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ISSN No: 2319-5886

International Journal of Medical Research & Health Sciences, 2016, 5, 11:40-46

The Effects of Eight Weeks of Yoga Training on Motor Control, Proprioception and Forward Head Angle among Girls diagnosed with Forward Head Posture

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ABSTRACT

Forward head abnormality is a prevalent musculoskeletal abnormality which is accompanied by weakness of stabilizer muscles of the neck. The purpose of this research was investigation of the effects of eight weeks of Yoga exercises on motor control, neck proprioception and forward head angle among 15-17 year old girls suffering from forward head posture. This semi-experimental study includes 30 girl students suffering from forward head abnormality in two equally numbered groups of experimental with an age average of 16±0.42 and control, with age average of 16.25±0.61. Prior and post to undertaking the eight weeks of yoga exercises, forward head angle was measured through silhouette body photography, neck proprioception was measured through angle reconstruction and using a laser light and finally, neck motor control was measured through neck motor control tests. Additionally, co-variance analysis test was applied as well for the purpose of studying research variables. Research findings indicated that after eight weeks of yoga exercises, a significant difference was observed between the control and experimental groups in terms of neck proprioception, motor control and forward head angle. Considering the results of this research, it seems that yoga exercises have positive effects on neck proprioception, motor control and forward head angle among girls suffering from forward head posture.

Keywords: Yoga, Motor Control, Proprioception, Forward Head Angle

INTRODUCTION

Suitable body position is defined as correct alignment of spinal cord bones and joints in a way that muscles and ligaments function at their utmost natural sense. Suitable body positioning is in other words, defined as relative synchronization of different body parts.

In a correct posture, muscular activity is minimal. In addition, a good and suitable posture can be beneficial for performance of different internal organs, the nervous system and respiratory system as well. Deviation of Head's posture from its normal position is a prevalent abnormality and different studies have reported a prevalence of between 66 to 80% for this abnormality. In this abnormality head and neck areas are deviated towards front and this leads to increased flexion in cervical vertebrae and orientation of head towards front and down. In such a situation, eyes need to be parallel with horizon line and therefore cervical extensor muscles become overactive in order to correct the eyes' sight line through extension of cervical vertebrae. On this basis, in this abnormality in addition to head's movement towards front, the lower and middle vertebrae undergo a flexion while upper vertebrae undergo an extension. Forward head abnormality is followed by side-effects including compaction of under skull nerves, instability of middle vertebrae of neck, reduced lung capacity, limitation of motion range of Glen humeral joint,

Temporomandibular joint, disorders in digestive system as well as reduction of motion range of shoulder girdle and shoulder joint. Tension headaches and migraines, fibromyalgia syndrome, myofascial pains and temporomandibular dysfunctions are other side-effects of forward head posture to be mentioned. Ultimately, these factors result in interruption of quality of life. However, this disorder may even be diagnosed in people who lack any symptoms.

Formation of correct positional habits with the aim of correction of posture and obtaining the correct performance of the spinal cord is crucially essential. Forward head posture and cervical hyper lordosis are significant and certain pathologic processes which must be corrected if a person was diagnosed with one. In this way, numerous side-effects of this disorder are prevented as well [1]. Prolonged protraction may lead to chronic forward head disorder. This inflicts excessive tension on cranial cervical extensor muscles. In this position, the curve of the cervical vertebrae is increased and vertebrae are positioned in a hyper-extension state. In terms of anatomy of spinal cord joints, musculoskeletal disorders are referred to as any type of tissue damage in the skeletal-muscular-nervous system. In fact, it results in interruption in performance and functionality of organs. In this disorder, the head becomes positioned away and to the forward from the center of gravity and therefore an excessive amount of pressure is imposed on temporomandibular joint and neck and neck muscles [2]. Forward head disorder is one of the most prevalent types of spinal cord disorders. Nowadays, work related musculoskeletal disorders are considered as the most costly issues related to public health. In fact, these issues threaten the human's life quality [3]. In general, risk factors for musculoskeletal disorders include job related factors and non-job related factors [4]. In these cases contextual causes such as interruption in structure or function of vertebrae, muscles, ligaments, joints, disks and nerve roots can be involved as well [5]. Among the side-effects of these disorders, it can be pointed to interruption in respiration pattern and also the temporomandibular may develop a state of osteoarthritis [6]. Natural alignment of the spinal cord in the sagittal plate may develop alterations in time as a result of illnesses, lack of motion and unsuitable body movement. These alterations result in occurrence of unnatural posture and consequent disorders. This position may be followed by lordosis in the neck area which results in forward head disorder [7]. Awareness of an individual about his/her body and its relation with the immediate environment is called proprioception or articular sense. This sense results in awareness about motion position of the joint and ultimately results in regulation of muscular expansion which is aimed at improved joint motion [8]. The expression of articular sense is considered as a type of feedback loop between organs and central nervous system. This expression is defined as a combination of feeling of success in joint and kinesthesia. Reviewing the literature of the subject shows that proprioception of neck forms human body navigation and its perception of motion. In fact length and intensity of outputs of the proprioception can be effective on human body's conscious recognition and motional perception [9]. In addition, recent experimental protocols based on these findings have been able to provide a solution for stabilization of motional learning. Healthy people maintain their positional stability through making use of sensory signals in order to avoid injuries during activities. Decreased level of sensory input from joint receptors results in an abnormal body positioning and reduced postural responses [10].

The subject of motion control has a long history of debate. Most of recent studies show the relation between defected motion control and pain [11]. Defected motion control is known as interruption of motional control and is defined as active interruption of motional control during functional activities. While suffering from defection of motion control of the neck spinal cord, the patient won't be able to control his or her cervical spinal cord during active functions. Several different therapeutic methods have been proposed for motional control and amplification of neck proprioception as well as reformation of forward head angle. Henry et al. (2006) have stated that 70% of people suffering from random headaches also suffer from neck issues. In fact their treatments must be focused on their neck area. It is also been said that 15-20% of chronic headaches are due to functional disruption in cervical spine. Henry et al. (2006) have also stated that one of the most basic goals for most researchers is to find a suitable treatment with minimum side-effects. One of these accepted methods is using active educational exercises [12].

Following occurrence of forward head posture, also some other alterations occur in other parts of the body. The most important of these alterations is feeling neck pain. These changes in positioning of head and neck result in application of excessive stress on muscles of these areas. This prolonged stress can result in pain and chronic musculoskeletal disorders. Verhagen et al. (2007) have shown that using active therapeutic interventions is more effective compared to using passive ones. However, despite several recommendations, there are only a few other researches having been elaborated on findings of review studies [13].

Physical situation and posture structure are related to both physical and mental health. Providing all stratums of the society with mental and physical health is highly important. Postural abnormalities have undesirable effects on body

perception. One of the functional factors which results in human body abnormality is having wrong sitting behaviors, as well as other wrong behaviors in terms of resting, carrying stuff, execution of daily routines and motional poverty as well.

On the other hand, necessity of this research lies in its ability in terms of enrichment of theories regarding effectiveness of yoga exercises on forward head abnormalities. It can also provide other researchers with a suitable context for performing other related studies.

With respect to aforementioned content, importance and necessity of this research lies in:
1- High prevalence of forward head abnormality and its deteriorating side-effects
2- Inadequacy of previous researches regarding effectiveness of yoga exercises on forward head posture.
3- Effectiveness of yoga exercises in terms of improvement of posture and increase of perception of proprioception and increased balance.

Yoga exercises improve human body's health and internal balance and helps prevention of many prevalent illnesses. With respect to nature of yoga exercises and amplification of deep muscles of the spinal cord during exercise, only a few previous studies have been performed regarding effects of yoga exercises on reformation of abnormalities, especially the forward head abnormality. On this basis the purpose of the present study is to investigate the effects of eight weeks of yoga exercises on cervical motional control, proprioception and forward head angle among girls suffering from forward head angle.

MATERIALS AND METHODS

This semi-experimental study includes 30 girl students suffering from forward head abnormality in two equally numbered groups of experimental with an age average of 16±0.42 and control, with age average of 16.25±0.61. Prior and post to undertaking of eight weeks of yoga exercises, forward head angle was measures through silhouette body photography, neck proprioception was measured through angle reconstruction and using a laser light and finally, neck motor control was measured through neck motor control tests. Additionally, co-variance analysis test was used for studying research variables.

RESULTS

Table 1: General information of participants prior and post to 8 weeks of yoga exercise program

Groups - General Information		Yoga Exercise Group	Control Group
Age		16 ±0.42	16 ±0.42
Height		161 ± 2.53	161 ± 2.53
Motional Control	Pre-Test	2.61 ± 0.44	2.77 ± 0.33
	Post-Test	1.35 ± 0.43	2.96 ± 0.35
Proprioception	Pre-Test	14.71 ± 0.22	14.22 ± 0.66
	Post -Test	9.09 ± 0.26	14.26 ± 0.61
Forward Head Angle	Pre-Test	51.62 ± 0.22	51.44 ± 0.14
	Post -Test	48.62 ± 0.21	50.64 ±0.15

Eight weeks of yoga exercises have effects on proprioception among 15-17 year old girls suffering from forward head abnormality

Table 2: Results of covariance analyses

Variable	Mean Square	Eta Squared	P-Value	F	Power	Eta
Proprioception	15.296	3.036	0.152	2.112	0.298	0.154
Yoga Exercises	546.934	0.570	<0.0001	75.508	1.000	-5.62

As you can see in above table, effect of eight weeks of yoga exercises on proprioception among 15-17 year old girls suffering from forward head posture is significant and meaningful. Therefore it can be stated that eight weeks of yoga exercises are effective on proprioception among girls suffering from forward head abnormality. With respect to obtained beta value, it is concluded that proprioception is averagely 5.62 units lower in yoga exercise group compared to the control group.

Table 3: Results of investigating pretest and post-test means

Group	Abundance	Sig.	Posttest Average	Pretest Average	T Value	Freedom Degree
Yoga	15	0.001	9.09 ± 0.26	14.71 ± 0.22	7.45	28
Control	15	0.001	13.26 ± 0.61	14.22 ± 0.66	4.43	28

According to the above table, it can be inferred that since the reported significance value is 0.001, and also the reported T value is 7.45; therefore it can be 95% confidently said that research hypothesis is accepted. In other words, it can be stated that eight weeks of yoga exercises have been effective on proprioception among 15-17 year old girls suffering from forward head posture.

Eight weeks of yoga exercise is effective on motor control among 15-17 year old girls suffering from forward head abnormality.

Table 4: Results of co-variance analysis

Variable	Means Square	Eta Squared	P-Value	F	Power	Eta
Motor Control	941.793	0.114	0.009	7.299	0.757	0.253
Yoga Exercise	90486.800	0.925	<0.0001	701.253	1.000	78.082

As you can see in above table, effect of eight weeks of yoga exercises on motor control is significant among 15-17 year old girls suffering from forward head posture.

Table 5: Results of investigating pretest and post-test means

Group	Abundance	Sig.	Posttest Average	Pretest Average	T Value	Freedom Degree
Yoga	15	0.001	1.35 ± 0.43	1.61 ± 0.44	8.12	28
Control	15	0.001	2.96 ± 0.35	2.77 ± 0.333	5.23	28

According to the above table, it can be inferred that since the reported significance value is 0.001, and also the reported T value is 8.12; therefore it can be 95% confidently said that research hypothesis is accepted. In other words, it can be stated that eight weeks of yoga exercises have been effective on motor control among 15-17 year old girls suffering from forward head posture.

Eight weeks of yoga exercise is effective on forward head angle among 15-17 year old girls suffering from forward head abnormality.

Table 6: Results of co-variance analysis

Variable	Means Square	Eta Squared	P-Value	F	Power	Eta
Forward Head	19.879	0.055	0.074	3.307	0.432	0.203
Yoga Exercise	465.607	0.576	<0.0001	77.453	1.000	5.573

As you can see in above table, effect of eight weeks of yoga exercises on forward head angle is significant among 15-17 year old girls suffering from forward head posture.

Table 7: Results of investigating pretest and post-test means

Group	Abundance	Sig.	Posttest Average	Pretest Average	T Value	Freedom Degree
Yoga	15	0.001	48.62 ± 0.21	51.62 ± 0.22	6.90	28
Control	15	0.001	51.64 ± 0.15	51.44 ± 0.14	3.71	28

According to the above table, it can be inferred that since the reported significance value is 0.001, and also the reported T value is 6.90; therefore it can be 95% confidently said that research hypothesis is accepted. In other words, it can be stated that eight weeks of yoga exercises have been effective on forward head angle among 15-17 year old girls suffering from forward head posture.

DISCUSSION AND CONCLUSION

With respect to research hypothesis pertaining effectiveness of eight weeks of yoga exercises on proprioception among 15-17 year old girls suffering from forward head posture, obtained results have manifested that mentioned exercises have a significant effect on neck proprioception among people diagnosed with forward head posture. Kendall has stated that the state of short posterior neck muscles in people diagnosed with forward head posture results in reduced ability for having a suitable posture. These muscles are typically stronger than their antagonist muscles and result in lack of muscular strength and consequently lead to formation of an unsuitable posture. This is while none of the strained or weak muscles in the anterior part of the neck are even able to reform and maintain suitable line which is aimed at forming a desirable posture. In Kendall's view, Yoga has been proven effective in terms of significant reduction of such pains as well as improvement of mental status of patients and their lifestyles. On the other hand, this in turn removed one's need for NSAIDS. As he stated, these physiological effects depend on capability of yoga exercise in terms of strengthening muscles and nerves. In addition, Gupta et al. (2013) performed a research and discussed the effects of four weeks of Deep neck flexor muscles' exercises in comparison with conventional isometric exercises on forward head posture, pain and cervical disability among male dentists suffering from chronic neck pain. Their results indicated that neck pain and disability were both declined among subjects of both groups; however a significant statistical improvement in forward head posture was only realized with the experimental group. Yoga exercises are followed by strengthened muscles. Since proprioception is mostly dependent on receptors existing in muscles and joints, especially during performance of active moves the role of muscular receptors becomes more significant. During tensions of muscles while motive cycles, rate of stimulation of muscle spindle is more compared to case of shortening of muscles. On the other hand yoga stimulates la afferents and also leads to increased rate of stimulation of motional units. These factors result in increased precision of proprioception [14].

With respect to research hypothesis pertaining effectiveness of eight weeks of yoga exercises on motor control among 15-17 year old girls suffering from forward head posture, results have shown that mentioned exercises have a significant effect on neck motor control among people diagnosed with forward head posture. Libenson and Hayman (2012) have considered using yga exercises as an inexpensive way of returning patients suffering from spinal cord injuries, to their daily routines. They concluded that through increasing the stability between adjacent vertebral segments the stresses imposed on spinal cord are controlled. In this regard, in addition to improvement of daily functional activities, patients are also made immune from developing defected postures. This finding is in consistence with findings obtained from research performed by Diab et al. (2010). They investigated the effect of reformation of forward head angle on performance of nerve root and pain in neck Radiculopathy pain and found out that in experimental group, head-neck angle and pain had changed significantly.

In addition, Sokhangui et al. (2015) discussed the effects of two exercise drills of Yoga and Pilates on range of motion and torso pain. Their results showed that yoga and Pilates are effective in terms of smoothing the side-effects of Mastectomy. Therefore, these exercises can be used as a useful tool in terms of rehabilitation of patients. Thomas et al. (2016) carried out a study and investigated the effects of seven weeks of yoga exercises on flexibility, power expansion rate and athletes' jump height. Their results indicated that yoga exercises had no effects on flexibility, power expansion rate and jump height. In another study, Boyong et al. (2016) carried out a study and investigated the effect of exercises aimed at stabilization of shoulder on neck posture and muscular activity among patients suffering from neck pain and forward head abnormality. Results of this study showed a significant improvement in Crania V-A,Upper trapezius and serratus anterior muscles, neck disability index, objective pain scale score and quality of life among experimental group subjects. In another research, Akbari et al. (2012) investigated effects of yoga exercises on waist spinal cords range of motion and pain and functional disability among women suffering from chronic herniated lumbar disk. Their results indicated significant increases in disability average, depression and waist lordosis in both groups. In other words, no difference was observed between experimental and control groups.

With respect to research hypothesis pertaining effectiveness of eight weeks of yoga exercises on forward head angle among 15-17 year old girls suffering from forward head posture, results have shown that mentioned exercises have a significant effect on forward head angle among people diagnosed with forward head posture. Also the results of previous researches have given clues of a significant affection between yoga exercises and treatment of forward head posture as well as consequent muscular pains and skeletal pains. On this basis, results of the present study are in consistence with results obtained by Seyedi (2014). Seyedi (2014) discussed the effects of 12 weeks of

reformatory exercises for head and shoulder abnormalities. Results indicated a significant reduction in forward head angle among the experimental group subjects. In addition, results of the present study are also in consistence with results obtained by Eshaghi (2015). Eshaghi (2015) investigated the effects of yoga on balance and forward head posture among blind male students. In this research it was proved that yoga in effective on overall balance among students and also resulted in a significant reduction in forward head posture. Kim et al. (2016) investigated the effects of exercising with elastic band on subjects suffering from rounded shoulders and forward head abnormalities. Prior and post to engagement in exercises, the forward shoulder angle, the V-A angle and the cranial rotation angle were measured among 12 individuals. Results manifested that exercise program undertaken was significantly effective on forward shoulder angle and V-A angle. However, no significant effects were observed for other variables. Bakhtiari et al. (2013) investigated the effects of stabilizing exercises on reformation of forward head posture. Their results indicated thatafter intervention; the degree of forward head posture was significantly decreased in both groups. However, after three months, the posture in control group was returned to its prior state but in contrast, among participants of the experimental group, the difference remained significant after three months. In addition, Grindle et al. carried out a controlled and random experimental study regarding effects of yoga on men and women from initiation of hyper kyphosis. They reported that their experimental group had developed Flex reduction in angle of kyphosis curve. In other words they indicated that yoga exercises are essentially effective on treatment of kyphosis. In comparison with the control group, those who had been randomly engaged in yoga activities obtained a rehabilitation of 4.4% in their Kyphosis angle and also 5.5% rehabilitation in Kyphosis index.

It seems that yoga is a suitable solution, both scientific and side-effects free method as well, for rehabilitation of forward head posture among people suffering from this abnormality. Physical movements of yoga are effective towards elimination of harmful effects of nervous tensions and stresses. In fact, making use of yoga exercise makes the physics full of energy while shedding light on mind and prospering the psyche with satisfaction and balance.

With respect to results of this research, it seems that yoga exercises can have positive effects on neck proprioception, motor control and amount of forward head angle among girls suffering from this abnormality. On this basis, with respect to prevalence of the former abnormality among people, especially among girls, yoga might be used as a therapeutic strategy of non-offensive style and of low cost as well in companion with another complementary reformatory model in terms of reformation and improvement of forward head posture.

REFERENCES

[1] Morningstar، M. Cervical curve restoration and forward head posture reduction for the treatment of mechanical thoracic pain using the pettibon corrective and rehabilitative procedures. Journal of chiropractic medicine، 2002; 1:113-115.
[2] Neuman، DA. Kinesiology of the musculoskeletal system: foundations for rehabilitation، Elsevier Health Sciences, 2013.
[3] Taheri-H. Effect of 8 weeks of exercise therapy and self-medicate with chronic neck pain and disability booklet on computer users. Master of Isfahan University, 2011.
[4] Damgaard، P. ،Bartels، E. M. ،Ris، I. ،Christensen، R. & Juul-Kristensen. Evidence of physiotherapy interventions for patients with chronic neck pain: A systematic review of randomised controlled trials. ISRN Pain, 2013.
[5] Ehsani f، Mossalanejad z ،The prevalence of chronic non-specific neck pain employee welfare organization in the city of Semnan، risk factors and consequences، Journal of Physical Therapy, 2014; 1:17-21.
[6] Kendall، F. P. ،Mccreary، Ek. ،Provance، Pg. ،Rodgers، M. M. & Romani، WA Muscles: testing and function with posture and pai workers Journal of Physical Therapy, 2005; 3(2): 9-33.
[7] Seydi، p. Effect of a 12-week corrective exercises on abnormalities of the headand shoulders forward. Studies of Sports Medicine, 2014; 5: 31-44.
[8] Muslemi. haghighi، f، And Ghaffari Nejad، F. Evaluation and Comparison of the ankle joint proprioception in women (20 to 30 years old)، healthy non-athlete jogging activities and athletes without jogging activities. Semnan University of Medical Sciences Journa, 2006; 7: 13-18.
[9] Afhami، n. ،sahebazamani m، AmirSeyf adini، m. &poor، m. Comparison of surface and deep neck flexor muscle strength in girls with forward head posture and healthy Using Surface Electromyography pressure pads Kerman University of Medical Sciences, 2012; 19: 70-79.
[10] Andersen، Ll ،Kjaer، M. ،Sögaard، K. ،Hansen، L. ،Kryger،A. I. & Sjögaard، G. Effect of two contrasting types of physical exercise on chronic neck muscle pain. Arthritis Care & Research, 2008; 59: 84-91.

[11] Falla، D. ،Jull، G. ،Russell، T. ،Vicenzino، B. & Hodges، P. Effect of neck exercise on sitting posture in patients with chronic neck pain. Physical therapy, 2007; 87: 408-417.
[12] Fathy، D. & Rezaei، oven.. Review and compare postural abnormalities Students in middle and high school boys and girls. The Head Office of Physical Education and the Ministry of Education, 2011; 46: 11-53.
[13] Carolyn K, Colby L. Therapeutic exercise foundations and techniques. Book Promotion & Service Ltd, 2002; 591-677.
[14] Harman K, Cheryl LH, and Butler H. Effectiveness of an exercise program to improve forward head posture in normal adults: a randomized, controlled 10- week trial, J Man Manip Ther, 2005; 13(3):163-76.