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Screening of Rounded Shoulder and Forward Head Posture in College Young Adults of CPU

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Abstract:

Forward Head Posture (FHP) is characterized by the anterior positioning of the head relative to a vertical reference line, while Rounded Shoulder Posture (RSP) is identified by acromion protraction anterior to the line of gravity, shoulder protraction, downward rotation, and anterior tilting. These postural deviations are increasingly observed among young adults, potentially leading to musculoskeletal imbalances and functional impairments. The primary objective of this study was to determine the prevalence of FHP and RSP among young adults at CPU and to evaluate the correlation between these two postural deviations. While previous research has predominantly focused on the prevalence of FHP, limited data exist on the co-occurrence and relationship between FHP and RSP. This study aims to bridge that gap by assessing their correlation in a young adult population. A total of 58 participants were included. Each participant was seated in an upright, comfortable position with arms resting on the thighs and head in a neutral sideways orientation for a lateral-view photograph. Using APECS software, the craniovertebral angle (CVA) was measured to assess FHP. The length of the pectoralis minor muscle was evaluated using the Pectoralis Minor Length Test (PMLT). Among the 58 participants, 43 exhibited FHP, yielding a prevalence of 74%, while 15 demonstrated normal head posture. RSP was present in 30 participants, indicating a prevalence of 51%. A strong correlation of 76.7% was observed between FHP and RSP among individuals with FHP.

This study highlights a high prevalence of forward head and rounded shoulder postures among young adults and demonstrates a significant correlation between the two. These findings underscore the importance of early postural assessment and intervention to prevent long-term musculoskeletal complications.

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Keywords: CVA- craniovertebral angle, RSP-Rounded Shoulder Posture, FHRSP-Forward Head Rounded Shoulder Posture, FHP-Forward Head Posture, PMLT- pectoralis Minor Length Test.

Introduction

Muscular and skeletal structures can change into an incorrect shape due to a reduction in physical activity and inappropriate posture habits in daily living. Forward head posture (FHP) is defined as excessive anterior positioning of the head in relation to a vertical reference line. Rounded shoulder posture (RSP) refers to a posture characterized by acromion protraction in front of the line of gravity, shoulder protraction, and downward rotation as well as anterior tilt [I]. Also, long-term use of smart phones leads to wrong posture such as forward neck posture, rounded shoulders and slouched posture. Changes in physical functions that occur due to rounded shoulders can cause one or more abnormal conditions in a complex structure consisting of the head, neck, and shoulders. FHP and RSP deform the normal relationship of the muscles and the bone structures, which are correlated. Despite the growing recognition of the impact of poor posture on physical well-being, there remains a need for comprehensive screening strategies tailored specifically to young adults. Early detection of FHP and RSP is critical for implementing timely interventions to prevent progression and mitigate associated musculoskeletal symptoms [2]. However, existing literature on screening methods and prevalence rates in this demographic group is relatively sparse and fragmented.

In FHP, an excessive extension of the upper cervical spine is associated with shortening of the upper trapezius (UT), cervical extensor muscles, sternocleidomastoids (SCM) and the levator scapulae muscles. The rounded shoulder posture is associated with the shortness of pectoralis muscles, and protracted, anteriorly tilted, internally rotated scapula is observed. Forward head and round-shoulder postures are also associated with altered spine and scapular kinematics and muscle activities, resulting in increased muscle activity of neck and shoulder stabilizers 3]. The upward rotation of scapula is an essential component of the arm elevation (flexion or abduction). The primary upward rotator muscles include the serratus anterior (SA), upper trapezius and lower trapezius. These muscles contribute equally importantly to

the upward rotation of the scapula, and function as proximal stabilize to provide a stable attachment for distal mover [4].

Craniovertebral angle is described as the acute angle formed between a horizontal line passing through the spinous process of the seventh cervical vertebra (CT) and the line connecting the midpoint of the tragus to the spinous process of C7 Forward head posture and CV angle magnitude are inversely related, (i.e., as the CV angle decreases, the severity of FHP increases). Craniovertebral angle is the most widely used measurement to assess FHP. Not only it is both valid and reliable.

The Pectoralis minor (PM) muscle is thought to be a key muscle in the positioning and Mobility of the shoulder girdle. It originates from the third, fourth, and fifth ribs, which run supra lateral, converge, and insert at the medial aspect of the coracoid process. The functions of the PM are abduction, depression, downward rotation, and the upward tilt of the scapula. It is the only muscle that connects the scapula to the thoracic region's anterior surface. As a result, it is anticipated that shortening this muscle may limit scapular motions in the superior and posterior direction, which reduces the subacromial space and generate and generate a pathological environment leading to forward head posture.when the patient is supine with arms by the side and elbows flexed, the distance between the treatment table and the posterior aspect of acromion should not be more than 2.54cm(inch) assuming the PM muscle is of normal length[10].

In previous studies, the response of the muscles involved in stabilization is necessary to maintain normal scapular rhythm and shoulder movement. In addition, the head position affected muscle activity during reaching. There was a difference in muscle activity in subject with and without shoulder girdle elevation during shoulder abduction 90°. In addition, a previous study reported that the muscle activity was different in the subject with and without scapular instability in tasks loaded during 90° shoulder flexion. A FHP does not always imply an RSP, and vice versa. Furthermore, not everyone with FHP and RSP experiences pain. Muscle activation changes in the FHP or RSP might lead to pain or dysfunction during the arm raising load task in a subject without pain. Previous studies reported that a decrease in craniovertebral angle (CVA) doesn't necessarily lead to an increase in RSP although FHP and RSP could simultaneously occur [12].

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Objectives of Study

This study is analysed to find correlation between FHP and RSP. This research project aims to address the gap by screening of FHP and RSP in young adults. By synthesising findings from epidemiological studies and clinical assessments, this project seeks to provide a comprehensive overview of current knowledge on the screening methods strategies related to FHP and RSP in young adults.

Materials and Methods:

1. Tripod
2. Phone camera
3. Plumbline
4. Chair
5. Protractor
6. Bed
7. ADCES app

For interpretation of the study, young adults of CPU from age 18-40 are selected on the basis of inclusion criteria and the consent of the participants is taken, the data have been collected in OPD of Physiotherapy department (CPU), Kota Rajasthan. Then by placing the tripod and camera on the shoulder level of the participant a plumb line is placed for the reference, the picture is clicked with same angle and same position i.e. facing towards window so, that the lateral view in camera can be captured and a plastic pointer is applied by a two sided tape on C7 vertebrae after that all the pictures of participants is exported to APECS image app and the CVA angle of each individual participant is measured. After clicking the picture, the participants are instructed to lie supine on the bed and arms are placed straight with thumb pointing outwards then by the use of rigid standard plastic transparent right angle protractor the distance of acromion process from the bed surface is noted in a notebook with the demographic data (name, age, gender, weight) after taking the data of all participants, are instructed to leave the OPD and continue their normal day to day activity.

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Study Design:

Cross-Sectional Survey.

Search Method And Eligibility Criteria:

All 58 participants are instructed to sit straight in comfortable position arms resting on thigh and faced towards sideways to click an image in lateral view then by the use of APECS software each participant CV Angle is calculated and then the length of PM muscle is calculated by PMLT.

Sample Size:

A total of 58 young adults were taken from department of Physiotherapy.

Inclusion Criteria:

- Young adults (18-40) both male and female.
- Neck and shoulder pain.
- Muscles imbalance (neck and upper back)
- Restricted ROM of neck

Exclusion Criteria:

- Any history of cervical pathology
- Degenerative or inflammatory disorder of cervical spine (spondylosis, ankylosing spondylosis)
- Recent trauma
- Surgical interventions
- Fracture
- Infection
- Myelopathy

Study Selection and Data Extractions

For the sake of analysis, the python programming language along with the use of

'JUPYTER' software and the tables are formed using MS Excel. Thus, the result is obtained by the combined use of JUPYTER and other analytic tools from different webs.

Hence, our study describes the details of prevalence of FSP and RSP in young adults of CPU and the rate of correlation between FSP and RSP.

- To assess head and neck posture while siting a digital imaging app APECS (FHP Image tool software) was used.
- A camera was mounted on a tripod stand at a distance of 150 cm, with the height adjusted to the subject's shoulder level.
- The subject was instructed to sit in front of the camera and face the lens in a straight line. The picture was taken and saved as a jp in the FHP programme. The angle was calculated along the line drawn from the tragus of the ear to the spinous process. In order to determine the prevalence, the data from 58 subjects were examined using the mean percentage. It was discovered that, out of the 58 Subjects 43 had forward head position while 15 had normal head posture. The prevalence of forward head posture in pupils was found to be 74 %.
- For the rounded shoulder posture, the patient is instructed to lie in supine line on bed and by the help of a protector the length of acromion process from the surface of bed is measured.
- Then, by calculating the mean of both sides i.e. right and left, the final result is calculated which provide us the data that out of 58 young adults 30 have rounded shoulder and 28 are without RSP. The prevalence found to be 51%.

Study Results

After taking all the values and data, each image is selected and exported in APECS software which calculated the CV Angle and the mean of all 58 participants is calculated which shows that the 74.1% of all participants have forward head posture based on the reliability of CVAngle for calculating for head posture the values are (50-53 degree is considered normal), (50-30 degree is considered as mild to moderate FHP), (below 30 degree are severe which is nil in our findings), that describes that from 58 participants, 15 have normal posture and 43 have moderate FHP, and none of them have CVAngle less than 30 degree.

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After calculation the CVAngle of the participants the length of PM is calculated for screening of RSP, as by the reference of previous research paper the realisability of

PMLT is high in assessing the RSP in humans, The normative values for resting length of pectoralis minor muscle for males are 8.54 ÷ 0.88 and for females 8.22 ÷ 0.90 with an asymptomatic shoulder. The mean value of all participants PM length is calculated than by analysing the data in reference of normal value we find that 51.7 % of participants have RSP. From 58 participants 30 participants are with RSP and 28 without.

Afterwards, the data which we collected and analysed above used to find the correlation of FHP and RSP in participants by which we found that (out of 74% participants who are present with FHP) 43 in number, from them 76.7% have both FHP and RSP.

TABLE: Shows the Outcome measures

Variable	Mean	Standard Deviation	P Value
CVA	44.01	5.9	.200
PML-R	9.68	1.54	.022
PML-L	9.67	1.67	.067

Outcome Measures:

the mean of all 58 participants is calculated which shows that the 74.1% of all participants have forward head posture based on the reliability of CVAngle for calculating for head posture the values are (50-53 degree is considered normal), (50-30 degree is considered as mild to moderate FHP), (below 30 degree are severe which is nil in our findings), that describes that from 58 participants, 15 have normal posture and 43 have moderate FHP, and none of them have CVAngle less than 30 degree. The mean value of all participants PM length is calculated than by analysing the data in reference of normal value we find that 51.7 % of participants have RSP. From 58 participants 30 participants are with RSP and 28 without. Afterwards, the data which we collected and analysed above used to find the correlation of FHP and RSP in participants by which we found that (out of 74% participants who are present with FHP) 43 in number, from them 76.7% have both FHP and RSP

Discussion

The present study aimed to investigate the prevalence of forward head posture (FHP) and rounded shoulder posture (RSP) in young adults, shedding light on potential similarities between these postural abnormalities and their implications for musculoskeletal health. Our findings reveal that there is high prevalence of postural abnormalities in young adult. This highlights the significant burden of poor posture within this population and underscores the need for targeted interventions to address these issues. previously studies have conducted the rate of forward head posture and rounded shoulder individually but in our study, we have also observed the relation between forward head posture and rounded shoulder posture i.e.77%. Our findings align with previous research indicating a rising prevalence of FHP and RSP among young adults, likely influenced by modern lifestyle factors such as sedentary behaviour, prolonged screen time, and poor ergonomic practices. However, our study provides updated prevalence rates and contributes to the growing body of literature on postural abnormalities in the young adults. The high prevalence of FHP and RSP observed in our study carries important implications for the health and well-being of young adults. These postural abnormalities have been associated with a range of musculoskeletal issues, including neck pain. shoulder discomfort, and decreased functional capacity. Addressing these issues early on is crucial for preventing long-term complications and improving overall quality of life.

Limitations:

Despite the valuable insights gained from this study, several limitations should be acknowledged. These include that data is of young adults only, and doesn't aim on how to manage the posture associated risks, which can be evaluated further in studies our study aims to only provide the data and rate.

Strength:

By understanding the factors contributing to poor posture and implementing targeted interventions, we can mitigate the musculoskeletal burden associated with these conditions and promote overall health and well-being among young adults.

Conclusion:

In conclusion, our study provides valuable insights into the prevalence of forward head posture and rounded shoulder posture among young adults, highlighting the need for proactive measures to address these postural abnormalities.

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