THE RELATIONSHIP OF FORWARD HEAD POSTURE WITH NECK PAIN AND DISABILITY AMONG UNIVERSITY STUDENTS"- A CORRELATION STUDY

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ABSTRACT

BACKGROUND AND OBJECTIVE: Forward Head Posture is the commonest type of faulty posture that is found among all the populations that leads to severe neck pain in different levels. The purpose of this study was to find out the correlation of forward head posture and neck pain and disability in university students.

METHODOLOGY: A total of hundred participants were recruited from Teerthanker Mahaveer University which were the university students. All research participants received an informed consent form to familiarize them with the purpose of the study prior to the study procedure. After that participants received the NPQ to fill and all the CROM were taken for the study and also the CVA was measured to check the severity of the FHP. The data were collected from all the hundred participants after filling up the questionnaire and taking all the readings required under supervision of the researcher.

RESULT: Result demonstrated that there was a weak positive correlation was found between age and Cervical-flexion (r = 0.053) in neck pain group. Furthermore, there was moderate positive correlation was found between age and Cervical-extension (r = 0.001) in neck pain

group. No significant correlation was found between age and other variables in non-neck pain group. Results demonstrated that there was a positive correlation between NPRS and NPQ (r = 0.056) in NP group. Results demonstrated that there was a positive correlation between NPRS and NPQ (r = 0.025) NNP group.

CONCLUSION: This study concluded that there was a correlation between age and flexion and extension in individuals having neck pain and NPQ and Numerical pain rating scale in subjects having neck ache and NNP.

KEYWORDS: forward head posture; neck pain; craniovertebral angle; modified goniometer.

1. **Introduction**:

The way people use laptops, TVs, Cell phones, and bag packs leads to improper posture.[1]A muscle imbalance that is caused by muscle shortening and elongation can lead to malfunctions in different components of the body.[2]

Over the last several years, the head, neck, and jaw position has been a problem due to the biomechanical connection between the cervical, head, and dental structures.[3] Each inch of anterior cervical spine positioning puts 4.5 kilograms of extra weight on it, It ultimately results in a forward-leaning posture. FHP can have negative effects on vascular, musculoskeletal, and neural systems.[4, 5, 6]

Proper posture involves keeping the body in a relaxed state, minimizing the amount of stress and strain on the muscles and bones. Some researchers believe that an ideal posture is one in which the plumb line passes through the outer auditory meatus. As seen from the side, the vertical line passes via the front of the ankle joint, through the knee joint, posterior to the hip joint through external auditory meatus per joint of the shoulder.[7, 8, 9]

The head is positioned anteriorly in Forward Head Posture relative towards the plumb line, which is a horizontal line perpendicular to it connecting through COG of the body.[10] Overloading muscles and connective tissues because of a change in posture accelerate the spatial change in between the line of gravity and the spine.[11] Improper posture with activity limitation and physical impairment leads to musculoskeletal disorder which is neck dysfunction or neck pain.[12,13] In FHP the extend upper cervical vertebrae and the lower cervical vertebrae bend forward.[14] The gravitational center shifting (the head) closer to the axis of load-bearing this increases the length of the external moment arm.[15]

Sustained force on the non-contractile structures and the craniovertebral extension muscles leads to change in the biomechanical movement, results in musculoskeletal damage or pain. [16] Furthermore, FHP limits the head- and neck-region functional movement.[17] Asymmetrical rotational, gliding movement because of restriction within the articular capsule, but movement of the joint can still occur. Expanded periods of FHP give rise to shortening of the muscle fibers as well as decreased number of sarcomeres which can also affect the muscle contraction. [18,19,20]

Cervical pain is a common problem that has a significant effect on people and related communities, guardians, businesses, and health-care.[21,22,23] The overall frequency of neck pain in the general population i.e 86.8%.[22,23] Most persistent musculoskeletal pain syndrome is believed to be the Neck pain.[24] Neck ache may be associated with severe situations which include neurological situations, infections and cervical spine fractures, or it is able to be idiopathic (neck ache without unknown cause).[25]

Continuous actions and maintaining the posture in a flexed position for an extended time is related to neck pain.[26] Deficits in neck rotation and flexion of cervical range of motion are associated with greater FHP.[27,28] Moreover, in asymptomatic adults FHP has a poor impact on steady balance control. Previous researches affirm that a Craniovertebral angle of more than 49.9º become associated with neck pain.[29]

Due to FHP, the muscle's deep cervical flexor and the midthoracic rhomboid weaken for scapular retraction. FHP also shortens pectoralis major , neck extension muscles. Due to the increased muscle activity of the upper trapezius, the majority of patients experience pain from overusing their muscles.[30] Stretching of the anterior cervical structures and shortness of the posterior muscles, the FHP increases the forces that compresses on the zygapophyseal joints of the neck, the posterior part of the vertebrae, and changes in the length and strength of connective tissue which leads to decreased tension production capacity of muscles. All these eventually lead to pain.[31,32,33,34]

2. Method:

100 participants fulfilled the inclusion criteria. & exclusion criteria are to be selected and further divided into 2 groups neck pain and non-neck pain.

Firstly, the topic and objectives of the study will be properly informed to the patients

participating followed by informed consent from them.

Neck pain and the resultant patient disabilities were measured using the **Northwick Park Neck Pain Questionnaire**. Patients will complete the questionnaire. There are five answer possibilities for each parameter which have a scoring ranging from zero to four. 0 is noticeable in the absence of pain and 4 is noticeable in the worst case of pain. For each parameter, there is only one potential response. For first nine questions total points earned equals the neck pain score. Question 9 is not necessary to fill (about driving) if the patient's poor health prevents them from being able to drive .

The Numerical Pain Rating Scale was used to measure the severity of the pain. The scale consists of 11-point numeric scale ranges from 0 to 11. 0 indicates no pain and 11 indicate severe pain. It is a self-administration scale. The respondent was asked to mark the number that best describes their pain.

The Universal Goniometer was used to estimate the neck's active range of motion (ACROM). Patients were asked to be in sitting position with their back straight and arms resting on the side of the chair with elbow flexion and forearm pronation and ankle, knees and hips were positioned at right angles. Total six measurements were recorded i.e.; flexion, extension, RLF, LLF, RR, LR. Prior to testing, subjects were instructed to perform all the six cervical motions to end range to avoid any error and also to acquaint him with the testing procedures.

Craniovertebral Angle (CVA) was measured for Forward Head Posture which is done by using **Modified Goniometer**. The universal half-circle goniometer was modified by securing a perpendicular rod posteriorly at the fulcrum. CVA was measured in degrees by guiding the person down (flex) and up (extend) the neck in standing position before taking measurements. Now, place the modified goniometer as such that It is measured in between a imaginary vertical a line that goes through the C7 and the line connecting the C7s spinous process with the tragus of the ear. The reference point is the tragus of the ear, which moves in direct proportion to the skull. Since it can be easily palpated, the spinous process of C7 is used as additional reference point. A head-forward position is indicated by an angle less than 50 degree.

3 Result:

100 subjects were enrolled, and they were split into two groups: those with neck pain and those without it, with 50 subjects in the neck pain group. (17 males and 33 females) and non-

neck pain have 50 subjects (35 males and 15 females). Table1 depicts the demographic characteristics of these participants.

The Pearson correlation coefficients between age, C-flexion, C-extension, C-lateral flexion (left and right), and C-rotation are shown in Table 2. (left and right),CVA, NPRS and NPQ. Results demonstrated that there was a marginally positive relationship or Age and C-flexion were shown to be correlated. (r = 0.053) in neck pain group. Furthermore, there was moderate positive correlation or relationship was found between age and C-extension (r = 0.001) group with neck discomfort. There is no significant correlation was found between age and other variables in non-neck pain group.

Table 3. Shows the Pearson correlation coefficients between the CVA, NPRS and NPQ (neck pain group). The findings showed that NPRS and NPQ had a good link or correlation (r = 0.056). This implies that a lot of neck pain and severe neck pain are associated. i.e.; when NPQ rises then NPRS increased and vice versa. No significant correlation found between CVA and NPRS (r = 0.503) and also between CVA and NPQ (r = 0.773).

Table 4. Shows the Pearson correlation coefficients between the CVA, NPRS and NPQ (Non-neck pain group). The findings showed a substantial association between NPRS and NPQ (r = 0.025). Thus, a high level of neck discomfort is associated with a disability caused by severe neck pain. i.e.; when NPQ rises then NPRS increased and vice versa. No significant correlation found between CVA and NPRS (r = 0.078) and also between CVA and NPQ (r = 0.889).

4 Discussion:

The major goal of this cross-sectional study was to determine the relationship between NP and disability in university students and the anterior location of the cervical spine (forward head posture). This allowed researchers to determine how much NP affected the students' daily activities. This study showed a connection between ageing and the range of motion in the cervical region, with those who experienced pain having significantly less range of motion than those who did not experience pain.

The previous study done by Dae-Hyun Kim et al indicated that because of reduced lordotic curve angle and reduced ROM in the cervical spine that is ext. and flexion (age is the factor) was related to pain. Moreover, he also added that with pain there was reduced ROM in flex.

And ext. of the cervical spine was reported in the participants with pain in the neck area as compared to non-neck pain participants.[35]

In this study we had included younger population that's the reason that age was also the factor for decreased range of motion in university students because of tedious use of mobile phones and also sustaining Long-term poor posture causes neck pain and decreases the cervical region's range of motion in both the flexion and extension directions.[36]Rania N. Et al in their study also reported that there is a decrease in the cervical spine's range of motion. (flex., ext.) because of repetitive use of smart phones in young age which leads to neck pain.[37] There was no significant relationship was found in this present study between age and left Forward head posture is inappropriate with a flexion in the lower cervical region and an extension in the upper cervical region. This leads to change in the posture in the sagittal plane but not in the horizontal plane.[35] Meisingset et al in their study also reported that movement of the sagittal plane i.e.; flexion and extension was the only factors linked with NP and disabilities.[38]

This study demonstrated a substantial correlation between NPRS and NPQ in both those who reported neck pain and those who reported no such pain.

Results from this study are consistent with those from earlier studies done by Hermann and Reese that there is a positive correlation between NPRS and NPQ. In their study, they found out that physical disabilities like reduced CROM and muscle spasm in the cervical area, disability, vigours pain, and limitations in functional activities are the core factors to be responsible for neck pain and resulting disability due to cervical spine disorders. One of the important dimensions in NPQ is pain intensity which simultaneously leads to a positive correlation between neck pain (NPRS) and disability (NPQ).[39]

Due to the fact that the study's participants are young people who are also conscious of their physical well-being, there was no correlation between age and FHP, as well as between FHP and NPRS and NPQ, in this study.

So, for FHP to produce there may be some time needed to produce a reduction in the CROM to develop head posture and disability.[40] NF. Mahmoud did a study that supports the present study findings and they found that with increasing age and degenerative changes, there is a rise in neck pain and disability in older adults as compared to the participants who are in their 20s.[41]

Poor postural alignment results in pain and forward head posture. In this present study there is a significant relationship was found between age and cervical flexion and extension and also between NPRS and NPQ as NPRS rises there is a rise in NPQ. There is a reduced range of motion in the sagittal plane (flexion and extension CROM) in subjects with pain in the neck region or cervical region. In this present study, the results demonstrated that a reduced cervical flexion or extension range of motion that could be the predictive factor for pain in the neck area and disabilities. So, determining the cervical spine's range of motion in conjunction with FHP would be employed as a fundamental guideline in clinics to predict or prevent the occurrence of neck discomfort in people who have a forward head position.

For the management and prevention of neck pain in the future and also in university students it is important to educate them about postural correction exercises and also re-educate them about good ergonomics so they can manage and reduce the likelihood of neck pain and forward head posture.

5. Conclusion:

Based on the results of this study, it appears that age and the flexion and extension of CROM in people with NP are related, but age and other variables are not significantly correlated. (lateral flexion, rotation, FHP, NPRS and NPQ). Statistically significant relationship is found in between NPRS and NPQ in participants who have pain in and those who are not having any neck pain. Moreover, no correlation between FHP and NPRS and NPQ in participants had neck pain or those who haven't any neck pain. In-depth investigation is required to demonstrate a direct link between FHP and NP and impairments.

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LIMITATIONS OF THE STUDY

- One important limitation in this study is that it has only younger population (university students).
- Study was not blinded.
- Not an experimental study.
- Not an interventional study.
- This study didn't take the population according to the severity of the neck pain (mild, moderate and severe).
- Small sample size.

Table 1. Details of age, various ROM, NPRS, NPQ and CVA of the subjects.

Variables	Mean±SD	
	Neck Pain	Non Neck Pain
Age (years)	21.6±1.5	20.9±1.7
Flexion	52.9±7.7	59.5±4.8
Extension	57.8±6.5	62.2±4.1

Lateral Flexion (Left)	41.3±4.3	42.2±3.8
Lateral Flexion (Right)	40.9±4.5	42.1±3.2
Rotation (Left)	60.4±7.4	67.2±6.4
Rotation (Right)	59.3±9.3	68.02±8.3
CVA (degrees)	44.6±4.2	57.8±5.07
NPRS	6.3±0.9	1.02±1.36
NPQ (%)	23.3±11.9	7.89±13.9

CVA: craniovertebral angle; NPRS: Numerical Pain Rating Scale; NPQ: Northwick Park Neck Pain Questionnaire.

Table 2. Pearson's correlation between age, flexion, extension, lateral flexion (left and right), rotation (left and right), CV angle, NPRS and NPQ.

Variables	**AGE**	
	Neck Pain	Non Neck Pain
Flexion	0.053*	
Extension	0.001*	0.240
Lateral Flexion (Left)	0.990	0.147
Lateral Flexion (Right)	0.597	0.623
Rotation (Left)	0.926	0.167
Rotation (Right)	0.202	0.225
CVA (degrees)	0.250	0.612
NPRS	0.971	0.777
NPQ (%)	0.12	0.295

*R value is <0.05 for Pearson's Correlation **Table 3. Pearson's correlation coefficients between CV angle, NPRS and NPQ (Neck Pain Group).**

	CVA	**NPRS**	**NPQ**
CVA (degrees)	1	0.503	0.773
NPRS	0.503	1	0.056*
NPQ (%)	0.773	0.056*	1

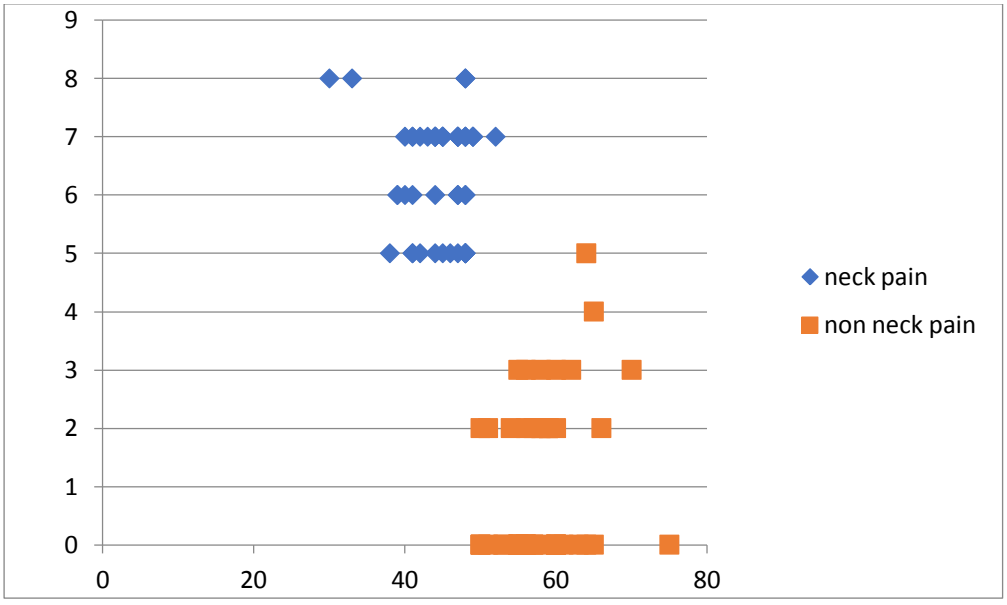
*R value is <0.05 for Pearson's Correlation

Table 4. Pearson's correlation between CV angle, NPRS and NPQ (Non-Neck Pain Group).

	CVA	NPRS	NPQ
CVA (degrees)	1	0.078	0.889
NPRS	0.078	1	0.025*
NPQ (%)	0.889	0.025*	1

*R value is <0.05 for Pearson's Correlation

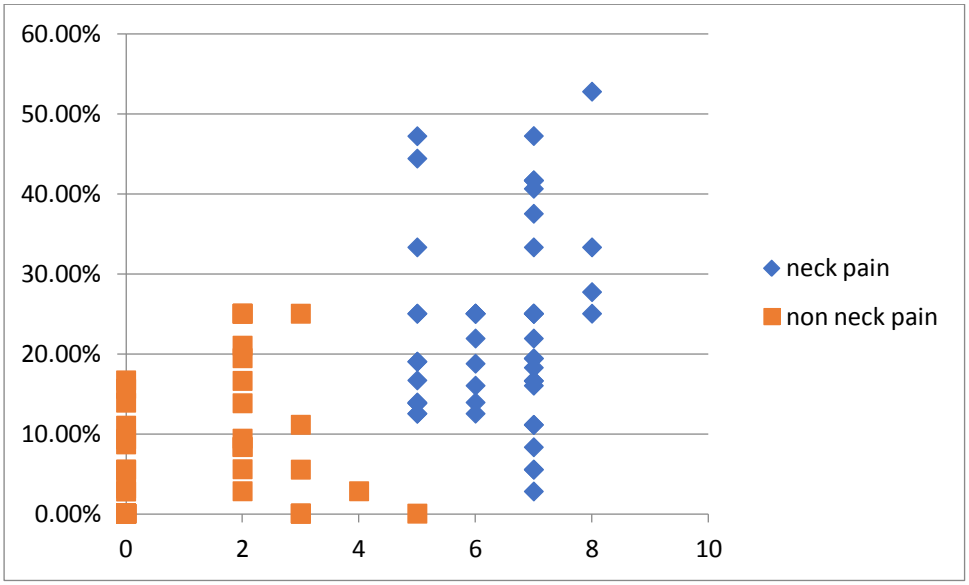
SCATTER Graph1. SHOWS CORRELATION BETWEEN FHP AND NP IN STUDENTS WITH OR WITHOUT NECK PAIN.



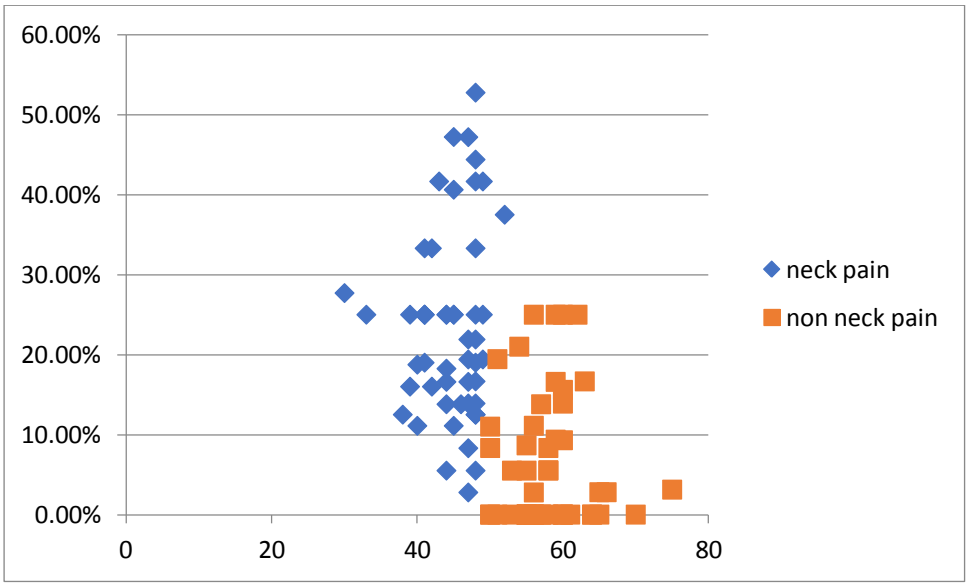
This scatter graph shows no significant relationship between FHP and NPRS of students with

or without neck pain.

Graph 2. SHOWS SIGNIFICANT RELATIONSHIP BETWEEN NUMERICAL PAIN RATING SCALE AND NORTHWICK PARK NECK PAIN QUESTIONNAIRE. This scatter graph shows that there is a positive correlation present between NPRS and NPQ of students with or without neck pain**.**

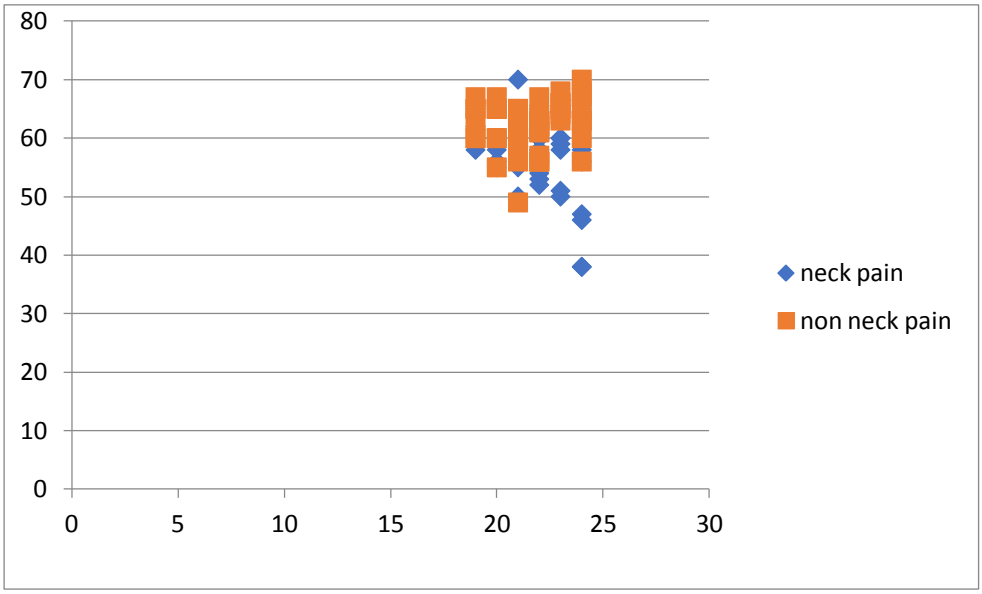


Graph 3. SHOWS RLEATIONSHIP BETWEEN FORWARD HEAD POSTURE AND NPQ. This scatter grap shows that there is no significant relationship was found between FHP and NPQ of students with or without neck pain.



Graph4. SHOWS RLEATIONSHIP BETWEEN AGE AND FLEX. IN NP AND NNP.

This scatter graph shows that there is significant relationship was found between age and flex. in subjects having NP and who haven't any NP.



Graph 5. SHOWS RLEATIONSHIP BETWEEN AGE AND EXT. IN NP AND NNP.

This scatter diagram shows that there is significant relationship was found between age and ext. in subjects having NP and who haven't any NP.