ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 12, Issue, 03, pp.10581-10584, March, 2020

DOI: https://doi.org/10.24941/ijcr.38210.03.2020

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

EFFECTS OF POSTURE CORRECTING EXERCISES ON RESPIRATORY PARAMETERS IN INDIVIDUALS WITH UPPER CROSSED SYNDROME

Priya Mehta[1,*] and Akshita Maheshwari[2]

[1]MPT Neurology, Demonstrator, Department of Physiotherapy, MGM Allied Health Sciences Institute, MGM Medical College, Indore (M.P.), India

[2]Undergraduate Student, Department of Physiotherapy, MGM Allied Health Sciences Institute, MGM Medical College, Indore (M.P.), India

ARTICLE INFO

Article History:
Received 24th December, 2019
Received in revised form
20th January, 2020
Accepted 18th February, 2020
Published online 28th March, 2020

Key Words:
Upper Crossed Syndrome,
Forward Head Posture,
Chest Expansion,
Peak Expiratory Flow,
A-T length.

ABSTRACT

Background: Upper crossed syndrome (UCS) also referred as Forward Head Posture (FHP) is a condition characterized by muscular imbalance where muscles of the neck and the shoulder girdle experience with weakness and tightness that affects head position, spine, and shoulder girdle. Literature reviewed that FHP has negative impact on respiratory functions. **Objective:** To study the effects of posture correcting exercises on respiratory parameters in individuals with upper crossed syndrome. **Methods:** 15 participants with defined upper crossed syndrome fulfilling the inclusion and exclusion criteria were selected who performed pectoralis major and minor, levator scapulae and upper trapezius muscles stretching exercise, middle and lower trapezius strengthening exercise and McKenzie exercise respectively. The aforementioned interventions were provided for 30 minutes per session, five times a week, for 3 weeks. Chest expansion, Peak Expiratory flow rate (PEF) and Acromian-Tragus (A-T) length were assessed using an inch tape, peak flow meter and a steel ruler respectively on the first visit and after completion of 3 weeks exercise protocol. **Results:** Statistical analysis was done by SPSS version 20 and Mann Whitney U Test was used. The results showed statistically significant improvement in Chest expansion ($p<0.05$) and Peak expiratory flow ($p<0.05$) post Intervention. Conclusion: There is significant effect of posture correcting exercises on respiratory parameters in individuals with upper crossed syndrome and they may be recommended as effective exercises to improve neck posture as well as respiratory functions in adults with UCS.

Citation: ***Priya Mehta and Akshita Maheshwari.*** **2020.** "Effects of posture correcting exercises on respiratory parameters in individuals with upper crossed syndrome", *International Journal of Current Research*, 12, (03), 10581-10584.

INTRODUCTION

Upper crossed syndrome (UCS) is a condition characterized by muscular imbalance where muscles of the neck and the shoulder girdle are present with weakness and tightness that affects head position, spine, and shoulder girdle[1].In UCS, tightness of the upper trapezius and levator scapulae on the dorsal side crosses with tightness of the pectoralis major and minor and weakness of the deep cervical flexors ventrally crosses with weakness of the middle and lower trapezius[2]. It is also referred to as proximal or shoulder girdle crossed syndrome, cervical crossed syndrome, student syndrome, forward head posture, or slouched posture (Kirthika, 2018; Page, 2010). Janda, who first described UCS, argued that the syndrome occurred when a slouched sitting posture was sustained for a prolonged period (Page, 2010).

Corresponding author: **Priya Mehta,**
MPT Neurology, Demonstrator, Department of Physiotherapy, MGM Allied Health Sciences Institute, MGM Medical College, Indore (M.P.), India.

Specific postural changes can be observed in UCS, including forward head posture (FHP), increased cervical lordosis and thoracic kyphosis, elevated and protracted shoulders, and rotation or abduction and winging of the scapulae (Page, 2010). FHP is also a result of poor postural habits which commonly occurs due to excessive use of smart phones and display devices, hence also known as Texting posture. Pectoralis minor, trapezius, levator scapulae and the rhomboideus have a notable action during respiration particularly forced inspiration (Chaurasia, 2019; Han, 2016). Several studies have reported pulmonary dysfunction due to imbalance in these accessory muscles of respiration and showed that forced vital capacity (FVC), forced expiratory volume in 1 second ($FEV_{1.0}$)were significantly lower in the FHP group, when compared with the normal group leading to weakened respiratory function (Kirthika, 2018; Han, 2016; Kang, 2016). Stretching is a form of flexibility training to extend or lengthen the shortened tissues like muscles while *strengthening exercise* are activities that encourage growth, thereby increasing the strength (Lee, 2017; Kim,

2015). Stretching of the pectoralis muscles is used to correct abnormal postures and shoulder impingement syndrome (Kendall et al., 2005). Muscle strengthening exercises for the middle and lower trapezius and stretching exercises for the rhomboids and upper trapezius have a positive impact on upper crossed syndrome by increasing body temperature (Bae, 2016; Kendall et al., 2005). The role of the longus capitis and longus colli, the deep flexor muscles of the neck, is considered important in postural adjustment and maintaining stability of the neck and to improve neck-shoulder posture (Boyd-Clark, 2002; Lee, 2013). The McKenzie Method of Mechanical Diagnosis and Therapy (MDT) is an internationally acclaimed method of assessment and treatment developed by New Zealand Physiotherapist, Robin McKenzie. The McKenzie exercise encourages self-care treatment through repeated exercises and focuses on extension, including ROM exercise, manipulation, and patient education (McKenzie, 1983). The recent advancements in technology with continuous usage of smart phones and laptops played a vital role in inducing poor postural habits. Many studies have been conducted on the effects of various posture on Respiratory function, but a very limited literature has been found for the effect of posture correcting exercises on improving the respiratory functions. The need of this study is to provide evidence about the effect of posture correcting exercises on respiratory parameters so that these exercises may be recommended as effective exercises to improve posture as well as respiratory functions in adults with UCS.

MATERIALS AND METHODS

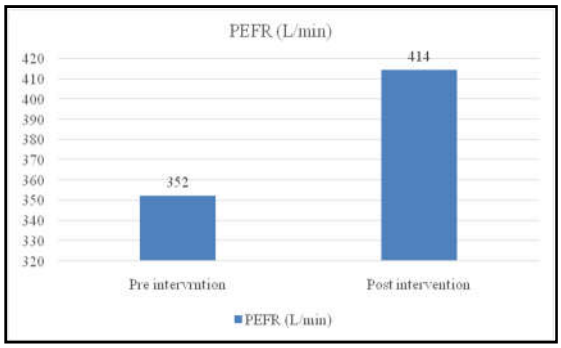
It is a Quasi experimental pilot study conducted in Out Patient Department of Maharaja Yashwantrao hospital, Indore. Ethical committee approval was taken from Institutional ethical committee. 15 participants were included using convenient sampling with A-T length more than 2.5 cm and between age group of 18 to 25 years. Participants were excluded if having neck pain, neuromyopathy, inflammatory disease, history of disc surgery within three months, congenital spinal or thoracic deformity, neck or respiratory diseases, cervical fracture, vascular diseases, psychiatric problems that would hinder the comprehension, cardiopulmonary disease and any restriction type of pulmonary activity.

Procedure -All participants were first assessed for UCS on the basis of A-T Length. For evaluating the A-T length, the horizontal distance between the center of the ear and center of the Acromian while the subject in standing position against a wall were measured by using a steel ruler. The subjects were recruited in the study if A-T length is 2.5 cm or more. Procedure was explained and written consent was obtained. Chest expansion values and Peak Expiratory Flow Rate was measured before providing the interventions. Treatment was given for 30 minutes per session, once a day, five times a week, for 3 weeks, which included stretching, strengthening and McKenzie exercises. For the stretching of pectoralis major and minor, the subjects performed muscular extension for both stretching the pectoralis major and the pectoralis minor. For the former, the subjects will stand with one arm touching the edge of the wall and will abduct the shoulder horizontally to the ground. For the later, the subjects with their shoulders abducted, extend the shoulders while raising their arms over their heads. Each of the movement was held for 30 seconds; three movements would be considered one set, which was performed a total of six on both sides.

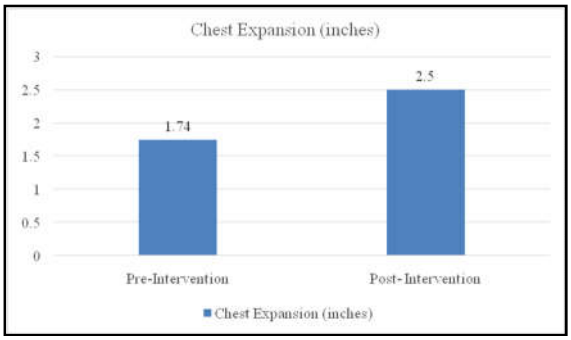
The self-stretching exercise was engaged for the rhomboids and the upper trapezius. In the self-stretching exercise, the rhomboid was pulled laterally and the upper trapezius was pulled into cervical flexion. Each repetition was performed for 10 seconds, with a five-second break between each repetition. One exercise set was consisted of three repetitions. The patients performed ten sets. The middle trapezius strengthening exercise was performed while in a prone position with the shoulder and elbow joints at a 90-degree angle. The lower trapezius strengthening exercise was performed in a prone position with the shoulder joints at a 135-degree angle while stretching both arms upward without bending the joints. Ten movements were considered a set, two sets were performed with two minutes rest between sets. Exercise program of McKenzie exercise consist of 7 movements with maintained peak isometric force for seven seconds for a total of 15 reps, with a break after completing the motionthat includes- Retraction for neck from sitting position, Extension for neck from sitting position, Lateral bending of head, Rotation of head, Flexion of neck from sitting position, Chin tuck neck from supine position and Extension for neck from supine position. After providing 3 weeks of following interventions A-T length, chest expansion and Peak Expiratory Flow Rate were measured again.

RESULTS

15 participants including 3 males and 12 females received treatment. The data of pre-intervention and post-intervention values were analyzed using SPSS 20.0 software. Mann Whitney U test was used for statistical analysis of PEFR, chest expansion and A-T length at statistical significance level $p<0.05$. Table1 showing summary of data analysis of PEFR, Chest expansion and A-T length. Statistically significant improvement was found post intervention in PEFR ($0.034<0.05$) as shown in Graph 1 and chest expansion values($0.092<0.05$) as shown in Graph 2. Statistically significant decrease in A-T length was found post intervention ($0.00262<0.05$) as shown in Graph 3.



Graph 1. PEFR values Pre-intervention and Post-intervention



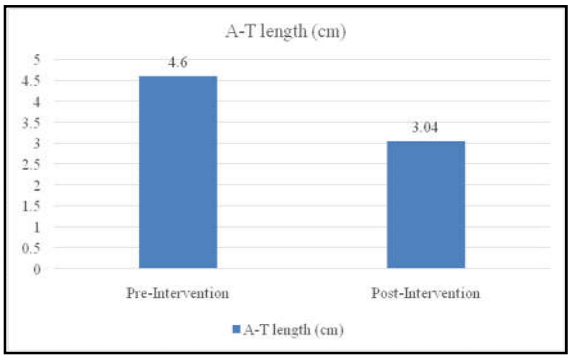
Graph 2- Chest expansion values pre-intervention and post-intervention

Table 1. Data Analysis of PEFR, Chest expansion and A-T length pre and post intervention

Outcome measure	Pre-intervention (Mean ±SD)	Post-intervention (Mean ±SD)	z-score	p-value (p<0.05)*
Peak Expiratory Flow Rate (L/Min)	352±108.04	414±97.62	-2.11538	0.034
Chest Expansion Measurement (Inches)	1.74±0.63	2.84±0.77	-3.29751	0.0092
A-T Length (cm)	4.6±1.23	3.04±1.13	-3.00716	0.00262

DISCUSSION

In present study, effects of posture correction exercises on respiratory functions were investigated in individuals with UCS and the participants exhibited significant increase in PEF rate and chest expansion after 3 weeks of interventions.



Graph 3. A-Tlength measurement Pre-intervention and Post-intervention

Also, the A-T length reduced significantly in the patients after 3 weeks of interventions. Previous studies have documented improvement in forced vital capacity and forced expiratory volume in 1 second in stroke patients by applying upper cervical & upper thoracic mobilization and deep cervical flexors exercises (Cho, 2019). Similar results were found in a study done on smart phone users having forward head posture (Lee et al., 2017). These findings are consistent with results of our study. Evidences have also shown that forward head posture reduces respiratory function including forced vital capacity, forced expiratory volume in one second and ration of forced expiratory volume in one second to forced vital capacity.

Suggested reasons for reduced respiratory function in FHP are reduced diaphragm muscle strength (Zafar et al., 2018), fatigue of neck erector spinaeand upper trapezius muscle, morphological changes which leads to expansion of upper thorax and contraction of lower thorax (Koseki et al., 2019), higher activities of Pectoralis Minor, Trapezius, Levator Scapulae muscles in FHP then in neutral head position (Kim, 2017; Jull, 2009; Kang, 2016). To our knowledge, no study till date has been done to check effectiveness of posture correcting exercises on respiratory parameters. Possible mechanism for obtained respiratory parameter improvement can be reduction in muscle imbalance and extra load around the neck and the surrounding tissues led to the relaxation of FHP, a shift from slumped kyphotic posture to the better erect posture reduced intra-abdominal pressure making thoracic excursions easier and increased muscle power in the neck followed by an increase in muscle power of the respiratory muscles (Kim et al., 2016; Koseki et al., 2019; Kim et al., 2017; Jull et al., 2009; Kang, 2016).

Future studies using a control group and follow up of participants are suggested.

Conclusion

There is significant effect of posture correcting exercises on respiratory functions in individuals with upper crossed syndrome and they may be recommended as effective exercises to improve posture as well as respiratory functions in adults with Forward Head Posture. It is expected that the results of this study may serve as useful clinical data in handling patients with postural changes contributing to respiratory disturbances and patients with respiratory disturbances contributing to postural abnormalities.

Conflict of Interest: No conflict of interest.

Abbreviation

- A-T- Acromian- Tragus
- FHP- Forward Head Posture.
- FVC- Forced Vital Capacity
- PEFR- Peak Expiratory Flow Rate
- UCS- Upper Crossed Syndrome.

REFERENCES

Bae WS., Lee HO., Shin JW., Lee KC. 2016. The effect of middle and lower trapezius strength exercises and levator scapulae and upper trapezius stretching exercises in upper crossed syndrome. Journal of Physical Therapy Science. May;28(5):1636-1639.

Boyd-Clark LC., Briggs CA., Galea MP. 2002. Muscle spindle distribution, morphology, and density in longus colli and multifidus muscles of the cervical spine. Spine 27: 694–701.

Chaurasia BD. 2019. Human Anatomy Volume 3. 8th edition: CBS; 2019.

Cho J., Lee E., Lee S. 2019. Upper cervical and upper thoracic spine mobilization versus deep cervical flexors exercise in individuals with forward head posture: A randomized clinical trial investigating their effectiveness. *J Back Musculoskelet Rehabil.,* 32(4):595-602.

Han J., Park S., Kim Y., 2016. Effects of forward head posture on forced vital capacity and respiratory muscles activity. *Journal of Physical Therapy Science*. 28:128–131.

Jull GA., Falla D., Vicenzino B., Hodges PW. 2009. The effect of therapeutic exercise on activation of the deep cervical flexor muscles in people with chronic neck pain. *Man Ther*., Dec;14(6):696-701.

Kang JI., Jeong DK1., Choi H2. 2016. The effect of feedback respiratory exercise on muscle activity, craniovertebral angle, and neck disability index of the neck flexors of patients with forward head posture. *J Phys Ther Sci.,* Sep;28(9):2477-2481.

Kang KW., Jung SI., Lee do Y., Kim K., Lee NK. 2016. Effect of Sitting Posture on Respiratory Function While

Using A Smartphone. *Journal of Physical Therapy Science*. May;28(5):1496-8.

Kendall FP., McCreary EK., Provance PG. 2005. Muscles: testing and function with posture and pain. 5th ed. Baltimore: Williams & Wilkins.

Kim HY., Yeun YR., Kim SJ. 2016. Preventive effects of stretching and stabilization exercises on muscle fatigue in mobile phone users. *Journal of Physical Therapy Science*., 28(9):2529-2532.

Kim MS., Cha YJ., Choi JD. 2017. Correlation Between Forward Head Posture, Respiratory Functions, and Respiratory Accessory Muscles in Young Adults. *J Back Musculoskelet Rehabil.,* Aug 3;30(4):711-715.

Kim SY., Kim NS., Kim LJ. 2015. Effects of cervical sustained natural apophyseal glide on forward head posture and respiratory function. *Journal of Physical Therapy Science.,* 27:1851–1854.

Kirthika S V., Sudhakar S., Padmanabhan K., Ramanathan K. 2018. Impact of upper crossed syndrome on pulmonary function among the recreational male players: A preliminary report. *Saudi Journal of Sports Medicine*. 18:71-4.

Koseki T., Kakizaki F., Hayashi S., Nishida N., Itoh M. 2019. Effect of Forward Head Posture on Thorasic shape and Respiratory Function. *Journal of Physical Therapy Science*, Jan; 31(1): 63–68.

Lee MY., Park SJ., Kim JS. 2013. Effect of Neck Exercise On High School Students' Neck Shoulder Posture. *Journal of Physical Therapy Science.,* May; 25(5): 571–574.

Lee NK., Jung SI., Lee DY. et al. 2017. Effects of exercise on cervical angle and respiratory function in smartphone users. *Osong Public Health Res Perspect*., 8:271–274.

Lee NK., Jung SI., Lee DY. 2017. Effects of Exercise on Cervical Angle and Respiratory Function in Smartphone Users. *Osong Public Health Res Perspect*., 8(4):271-274.

McKenzie RA. 1983. Treat your own neck. Lower Hutt: Spinal Publication.

Page P., Frank C, Lardner R. 2010. Assessment and Treatment of Muscle imbalance-The Janda Approach. 1st edition. LA: Human Kinetics; 1st Jan.

Zafar H., Albarrati A., Alghadir AH., Iqbal ZA. 2018. Effect of Different Head-Neck posture On Respiratory Function in Healthy males. *Biomed Res Int*. 2018 Jul 12; 4518269.

****