
THE POTENTIAL OF SLING-BASED MANUAL THERAPY AND STABILIZATION EXERCISE FOR IMPROVING CERVICAL ALIGNMENT AND MOBILITY IN FORWARD HEAD POSTURE

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ABSTRACT

Greater use of information and communication technologies such as computer, smartphone, or other media has a tendency to induce failure of body postures. Laptop usage has been associated with adolescent neck pain, with daily use exceeding 2-3 hours as a threshold to forward head posture. Forward head posture would reduce cervical alignment and mobility of the neck. There are exercises that intent to improve the cervical alignment and mobility, particularly sling-based manual therapy and stabilization exercises. The method in this study used a literature review or study literature articles. Searches in the selected database provided a total of 468 references, after selected 28 articles were included in this review. A sling-based manual treatment can be used to strengthen specific muscle groups by changing the sling points and heights of the dangling rope, as well as promote neuromuscular activation through dynamic contraction and stabilization exercise is to re-train global and local stability simultaneously through modifying motor control In summary, sling device exerts neurophysiological effects on the cervical muscle strength by activating the descending pathways, while stabilization exercises improve cervical alignment and mobility by affecting postural control through concurrent contractions of the agonist and antagonist muscles.

Key Words: Sling; Stabilization; Cervical; Forward Head Posture

INTRODUCTION

In today's modern life, many human daily activities rely on technology-based tools to facilitate tasks that need to be done manually. Longer rest positions when using a computer, smartphone, or other media exposes individuals to greater risk factors and increase the incidence of forward head posture (FHP)¹. One research determined that FHP most happens in employees, adolescents, and students². According to the prevalence of common faulty postures among individuals, the most prevalent faulty postures were unequal shoulder degree (36%) and forward head position (25%)³. The individuals are regularly uncovered to the repetitive movements of the body that are hazardous for growing musculoskeletal symptoms. Extended use of smartphones,

computers, and other devices end in the adoption of static posture for an extended duration that induce neck and shoulder pain and leads to increased FHP⁴.

Tendency failure of body postures can appear in individuals with greater use of information and communication technologies. Laptop use has been linked to teenage neck pain, with daily computer use of more than 2-3 hours being considered as a threshold for forward head position (FHP). This change in posture can result in a spatial shift between the spine and the line of gravity, putting a strain on the connective tissues and muscles⁵. Numerous studies observed a relationship between forward head posture and laptop usage. Excessive anterior positioning of the top in relation to a vertical reference line is referred to as front head posture⁶. Changes that happen to the alignment of head and neck affect the postural defects in the sagittal plane and decrease cervical movement because of prolonged flexed head position, which impacts the balance managed by the head⁷. The repetitive use of smartphones, laptops, TVs, video games, or even backpacks have their own posture adapt to FHP. One of the researchers mentioned that individuals assumed increased FHP along with the length and frequency of viewing smartphone in comparison to posture neutrally. Most individuals use smartphone with a more head tilt angle and smaller neck tilt angle⁸.

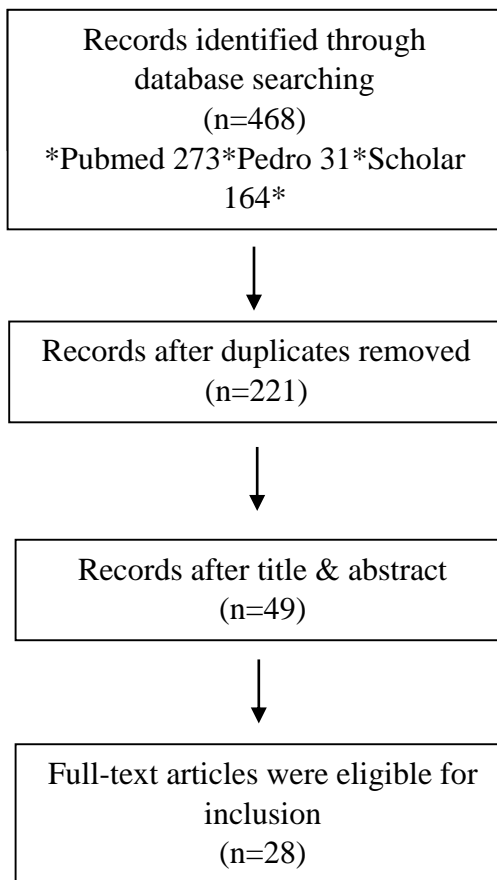
By tightening and shortening the posterior neck muscles while weakening and extending the anterior neck muscles, forward head position can induce muscular imbalance. Forward head position decreased the cervical alignment and mobility of the neck because there is a misalignment of posture⁹. There are several interventions that can be used to improve the cervical alignment and mobility with FHP. To overcome the problems in FHP, interventions such as stretching, strengthening, biofeedback techniques, stabilization exercise, and manual therapy can be applied¹⁰. A few literatures states that manual therapy and stabilization exercise can improve the cervical alignment and mobility. However, it is still rare to discuss sling-based manual therapy combined with stabilization exercise. Based on this background, this study aims to examine the effect of sling-based manual therapy and stabilization exercise for improving cervical alignment and mobility in an individual with a forward head posture.

METHOD

The method in this study used a literature review or study literature articles which using secondary statistics studies end results from several numerous studies related to the effect of sling-based manual therapy and stabilization exercise on cervical alignment and mobility in individuals with forward head posture. The literature were search through an electronic database such as Pubmed, Pedro, and Google Scholar. They had been discussed approximately manual therapy, manual therapy and forward head posture, manual therapy affects craniovertebral angle with forward head posture. The studies were included in this study if they were: 1. published from 2010-22 , 2.in English, 2. mentioned individual and forward head posture, 3. reported about manual therapy and stabilization for forward head posture, 4. clinical trial study, experimental study, and randomized controlled trial. The studies have been excluded from this study if they were not mentioned the exercise for forward head posture.

RESULT

Searches in the selected database provided a total of 468 references. A total of 28 articles were included in this review after eliminating duplicates and checking titles, abstracts, and full text.



DISCUSSION

Inappropriate Postures Lead to FHP

Individual that using computers, smartphone, and other devices are in a extra inappropriate postures than individual who are sitting upright and going through the front. Such incorrect postures might place regular stress on the neck structure, resulting in a positive FHP¹¹. FHP is a kind of poor posture associated with increased kyphosis in the thoracic spine and anterior shoulder position¹². Poor posture that has been executed in daily activities related changes within the position of the scapula when it comes to the muscle activities and phrases kinematic that therefore increase muscle strain and tension around the neck and shoulders ensuing in a variety of upper body it could be have an effect on neuromuscular symptoms¹³.

FHP is one of the biggest posture problems in our lives, especially for individuals depending on activities that call for long-term use of technical information in one day. Elevated FHP may be associated with neck pain due to the neck bending forward for long periods of time

and repeated movements¹⁴. Inconsistencies in the spinal cord segments can shift the load of the trunk away from the line of gravity, preventing the entire trunk from moving in a balanced manner. The increase in outward movement is the result of forward head posture that affects the alignment of other segments⁷.

Sling-based Manual Therapy and Stabilization Exercise

The sling-based manual treatment is separated into passive joint mobilization and segmental motor control training and is conducted in the supine position. A sling device was used for all this intervention. Passive mobilization resulted in oscillatory mobilization with a large amplitude (Maitland grade III). This approach was done three times for 60 seconds each time, with oscillations at 1 Hz and a 1-minute gap between each repetition. Segmental motor control training through repeated moves of every movement for 1 min and the therapist using the hands to assist the perfect segmental motion¹⁵. Stabilization exercise is carried out in the prone position with exercises targeting the periscapular muscle groups along with motion Y to W, L to W, and scapular retracted completed for three sets with 10-15 repetitions, chin tucks, and stretching pectoralis muscle groups¹⁶.

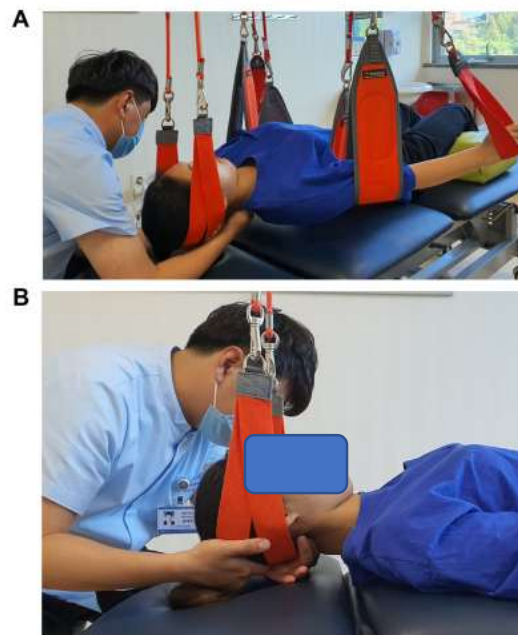


Figure. 1 Sling-Based Manual Therapy



Figure.2 Stabilization Exercises

Research has shown that sling-based manual therapy and stabilization exercises for the FHP are effective in improving cervical alignment and mobility. Sling-based manual therapy using joint mobilization is an intervention approach required to properly align the FHP¹⁴. The mobilization of the spinal joint, also known as the passive movement of the joint, is used to get the joint into the proper position with proper alignment and to increase the range of motion. Joint mobilization has the effect of inducing a reflex by stimulating articular receptors¹⁷. Meanwhile, the stabilization exercise provided stretching of the tight muscles and increasing the strength of weakened muscles so that the scapula muscles can be brought closer to the normal position¹⁸.

According to Kim (2019), manual therapy performed for 6 weeks can enhance the angle and range of motion of the craniocervical joint. Giving this intervention include passive mobilization and segmental motor control training showed a lower in sternocleidomastoid and anterior scalene muscle activity. Moreover, this intervention approach had a significant impact in the cervical mobility such as in flexion, extension, and rotation¹⁴. From this results it can be implied that manual therapy to direction and the level of spinal have an effect for the range of motion of the neck. Manual therapy where the loads on the neck is distinct in comparison to the load on the spine whilst it is necessary to maintain posture¹¹. Manual therapy procedural intervention that support by applying a sling device to aims to provide the research subject in actual neutral position with optimal loading of each target segment and to make a closed kinetic chain environment for exercise. Therefore, prior to intervention, research subjects were given a sling device to allow them to move in a comfortable position only at specific spinal levels¹⁴. Due to the unstable surface, a sling-based manual treatment can be used to strengthen specific muscle groups by changing the sling points and heights of the dangling rope, as well as promote neuromuscular activation through dynamic contraction¹⁹.

Decreased the joints of neck movement and mobility was impact from forward head posture. Manual spinal treatment is effective in improving the mobility of the joints around the neck. Increased cervical range of motion was associated with a greater increase in craniocervical angle. In addition, posterior anterior mobilization reduces cervical spine stiffness and increases

range of motion. Kinetic movement of the cervical spine can be achieved with increasing the movement of the articular surface of the cervical spine, ensuing in improved angle and mobility of the craniovertebral angle²⁰. Spinal mobilization techniques used in manual spinal treatment activate the descending pathway from the peritubular gray region (PAG) of the midbrain, reduce superficial neck flexion, and increase deep flexor activity. It has a neurophysiological effect on the strength of the neck muscles²¹.

Combination Sling-Based Manual Therapy and Stabilization Exercise Improving Cervical Alignment and Mobility

The occurrence of FHP can occur again in the future if when carrying out daily activities do not pay attention to the duration and position of the body when using information technology and the surrounding area when performing these activities. FHP will cause problems for other bodies if not handled properly using the proper intervention approach²². Research by Fathollahnejad et al (2019) states that giving sling-based manual therapy and stabilization exercise indicates it is more effective in improving cervical alignment and mobility in FHP¹⁶. This is also supported research by which Cho et al (2017) states manual therapy using the joint mobilization technique showed statistically and clinically significant results in craniovertebral angle, pain, cervical range motion, neck disability seen from NDI score²³. The neck disability index (NDI) was used to measure neck pain and neck functional disability. This contains 10 sections including: pain intensity, personal work, lifting, studying, headache, concentration, working, driving sleeping, and recreational activities. The questionnaire is evaluated based on a likert scale from 0 (no impairment) to 5 (maximum impairment). Grade 0-4 indicate deficiency disabled, 5-15 mild disabled, 15-24 moderate disabled, 25-34 severe disabled, and over 35 complete disabled²⁴.

Research by Fathollahnejad et al in 2019, 6 weeks and 1 month follow-up showed improved cervical spine alignment and mobility with manual therapy and stabilization exercises. This intervention approach stepped forward tissue elasticity and range of motion around the neck, alleviated it, relaxation, impaired muscle function, and reduced soft tissue swelling and inflammation¹⁶. Pain alleviation may additionally reduce motor system depression and partially enhance function²¹. Some research confirmed that a combination of manual therapy and stabilizing exercise become extra powerful in treating FHP than stabilizing exercise alone^{14,23,19}.

Combined of manual therapy and stabilization exercise to overcome the problems that happens in FHP. Stabilization exercise is exercising that the usage of easy movement to enhancement the posture²⁵. Stabilization exercises impact postural control by contracting the essential cervical stabilizer muscle at the same time as the agonist and antagonist muscles, particularly the deep neck flexor muscle²⁶. Stabilization exercise is to re-train global and local stability simultaneously through modifying motor control. Activation from the local muscles, global muscles tissues that purpose to stabilizing the neck and scapula movement act synergically to maintain normal function²⁷. As a result, stabilization exercise improves head and neck reflex through affect the proprioception of the neck muscle groups, increasing muscle

contractions, and growing the environmental exposure. A better balance of muscle can be achieved from a development in proprioception²⁸.

Research accomplished by Jaroenrungsap et al in 2021 showed that giving stabilization exercise help to correct the posture in forward head posture which can be visible on their results that there are substantial statistically in craniovertebral angle and neck disability index¹⁰. Stabilization exercise cervico-scapulothoracic strengthening and stretching can improve cervical and scapulothoracic alignment properly and prevent poor posture. The improvement of cervico-scapulothoracic alignment will affect overall muscle performance around the neck and scapula²². Stretching exercise can increase muscle flexibility and it will affect the range of motion of neck and craniovertebral angle²⁹. FHP also provides stress to the structure and tension of the muscle tissues around the neck and stabilization exercise assist to reducing tension of muscles such as upper trapezius and sternocleidomastoideus so it could be relieving the muscle imbalance³⁰.

CONCLUSION

Providing sling-based manual therapy and stabilization exercise can assist in improving the cervical alignment and mobility in adolescents with FHP. Sling-based manual therapy exerts neurophysiological effects on the cervical muscle strength by activating the descending pathways from the periaqueductal gray area (PAG) of the midbrain and the sling-based enhances neuromuscular activation through dynamic contraction due to the unstable surface as well as stabilization exercise affect the cervical alignment and mobility through concurrent contractions of the agonist and antagonist muscles, proprioception of muscle, and reducing the tension of muscle around the neck. In the future, it is hoped there will be research discussing about the exercise to help overcome the problems that happen in FHP for a long-term condition.

CONFLICT OF INTEREST

The authors declare no conflict of interest

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