International Journal of Biomedical and Advance Research
ISSN: 2229-3809 (Online); 2455-0558 (Print)
Journal DOI: https://doi.org/10.7439/ijbar
CODEN: IJBABN **Original Research Article**

Effects of Brugger's postural relief position exercise on upper back pain and posture imbalance in sternal symphyseal syndrome - Quasi experimental study

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Abstract

Background: As we all know that usage of laptops and computers are increasing everyday particularly in pandemic time in the field of education, business, publishing, banking and even entertainment i.e., work from home, online classes. The work time determines the cumulative biomechanical load and the degree of fatigue. It can be short and intense, leading to acute disorders or prolonged with low/moderate intensities, leading to chronic or degenerative disorders. Discomfort appears by increased amount of computer use. So, it is considered to be one of the most eligible fields to conduct a study regarding effects of Brugger's postural relief position exercise on back pain among subjects with sternal symphyseal syndrome.
Methods: It is a Quasi-experimental study.15 subjects were selected between the age group of 18 to 22 years, and were allocated to a single group. These subjects were trained with Brugger's postural relief position exercise for improving posture and reducing pain. The study was conducted for the period of six weeks. Posture improvement was measured by using KINOVEA software and the severity of the pain was measured using Visual Analog Scale.
Result: The pretest and posttest measurements were analyzed by using paired t test. On comparing the pretest and posttest values a greater improvement in posture and pain relief by Brugger's postural relief position exercise.
Conclusion: Hence the study was concluded that the Brugger's relief position exercise was effective in improving the posture and relieving pain on the computer users.
Keywords: Brugger's postural relief position, KINOVEA software, Sternal symphyseal syndrome, arm angle, craniovertebral angle.

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***Article History:**
Received: 03/06/2022
Revised: 28/07/2022
Accepted: 14/08/2022
DOI: https://doi.org/10.7439/ijbar.v13i9.5773

QR Code

How to cite: Rajasekar B, Jayabalan J, Sivakumar S and James TT. Effects of Brugger's postural relief position exercise on upper back pain and posture imbalance in sternal symphyseal syndrome - Quasi experimental study. *International Journal of Biomedical and Advance Research* 2022; 13(09): e5773. Doi: 10.7439/ijbar.v13i9.5773 Available from: https://ssjournals.com/index.php/ijbar/article/view/5773

1. Introduction

The tasks of using laptops and computers are increasing highly by education, business, publishing, banking and entertainment.[1] Musculoskeletal symptoms among students using computers for long periods on a daily basis are increased.[2] A prolonged sitting posture could initiate contraction of the neck muscles and may result in muscle overload, resulting pain in neck, upper limb and back.[3] In particular, due to the prolonged sitting the mid-thoracic region tends to become kyphotic. Muscle imbalance defined by Liebenson, as a systemic change in the quality of muscle dysfunction that results in altered joint mechanics leading to pain, dysfunction and degeneration.[4] Alois Brugger (1920-2001), the Swiss neurologist, developed his concept in early 1950s. He introduced the concept of global movements and interplay between body segments is demonstrated in the example of the cog wheel model. A very common postural syndrome in modern society with the result of prolonged sitting work involves excessive forward curving of lower, middle, and upper back; forward drawn head; rounded shoulders; and excessive forward curving of upper neck. Brugger describes

the entire clinical syndrome under the term "sterno-symphyseal syndrome." He speaks of "painfully tense and painfully week" muscles.[4]

Brugger, does not explain his findings by muscular imbalance, but by the position of joints and of the spinal column. If the fingers and hands are in flexion and internal rotation, it is not possible to lift arms to a full180 degrees, and shoulders tend to be drawn forward; if the arms are crossed infront of the chest, we cannot fully extend the spinal column in the thoracolumbar region and therefore tend to overextend the lumbar spine when attempting to straighten up. If the feet are in pronation and internal rotation, full extension is inhibited at the knees, and there is a tendency to adduct at the hip joint. In this hip position, extension of the lumbar spine is restricted; on trying to straighten up while sitting, there is overextension in the thoracolumbar region.[4]

Acute patients should not sit for more than 20 minutes without taking a "micro-break". Regular "micro-breaks" help to centrate the overall posture for better gravity tolerance. He introduces Brugger's postural relief position for "sterno-symphyseal syndrome". [4] Brugger's exercise is a routine designed to stretch tightened muscles and activate weakened that occur as a result of postural syndrome from a poor prolonged sitting posture. [5]

2. Materials and Methodology

It is a Quasi-experimental study.15 subjects of computer and smart phone using college students were selected between the age group of 18 to 22 years, and were allocated to a single group. These subjects were trained with Brugger's postural relief position exercise for improving posture and reducing pain. The study was conducted for the period of six weeks. Subjects with upper back pain with 6 to 8 rating in visual analogue scale, Students with slumped posture with craniovertebral angle less than 50 degree, subjects sitting more than 4 hours are included. Subjects with Untreated fractures on cervical and upper thorax spine, Neoplasm on spine, Cervical disc prolapses, Subject with psychological disorder, Vertebro basilar insufficiency and Migraine are excluded.

The selected subjects were explained about the study procedure and after taking informed consent form, the subjects were enrolled for inclusion according to specified criteria was included in this study. The pre-test was carried out 3 to 5 days prior to the experiment. The post test was carried out on the day of study completion via the same method to find the outcome measures. Pain intensity was measured by using visual analogue scale.

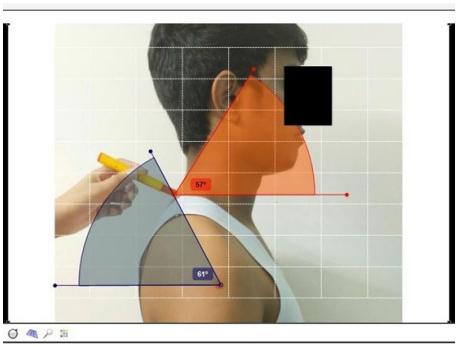

Figure 1: KINOVEA application

Craniovertebral angle Arm angle

Posture angle was measured by KINOVEA software. The camera was placed 1.5m away from the subject. The participant was in standing position, and a lateral view picture was taken. All the photography was taken from participant's right hand side. In KINOVEA software 2 outcome measurements were measured. A) Cranio vertebral angle, this angle was defined by Wickens and Kipath (1937). It is the angle termed at the intersection of a horizontal line through the spinous process of C7 and a line to the tragus of the ear. This is believed to provide an estimation of neck on upper trunk positioning. A small angle indicates more forward head posture. B) Arm angle or sagittal shoulder angle. [6] The angle formed by the intersection of a horizontal line through C7 and a line between the mid-point of the greater tuberosity of humerus and posterior aspect of the acromion, was measured. This angle provides a measurement of forward shoulder position. A smaller angle indicates that the shoulder is further forward in relation to C7 – in other words a more rounded shoulder.

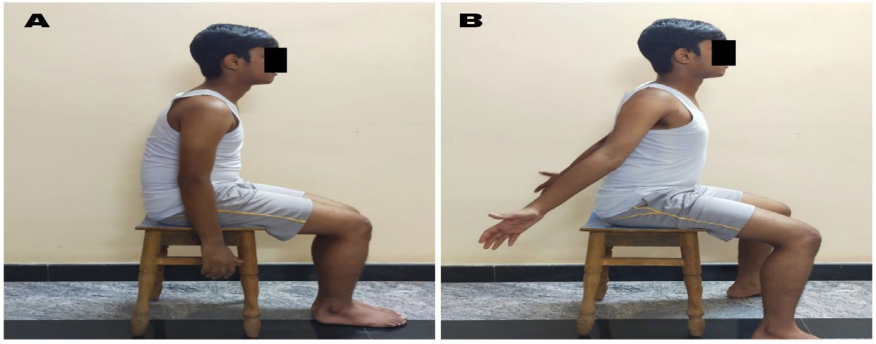

Figure 2: Starting (A) and Ending (B) position of Brugger's postural relief position exercise

Brugger's posture relief position exercise was teached to the subjects in both sitting and standing. In sitting, [7,5] Sit at the edge of the seat. On doing this the sternum will naturally lift up. Separate the legs to 45 degrees each side with the feet turned out slightly and in line with the knees. Shoulders were relaxed and down with the chin tucked in. Fully extend both elbows. Make sure to keep the shoulders down and imagine the scapula were pushing together and down into a V. Turn the thumbs out, palms up. Separate the fingers. Hold for 10 – 15 seconds. Repeat 2-3 times per hour. Subjects were asked to do this exercise with 20 mins break during their online classes and jobs, And in free time whenever it possible after sitting, standing. Outcome measures were pain intensity which was measured by visual analogue scale, and craniovertebral angle and arm angle were measured by using kinovea application.

Microsoft excel was used to analyze the data. The pretest and posttest measurements were analyzed by using paired t test.

3. Results

Table 1 shows the subjects pretest and posttest values comparison on pain intensity. Pretest and posttest values of pain intensity obtained from visual analogue scale were analyzed using paired 't' test. For 14 degrees of freedom and 5% level of significance the table 't' value is 2.145 and the calculated value is 4.183. Since the table 't' value is lesser than the calculated 't' value null hypothesis is rejected.

Table 1: Subject's pretest and posttest values comparison on pain intensity

Outcome measure	Mean value		Calculated 't' Value	Table 't' Value	P value and level of significance
	Pre-Test	Post-test			
VAS	6.533	5.533	4.183	2.145	P < 0.05 Significant

Table 2 shows the subject's pretest and posttest values comparison on craniovertebral angle. Pretest and posttest values of cranio vertebral angle obtained from KINOVEA software were analyzed using paired 't' test. For 14 degrees of freedom and 5% level of significance the table 't' value is 2.145 and the calculated value is 5.26 .Since the table 't' value is lesser than the calculated 't' value null hypothesis is rejected.

Table 2: Subject's pretest and posttest values comparison on craniovertebral angle

Outcome measure	Mean value		Calculated 't' Value	Table 't' Value	P value and level of significance
	Pre-Test	Post-test			
Cranio vertebral angle	46.5	47.6	5.26	2.145	P < 0.05 Significant

Table 3 shows the subjects pretest and posttest values comparison on arm angle. Pretest and posttest values of arm angle obtained from KINOVEA software were analyzed using paired 't' test. For 14 degrees of freedom and 5% level of significance the table 't' value is 2.145 and the calculated value is 5.13. Since the table 't' value is lesser than the calculated 't' value null hypothesis is rejected.

Table 3: subject's pretest and posttest values comparison on arm angle

Outcome measure	Mean value		Calculated 't' Value	Table 't' Value	P value and level of significance
	Pre-Test	Post-test			
Arm angle	66.5	67.9	5.13	2.145	P < 0.05 Significant

4. Discussion

As a result of the pandemic situation, education has changed dramatically, with the distinctive rise of learning, whereby teaching is undertaken remotely and on digital platforms. So, the uses of computers increase nowadays. Musculoskeletal impairments increased among computer users due to prolonged sitting and adapting uninterrupted slouched posture.

The repeated movements and sustained postures of daily activities induce the changes in the tissues and movement patterns that cause pain problems. Therefore, the pathological changes are secondary to the altered movement pattern and motor control. So, by improving motor control and correcting the movement impairment we can adjust the pain.[8]

Motor control can be considered a major contributing factor to the development of movement patterns that cause musculoskeletal pain.[9] Hodges states that it is necessary to consider the changes in motor control that present of pain. He considered that, if motor strategy leads to suboptimal loading of tissues, then trains the individual in alternative strategy to a more optimal solution to load tissues in a healthy manner.[10] Several approaches to optimization of motor control have been proposed with

the objective to correct muscle activation, postural alignment, and movement patterns that abnormally load tissues. [11,12]

Rehabilitation of control of movement and muscle activity is a mainstay for management of many pain conditions related to the musculoskeletal system.[13] The development of imprecise motion is also considered to be a factor in the development of musculoskeletal pain.[14] Movement and physical exercises are advocated in the management of many musculoskeletal conditions to reduce pain and disability in acute and chronic conditions. So, the altered movement patterns are the key factor in causing pain and that correcting the movements and the contributing factors is the most effective long-term treatment.[8]

Many of the muscles are undergoing to shorten position because of this posture. Noh, H. J. mentioned in his study states that, there is also increased activation in splenius capitis and trapezius in people with this posture.[15] and this may be related to both pain in the neck and pain in the shoulder. Regular stretching exercise can reduce and prevent the symptoms of MSDS. Stretching is known to be an effective and simple exercise which increases flexibility. Stretching exercise is reported to be effective at not only improving neuromuscular coordination and flexibility, but also at reducing pain and muscle weakness.[16] Stretching exercise may improve physical activity by encouraging correct posture of body and increasing muscle endurance.[17] Ana Claudia Violino., in his study he mentioned that Conventional stretching and muscle chain stretching in association with manual therapy were equally effective in reducing pain and improving the range of motion and quality of life of female patients with chronic neck pain, both immediately after treatment and at a six-week follow- up, suggesting that stretching exercises should be prescribed to chronic neck pain patients.[18] A gap has also been identified in the literature since most studies only examine the short-term outcomes, such as a recent study which concluded that regular stretching exercises performed for four weeks can decrease neck and shoulder pain.[19]

Micro break exercises are designed to break the cycle of stress the body endures during prolonged sitting at workstation. McLean was conducted the study that determine that micro breaks had a positive effect on reducing discomfort in all areas studied during computer terminal work, particularly when breaks were taken at 20 min intervals.[20] Micro break exercises helps to maintain a static posture, body fatigue, decreases the musculoskeletal injury risk.[21]

Brugger suggest micro break postural relief position exercise for peoples who adapt slouched posture because of prolonged sitting posture. Gurudut.et.al, conduct the study on effects of Brugger's relief position exercises in forward head posture. He concluded that the Brugger's postural relief position is one such self-care exercise that works in order to reverse FHP 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 Brugger's posture.[22] Tyron water states that the Brugger's exercise alone in addition to the combination of spinal manipulation and Brugger's exercise also had a positive effect on treating chronic low back associated with lower crossed syndrome.[23]

Gurudat conducted another study on Brugger's exercise with resistance and concluded that the Brugger's exercise with elastic band is the best exercise to correct posture and upper back pain.[24]

This study was conducted with 15 subjects who were selected based on the inclusion and exclusion criteria. After 6 weeks treatment duration subjects posttest values were collected. Based on the result of study it was concluded that the Brugger's postural relief position exercise shown slight improvement in postural correction related to uninterrupted prolonged sitting and also shows reduction in pain intensity.

Suggestions, This study were conducted on only 15 subjects within the age group of 18 to 22. And study duration also too short. So, the effects will be more accurate, when the future study will be done with more subjects, covers other age group, and study duration takes more than 1 months.

5. Conclusion

The objective of the present study was to find the effects of brugger's posture relief position exercise on upper back pain and posture imbalance associate with sternal symphyseal syndrome. The statistical analysis from the paired 't' test has been concluded that there was a significant improvement in pain and its interference and forward head posture and arm angle among subjects with upper back pain and posture imbalance in sternal symphyseal syndrome.

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