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ANALYSIS OF LEVEL OF BOTH SHOULDERS IN PHYSICAL THERAPY STUDENTS

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ABSTRACT

Background: During lectures, usually students sit in an awkward position, for prolonged period of time and that may cause postural instability. For a good posture, bilateral landmarks should be on same level, when viewed from front or behind. Therefore, both shoulders should also be on same level as well. Any alteration in level of shoulders in healthy individual may lead to deformity in spine or extremity. The objective of this study was to analyze the level of both shoulders in the physical therapy students and to find its correlation with the perception of students about their shoulder balance.

Method: An observational (cross – sectional) study was conducted on students of Doctor in Physical Therapy (DPT) from colleges of Physical Therapy, Karachi. 100 Students were selected by Simple Random Sampling technique. Data from students was collected by administering a questionnaire. It includes close-ended questions. Afterwards, the level of both shoulders of the students, were assessed by using Scoliosis Meter.

Results: Response from students showed that 79% of them assumed that both shoulders are in same level. When level of shoulder of students was assessed by scoliosis meter, it showed that 37% students have absolute level shoulder. Spearman's Correlation coefficient ($r = 0.046$, $p = 0.65$) showed a weak, positive correlation between perception of the students about shoulder level and assessment of shoulder tilt.

Conclusion: This showed that the perception of students about level of both shoulders was not correlated to the actual levels of the shoulders. Hence, as they were not assuming it uneven, so they may not pay any attention to keep themselves straight.

Keywords: Shoulder level, Physical Therapy Students, Perception, Scoliosis Meter, Posture, Shoulder Tilt.

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INTRODUCTION

Posture is the relative arrangement of body parts[1]. It is the position assumed intentionally or habitually by the person. Maintenance of posture is very important for daily living. Alteration in posture occurs in children and adults. In college going students, bad posture is very common due to lack of awareness of correct posture. Hence, faulty posture causes different problems in activities of daily living [1,2,3,4,5]. Internal and external factors may cause alterations in posture. Age, sex, height, weight, hereditary factors, physical environment, socioeconomic level, psychosocial and emotional factors and physiological changes during puberty can affect the posture of a student [1,5,6]. Improper posture, lack of awareness about correct posture and presence of pain due to any reason may cause postural instability [1,5,6]. Any change in normal postural alignment may cause over stretching of the muscles and associated structures like fascia, ligaments, tendons because these structures are stretched beyond their normal range. It also causes weakness of the muscles [7]. As a result of stress on periarticular structures, pain and discomfort arise, whereas if the stress continues, it may lead to spinal deformities and degenerations of intervertebral disk [8,9]. It is very difficult to diagnose any change in articular structures in early stage, thus the early diagnosis has been a challenge for health care providers[10].

Environment of class room plays a great role on posture of students. While having lectures, students sit in awkward position, such as trunk side bended, neck flexed/extended/rotated, or with poking chin, for prolonged period of time and that may cause postural instability. Most of musculoskeletal pain develops due to the environment of classroom [11,12,13]. Different researchers conducted studies on ergonomics, educational institute furniture, prolonged sitting, posture, heavy bags, student physical activity, and associated musculoskeletal changes, pain and problems [14,15,16,17,18,19,20]. Nurul Asyikin et al (2009) in Malaysia conducted a study on factors that affect the posture and can cause musculoskeletal problems and pain. This study mainly considered heavy bags, ergonomically improper furniture and poor sitting posture[21]. Poor ergonomics in school life leads towards problems in adulthood. Nse A Odunaiya et al (2014) conducted a case study to assess ergonomic suitability of educational furniture and possible health implications in a university setting. This study concluded that seat height was not suitable for 80.4% students and desk height for 74.2% students [22].

There are many causes of musculoskeletal pain. As mentioned above, environment of classroom and the duration spent in the classroom are key factors. When students spend more than 30% of their time in sitting posture, this will certainly affect their posture[16,21]. Therefore, whenever posture is affected by prolonged sitting with poor ergonomics, the musculoskeletal system is affected, which will lead to musculoskeletal disorders[17]. Cammie Chaumont Menéndez et al (2009) also conducted a study to evaluate posture of college students by two postural assessment tools. It was concluded that Modified Rapid Upper Limb Assessment (mRULA) for computer users and the University of California Computer Use Checklist were independent of each other [23]. Obembe et al (2013) conducted a study on undergraduate laptop users and concluded that most common musculoskeletal complaints reported by these university students is pain in shoulder (75.7%) [24].

Perception about own body is related to physical appearance, as well as also related to neural representation of the body. A study was conducted by Linkenauger et al (2009) on asymmetrical body perception. A study conducted by Linkenauger et al (2009) on asymmetrical body perception summarized that people who were right-handed had perceived that their right arm and hands were longer than their left arm and hand, whereas left handed participants perceived both arms accurately [25]. Body postures also influence the emotional facial expressions. Hence, it has a powerful influence on perception of facial displays of emotion by adults and children [26,27,28]. Sylvain Guimond et al (2012) assessed the correlation between posture and personality traits [29]. Posture not only causes musculoskeletal changes; it also affects pulmonary functions of students [30,31]. Edmondston et al (2007) conducted a study on postural neck pain. This study assessed the habitual sitting posture, perception of good posture, cervicothoracic kinesthesia and also compared them with asymptomatic individuals [32].

For a good posture, bilateral landmarks should be on same level, when viewed from front or behind. Therefore, both shoulders should be on same level as well. Whenever any disturbance occurs in level of shoulders, it is considered as pathological. Any alteration in level of shoulders in healthy individual may lead to deformity in spine or extremity [33]. A study was conducted by Akel et al (2008) to evaluate shoulder balance in healthy adolescent and found by digital photography that only 18.7% had absolutely level shoulder[33]. Furthermore, those volunteers stated that they had leveled shoulders. This study also concluded the results about the perception of the volunteers regarding their shoulders [33]. A study was conducted by Cho CK (2008) on Chinese adolescents to find the prevalence of common faulty postures and its associated factors. The study included digital photography, manual muscle tests, and flexibility tests. The most common faulty posture found in this study was uneven shoulder level [34].

Lesser work was done on the shoulder levels with the perception of students [34]. Therefore, our study was conducted to get the knowledge about the perception of appearance in the physical therapy (PT) students and assess the level of shoulders and correlate with their perceptions. This study will help in providing awareness of posture and brain storming which might help in correction or prevention.

METHODOLOGY

Study Design: Observational (cross-sectional) study

Sampling Method: Simple Random Sampling technique.

Study Setting and Participants: Data was collected from

100 students pursuing Doctor in Physical Therapy (DPT) in colleges of Physical Therapy in Karachi.

Duration: 6 months.

Inclusion Criteria: Students of physical therapy from any batch and year of DPT were included in this study. Both male and female participants of age in between 18 years to 30 years were included.

Exclusion Criteria: Students with any known structural or congenital deformity of limbs and spine were not included in this study. If he/she had any surgery or injury around shoulder, spine and upper trunk, that can alter the level of shoulders, were not being included. Students who are not willing to participate were also not a part of this study.

Data Collection Tool and Procedure: Data from students was collected by administering a questionnaire. It included demographic information, and close-ended questions[33,35] about themselves, such as, perception about their body appearance chiefly about the shoulder, dominant hand side, carrying bags and et cetera. After filling the questionnaire, the level of shoulders of the students, were assessed by using Baseline Scoliosis Meter. Thereafter, the shoulder tilt in degrees and also in distance in centimeters (cm) were measured and documented. For shoulder tilt in degrees, we placed the rod of scoliosis meter on the acromio-clavicular articulation and read the angle from the level gauge. For shoulder tilt in distance in centimeters (cm), we placed the ends of the rods on the acromio-clavicular articulation. A significant difference in degree measurement was noted when both shoulders were not on same level. Then, we released the rod on the higher side and moved the bar down until "0" was indicated on the gauge. Therefore, we were able to calculate the distance by counting the markings above the block on the higher side. This indicated the distance deviation in cm.

Ethical Consideration: This study was explained to the students and written consent was taken, prior to the filling of questionnaire. The confidentiality of the personal information was maintained throughout the study.

Data Analysis: The collected data was analyzed by using 'Statistical Package for the Social Sciences' (SPSS) version 20. Data was shown in Mean, Standard Deviation (SD) and percentages. Correlation of the perception of appearance with the assessment of shoulder tilt was calculated by Spearman's Correlation coefficient.

RESULT

100 students of DPT were randomly selected from first year to final year for this study. Among them, 80 were female and 20 were male students. Mean age of the students is 20.43 ± 1.59 years.

A questionnaire was given to students with close-ended questions and the responses from them were summarized in percentages. The response from students shows that 79% of them assumed that both shoulders are in same level. 44% students have perception that their body is very well balanced and 55% are happy with their appearance. 90% are right-handed students. 95% students carry bags and majority of students (56%) carry their bags on their right shoulder and mostly carry their books, folders with their right forearm. Hence, 18% of the students responded that they were suffering from right shoulder pain, 10% of students reported of left shoulder pain and 27% reported of pain on both shoulders, after prolonged sitting in class. Details of responses from students are given in Table 1 and 2. Table 1 shows the perception of students about themselves. This table shows that i) How these students feel about their appearance of shoulder as they see themselves in mirror; ii) Are they happy about their appearance; iii) What do they think that their body is balanced or not. Table 2 shows the dominant hand and habit of students for carrying their bags and the percentages shows that majority of students were using their right shoulder or hand.

Table 1: Responses from students regarding their appearance(n=100)

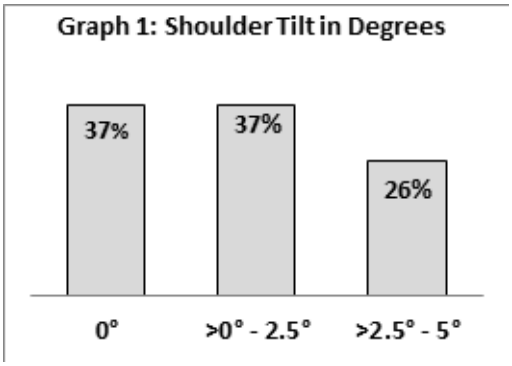
Appearance of shoulder	%
Right shoulder - down a lot	01
Right shoulder - down somewhat	05
Right shoulder- slightly down	05
Both shoulders – balanced	79
Left shoulder - slightly down	07
Left shoulder - down some what	03
Left shoulder - down a lot	00
Happy with your body appearance	%
Happy	55
Somewhat happy	36
Unhappy	07
Very unhappy	02
Your body is balanced	%
Very well balanced	44
Somewhat balanced	37
No opinion	05
Somewhat unbalanced	13
Very unbalanced	01

Table 2: Response from students (n=100)

Dominant hand	%
Right	90
Left	10
Where do you carry bag?	%
Right shoulder	56
Left shoulder	18
Any shoulder	20
Back	06

After getting the responses from students, the level of shoulder was assessed by scoliosis meter. It showed that 37 students have leveled shoulders. Graph 1 showed the shoulder tilt in degrees, irrespective of the dropped side. The tilt was divided in ranges of 0^{o}, $>0^{o}$ - 2.5^{o}, $>2.5^{o}$ - 5^{o}, without showing the dropped or elevated side. Graph 2

showed only the percentages of the dropped side, either it was right or left, or it was not dropped. When we assessed the shoulder tilt in distance, we found that 36 students have tilt of >0-1cm, whereas, 27 students have >1cm. Table 3 shows the shoulder tilt in degrees along with the dropped side. This shows the percentages of tilt in different ranges of degrees in the students having right or left dropped shoulder.



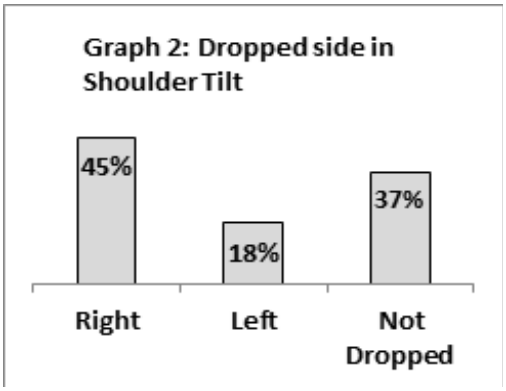


Table 3: Assessment

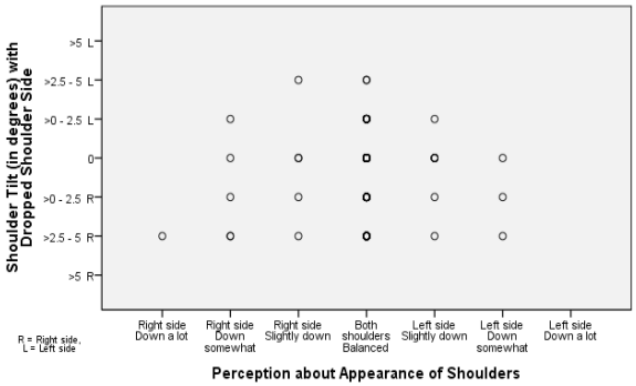
Shoulder Tilt in Degrees with Dropped side	%
>2.5° - 5° (Right side - Dropped)	23
> 0° - 2.5° (Right side - Dropped)	22
0° (Both shoulders - Leveled)	37
> 0° - 2.5° (Left side - Dropped)	15
> 2.5° - 5° (Left side- Dropped)	03

When we compare the response of students with our assessment of shoulder level, we found that 79% students assumed that both shoulders are on same level, while assessment showed that 37 % have 0° tilt. The relationship between the perception about appearance of shoulders and the assessment of shoulder tilt was calculated by using Spearman's correlation coefficient. The result showed a weak, positive correlation between perception and assessment (r = 0.046, p= 0.65), shown in Table 4. This showed that the perception of students about level of both shoulders was not the same to their assessment. Perception of students about their shoulder level and the actual measurement of shoulders through assessment are shown by a scatter diagram in Graph 3. This graph also shows that the assessment of shoulder level does not match the perception of students.

Table 4: Relationship between the perception of appearance and the assessment of shoulder tilt

Data	Spearman's Correlation	P-value
• Perception of Appearance in Mirror • Shoulder Tilt in Degrees	0.046	0.65
* The Spearman correlation coefficient (r) can take values from +1 to -1. A 'r' of +1 indicates a perfect association, a r=0 indicates no association and a 'r' of -1 indicates a perfect negative association. Whereas, 'r' closer to zero, shows weaker the association.		

Graph 3: Perception and Assessment



DISCUSSION

This study focused on the perception of students and the measured shoulder levels to analyze their perception. When a person assumes that his/her posture is not good, he/she tries to correct it. But if a person thinks that his/her posture is perfect and his/her shoulders are on same level, he/she will not try to do any corrective measures. Akel et al (2008) evaluated shoulder balance in 91 healthy adolescents and found that 18.7% have absolutely level shoulders [33]. Akel et al (2008) assessed the shoulder levels by radiological examinations and digital photographs, and thus, correlated both evaluations. Interestingly, all of them stated in questionnaire that they have levelled shoulders [33]. 72% of them were happy with their appearance and 87% stated that their bodies were balanced [33]. The results of our study show that 79% of students assumed that both shoulders are on the same level, but the assessment showed that only 37% students have absolutely levelled shoulders. 55% students were happy with their appearance and 44% assumed that their bodies were very well balanced. Another study was conducted on Chinese adolescents by Cho CY (2008) [43]. It was a survey for faulty posture and its associated factors. They distributed Musculoskeletal Questionnaire and Chinese Health Questionnaire to high school students and later conducted postural screening. They found that 36% students had uneven shoulder levels and 25% had forward head posture. Uneven shoulders were the most common faulty posture among those students [34].

There can be many reasons which can alter the level of both shoulders, such as scoliosis, poor posture, carrying weight.

The main reason is scoliosis. Due to scoliosis, one shoulder will be lower than the other shoulder. Shoulder level can also be altered by poor posture, shifting weight of trunk to one side during prolonged sitting, carrying bags on one shoulder or in one hand. When a student adopts poor sitting posture during class, either due to unfit furniture or he/she habitually sits in slouched posture, both put harmful consequences in long term. If students continue to keep their shoulder uneven, this can lead to muscle imbalance, which can later lead to spinal deformities [8,9].

Classroom environment is very important for posture of students. . Odunaiya NA et al conducted a study in 2014 to determine the ergonomic suitability of educational furniture in the lecture theaters of the university [22]. 240 students (120 females and 120 males) took part in the study. They highlighted that anthropometric dimensions of all students were different and hence mismatch with the furniture. They also found a significant difference in height of male and female students. Seat height and desk height were unsuitable for 80.4% and 74.2% students' respectively [22]. This study highlighted an important factor that can alter the posture of university students. As in our study, we also tried to highlight the posture of students by evaluating their shoulder levels. As the students adopt an awkward position during prolonged lectures, it gradually causes problems in posture. Most of the students in our study are right-handed. But left-handed students definitely need the chair and desk which suits them.

Shoulder level can also be affected by carrying bag on one side. Our study shows that majority of the students are right-handed, carry their bags on right shoulder and carry their books and folders with right forearm. The measurement showed that right shoulder was lower when compared to the other side in 45% students. Further studies can be done to assess the reason for dropped shoulders. A study by Linkenauger (2009) summarized that right-handed people assumed that their right arm is longer [25].

Griegel – Morris P et al (1992) conducted a study on incidence of postural abnormalities in two age groups of healthy individuals. The study concluded that forward head (66%), kyphosis (38%), right rounded shoulder (73%), and left rounded shoulder (66%) were present in both age groups. Hence, showed by a figure that right rounded shoulder, left rounded shoulder and the forward head were common in individuals of age group 20-35 years [8]. As we worked with shoulder levels, the above study was also identified the faulty posture of shoulders in young adults.

In another study, Hanvold TN et al (2010) focused on musculoskeletal pain and they found that most of the students had pain in their shoulders and upper trapezius [18]. In our study, students also reported of shoulder pain.

In our study, there was a weak, positive correlation between the perception of appearance and the assessment of shoulder tilt. This correlation showed that the perception of students about level of both shoulders was weakly associated with their actual assessment values, as 79% student's responded level shoulder, and 37% students had level shoulder upon measurement. The p-value also shows that it was not significant. Our study may help in finding shoulder drop in PT students, as they could know the difference between their perception and actual shoulder level. They can focus on their posture during classes and its correction.

Limitations and Recommendations

This study is limited to assessment of levels of shoulder only. Perception with assessment of other regions can be incorporated in upcoming studies. Furthermore, shoulder level assessment by radiological examinations and digital photographs can be considered. Associated factors (such as physical ergonomics of the class, lifestyle of students, extra-curricular activities and so forth) of uneven shoulders can be explored in future researches.

CONCLUSION

This study showed that perception of students about their shoulder level was not correlated with their actual levels. Since they were not assuming it to be uneven, they were not paying any attention to keep themselves straight.

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