Analysis, Investigation, Resources, Writing – Rough Preparation, Writing – Review and Editing, Visualization, Supervision, Project Administration, Receiving Funding; **Madhubala V.:** Conceptualization, Methodology, Software, Check, Formal Analysis, Investigation, Resources,

Writing – Rough Preparation, Writing – Review and Editing, Visualization, Supervision, Project Administration, Receiving Funding. All authors have read and agreed with the published version of the manuscript.

Acknowledgement
We express our sincere gratitude to Saveetha College of Physiotherapy for their support in conducting this research. We are deeply grateful to our mentors for their guidance and contributions to my research team. We sincerely thank the participants and their families for their cooperation. Finally, we express our gratitude to our colleagues and supporters for their support throughout the study.

Declarations

Conflict of Interest
The authors declare no conflict of interest.

Institutional Review Board Statement
The research was approved by the Institutional Scientific Review Board at the Saveetha College of Physiotherapy, Saveetha Institute of Medical and Technical Sciences (409/07/2024/ISRB/UGSR/SCPT).

Informed Consent Statement
Informed consent was obtained from all subjects involved in the study.

Data Availability Statement
The data presented in this study are available on request from the corresponding author.

Funding
This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sector.

Received: July 27, 2025; Accepted: September 29, 2025
Published: October 30, 2025

The online version available at
https://doi.org/10.15391/prrht.2025-10(5).08