

To Compare the Effectiveness between Bruegger's Exercise and Kendall Exercise on Forward Head Posture among Undergraduate Students

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Abstract- Background: The Forward Head Posture (FHP) is known as an internal factor that causes dysfunction with shoulder and neck pain. The FHP results in a posture in which the extended head and upper cervical, and the lower cervical vertebrae flex. Inappropriate postural habits of studying and computer work and carrying a backpack of inappropriate weight are among the risk factors associated with forward head posture. Therefore, students are more likely to develop this deformity because they spend more time studying and working on computers in higher educational levels. Bruegger's Exercise promotes postural awareness, reduces neck and shoulder tension, and enhances overall spinal alignment, contributing to a pain-free and functional daily life. Kendall Exercise focuses on strengthening the muscles that support proper neck alignment, helping to correct the forward positioning of the head. **Aim:** To compare the effects of Bruegger's Exercise and Kendall Exercise on FHP among undergraduate students. **Method:** An experimental study was performed. 30 subjects were selected as per inclusion criteria and were assigned to Group A and B. Group A received treatment with Bruegger's Exercise and Group B received Kendall Exercise. Total 20 sessions were given to each patient in 4 weeks. Both groups were reassessed after 4 weeks of treatment. **Results:** There was a statistically significant changes with reference to Craniovertebral angle (CVA) and Neck disability Index (NDI) in Group A. **Conclusion:** The study demonstrated that the Group A which received Bruegger's exercise showed a highly significant improvement in increasing CVA and minimising neck functional disability.

Key words: Forward head posture, Kendall Exercise, Bruegger's relief exercise, Craniovertebral angle, Neck disability Index.

INTRODUCTION

The Forward Head Posture (FHP) is known as an internal factor that causes dysfunction with shoulder and neck pain. The FHP results in a posture in which the extended head and upper cervical, and the lower cervical vertebrae flex. This increases the length of the external moment (the arm) by moving the

gravitational centre (the head) ahead of the load bearing axis. The exposure to this constant load on the craniovertebral extension muscles and the noncontractile structures causes a change in the biomechanical movement, and this increased stress can cause musculoskeletal damage or pain. In addition, FHP can also limit the functional movement in the head and neck area. These limitations are caused by irregular rotation and gliding movement inside the articular capsule whilst moving the joint. Moreover, it was reported that extended periods of FHP can result in a decrease number of sarcomeres, as well as shortening of the muscle fibres, which can affect muscular contraction¹.

In a study among healthy subjects 66% reported of FHP and they fall under the age range of 20-60yrs old. There are many factors that could contribute to the development of FHP such as age, gender, frequency of physical activity, occupation, usage of computer and smartphones and others².

Inappropriate postural habits of studying and computer work and carrying a backpack of inappropriate weight are among the risk factors associated with forward head posture. Therefore, students are more likely to develop this deformity because they spend more time studying and working on computers in higher educational levels. Carrying heavy backpacks, because of heavy books and laptops, for a long time is a double factor for exacerbating the mean forward head posture angle. Since the occupational future of students requires a sound physique, special attention to physical health and posture of students can be a top priority for planners and decision makers³.

Forward head posture frequently appears in the patients with neck disorders. Approximately 60% of the neck pain patients are reported to have forward head posture. Continuous forward head posture 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 forward head posture leads to shortening of the posterior neck extensors, tightening of the anterior neck and shoulder muscles, and affects scapular position and kinematics. Serratus anterior and upper trapezius muscles are the primary stabilizers of the scapula that regulate the force to control scapular motion for functional activities. Properly coupled motions of these two muscles are considered necessary for correct scapular movements, including proper initiation and recruitment of the muscles. Abnormal scapular orientations can alter the activation of the stabilizing muscles such as levator scapulae and upper trapezius muscles, and the mobilizing muscles such as rhomboids and pectoralis minor⁴.

A smaller craniovertebral angle (CVA) indicates a greater forward head posture. A CVA less than 48–50° is considered FHP. The CVA is the angle formed by a horizontal line drawn through the spinous process of the seventh cervical (C7) vertebra and a line that connects the C7 spinous process to the tragus of the ear.

Kendall exercise is a stretching method used to strengthen cervical muscles and is frequently used for improvement of neck stability and postural control. The Kendall exercise group participated in 4 sets of consisting of 12 repetitions of postures, each taking 30 seconds, based on Kendall exercise. 1). The Kendall exercise methods were as follows: (1) Strengthening the deep cervical flexors, lying flat on the back with the chin down and then lifting the head and holding this position for 2–8 seconds to strengthen deep cervical flexors; (2) Stretching the cervical extensors, placing both hands on the occipital area in a sitting position followed by a flexed neck posture with the head down to stretch the cervical extensors; (3) strengthening shoulder retraction, putting a TheraBand around a secure object and pulling the band back with both hands as far as possible to move the shoulder blades toward each other in a standing position; and (4) stretching the pectoralis muscle, placing both hands on the occipital area and pulling the elbows back up (bilateral) and performing arm abduction and external rotation (unilateral)⁵.

Bruegger's exercise was performed in a high sitting position. An elastic resistance band was wrapped on each hand of the participant leaving the palm open and was told to do abduction and extension of thumb along with fingers, followed by wrist extension and

forearm supination. Then, the participant was instructed to perform scapular retraction with shoulder external rotation, elbow extension, shoulder abduction, and extension. Bruegger's exercise was started with 10sec hold on day 1 and progressed to 30sec hold by the end of the 10th session with 5sec of increment every 2 days. The rest time was 30sec which was constant throughout. The exercise was repeated fifteen times per session⁶.

The purpose of the study was to compare the effects of Bruegger's exercise and Kendall exercise in increasing the craniovertebral angle among undergraduate students with forward head posture.

MATERIALS AND METHODS

Study design: Comparative study

Duration of study: 4 weeks

Study setting: Department of Musculoskeletal Physiotherapy, Harsha Institute of Physiotherapy, Nelamangala.

Sample size: 30 subjects with Forward head posture

Inclusion Criteria

Subjects with mild neck pain

Both genders

Age group between 20 to 30yrs

Craniovertebral angle (CVA) < 50°

Exclusion Criteria

1. Patients having Inflammation malignancy, neurological disorder, metabolic disorders.
2. Neck pain radiating into arms and upper extremity, Neck pain associated with headache and facial pain.
3. Any recent surgery, History of recent trauma and fractures of cervical spine.
4. Vestibular system problems, and being unable to perform the exercises

Outcome Measure

1. Craniovertebral angle (CVA)
2. Neck Disability Index (NDI)

METHODOLOGY

The study included 30 subjects with Forward head posture in which CVA less than 50°. The informed consent was obtained from the subjects and they were selected as per the inclusion and exclusion criteria. The procedure was clearly explained to the subjects and they were divided into Group A and Group B.

The 15 subjects in Group A are instructed to perform Bruegger’s exercise in which subjects were positioned in a high sitting position. An elastic resistance band was wrapped on each hand of the participant leaving the palm open and was told to do abduction and extension of thumb along with fingers, followed by wrist extension and forearm supination. Then, the participant was instructed to perform scapular retraction with shoulder external rotation, elbow extension, shoulder abduction, and extension. Bruegger’s exercise was started with 10sec hold on day 1 and progressed to 30sec hold by the end of the 10th session with 5sec of increment every 2 days. The rest time was 30sec which was constant throughout. The exercise was repeated 15 times per session.

The 15 subjects in Group B will be assigned to perform Kendall exercises which is performed in 4 sets consisting of 12 repetitions of postures, each taking 30 seconds.

Statistical Analysis

Between Group Analysis Neck Disability Index (NDI)– Group A & Group B

Variable	Intervention	Pre test	Post test	p-value
Neck Disability Index	Group A Bruegger’s exercise	23.75±2.52	10.16±1.46	0.0000
	Group B Kendall’s exercise	23.08±6.05	22.83±4.62	0.91

Between Group Analysis Cranio-Vertebral Angle (CVA) – Group A & Group B

Variable	Intervention	Pre test	Post test	p-value
Cranio-Vertebral Angle (CVA)	Group A Bruegger’s exercise	40.40±3.97	45.70±5.55	0.001
	Group B Kendall’s exercise	43.13±4.32	45.16±1.37	0.39

RESULT

Measurement tools for outcome included Craniovertebral angle which was measured by goniometry for forward head posture and for neck disability 'Neck Disability Index' (NDI) was used. Between group and with-in group analysis was done using parametric tests of significance by independent sample t-test and paired t test on SPSS version 23.0. Pre-treatment and post-treatment values were taken. The mean ±SD scores of CVA (degrees) at pre-intervention of Group A was 40.40±3.97 and Group B was 43.13±4.32 respectively. The mean±SD scores of CVA (degrees) at post-intervention of Group A was

The Kendall exercise methods were as follows:

- (1) Strengthening the deep cervical flexors, lying flat on the back with the chin down and then lifting the head and holding this position for 2–8 seconds to strengthen deep cervical flexors;
- (2) Stretching the cervical extensors, placing both hands on the occipital area in a sitting position followed by a flexed neck posture with the head down to stretch the cervical extensors;
- (3) Strengthening shoulder retraction, putting a TheraBand around a secure object and pulling the band back with both hands as far as possible to move the shoulder blades toward each other in a standing position; and
- (4) Stretching the pectoralis muscle, placing both hands on the occipital area and pulling the elbows back up (bilateral) and performing arm abduction and external rotation (unilateral).

45.70±5.55 and Group B was 45.16±1.37 respectively. The comparison of pre and post test for CVA of Group A demonstrated (p<0.001) and Group B (p<0.39). So, Group A showed a highly statistically significant difference than Group B.

The mean ±SD scores of NDI at pre-intervention of Group A was 23.75±2.52 and Group B was 23.08±6.05 respectively. The mean±SD scores of CVA (degrees) at post-intervention of Group A was 10.16±1.46 and Group B was 22.83±4.62 respectively. The comparison of pre and post test for NDI of Group A demonstrated (p<0.0000) and Group

B ($p < 0.91$). So, Group A showed a highly statistically significant difference than Group B.

DISCUSSION

This study is aimed to compare the effectiveness of Bruegger's exercise and Kendall exercise on subjects with Forward head posture. The outcome measures for Pre and Post intervention in this study (Craniovertebral angle and Neck disability Index) showed a significant difference between the effect of Bruegger's exercise and Kendall exercise on subjects with Forward head posture.

In Forward Head Posture (FHP), there is the shortening of the neck extensors posteriorly, tightening of anterior neck and shoulder muscles and has kinematic effects on the scapular position.

Bruegger's exercise shown a significant better result than Kendall exercise. The reason is that Bruegger's exercise works to reverse Forward Head Posture by strengthening the scapular retractors meanwhile stretching the protractors. By retracting the shoulders and maintaining an isometric contraction of the neck in the chin tuck position, the deep cervical neck flexors also get strengthened. With frequent repetitions and increased hold time, the participants get adapted to maintain the Bruegger's exercise position and there is reversing in the FHP. At the same time, the strength of the deep cervical flexors is also gained.

Bruegger's exercise along with an elastic resistance band further helps in correcting this posture by using the antagonistic muscles by strengthening the scapular muscles, maintaining chin tuck, and stretching the pectoral muscle.

Kendall exercise is a stretching method used to strengthen cervical muscles and is frequently used for improvement of neck stability and postural control, for which it has been proven to be effective. The Kendall exercise group demonstrated no such improvement in Craniovertebral angle and Neck disability scale scores. However, there were statistically significant differences between the Bruegger's group and Kendall group after the intervention. These results show that Bruegger's exercise is more effective on FHP than Kendall exercise. Therefore, the Bruegger's can be a new simple treatment method for the ever-growing FHP.

LIMITATIONS

A limitation of this study is:

1. Sample size was very small
2. The study was done in a small period.

CONCLUSION

The study found that the group which received Bruegger's exercise showed a highly significant improvement in increasing craniovertebral angle and minimising functional disability among undergraduate students with forward head posture.

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