BIOMECHANICAL ANALYSIS OF FORWARD HEAD POSTURE AMONG PONDICHERRY UNIVERSITY RESEARCH SCHOLARS BASED ON THE LAPTOP WORKING HOURS: AN ANALYTICAL STUDY

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Abstract

Aim: The purpose of the study was to investigate the presence of forward head posture (FHP) on the selected subjects and analyze its significance among subjects. **Methods:** 88 male research scholars were recruited as subjects for the analysis from Pondicherry University. Their age ranged from 21 to 35 years. A standard 18 mega pixel digital SLR camera with a product code of 550D was used to capture the images. The image was analyzed with Kinovea software and manual method was used to measure and analyze the degree of deviation in FHP among/between the subjects. The percentage scale was used to analyze the number of researcher affecting the FHP. **Results, discussion and conclusion:** Results concluded that those are work more hours in anterior forward head posture movement they are prone to Forward Head Posture deformities. But the severity in the postural deformity could be attributed to the lack of discipline in handling simple routine jobs like handling a cell phone, handling a laptop / PC in more hours, bending down to pick up or drop weights, sleeping position, driving vehicles etc. Though it could be attributed towards the lack of discipline in handling daily routines, the chief factor that contributes to their postural deformity is the lack of awareness, lack of interest to analyze their own fitness level. It is this factor that develops into a severe discomfort or injury in future.

Keywords: Biomechanics, Research Scholar, Laptop, Analyze, Forward Head Posture, Kinovea.

Introduction

Posture is a way you position your body or arrange your limbs while performing a motor task. The degree of load on various muscles and joints differs with each individual. In this study the scholar focused only on the load/stress on the neck region. Further, one categories of people were identified for this purpose namely research scholar. The research scholar have a pronounced forward/downward flexion of the neck most times during the simple routine jobs like handling a cell phone, bending down to pick up or drop weights, sleeping position, driving vehicles, mainly due to research work handling a laptop / PC in more hours for data entry as well as thesis writing etc. The study also concluded that those who are used computer based activity in more hours they prone to forward head posture **(Jung-Ho Kang et al., 2012).** In these scenarios, chances of individuals injuring their neck muscles and joints are significantly high. In this research the author and his team have focused on bringing such scenarios to limelight through a biomechanical analysis conducted on selected research scholars in various departments. The results are presented in the context of the title with respective images and conclusions.

Nature of research scholar

Most of the time research scholar work with mobile and computer (Lab) in pronounced forward/downward flexion of the neck due to data entry work, thesis writing work as well as journal writing for this they are more hour spent time to laptop and cell phones.

As per the scholars statement a researcher daily work with computer in more than 7Hours

Morning	Day	Night
8.00-9.00Am		8.30 to 11.30Pm
1Hours	3Hours	3Hours

All the researcher are given same statement and also the working time will slightly change but every one state that they are work more than 7 Hours. Most of the researcher is state that night time work more hours.

Forward Head Posture (FHP)

The FHP is considered to co-exist with hyper-extension of the upper cervical spine, flattening of lower cervical spine, rounding of upper back, and elevation and protraction of shoulders. FHP may result in craniofascial pain, headache, neck ache and shoulder pain together with decreased range of cervical motion, muscle stiffness and tenderness**(Raine S and Twomey L, 1994)**

Biomechanics Analysis

In FHP, the head shifts anteriorly from the line of gravity, the scapulae may rotate medially, a thoracic kyphosis may develop and overall vertebral height may be shortened. The features are as follows: there is an obliteration of the cervical lordosis and a compensatory tilting back of the head at the Atlanto-occipital joint. In the posterior cervical muscles there is stretching and weakness of Semispinalis cervicis and overaction with ultimate shortening of Semispinalis capitis. The corresponding flexors muscles in front, namely, Longus cervicis and Longus capitisshorten and lengthen respectively **(Burt HA, 1950).**

Methodology

There are several methods to measure the deviations of the forward head posture (FHP), however, the researcher selected the "New York Postural Assessment Test", because it fulfilled all the feasibility, financial and simplicity objectives designed for this study. And also the craniovertebral angle was used for this study. This study 88 research scholar were recruited as subjects for the analysis. The subjects were selected from Pondicherry University. Their age ranged from 21 to 35 Years. There are in various departments such as Science, Sports, and Language and so on. The random sampling method was used for selecting the subjects. They are working more than 7 hours pronounced forward/downward flexion of the neck in a day.

TEST ADMINISTRATION

The subject is asked to stand on a neutral posture. The lateral side of the head image was capture in standard Digital (SLR) camera. After that the photo was analyzed using paint.net as well as Kinovea software.

Horizontal line drawn from C7 to towards lateral side of throat. Then the diagonal line had drawn from C7 to center of the tragus of the ear. Now the inter section of the two line craniovertebral angle was measured. If the angle was less than 50^{O} which means they are prone to FHP **(Diab and Moustafa, 2012).** If the angle was more than 50^{O} which means they are normal and also the straight vertical line drawn from center of the lateral hip to lateral shoulder to toward center of the tragus but the tragus position may change forward or backward. Now from C7 to vertical line and tragus line angle was measured. If the hip, shoulder and tragus all center point in a same line it's a normal posture if there is some variation the angle will occur it's called FHP.

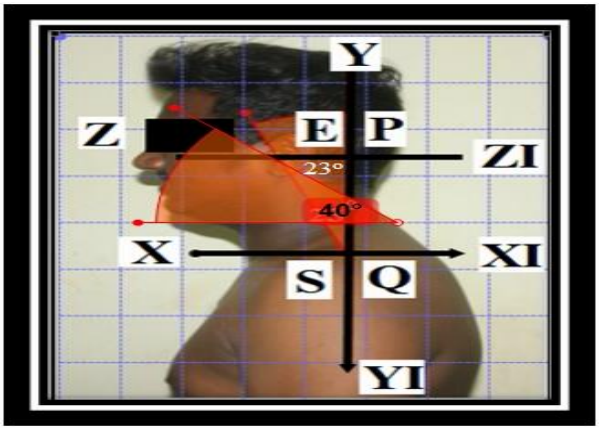
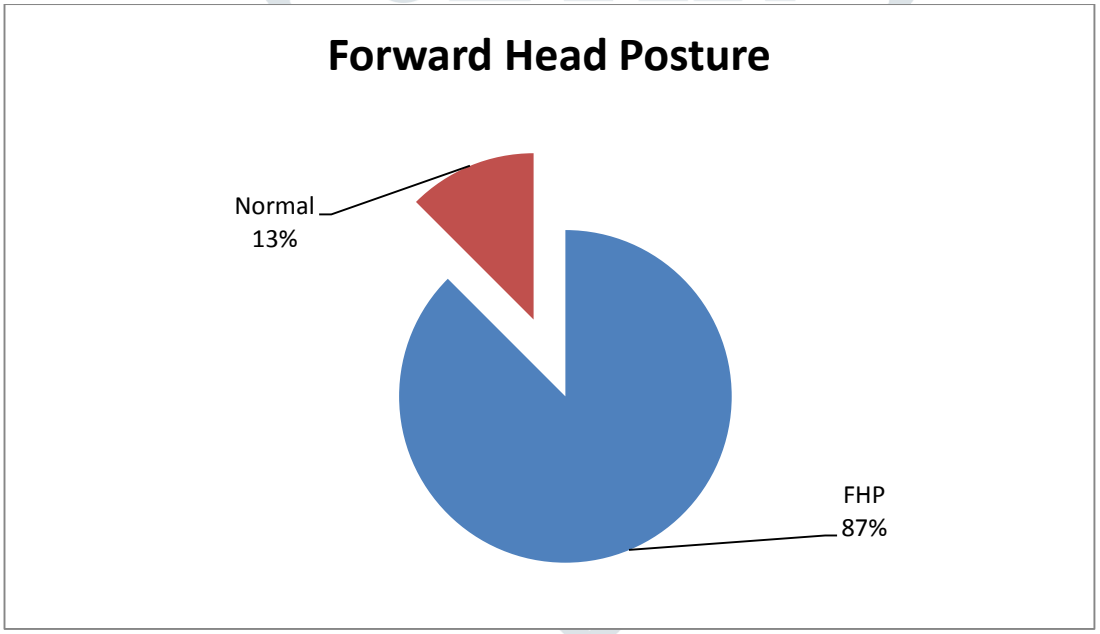


Table-1

FHP	77	87.5%
Normal	11	12.5%
Total	88	100%

Table -1 shows out of 88 subjects there were 77(87.5%) affected by FHP remaining 11 (12.5%) subjects were normal head posture.

THE PIE DIAGRAM SHOWING THE FORWARD HEAD POSTURE ACCORDING TO PERCENTAGE



Discussion

Generally the human nature movements are basically anterior forward/downward flexion in nature if the peoples are more in that same position prolong period that's lead to FHP the study also concluded that Long Time Computer Based Worker posture are affecting especially FHP **(Jung-Ho Kang et al., 2012).** In this study also the subjects are using more than 7 hours in a day they also 87% of the subjects are affecting FHP. Notable, lesser CVA indicates greater FHP.

Conclusion

According to the result it was concluded that FHP deformities were notably high among the research scholars from Pondicherry University. And also concluded that those who are work more than 6-7 hours pronounced forward/downward flexion of the neck its significantly leads to FHP so that the peoples have more concentration on their back neck muscles and back stretch its help to maintain a normal head posture. Hence, it is advised that the stake holders should pay more attention to the mechanics of the subjects head posture. Any remedial action warranted should be taken without any delay and monitoring should be done on a regular basis. This will enable proper posture for a prolonged healthy lifestyle.

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