International Journal of Health Sciences and Research
Volume 14; Issue: 6; June 2024
Website: www.ijhsr.org
Original Research Article *ISSN: 2249-9571*

To Compare the Effect of McKenzie Neck Exercise and Scapular Stabilization Exercise on Forward Head Posture Among the Smart Phone Users

Dr. Deepak[*], Dr. Mukesh Sharma[**]

[*]Consultant Physiotherapist,
[**]Assistant Professor in TDTR DAV IP & R, Yamuna Nagar

Corresponding Author: Dr. Mukesh Sharma

DOI: https://doi.org/10.52403/ijhsr.20240637

ABSTRACT

Background: Smartphone addiction has been shown to decrease the craniovertebral angle, which results in a forward head position (FHP) and decreases the functional ability of neck. Obtaining an effective treatment program to improve forward head posture has always been a concern for physical therapists. Therefore, the purpose of this study was to compare the effectiveness of McKenzie neck exercises and Scapular stabilization exercises on forward head posture on smartphone users.
Study Design: Experimental Design
Source of Data Collection: DAV Institute of Physiotherapy, Yamuna Nagar.
Methodology: 52 Subjects with FHP were included in the study on the basis of inclusion and exclusion criteria and were randomly allocated into 2 groups: Group A performed McKenzie neck exercises and Group B performed Scapular stabilization exercises (SSE). Exercises were performed for 4 weeks. Craniovertebral angle (CVA) and Neck disability were measured as Outcome measure on 1st, 14th and 28th day using ON Protractor mobile application and Neck disability index scale respectively.
Result: Statistically significant improvement ($p<0.05$) noticed in both groups for both the outcomes. However, in between comparison showed that McKenzie neck exercises improved the CVA and Neck disability score more than the Scapular stabilization exercises protocol.
Conclusion: This study provides evidence that the McKenzie neck exercises protocol resulted in superior outcomes in the treatment of forward head posture.

Key Words: Smartphone users, Forward head posture, McKenzie neck exercise, Scapular stabilization exercise, craniovertebral angle. Neck disability index.

INTRODUCTION

Smartphones have become one of the essential goods in our everyday lives. The number of smartphone users has steadily increased over the last several years all across the world. More than 50% of the worldwide population now uses smartphones.[1] It is commonplace for Smartphone to be used to access music, videos, and social network services as well as to make and receive calls.[2] Prolonged use of smartphones is prevalent among young adults and students, including university students who spend a large amount of time on mobile devices for social, leisure, or school activities.[3] Recent investigations have shown that smartphone users tend to report pain in the neck, shoulder, and

thumb, and the severity of the symptoms as the total time spent using the smartphone increases.[4]

Berolo et al. suggested that frequent smartphone use could lead to the use of a non-neutral neck posture or the development of musculoskeletal disorders.[5] The neck and shoulders are particularly vulnerable to pain due to smartphone use, with the muscles showing a high level of fatigue that results in exhaustion and pain.[6]

Most individuals use smartphones with the head shifted forward and the smartphone placed close to the waist or lap while in a sitting position.[7] Moreover, the maintenance of this position (head shifted forward) decreases the lordosis of the lower cervical vertebrae and creates a posterior curve in the upper thoracic vertebrae to maintain balance known as the FHP.[8] A FHP increases external flexion torque, placing a bigger load on the extensors and some parts of the connective tissues. This posture reduces the dispersion of biomechanical loading and therefore causes degeneration of the neck muscles and structural changes. Specifically, the deep cervical flexors and scapular retractors are weakened.[9] A FHP may cause many harmful symptoms such as neck pain, shoulder pain, upper back pain, chronic headaches, increased curvature of the spine, and scapular dyskinesis.[10]

The McKenzie exercise is a self-therapeutic, repetitive exercise, focused on extension. This program is expected to be effective for correcting neck posture, and increasing return-to-work rate.[11] Patients with FHP have problems around the neck, around the neck-shoulder muscles, as well as abnormal postures such as rounded shoulders. In order to correct head and neck posture, it is important to improve the thoracic spine. Therefore SSE is used as an effective way to recover the imbalance in posture and the muscles. [12]

Although the effect of SSE and McKenzie neck exercise have been extensively studied and well documented. There is lack of literature comparing the effect of SSE and McKenzie neck exercise on FHP. Therefore, considering the positive effects of these exercises on FHP, this research is aiming to compare the effectiveness of SSE and McKenzie neck exercise on FHP among the smart phone user.

METHODS

Participants

Study design was experimental and sampling technique was non-randomized convenient sampling technique. Total 52 subjects were included in the study on the basis of inclusion criteria and were randomly allocated into 2 groups as Group A and B using computer software program that generates random sequence.

Sampling Criteria:

Inclusion Criteria:

- Age 20-28 years.
- Both Male & Female.
- CVA less than 50 degrees.
- NDI score less than 24 (mild to moderate disability score on NDI)
- Excessive smartphone user(score>30) measured by Smartphone addiction scale– Short version

Exclusion Criteria:

- Presence of any orthopedics, neurological, psychological, cardiovascular or any other impairment that would not allow them to perform the study tasks.
- Presence of radiating pain in upper extremity
- Diagnosed cases of disc prolapsed, spinal malignancy, infection or inflammatory disease
- Presence of dizziness, vertigo or cervicogenic headache.
- History of spinal fracture or spinal surgery in last 6 months.

Outcome Measures

Neck Disability and CVA were measured as outcome measure on the 1st, 14th and on 28th day using the NDI and ON Protractor mobile application, respectively.

Study Protocol

Subjects in Group A performed McKenzie neck exercises and Group B performed Scapular stabilization exercises.

Group A:

McKenzie neck exercise protocol [11]:

1) **Neck Retraction in sitting:** subject was instructed to perform tuck in the chin then apply overpressure by pushing the chin backwards with the fingers.
2) **Neck extension in sitting:** subject was instructed to perform neck retraction then Lift the chin upwards and tilt the head backwards as if looking up at the ceiling and keep the neck retracted.
3) **Neck retraction in lying:** subject was instructed to lie supine and perform neck retraction then push the head backwards as much as possible by applying pressure with both the hands.
4) **Neck extension in lying:** Lying supine on a bed, place one hand behind the head, and then place the head, neck and top of the shoulders off the edge of the bed. Instruct him to slowly lower the head towards the floor while supporting it with one hand. Now ask to remove the hand, tilt the head and neck as far backwards as one can.
5) **Neck side bending:** subject was instructed to perform neck retraction then bend the head sideways to bring their right ear close to the right shoulder, while keeping the neck retracted. Ask to apply overpressure after getting the end range by pulling the head with the opposite hand.
6) **Neck rotation:** subject was instructed to perform neck retraction then turn his head as far as possible. Ask to apply overpressure using both hands to increase the head rotation.
7) **Neck flexion in sitting:** The subject was instructed to perform neck retraction then tilt the head forward toward their chest. Ask to apply some pressure at end range by pushing the head downwards with both hands.

Single set of 15 repetitions were performed for each exercise, with 7 second hold time.

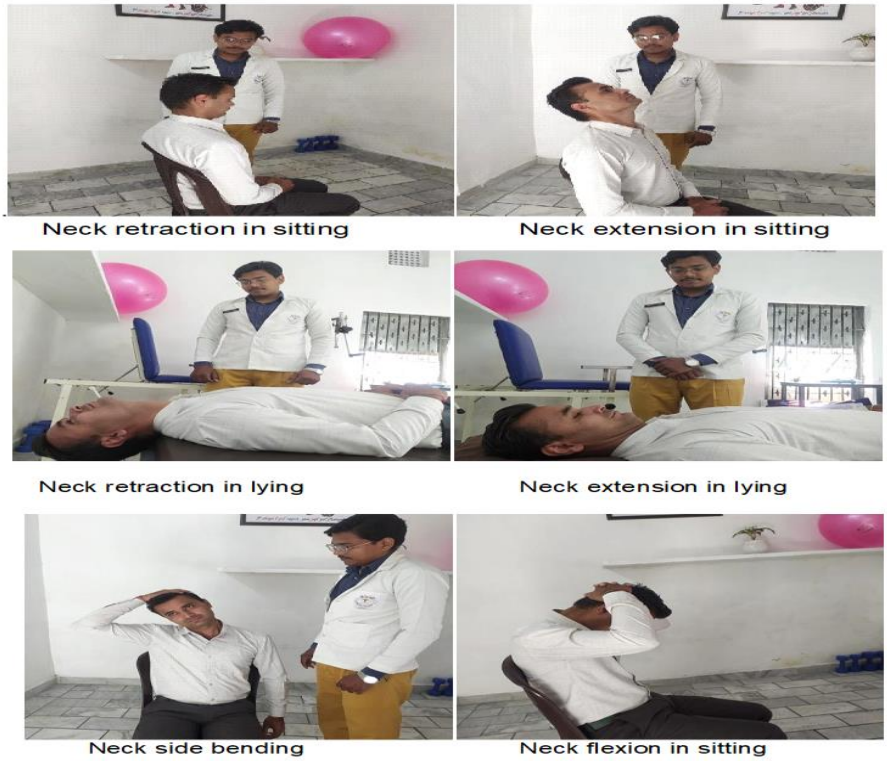

Figure1 McKenzie Neck Exercises

Group B:

Scapular stabilization exercise protocol[12]: Subject was instructed to lie face down on Swiss ball with the naval on the tip of the ball and feet split wide for a stable Base of support. Keep the head in line with the body without flexing or extending the neck.

1. **"I" Formation:** Subject was instructed to squeeze the shoulder blades and lift both the arm in front of him and forming the letter "I" with palm facing downwards.
2. **"Y" Formation:** Subject was instructed to squeeze the shoulder blades and lift both the arms in front of him (120^O shoulder abduction) and forming the letter "Y" with palm facing downwards.
3. **"T" Formation:** Subject was instructed to squeeze the shoulder blades and lift both the arms sideways (90^O shoulder abduction) and forming the letter "T" with palm facing downwards.
4. **"W" Formation:** Subject was instructed to squeeze the shoulder blades and lift both the arms sideways (45^O shoulder abduction) with elbow 90^O flexion and forming the letter "W" with palm facing downwards.

Subjects were asked to hold each of the position for 5 seconds and then lower the arms.

3 sets of 10 repetitions with 5 seconds hold time were performed of each exercise.

3seconds rest between repetitions and 60 seconds rest between each exercise was given for each group.[12]

I formation Y formation

T formation W formation

Figure 2 Scapular Stabilization Exercises

DATA ANALYSIS

The data analysis was done with the help of SPSS v-20. Unpaired t- test used for between group comparisons. Repeated ANOVA and Tukey's method for pairwise comparison was used within the group comparison. The results were found to be non- significant at $p>0.05$.

Unpaired T Test	CRANIOVERTIBRAL ANGLE					
	Day1		Day14		Day28	
	Group A	Group B	Group A	Group B	Group A	Group B
Mean	32.92	32.87	38.14	35.34	43.78	40.25
S.D.	1.419	1.285	1.089	1.167	1.049	0.839
Number	26	26	26	26	26	26
Maximum	35.16	35.11	40.2	36.9	45.33	41.47
Minimum	30.14	30.09	36.23	32.98	41.1	38.7
Range	5.02	5.02	3.97	3.92	4.23	2.77
Mean Difference	0.05		2.79		3.53	
Unpaired T Test	0.123		8.924		13.391	
P value	0.9027		<0.0010		<0.0010	
TableValueat0.05	2.01		2.01		2.01	
Result	Not-Significant		Significant		Significant	

Table 1: Comparison of CVA between the Group A and B

Unpaired T Test	NECK DISABILITY INDEX					
	Day1		Day14		Day28	
	Group A	Group B	Group A	Group B	Group A	Group B
Mean	21.19	21.12	16.54	18.19	8.81	13.23
S.D.	1.812	1.818	1.606	1.524	1.470	1.505
Number	26	26	26	26	26	26
Maximum	24	24	19	21	11	16
Minimum	18	18	14	16	6	11
Range	6	6	5	5	5	5
Mean Difference	0.08		1.65		4.42	
Unpaired T Test	0.153		3.810		10.720	
P value	0.8792		<0.0014		<0.0010	
TableValueat0.05	2.01		2.01		2.01	
Result	Not-Significant		Significant		Significant	

Table 2: Comparison of NDI score between Group A and B

DISCUSSION

The result of the present study suggests that McKenzie neck exercise and SSE both are effective in improving CVA and functional ability of neck in FHP. However McKenzie neck exercises are found to be statistically more effective than SSE in improving FHP.

Effect of scapular stabilization exercises on FHP:

Continuous FHP increases the load on the posterior cervical structures such as bones, ligaments, joint capsules, and muscles, and changes scapular kinematics and kinetics. Previous studies have shown that FHP leads to shortening of the posterior neck extensors, tightening of the anterior neck and shoulder muscles, and affects scapular position and kinematics.[13] Thigpen CA and other studies have reported that weakened muscles cause disruptions in normal movement patterns and motor control, and that these muscles are replaced by other muscles to perform similar movements. Movement pattern correction is an important part of muscle-recruiting strategies in rehabilitation. Recovering the normal activation of the serratus anterior and trapezius muscles is essential for neck and shoulder disorder rehabilitation. [14]

Previous research studies have reported that FHP is associated with increased activity of upper trapezius and decreased activity of serratus anterior and lower trapezius muscles.[15] SSE changes the patterns of muscle imbalances caused by upper crossed syndromes. The main goal of SSE is to inhibit the over activity of muscle (i.e., upper trapezius) and to facilitate the muscle with weak activity (i.e., lower trapezius and serratus anterior) for postural control. Boyoung I et al. stated that SSE is an effective method to improve abnormal posture in patients who is FHP results in

structural distortion of the neck and compensatory movement of the muscles as it solves the problems associated with the neck, back, and scapula.[16]

Effect of McKenzie neck exercises on FHP:

In the present study, the CVA of the experimental group significantly improved. These results are similar to study performed by Youn et al. who examined CVA changes in groups undergoing McKenzie exercise with conventional therapy versus only conventional therapy and showed that the CVA of subjects in combined therapy significantly improved in just one to two weeks compared to four weeks for the conventional therapy group. [17]

Kjellman and Oberg also showed that the McKenzie exercises were more beneficial than general exercises and ultrasound in the control group, with faster neck pain relief during the first three weeks. [18] Therefore, the results of the present study are in agreement with the literature which demonstrates that McKenzie exercise corrects abnormal posture and can shorten the time toward postural improvement. Boyoung I, et al. [16] stated that neck pain is often accompanied by protective muscle spasm which developed pressure within the homonymous muscle, thus producing ischemia, more pain and abnormal neck posture. They showed that postural correction was effective in reducing neck pain and muscle spasm. Previous studies have shown that FHP leads to shortening of the posterior neck extensors, tightening of the anterior neck and shoulder muscles, and reduce the mobility of the spine. The mechanical improvement may be attributed to treating the adaptive muscle shortening of the neck region, resulting in limited uncomfortable movement and reduced spinal mobility necessitating activities that promote the rebuilding process.

McKenzie exercises are also a very useful treatment method because they often rely on the force created by the patient in different direction. It is an active therapy that involves repeated movements or sustained positions to reduce pain and disability and improve spine mobility. Furthermore, it helps patients moving their spine in the least detrimental direction for their problem, minimizing movement restrictions caused by kinesiophobia or pain. [19]

Abdulwahab and Sabbahi reported that the neck retraction exercises released the compression on the cervical root in subjects with cervical radiculopathy and extended the lower cervical region, which recovered the normal neck posture. The McKenzie group showed improvement in physical performances, which may be due to the noticeable alteration in the awareness of pain. McKenzie's exercises decreased anxiety caused by pain anticipation and fear from achieving certain physical motions, which increased self-confidence.[20]

CONCLUSION

The result of the present study suggests that both McKenzie neck exercise and SSE are effective in improving FHP among the smart phone users. However significant difference is found between the groups in improving the NDI and CVA. Therefore, it is concluded that McKenzie neck exercises are more effective than SSE and resulting in speedy and early recovery in improving FHP.

Declaration by Authors

Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Ashiyat K. Akoduetal. Correlation among smartphone addiction, CVA, scapular dyskinesis, and selected anthropometric variables in physiotherapy undergraduates. J TaibahUniv Med Sci. 2018 Dec; 13(6): 528–534.
2. Yong- Soo Konget al. The effect of modified cervical exercise on smartphone users with forward head posture. J Phys Ther Sci. 2017 Feb; 29(2): 328–331.

3. Kwon M., Kim D., et.al. The smartphone addiction scale: development and validation of a short version for adolescents. PloS One. 2013; 8(12):e83558.
4. Sang In Jung et al.The effect of smartphone usage time on posture and respiratory function.J Phys Ther Sci. 2016 Jan; 28(1): 186–189.
5. Berolo S., Wells R.P., Musculoskeletal symptoms among mobile hand-held device users and their relationship to device use: a preliminary study in a Canadian university population. Appl Ergon. 2011; 42:371–378
6. Szeto G., O'Sullivan P. Examining the low, high and range measures of muscle activity amplitudes in symptomatic and asymptomatic computer users performing typing and mousing tasks. Eur J Appl Physiol. 2009; 106:243–251.
7. Lee H., Nicholson et.al. Development and psychometric testing of Korean language versions of 4 neck pain and disability questionnaires. Spine. 2006; 31:1841–1845.
8. Kang J.H., Park R.Y., et al. The effect of the forward head posture on postural balance in long time computer based worker. Ann Rehabil Med. 2012; 36(1):98–104.
9. Tan LA, Straus DC, Traynelis VC: Cervical interfacet spacers and maintenance of cervical lordosis. J Neurosurg Spine, 2015, 22: 466–469.
10. Gupta V.K., Arora S., Gupta M. Computer-related illnesses and Facebook syndrome: what are they and how do we tackle them. Med Update. 2013; 23:676–679.
11. Kim S, Jung J, Kim N.The Effects of McKenzie Exercise on Forward Head Posture and Respiratory Function. J KorPhysTher 2019;31(6):351-357
12. Kang JI, Choi HH, Jeong DK, Choi H, Moon YJ, Park JS. Effect of scapular stabilization exercise on neck alignment and muscle activity in patients with forward head posture. J. Phys. Ther. SCI.2018; 30: 804-808.
13. Yoo WG et al. Effect of the neck retraction taping (NRT) on forward head posture and the upper trapezius muscle during computer work. J Phys Ther Sci, 2013, 25: 581–582.
14. Thigpen CA, Padua DA, Michener LA, et al.: Head and shoulder posture affect scapular mechanics and muscle activity in overhead tasks. J Electromyogr Kinesiol, 2010, 20: 701–709.
15. Wegner S, Jull G, O'Leary S, et al.: The effect of a scapular postural correction strategy on trapezius activity in patients with neck pain. Man Ther, 2010, 15: 562–566.
16. Boyoung I, et al. Effects of scapular stabilization exercise on neck posture and muscle activation in individuals with neck pain and forward head posture. J Phys Ther Sci. 2016 Mar; 28(3): 951–955.
17. Youn JH, Sung DJ. The influence of McKenzie Approach on head, shoulder posture of the patients with chronic neck pain. The Research Institute of Physical Education & Sports Sci. 1998; 17: 79-90.
18. Kjellman G, Oberg B. A randomized clinical trial comparing general exercise, McKenzie treatment and a control group in patients with neck pain. J Rehabil Med 2002; 34: 183-190.
19. Petersen T, Kryger P, The effect of McKenzie therapy as compared with that of intensive strengthening training for the treatment of patients with sub-acute or chronic low back pain: a randomized controlled trial. Spine, 2002; 27: 1702-1709.
20. Abdulwahab SS, Sabbahi M. Neck retractions, cervical root decompression, and radicular pain. J Orthop Sports Phys Ther 2000; 30: 4-9.

How to cite this article: Deepak, Mukesh Sharma. To compare the effect of McKenzie neck exercise and scapular stabilization exercise on forward head posture among the smart phone users. *Int J Health Sci Res.* 2024; 14(6):251-257. DOI: *10.52403/ijhsr.20240637*

******