OKLAHOMA STATE UNIVERSITY / MASTER OF ATHLETIC TRAINING

The effectiveness of corrective exercises to improve posture in patients with upper cross syndrome and scapula dyskinesis: A Critically Appraised Topic

OKLAHOMA STATE UNIVERSITY
CENTER FOR HEALTH SCIENCES

Hana Ogino B.S., JSPO-AT, Michael Daniel B.S.,PES, Jennifer L. Volberding PhD, LAT, ATC

INTRODUCTION

Upper Cross Syndrome (UCS) is an abnormal posture defined by a muscular imbalance pattern in the neck, torso, and scapula muscles that commonly results in scapular dyskinesis. Postural features of UCS are characterized by increased cervical lordosis, rounded shoulders, changes in scapular position and movement patterns, and increased thoracic kyphosis The National Academy of Sports Medicine (NASM) and Comprehensive Corrective Exercise Program (CCEP) address the cause of imbalances and incorrect movement patterns that lead to problems with posture, balance, and systemic coordination then modifies the imbalances that improves overall exercise quality.

OBJECTIVES

This Critically Appraised Topic (CAT) served to review the current evidence regarding whether corrective exercises can be used to address UCS and scapular dyskinesis thereby providing clinicians with more options to address the condition.

METHODS

Sources of Evidence Searched: PubMed, Google scholar, Oklahoma State University Library

Search Terms:

- Patient/Client Group: patients with UCS and scapular dyskinesis
- Intervention/Assessment: corrective exercises
- Comparison: non-corrective exercises group
- Outcomes: improved alignment using photographic technique

Inclusion Criteria:

- Studies classified as level 2 evidence or higher
- Limited in the last 5 years (2016-2021)
- Studies that included participants older than 18 years old
- Studies that identify improvement of alignment, movement pattern, and muscle activation
- Studies that require a moderate amount of CCEP / NASM exercises program
- Studies that included Upper crossed syndrome and scapular dyskinesis

Exclusion Criteria:

- Studies that did not included participants younger than 18 years old
- Studies that did not include using photographic technique for measurement of the posture
- Studies that did not compare corrective exercises program group to the control group

RESULTS

Summary Table

Study Design	Seidi et al (2020)[3] RCT	Karimian et al (2019)[6] RCT	Almasoodi et al (2020)[7] RCT
Study Participants	24 males with UCS Age between 18 to 24 CCEP group (N= 12) and control group (N = 12)	23 males with UCS Experimental group (N= 12, age 45.2 ± 8.1) and control group (N = 11, age 44.1 ± 7.8)	30 males with UCS Age between 25 to 42 NASM group (N= 15) and control group (N = 11)
Intervention	8 weeks of CCEP. 3 session per week and each session is for 1 hour. 10 mins of warm-up and with 5 mins of cool-down. <u>Control group</u> Daily activity	12 weeks of NASM <u>Control group</u> Daily activity	8 weeks of NASM exercises. 3 session per week. <u>Traditional (control) group</u> 8 weeks of stretching, stabilization, and strengthening exercises. 3 sessions per week and each session is for 50 minutes.
Outcomes Measures	• Forward head and shoulder angles (FHA and FSA) • Thoracic kyphosis angle (TKA) • Electromyography measurement • Dynamic scapular dyskinesis test	• Forward head and shoulder angles (FHA and FSA) • Thoracic kyphosis angle (TKA)	• Forward head and shoulder angles (FHA and FSA) • Thoracic kyphosis angle (TKA) • Shoulder pain and disability Index
Results	Significant differences ($p < 0.05$) for alignment, muscle activation, and movement pattern in the CCEP from pre-test to post-test and follow-up. Significant differences for alignment, muscle activation, and movement pattern in CCEP, compared to control group at the post-test and follow-up. FHA; pre 46.71 ± 2.39, post 39.52 ± 1.96, follow-up 40.57 ± 2.03 (P=0.003, f=18.263) FSA; pre 54.36 ± 2.22, post 45.45 ± 1.87, follow-up 46.46 ± 1.02 (P=0.001, f=25.461) TKA; pre 47.90 ± 2.56, post 36.34 ± 1.85, follow-up 38.17 ± 1.21 (P=0.007, f=17.298)	Significant differences in the in FHA (P=0.001, 90% positive effect, Effect size=1.34), FSA (P=0.000, 88% positive effect, Effect size= 1.28), TKA (P=0.003, 90% positive effect, Effect size= 1.30) of the intervention group. FHA; pre 47.08 ± 2.79, post 39.90 ± 4.87 FSA; pre 55.43 ± 4.21, post 47.85 ± 4.86 TKA; pre 44.76 ± 1.94, post 41.15 ± 2.23	Significant differences in FHA, FSA, TKA, shoulder pain, and functional disability ($p < 0.05$) of the intervention group. FHA; pre 46.20±1.56, post 41.13±1.24 (t= -4.053, p= 0.000) FSA; pre 51.73±2.05, post 44.13±2.58 (t= -5.067, p= 0.000) TKA; pre 47.60±2.64, post 38.40±2.82 (t= 5.187, p= 0.000) Shoulder pain; pre 44.66±7.89, post 25.66±8.20 (t= -3.807, p= 0.001) Functional disability; pre 32.66±9.23, post 18.00±5.60 (t= -3.969, p= 0.001)
Conclusion	CCEP program improved muscle imbalance, movement patterns, and postural alignment in an 8 week program. UCS is able to be improved by the CCEP program.	NASM exercises along with ergonomic interventions could be an effective rehabilitation program for reducing forward head, forward shoulder, and kyphosis angles.	NASM exercises intervention are effective for decreasing FHA,FSA, TKA which improves UCS when compared to traditional exercises.

CONCLUSION

Based on the results of the studies included in this critically appraised topic, there is moderate evidence to support the use of corrective exercises for improving UCS and scapular movement patterns in adults. 8-12 weeks of corrective exercise program can lead activation of the muscle imbalance, improving movement pattern of scapula, and postural alignment. The future studies should be done on both genders to determine if the changes measured in the male population translate to females. Strength of Recommendation: B

REFERENCES

1. Morris CE, Greenman PE, Bullock MI, Basmajian JV, Kobesova A. Vladimir Janda, MD, DSc: tribute to a master of rehabilitation. Spine (Phila Pa 1976). 2006;31(9):1060-1064. doi:10.1097/01.brs.0000214879.93102.4e
2. Bayattork M, Seidi F, Minoonejad H, Andersen LL, Page P. The effectiveness of a comprehensive corrective exercises program and subsequent detraining on alignment, muscle activation, and movement pattern in men with upper crossed syndrome: protocol for a parallel-group randomized controlled trial. Trials. 2020;21(1):255. Published 2020 Mar 12. doi:10.1186/s13063-020-4159-9
3. Seidi F, Bayattork M, Minoonejad H, Andersen LL, Page P. Comprehensive corrective exercise program improves alignment, muscle activation and movement pattern of men with upper crossed syndrome: randomized controlled trial. Sci Rep. 2020;10(1):20688. Published 2020 Nov 26. doi:10.1038/s41598-020-77571-4
4. Park JH Ms, Kang SY PhD, Lee SG PhD, Jeon HS PhD. The effects of smart phone gaming duration on muscle activation and spinal posture: Pilot study. Physiother Theory Pract. 2017;33(8):661-669. doi:10.1080/09593985.2017.1328716
5. Arshadi R, Ghasemi GA, Samadi H. Effects of an 8-week selective corrective exercises program on electromyography activity of scapular and neck muscles in persons with upper crossed syndrome: Randomized controlled trial. Phys Ther Sport. 2019;37:113-119. doi:10.1016/j.ptsp.2019.03.008
6. Karimian R, Rahnama N, Ghasemi G, Lenjannejadian S. Photogrammetric Analysis of Upper Cross Syndrome among Teachers and the Effects of National Academy of Sports Medicine Exercises with Ergonomic Intervention on the Syndrome. J Res Health Sci. 2019;19(3):e00450. Published 2019 Jul 3.
7. Almasoodi, M. C. I., Mahdavinejad, R., & Ghasmi, G. The Effect of 8 Weeks National Academy of Sports Medicine Exercises Training on Posture, Shoulder Pain, and Functional Disability in Male with Upper Cross Syndrome. Sys Rev Pharm, 2020;11(11):1826-1833.
8. Seidi F, Rajabi R, Ebrahimi I, Alizadeh MH, Minoonejad H. The efficiency of corrective exercise interventions on thoracic hyper-kyphosis angle. J Back Musculoskelet Rehabil. 2014;27(1):7-16. doi:10.3233/BMR-130411
9. Oxford Centre for Evidence-based medicine: Levels of Evidence (March 2009). Centre for Evidence-Based Medicine (CEBM), University of Oxford. https://www.cebm.ox.ac.uk/resources/levels-of-evidence/oxford-centre-for-evidence-based-medicine-levels-of-evidence-march-2009. Published October 1, 2020. Accessed October 30, 2021.
10. Ahmadi H, Yalfani A, Gandomi F. The effect of eight-week water-based corrective exercises on forward head, rounded shoulder, thoracic hyperkyphosis posture, and neck pain: A randomized controlled trial. Res Sque. Published 2019 Dec 16. doi:10.21203/rs.2.18600/v1