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COMPARATIVE EFFECTIVENESS OF STRETCHING VS SHOULDER SHRUGGING EXERCISES ON PAIN, AND FUNCTIONAL DISABILITY IN SMARTPHONE USERS

[1]Sadia Ghafoor, [2]Faiza Azam, [3]Ali Raza, [4]Subhan-ur-Rehman Burki, [5]Sheza Asif, [6]Hafiz Ali Bin Asim, [7]Waqas Hanif

[1]University of Lahore,

[2]Institute Government College University Faisalabad,

[3]Lecturer,Riphah College of Rehabilitation and Allied Health Science,

[4]Principal and Assistant Professor at Northwest Institute of Health Sciences,

[5]Riphah International University,

[6]Foundation University College of Physical Therapy,

[7]Physiotherapist, Superior University Lahore,

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ABSTRACT

Background: Mobile phone users often adopt awkward forward neck flexion postures, leading to neck pain and chronic musculoskeletal issues. This posture can lead to distraction forces, potential instability, and impaired joint position sense. Factors like lack of physical activity, computer use, and female gender can also contribute to neck and back pain syndromes. **Objective**: the aim of this study is to compare and analyze the effective exercise protocol between stretching and shoulder-shrugging exercises on neck pain and disability in mobile phone users. **Methods**: A quasi-experimental design was used in this study involving 30 patients aged 18-30 with neck pain, and without radiculopathy. The study was conducted in both public and private sectors, with purposive sampling and exclusion criteria for spine fractures, osteoporosis, and spine-related infections. Group A received stretching exercises and electrotherapy, and group B was given shoulder-shrugging exercises with electrotherapy. **Results**: The study compared pain levels and neck disability in two groups, Group A and Group B. Results showed significant improvements in pain levels and neck function, with Group A showing superior pain relief, but no significant differences in NDI scores. **Conclusion**: Research shows stretching and shoulder-shrugging exercises effectively reduce pain and improve functional disability in smartphone users. Regular stretching improves flexibility, relieves muscle tension, and enhances functionality.

Keywords: smartphone, shoulder exercises, neck disability index, neck pain

INTRODUCTION

Mobile phones, a portable device, enable users to make and receive calls, access the public switched telephone network, and support various services like text messaging, multimedia, and video games.[1] An analysis related to the global mobile phones ownership and usage revealed that, the number of smartphone users in the world today is 4.88 Billion.[2] The average adult reports using a smartphone for 5.1 hours per day.[3] Smartphone users often adopt an awkward forward neck flexion posture, holding their hands below eye level, looking down, and using their thumb to touch the screen.[4] Xie et al. found that the cervical spine is affected differently when texting with one or both hands.[5] Neck pain, a multifactorial disease,[6] is a significant issue in modern society, influenced by factors like lack of physical activity, daily computer use, working in awkward posture, perceived stress, and female gender.[7] Forward head posture, influenced by daily life factors like computer and mobile phone use, is a common issue contributing to neck and back pain syndromes and chronic musculoskeletal pain. While using a hand-held mobile device, a forward head posture (lower cervical flexion and upper cervical extension)[8] leads to distraction forces and potential instability.[9] Prolonged forward head posture can cause proprioceptive changes, impaired joint position sense, and sensorimotor integration deficiencies.[10]

Range of motion losses in the cervical region can be caused by inactivity and structural changes, leading to increased connective tissue density and muscle shortening.[11] The head's center of gravity is positioned at the front, affecting the vertebral body weight. Neck muscles maintain 80% peak force-generating capacity, and maintaining a neutral head position reduces the load on cervical muscles.[12] Changes in posture alter the moment produced by head weight.[13]

A study by Ogrenci et al. linked cervical lordosis angles and daily smartphone use to neck pain. [14] Individuals with less than 12.5 degrees of cervical lordosis are at higher risk. Smartphone use for 2 hours daily for 10 years increases the risk of decreased cervical lordosis and future neck pathologies.[14] Researches show that using a smartphone in a sitting position increases neck flexion angles more than standing. The device's placement also affects these angles, with placing a smartphone at elbow height increasing cervical extensor activity, increasing the risk of text neck.

Both stretching and shoulder-shrugging exercises are widely used in neck pain. Existing studies have demonstrated varying degrees of improvement with each technique individually, but the lack of direct comparisons leaves uncertainty regarding their relative efficacy. This study compared stretching and shoulder shrugging exercises for pain reduction, and functional disability in smartphone users, aiming to optimize clinical decision-making and improve treatment techniques.

MATERIAL AND METHODS

The study was a quasi-experimental design over 6 weeks, from September 2023 until October 2023, and took place in both the public and private sectors. We used purposive sampling, dividing the sample size of 30 patients equally into Group A (n = 15) and Group B (n = 15). Participants with a history of neck pain, aged between 18 and 30 years, both genders, neck pain without radiculopathy, numeric pain rate scale (NPRS) ≥ 5, and neck disability index (NDI) ≥ 25, were included in the study. The exclusion criteria of the study were patients who had fractures of the spine, osteoporosis, a history of surgery or infections related to the spine, or signs of nerve pain or radiculopathy.

Group A received cervical stretching exercises and electrotherapy. Group B was treated by shrugging exercises and electrotherapy. Both groups received treatment sessions 5 days a week and data was collected at baseline and end of 6th week.

The first group received treatment that included electrotherapy, TENS, a hot pack for 20 minutes, and stretching exercises. For proper positioning, the subject was sitting on a stool while the therapist applied cervical stretching to all muscle groups. Ten repetitions of 10 seconds hold. Patients were also given a home plan: neck isometrics and self-stretching. Group B was treated with TENS, a hot pack for 20 minutes, and shoulder-shrugging exercises. Active and resistive shrugging were employed at 10 repetitions for each.

The data was analyzed by IBM SPSS version 24. To check the normality of data Shapiro-Wilk Test was used. Shapiro-wilk test showed p-value >0.05, it indicated that data is normally distributed and parametric tests were used. A paired t-test was used to assess within-group comparisons and an independent sample t-test was used to analyze the mean differences with standard deviation between the two groups for NDI and NPRS scores. The considered significant P-value is less than 0.05.

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RESULTS

Figure 1 shows frequency distribution of gender of both groups; female 11 (36.67%) and male 19 (63.33%) included in this study. Table 1 showed summary of age, daily mobile usage (in hours) and onset of symptoms (in months). Group A has a mean age of approximately 24.27 years with a standard deviation of 2.99 years; meanwhile, Group B has a mean age of 24 years with a standard deviation of 2.75 years.

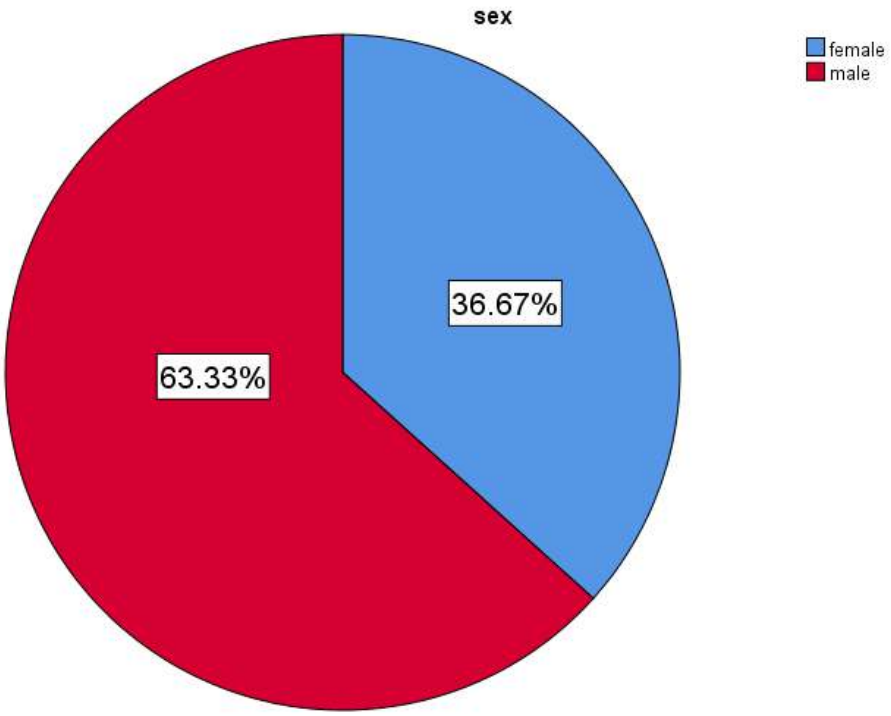

Fig: 1

variables		N	Mean	Std. Deviation	Minimum	Maximum
Age	Group A	15	24.2667	2.98727	19.00	30.00
	Group B	15	24.0000	2.75162	20.00	28.00
Daily mobile usage (hours)	Group A	15	5.7400	1.19272	4.00	7.60
	Group B	15	5.7133	0.86509	4.00	7.00
Neck pain history (months)	Group A	15	5.6000	2.19740	3.00	12.00
	Group B	15	7.0000	2.64575	4.00	13.00

Table: 1 Descriptive statistics of both groups

The results of within groups analysis (table 2) show significant improvements in both pain levels and neck disability following treatment for both Groups.

Groups	Variables	Paired Samples Statistics				P value
		Pre treatment		Post treatment		
		Mean	SD	Mean	SD	
Group A	NPRS	4.8667	1.55226	1.3333	.81650	0.000
	NDI	29.2667	3.17280	9.0000	2.07020	0.000
Group B	NPRS	5.2667	1.48645	3.4000	1.05560	0.002
	NDI	29.0000	2.82843	10.4667	2.66905	0.000

Table 2: within group analysis

Table 3 shows that stretching and shoulder-shrugging exercise groups showed no significant differences in improving neck disability $p<0.05$ but NPRS revealed significant difference.

Variables		N	Group A Mean ± SD	Group B Mean ± SD	T	p-value
NPRS	Baseline	15	4.86±1.552	5.26±1.486	-0.721	0.477
	After treatment	15	1.33±.816	3.40±1.055	-5.998	0.000
NDI	Baseline	15	29.26±3.172	29.00±2.828	-0.243	0.801
	After treatment	15	9.00±2.070	10.47±2.669	-1.682	0.102

Table 3: between groups' analysis

DISCUSSION

Group A exhibited a decrease in mean NPRS score from 4.8667 to 1.3333 ($p = 0.000$) and in mean NDI score from 29.2667 to 9.0000 ($p = 0.000$). Similarly, Group B saw a reduction in mean NPRS score from 5.2667 to 3.4000 ($p = 0.002$) and in mean NDI score from 29.0000 to 10.4667 ($p = 0.000$). These findings indicate that the treatments were effective in alleviating pain and improving neck function in both groups. The independent t-tests compared Group A and Group B revealed no significant differences in NPRS and NDI scores at baseline. However, after treatment, Group A exhibited significantly lower NPRS scores compared to Group B, indicating superior pain relief. Conversely, there were no statistically significant differences in NDI scores between the two groups after treatment, although there was a trend towards significance. Overall,

the results suggest that the treatment was more effective in reducing pain intensity (NPRS) in Group A compared to Group B, while its impact on functional disability (NDI) was similar between the groups.

A study investigated the effects of teaching patients neck stretching exercises following thyroidectomy. After one week, 56.7% had no disability, with 30% reporting mild and 13.3% reporting moderate disability. No severe disability was reported. After four weeks, both experimental and control groups showed reduced disability, with 96.7% and 90% reporting no disability, respectively.[15] A statistically significant difference was noted between the groups regarding pain and disability one week post-surgery, with less discomfort in the intervention group. A study compared the effects of stretching and stabilisation exercises on upper trapezius muscle fatigue in mobile phone users. Thirty young adults aged 19–23 were divided into two groups. Both groups showed significant differences before and after the exercise intervention. The results showed that stretching exercises were more effective in reducing upper trapezius muscle fatigue and discomfort in mobile phone users,[16] while stabilization exercises were more effective in reducing muscle fatigue. Researches on neck stretching exercises post-thyroidectomy and shoulder stabilizing exercises for neck pain and disability reveals their effectiveness in addressing musculoskeletal issues and functional impairment. These studies showed the same results regarding neck pain. A meta-analysis of eight randomized control trials found that strengthening exercises can improve pain and quality of life in office workers with non-specific neck pain. However, there is not enough substantial evidence to support the effects of endurance exercise or stretching alone.[17]

Stretching can potentially alter the functional properties of the series elastic component, resulting in reduced transmission of energy to the muscle. This, in turn, can impact the muscle's ability to generate force.[18] A study of 96 office workers with moderate-to-severe neck pain found that regular stretching exercises for four weeks can decrease pain, improve neck function, and enhance quality of life. The treatment group received additional instruction to perform neck and shoulder stretching exercises twice daily, five days a week. The study found that the treatment group showed significantly greater improvement in neck function and quality of life scores compared to the control group.[19]

Physiohealth.com published an article on how shrugging off neck pain. They explained how posture and movement of the neck, shoulder, and thoracic spine are closely related, and any alteration can cause stress on other structures. Dropping the shoulder blade can aggravate symptoms. Scapular exercise, which involves setting and controlling the shoulder blade, can alleviate stressors and potentially "decompress" the neck. [20]

CONCLUSION

In conclusion, research findings suggest that both stretching and shoulder-shrugging exercises demonstrate greater effectiveness in reducing pain and improve functional disability in smartphone users. Through comprehensive analysis, it became evident that regular stretching routines significantly improved flexibility and relieve tension in the muscles associated with smartphone usage-related discomfort. Regular stretching routines improve flexibility and relieve muscle tension, making it a crucial strategy for managing pain and enhancing functionality.

Conflict of interest: None

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