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FORWARD HEAD POSTURE ANGLE IN HEALTHY OLDER FEMALES- A CROSS SECTIONAL STUDY

Manivannan M.Kaandeepan¹, Trupti K. Parikh¹, Tapan S¹

¹KJ Pandya college of physiotherapy, Sumandeep vidyapeeth, pipariya, waghodia taluk, vadodara- Gujarat

E-mail of corresponding author: lavenmani@gmail.com

ABSTRACT

AIM: To investigate the influence of old age on forward head posture in healthy old age female subjects.

Methods: A total of 34 normal healthy old age female subjects age group 60 years and above were selected from vadodara city and from the department of physiotherapy, Sumandeep Vidyapeeth University, sampling method being convenient sampling. The subjects were photographed perpendicular to the sagittal plane in order to capture a sagittal view of the head and neck during the standing activity. A 5.0 megapixel digital camera (3x optical zoom, and a built in flash,) was used for all photographic data collection. The camera was positioned 3 feet from the subject. The forward head posture angle was measured to the nearest degree with the help of protractor. The data were collected and analyzed by Pearson correlation method.

Results: The pearson correlation test showed, mean of 46.41 with standard deviation of 5.32. It shows no significant correlation.

Conclusion: In our sample study, there was no significant correlation found between forward head posture angle in related to old age. Thus the null hypothesis is accepted ie.. there is no effect of age on forward head posture angle.

Keywords: Posture, Forward Head Posture Angle, Healthy Older Females

INTRODUCTION

Aging can also be defined as a progressive functional decline, or a gradual deterioration of physiological function with age, including a decrease in fecundity (Partridge and Mangel, 1999), or the intrinsic, inevitable, and irreversible age-related process of loss of viability and increase in vulnerability.^[1] Posture is a "position or attitude of the body, the relative arrangement of body parts for a specific activity, or a characteristic manner of bearing one's body."^[2]

Changes in postural response characteristic in the older adult are simply indications of deterioration in postural muscle response efficiency.^[3] Age-associated changes in posture have been frequently described by a cluster of postural deviations that includes a forward head, rounded shoulders, changes in lumbar lordosis, and increased flexion in the hips and knees. These age-associated postural changes may be attributed to age-related biological and physiological changes, functional or pathological causes, or a combination of these changes.^[4]

The position of each joint has an effect on the position of the other joints. Ideal static postural

alignment is defined as a straight line that passes through the ear lobe, the bodies of the cervical vertebra, the tip of the shoulder, midway through the throat, through the bodies of the lumbar vertebra, slightly posterior to the hip joint, slightly anterior to the axis of the knee joint and just anterior to the lateral malleolus. Correct posture is the position in which minimum stress is applied to each joint. If the upright posture is correct, minimal muscle activity is needed to maintain the position. Any static position that increases the stress to the joints may be called faulty posture. Causes for poor posture are poor postural habit, muscle imbalance, pain and respiratory conditions^[5].

Perfect head posture- A line dropped from the center of the external auditory meatus (EAM) would land directly in the center of the shoulder (the tip of the acromion process).^[6]

The most common postural deviation affecting the cervical spine is forward head posture.^[7] A forward head involves increased flexion of lower cervical and the upper thoracic regions, increased extension of the upper cervical vertebrae and increased extension of occiput on the 1st cervical vertebrae. There may also be temporomandibular joint dysfunction with retrusion of mandible.^[8]

Forward head 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 line of gravity in comparison with optimal posture.^[9]

Old age population, age more than 60 and above having the condition of anterior head translation either with or without symptoms. Forward head posture(FHP) leads to long-term muscle strain, disc herniation, arthritis & pinched nerves.^[10]

For every inch that the head moves forward in posture, it increases the weight of the head on the neck by 10 pounds.^[11] During normal quiet standing, the cervical region sustains an external flexion moment because the head's centre of

mass is anterior to the joints of cervical spine. Active contractions of the cervical extensors maintains upright posture of the head & neck, but as in the trunk, EMG data reveal that only slight activity is required to hold the head erect. Abnormal posture increases the muscle work^[12].

A particular problem with the anterior sagittal glide of the head having the effect on the cervical facet joints. The facets are forced to go into extension and become impacted. Impacted facet joints prevent the hyaline cartilage compression and decompression necessary for normal nutrition, resulting in increased facet degeneration. . Researchers have described normal head posture in asymptomatic adults using a range of measured values rather than a distinct point, suggesting that simply having the head anterior to the vertical ideal may not be a pathological condition but rather may be representative of the variation found in the normal population.

Several studies have been conducted on the subject of the FHP with both age-associated and gender-associated findings reported. While some inconsistencies were evident within the results and conclusions of the studies, the literature suggests that age and gender differences tended to influence the forward head posture. Identification of the diversity of FHP positions within a healthy older population would afford clinicians normative ranges upon which to base postural assessment decisions, and would subsequently improve therapeutic intervention measures for older individuals exhibiting impaired posture.

METHODOLOGY

A total of 34 normal old age females with age above 60 years were selected through convenient sampling from the district of vadodara who met the inclusion and exclusion criteria.

Inclusion Criteria

- Above 60 years of age

- Females Subjects Only.
- Living independently in the community
- Not requiring assistance with any ADL activities, not using assistive gait devices, experiencing no current balance difficulties, and
- Not currently under direct care of a physician for problems with balance or for a major medical problem [including cardiac respiratory problems.

Exclusion Criteria

- Person with scoliosis, kyphosis & other postural deformities
- Rheumatologic disease
- Ankylosing Spondylitis
- Person with neck pain, shoulder pain related conditions
- Vertebral Osteomyelitis
- Cervical Degenerative arthritic conditions
- Tumors in cervical region
- Endocrinologic & metabolic disorders
- Previous history of spinal fractures
- Respiratory diseases eg.. Like chronic obstructive pulmonary disease etc.
- Temporomandibular joint disorders
- Person with any psychiatric illness, anxiety, stress

Instrumentation

- Digital camera of 5 megapixel
- Adhesive tape
- Fluorescent marker
- Scale & Protractor

PROCEDURE

Subjects fulfilling inclusion criteria were selected by convenient sampling method. Then, participants were explained procedure of the study. All participants signed an informed

consent form. Adhesive markers will be placed on the midpoint of tragus & the C₇ spinous process. Markers will be marked with fluorescent marker pen. Participants were asked to stand comfortably & the subjects instructed to simply close their eyes, flex, extend the head twice, come to their most neutral relaxed position, hold this position still, and then open their eyes.^[13]

A 5.0 megapixel digital camera (3x optical zoom, and a built in flash,) was used for all photographic data collection .The camera was positioned 3 feet from the subject. The subjects were photographed perpendicular to the sagittal plane in order to capture a sagittal view of the head and neck during the standing activity. The photographs were be downloaded to a computer for cataloging and subsequent printing.^[14]

METHOD FOR MEASURING FORWARD HEAD POSTURE ANGLE

On the printed photograph of each subject, a horizontal line was drawn through C₇, and a second line was drawn connecting the tragus of the ear to the C₇ marker. The intersection of these lines will define the sagittal plane relationship between C₇, the tragus of the ear, and the horizontal. The angle will be then measured to the nearest degree with the help of protractor. Then, data will be analyzed.

DATA ANALYSIS

Data was analyzed by Pearson Correlation method with the use of SPSS software version 16.0 for windows and p<0.05 was kept as highly significant.

Table-1: Correlation between Age and Forward Head Posture Angle

		Forward Head Posture	Age
Forward Head Posture	Pearson Correlation	1	-0.14
	Sig. 2-tailed		0.938
	N	34	34
Age	Pearson Correlation	-0.14	1
	Sig. 2-tailed	0.938	
	N	34	34

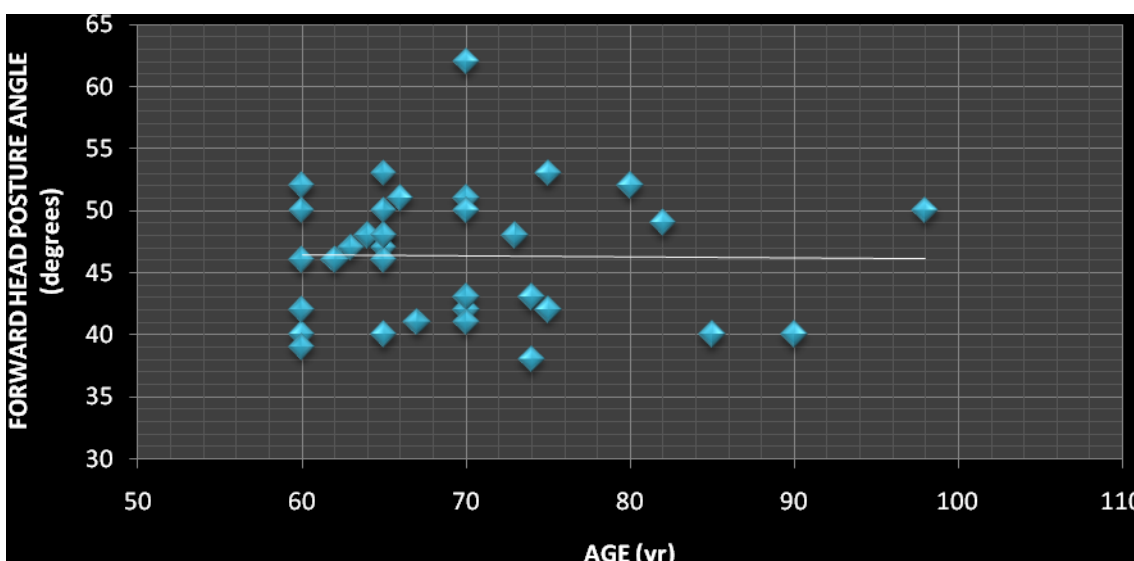
Table 2: Subjects Age, Forward Head Posture Angle

NO	AGE	FHP ANGLE (In degrees)	NO.	AGE	FHP ANGLE (In degrees)
1	65	40	18	67	41
2	65	47	19	70	51
3	60	46	20	70	50
4	65	46	21	70	43
5	65	48	22	66	51
6	62	46	23	70	62
7	60	40	24	70	41
8	64	48	25	74	43
9	60	39	26	73	48
10	65	48	27	75	42
11	60	42	28	75	53
12	63	47	29	74	38
13	65	53	30	80	52
14	60	52	31	85	40
15	60	50	32	82	49
16	65	50	33	98	50
17	70	42	34	90	40

Table -3: Mean, standard deviation and minimum and maximum values for forward head posture angles [neck angle] in healthy old age females

No of subjects	Mean	Standard Deviation	Variance	Range	Minimum	Maximum
34	46.41	5.32	28.31	24	38	62

GRAPH: pearson correlation test between age [x-axis] and forward head posture [y-axis]



RESULT ANALYSIS

The data were collected and analysed with Pearson correlation method. The results obtained as mean of 46.41 with standard deviation of 5.32. $p < 0.938$. It shows no significance between old age and forward head posture angle in healthy female subjects. Thus the null hypothesis is accepted.

DISCUSSION

Postural adjustments are the result of a complex system of mechanisms that are controlled by multisensory inputs (visual, vestibular & somatosensory) integrated in the central nervous system. With ageing, there is reduced peripheral sensibility in the visual, vestibular and

proprioceptive systems. ^[15] Age is characterized by a decline in the postural performance, which is based on a coherent and stable coupling between sensory information and motor action. ^[16] With ageing, discs in the spine lose some of their water content, becoming less spongy, more rigid and narrower, exaggerating bad posture and stiffness. The posture of ageing reveals muscular tensions that acquired and may have carried for years.

Rene Cailliet M.D., famous medical author and former director of the department of physical medicine and rehabilitation at the University of Southern California states:

“Head in forward posture can add up to thirty pounds of abnormal leverage on the cervical spine. This can pull the entire spine out of alignment. Forward head posture (FHP) may result in the loss of 30% of vital lung capacity. These breath-related effects are primarily due to the loss of the cervical lordosis, which blocks the action of the hyoid muscles, especially the inferior hyoid responsible for helping lift the first rib during inhalation.”

Number of authors have assessed the repeatability of the relaxed neutral position or "self-balance position" with the use of sophisticated biplanar photography. As the posture gradually degrades, there is need to keep the eyes level with the visual environment. This increased effort is required to keep the head upright and results in continuous overloading of the posterior musculature of the neck. With aging, degeneration starts in the spine vertebrae and if there is any deviation or with musculoskeletal problems accompanied in long standing case it is much more problematic..

The purpose of this study was to investigate the influence of ageing on forward head posture. We have taken only female subjects, those who are normal and healthier with vision power 6/6 normal and age of 60 and 60plus. The results shows, mean of 46.41degrees [neck angle] with standard deviation of 5.32. Several authors have described on lateral cervical radiographs the attributes of normal spinal geometry in patients who have no history of neck pain, and in patients without cervicocranial symptoms who were selected using specified biomechanical criteria. Gore et al. described the geometric configuration of the cervical spine in 200 asymptomatic people between the ages of 20 and 60. When comparing the angle of intersection of lines drawn along the posterior vertebral body margins of C2 and C7 (as described above), they found the average degree of overall cervical

lordosis was 21 degrees. ^[17, 19] Similarly, Harrison et al. found the overall average degree of lordosis between C2 and C7 in their asymptomatic subjects was 34 degrees. A normal average range of lordosis between C2 and C7 of 21-34 degrees in so-called "normal subjects." ^[18,19]

The mean reported by Theresa Nemmers in their study "Variability of the forward head posture in healthy community-dwelling older women." was 42.38 degrees ^[4]. Rainey and Twomey in their study "Posture of the head , shoulders and thoracic spine in comfortable erect standing" reported 48.9 degrees in old age subjects^[14]. Our study mean degree was 46.41 degrees. With Theresa Nemmers study, the mean degree is larger because their sample size is more comparing to our study. With Rainey and Twomey study, the mean is somewhat less. Literature studies and authors reported that, the normal forward head posture angle was 49* to 59* degrees in old age . ^[4]

In hyperlordosis of cervical spine and in long standing or severe forward head posture, the cervical angle was more than 65 degrees. Degrees are increased due to displacement of cervical vertebrae, if problems were found in cervical spine due to musculoskeletal problems. The subjects are selected those who met the inclusion criteria and not dependent with any assistive devices for daily living activities. The mean degrees in our study 46.41 was normal, when compared with literature reviews studies. In our study, results suggest that there is no influence of ageing on forward head posture. i.e. there was no greater/larger deviational changes on forward head posture angle in relation to old age healthy subjects.

CONCLUSION

In our sample study, there were no significant correlations found between forward head posture angle in related to old age. It shows , in healthy old age subjects, there is minimal displacement

of the cervical vertebrae. The alignment of cervical vertebrae are not displacing significantly with ageing. Musculoskeletal disorders, postural deformities, visual and cardio-respiratory diseases, are the predisposing factors in earlier days and day by day, the displacement of cervical vertebrae were increasing that leads to forward head posture .

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