

TO COMPARE THE EFFECTS OF DEEP NECK FLEXORS STRENGTHENING EXERCISE AND MCKENZIE NECK EXERCISE IN SUBJECTS WITH FORWARD NECK POSTURE: A RANDOMISED CLINICAL TRIAL

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ABSTRACT

Background: Forward Neck Posture also called as Protracted neck, is one in which the head is positioned anteriorly and the normal anterior cervical convexity is increased with the apex of the lordotic cervical curve at a considerable distance from the LOG in comparison with optimal posture. Nowadays texting may play a significant role in forward neck posture. According to Wellness Centre "It is the repetition of forward head movements combined with poor ergonomic postures and/or trauma that causes the body to adapt to forward head posture.

Purpose: To compare effects of deep flexor strengthening exercises and McKenzie neck exercises in subjects with forward neck posture.

Materials and Methods: 30 Subjects clinically diagnosed with FNP meeting the inclusion criteria were randomly assigned into three groups. Group A received McKenzie neck exercises, Group B received Deep Neck Flexor Strengthening Exercises and both the groups commonly went for pectoralis minor stretching respectively for once daily for a total of 6 sessions.

Results: The results suggested that all the outcome measure i.e Forward Neck Posture, flexibility of pectoralis minor and CROM values showed significant differences among both the groups.

Conclusion: The present study concluded that the comparison of McKenzie neck Exercises and Deep Neck Flexor Strengthening Exercises revealed no statistically significant differences, However each group showed improvement in cervical range of motion and forward neck posture with increase in the pectoralis minor flexibility.

KEY WORDS: Forward Neck Posture, Deep Neck Flexor Strengthening, McKenzie Neck Exercises.

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INTRODUCTION

Forward Neck Posture, is one in which the head is positioned anteriorly and the normal anterior cervical convexity is increased with the apex of the lordotic cervical curve at a considerable distance from the LOG in comparison with optimal posture [1]. Every inch of your neck goes

forward there is an extra 10 lbs (4.5kg) of weight on your neck which cause forward neck posture [2]. Forward neck posture is also called as Forward head posture, Scholar's neck, Reading neck or Wearsie neck [3]. The effect of posture on health is becoming more evident and Forward neck posture is the common postural problem

estimating to occur in between 66% to 90% of the population [4-6].

The Conventional treatment for forward neck posture is mainly ergonomic and self posture correction. Other conventional treatment for FNP are Chin tucks, Shoulder blade squeezes, stretching of anterior chest muscles, neck isometrics and HMP.

Mckenzie approach is said to be effective in correcting forward neck posture. Clinical research demonstrates reliability of the Mckenzie evaluation. Mckenzie states that self treatment is the best way to achieve a last improvement of back pain and neck pain [7]. The deep neck flexor muscles are said to be the supporting muscles of cervical region. Deep cervical flexor training is to activate, endure, and isometric contract the deep cervical flexors in progressive range positions [8,9]. Subjects with FNP shows changes in cervical range of motion (ROM) and subjects usually presents with tight pectoralis minor muscle. Pectoralis minor muscle is said to be the king of compensation, it's the first muscle to go under tightness in subjects with FNP [10]. This study is intended to compare the effect of deep neck flexor strengthening exercise and McKenzie neck exercise in subjects with asymptomatic forward neck posture.

MATERIALS AND METHODS

Present study is conducted as a randomized clinical trial with 30 participants with forward neck posture from KLE Institute of Physiotherapy students, among them, 15 participants in Group A and 15 in Group B. Above sampling designed we were adopted Non Probability Sampling Design and the participants were selected based on convenience; allocation of the participants was done randomly using envelope method. Data was collected for a duration of 4 months.

Procedure: An approval for the study was obtained from the Institutional Ethical Committee. Patients were included as per the inclusion and exclusion criteria. Asymptomatic student population with FNP between the age of 18 -26 years, willing to participate in the study with no history of pain, deformities, trauma or fracture around the cervical region and consent form was taken from them. Subjects with Forward

neck posture were screened and were requested to participate in the study. They were explained about the safety and simplicity of the procedure. Baseline evaluation of cervical posture, cervical range of motion and pectoralis minor muscle length was done. After this all the subjects were randomized into 2 groups, Group A and Group B. Group A underwent McKenzie neck exercises. They were given 4 different types of exercises to do once daily. Retraction and Lateral flexion with overpressure, retraction and extension with overpressure both were done in sitting position and retraction and Extension with traction and rotation, extension mobilisation this two exercises were given in supine lying. Group B underwent deep neck flexor strengthening exercises were subject were instructed to lie in crook lying position. They were made to lock his/her fingers and place under the skull and retract chin as far as possible. Subject has to gently lift his/her head a few centimeters. Fingers should be touching the head but not supporting it. Subject has to breathe and maintain the position. The moment subject start sticking out chin, exercise was stopped and restarted again. Exercise was done for 10 repetitions for a hold of 20 seconds initially, increasing it by 10 seconds every session commonly underwent pectoralis minor stretching before every session of exercise of 4 sets with 30 second's hold.

Fig. 1: Showing the Procedure.

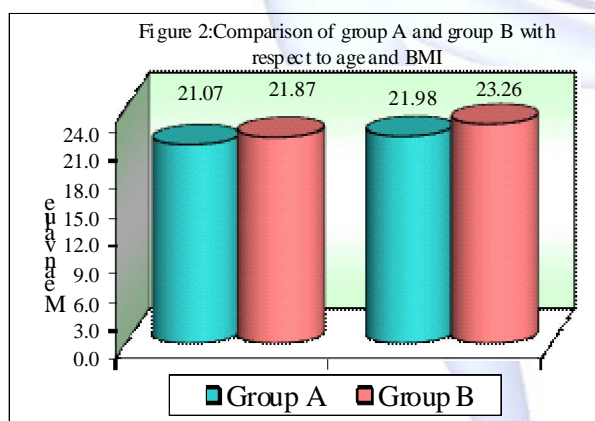




RESULTS

The two groups were compared based on outcome measure-cervical range of motion, flexibility of pectoralis minor and postural analysis through plumb line. In group A, there were total 3 male participants and 12 female participants. In group B, the total number of male participants were 7 and total number of female participants were 8. Age of the participants in the present study was between 18 to 26 years. The mean age of the participants in group A was 21.07 ± 1.03 years, the mean age of participants in group was 21.87 ± 1 . (Graph no. 1)

Graph 1: Comparison of Group A and Group B with respect to age and BMI.



In comparison of the cervical range of motion- flexion, extension, lateral flexion and rotations, postural assessment using plumb line and flexibility of pectoralis minor was done within each group at the 1st and 6th session of study, both the McKenzie neck exercises and deep neck flexor strengthening exercises showed no statistically significant differences. ($p < .05$) but showed statistically significant differences within the groups (Table 1).

Table 1: Normality of pre and posttest scores of various variables by Kolmogorov-Smirnov Z test

Main	Variables		Group A		Group B	
			Z-value	p-value	Z-value	p-value
Cervical range of motion (Degrees)	Flexion	Pre test	0.593	0.873	0.484	0.973
		Posttest	0.471	0.98	0.863	0.446
	Extension	Pre test	0.588	0.879	0.717	0.684
		Posttest	0.549	0.924	0.776	0.583
	Rt lateral flexion	Pre test	0.479	0.976	0.896	0.398
		Posttest	0.628	0.825	0.709	0.696
	Lt lateral flexion	Pre test	0.622	0.834	0.5	0.964
		Posttest	0.944	0.334	0.745	0.635
	Rt rotation	Pre test	0.489	0.97	0.732	0.658
		Posttest	0.373	0.999	0.647	0.796
	Lt rotation	Pre test	0.667	0.764	0.692	0.725
		Posttest	0.649	0.793	0.393	0.998
Pectoralis minor length (cm)	Right	Pre test	0.573	0.898	1.143	0.147
		Posttest	0.786	0.567	1.295	0.07
	Left	Pre test	0.708	0.697	1.199	0.113
		Posttest	0.771	0.592	1.18	0.123
Plumb line (cms)	Pre test	0.518	0.951	0.458	0.985	
	Posttest	0.797	0.549	0.852	0.463	

Note: All p values are more than 0.05. It means that, the pre and posttest scores of various variables not follow a normal distribution. Therefore, the non-parametric tests were applied

DISCUSSION

The present randomized clinical trial was aimed to find out the effectiveness of McKenzie Neck exercises and Deep Cervical Flexor strengthening exercises given for 6 sessions to the subjects with Forward Neck Posture in terms of increasing pectoralis minor muscle flexibility, improving cervical range of motion and quantitative measurement of Forward Neck Posture

In the present study, the age group inclusion criteria were between 18-26 years. Study done by Siniluck Kanchanomai et al, included the age group between 18-25 years, showed prevalence of musculoskeletal symptoms in neck among the undergraduate students ranging at 48-78%. Neck pain was 1.9 fold higher in second year students in comparison to first year students. This shows the increasing level of stress in undergraduate students [11]. A study done reported adolescents or patients with neck pain have more Forward neck posture, thus a smaller craniovertebral angle. Prevalence of neck pain in adolescents with FHP was more than adolescents without FHP (29.8% vs 8.4%) [12].

A survey done in 2008 on Chinese adolescents reported with forward head posture as high as 25% [13]. In the present study, the mean age in group A and in group B is 21 ± 0.7 and 21.87 ± 1.51 respectively, which is valid according to the above study as well. Another study done by Hanvold et al, found significant effect when examined the course of neck and shoulder pain among young adults. This may be due to more of computer usage in undergraduate students, causing abnormal muscle strength, causing abnormal physical load to muscles, ligaments and bone causing musculoskeletal injury [14].

A cross sectional study done by Niraj A. Bharadra et. al. reported work related musculoskeletal injuries in physiotherapists. Handling the patients for exercise during clinical trial was the most common aggravating factor. A cohort study done by Campo M. et.al, found prevalence of work related musculoskeletal disorders in physical therapists. Risk factors responsible for this, included patient repositioning, patient transfer, soft tissue work, twisted posture, joint mobilization and job strain [15]. Present study spreads awareness of posture maintenance among the physiotherapists.

In the present study, percentage of including male subjects in Group A and in Group B was 20% and 46.67% respectively whereas percentage of female subjects in Group A and in Group B was 80% and 53.33% respectively. McLean et. al, reviewed 14 prospective cohort studies systematically and revealed factor like female sex was linked to the onset of neck pain [16]. Some studies observed more prevalence of forward head posture in females as compared to males [13,17], while other study showed no gender difference in prevalence of FHP [18]. Study done by Rodrigo M. Ruivoet. al, showed resting CV angles lower in females than boys [19]. Study done on standing cervical habitual posture in adolescents by Hakala et al, found females had $2-3^\circ$ more neck flexion than males [20]. Two studies with small sample size done in contrary to the present study reported no gender differences for cervical habitual posture in adolescents and pre-adolescents [21,22].

In the present study, cervical range of motion was used as an outcome measure using universal goniometer. A study done by C

Fernandez-de-las-Penaset. al, showed positive correlation between the craniovertebral angle and neck mobility [23]. Studies have suggested importance of cervical movements in the rehabilitation of the neck [24-27]. Several authors have studied the significance of head posture in subjects with neck pain with restricted range of motion in the cervical spine [28-31]. Study done on different measurement instruments for testing the validity and reliability for active cervical range of motion i.e, flexion, extension, rotation, and side bending, goniometer is greatly to be practical to use [32-39]. Studies have shown clinically, damaged neck rotation, extension and neck retraction predict high disability, which suggested the need to unload the cervical spine from forward head posture [24-26].

Another Study done by Whitcroft et. al. compared the accuracy and reliability of visual estimation, universal goniometer and tape measurement with that of CROM goniometer, which concluded most reliability of universal goniometer when aligned on a fixed landmark for measuring neck movement clinically [40].

Present study presented with quantitative measurement of forward neck posture using a Plumb line. A comparative study done by Edward R Hickey et. al, concluded both CROM device and plumb-line technique to be reliable measures in measuring resting head posture [41]. It is commonly seen clinically and in research settings to assess erect human posture in two dimensions, in the sagittal plane, using a vertical reference line to observe the body's response to gravitational forces. The most commonly cited vertical reference line, as by Kendall et. al [42], a compromise between the actual gravitational line, reported by Hall et al [43], and the plumb line which was originally used by Braune and Fischer in 1889 [44]. Kendall et al [42], considered that their vertical reference line divided the body into anterior and posterior components in Sagittal view which were hypothetically of equal weight. Innovative clinical tools such as flexible rule included in the methods of measuring cervical resting posture in a clinical setting but have largely reflected variations on the method of Kendall et al, where the position of the head is described

with respect to a vertical reference line [44-47]. Study done by Anne Leath Harrison et al. measuring sagittal plane head and shoulder posture, as a clinically reliable and practical method [48]. A study done by Stephanie S Lynch et. al, evaluated FHP and RSP with the use of plumb-line, for the inclusion of participants in the study [49].

Present study worked on pectoralis minor muscle lengthening by giving passive pectoralis minor stretch in supine lying position, 4 stretches of 30 seconds hold with 30 sec rest between each stretch. A similar study done by Lee JH et. al, had used the similar procedure of pectoralis minor stretching and showed good results [50]. The pectoralis minor is a muscle that easily shortens and tightens due to many factors, including rounded shoulder posture, glenohumeral joint dysfunction, breathing dysfunction, and a variety of compensation patterns. The pectoralis minor is often the overactive muscle in these compensation patterns and hence called as the "King of Compensation" [10]. ICC for PMI was 0.96 and CI was 0.93-0.97. According to Portney and Watkins, for many clinical measurements reliability should exceed 0.90 to ensure reasonable validity [51]. A study done where active stretching of pectoralis muscle group was chosen based on the theories that forward neck posture are caused by the tightness of pectoralis muscle group [49]. A study done by Ana Claudia Violino Cunha et. al, on a 30 sample size, performed two different types of stretching where in the GPR group, the two stretching postures were kept for 15 minutes each whereas the conventional stretching group, stretch was maintained for 30 seconds. In the latter, stretching time was equal to that of GPR group. Both the programs showed equivalent results. This may be due to the fact that both the stretching procedure was done by the same physiotherapist, instructing the subjects to breathe normally without inspiratory block, no pain and avoiding TRICK movements. No studies have reported, stretching for longer duration is effective than shorter one [52]. John D Borstad compared 3 stretches of pectoralis minor muscle on 50 subjects without shoulder pathology. The length was checked by electromagnetic motion-capture system. The unilateral self stretch

demonstrated highest length change (2.24cm), followed by the supine manual stretch (1.69cm), followed by sitting manual stretch (0.77cm) [53].

A study done by S May et al, lends credibility to McKenzie's postural syndrome and suggests this as a possible precursor for future more disabling or painful problems. Postural syndrome may not show in those seeking professional healthcare, but is clearly highly prevalent in a young population [54].

A comparative study between DCF strengthening exercises and Mckenzie neck exercises done by Eun-Young Kim et. al, on Forward Head Posture due to use of smartphones, showed no significant differences between the two groups, but both groups showed statistically significant changes after the experiment as same in the present study. Subjects maintained static contraction for 10 seconds with a rest of 5 seconds hold, considered as 1 set. 1 set consisted of 10 times exercise [55]. Each day total 5 sets were done whereas in present study, 4 exercises of DCF strengthening with 10 repetitions of each along with pectoralis stretch were given for 6 sessions.

Mckenzie neck exercises were performed for 20 minutes each time, 3 times each week for a 4-week period [55] whereas in the present study 4 Mckenzie neck exercises with 10 repetitions of each, along with pectoralis stretch were given for 6 sessions.

A study done by Falla D et. al, reported that the chin tuck exercises for strengthening deep craniovertebral flexors and head bending exercises for improving cervical flexor muscular endurance, improved muscular functions [56]. Kjellman and Oberg et. al, performed postural correction exercises using the Mckenzie method in 77 cervical pain patients. A reexamination 12 months, rate of visiting the hospital among these subjects was statistically significantly low due to postural correction exercises. This study indicated the effectiveness of applied exercises in improving muscular strength and postural control around the cervical region.

CONCLUSION

The present study provided evidence to prove that both Mckenzie Neck exercises and Deep Neck Flexor strengthening exercises, along with the Pectoralis Minor stretching are equally

effective in the short term management of Forward Neck Posture.

ABBREVIATIONS

FHP- Forward Head Posture

FNP- Forward Neck Posture

HMP- Hot Moist Pack

CROM- Cervical Range Of Motion

GPR- Global Posture Re-education

ICC- Intra- Class Correlation Co- efficient

CI- Confidence Interval

Conflicts of interest: None

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