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A Cross-Sectional Study for Screening of Postural Deficits among University Students

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ABSTRACT

Background: *Postural deviations are frequent in university students and may cause pain and functional impairment. Few studies have examined the association between body posture and intrinsic and extrinsic factors.* ***Objective:*** *To assess the prevalence of postural changes in university students, and to determine whether factors such as age, gender, BMI, and physical activity might explain these deviations, this study helping in preventing aggravation of postural deviations and providing the young adolescent students with exercises and help tips for correcting these problems.* ***Design:*** *Cross sectional study.* ***Subjects and Methods:*** *The posture of 48 students in Hail University was assessed by DIER formetric 4D. Their mean age was 20.35 ± 2.678, height was 185.56 ± 7.128 and weight was 54.19 ± 7.085.* ***Results:*** *results revealed positive correlation between height and weight, height and self-image, weight and surface rotation, self-image and pelvic tilting, kyphotic angle and lordotic angle, pelvic tilt and trunk imbalance, lateral deviation and trunk imbalance.* ***Conclusion:*** *high prevalence of abnormalities among students, so it is recommended that all instructors place more emphasis on training and using corrective actions in course one of general physical education. Furthermore, teaching the correct sleeping, sitting and carrying ways will stop high expenses and devoting long times for clinical remedies.*

Keywords: Postural deviation, University students

INTRODUCTION

Postural changes are prevalent problems in the adult population and commonly affect children and adolescents, although many authors have investigated the prevalence of postural deviations in adults, only few studies have examined the association between body posture and intrinsic and extrinsic factors [1].

Postural deviations assessed in epidemiological studies are usually anteroposterior changes (scoliotic attitude), dorsal kiphosis, and lumbar hyperlordosis [1-3].

Bad posture may be related to muscle and emotional issues, which could generate positional or structural deviations if the individual remains in inappropriate positions for a long time [4].

Among the main factors associated with postural changes and back pain in students, the following should be mentioned: gender (depending on the deviation to be assessed) [1-5] body composition, time spent watching television, and socioeconomic status [2].

Postural assessment is a complex procedure, because it takes into account many intrinsic and extrinsic factors that can affect individual´s posture, such as the environment, his/her social, cultural and emotional status, physical activity, obesity, physiological developmental disorders, sexual maturation, gender and heredity [6].

Detsch, et al. [7] have studied the association between the postural deviations and age, body mass index (BMI) and body postures adopted every day.

With this in mind, the purpose of the present study was to verify the prevalence of postural deviations in university students aged more than 20 years-old and its association w[ith the intrinsic and extrinsic factors.

MATERIALS AND METHODS

Subjects

Our study consists of 48 students in Hail University. Their mean age was 20.35 ± 2.678, mean height was 185.56 ± 7.128 and mean weight was 54.19 ± 7.085. Participant with history of any musculoskeletal problems, neurological abnormalities, ear problems, fracture and dislocation of the lumber vertebrae were excluded from the study.

Materials

Formetric 4D, technology for dynamic spine and posture analysis

It allows all analyses of for metric systems with reconstruction of the spine. The system is able to perform scanning sequences with automatic averaging, measurement sequences of up to one minute for posture analysis and functional studies with up to 10 images per second (Optional 24 images/sec.). The subjects stand at a distance of about 2 meters (6.5 ft.) in front of the height-adjustable 4D scanning device. The complete procedure only takes a few seconds. The results of the protocols of the analysis are available immediately after the measurement, the DIERS formetric can record measurement for spine and posture analysis.

Methods

Questionnaire about the activity level and life style used to assess the activity level

Before the measurement, the subjects were given questions about their activity levels and the pattern of their lives.

Measurement of posture made, but we used in our study just measurements for: (trunk imbalance VP-DM, pelvic tilt DL-DR, kyphotic angle ICT-ITL (max.), lordotic angle ITL-ILS (max.), surface rotation (max.), and lateral deviation VPDM (max.). These measurements were made By DIERS formetric 4D.

Data analysis

The Statistical Package for Social Sciences (SPSS ver. 18) was utilized for Statistical analysis of obtained data. Descriptive statistics were applied (e.g., frequency and percentage). The correlation between measured variables is tested using Pearson correlation coefficient.

RESULTS

Our results revealed the following findings represented by figures and tables as shown.

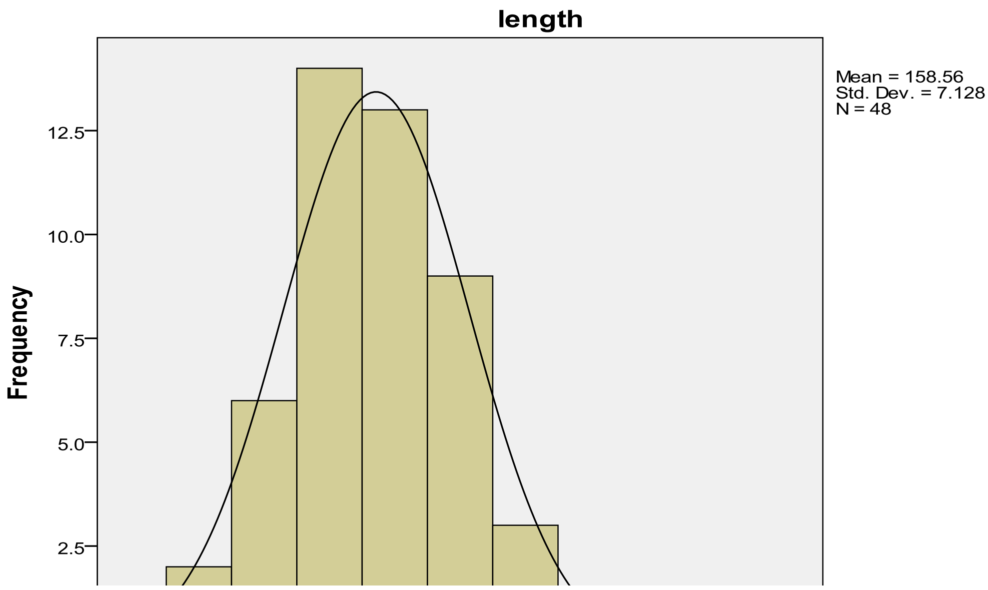

Figure 1 Frequency distribution of age

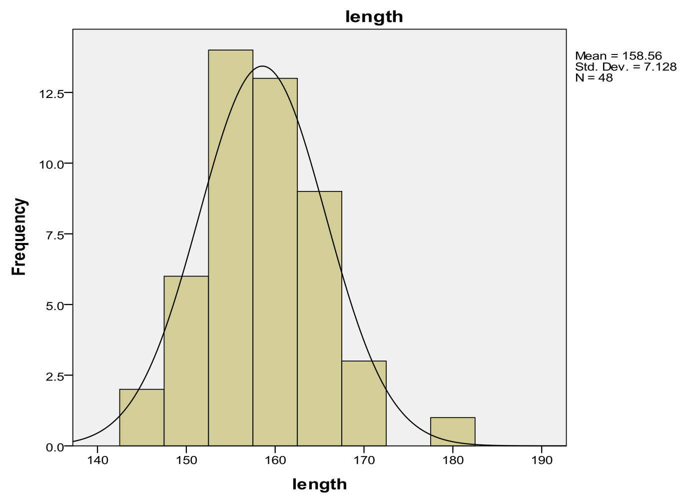

Figure 2 Frequency distribution of height

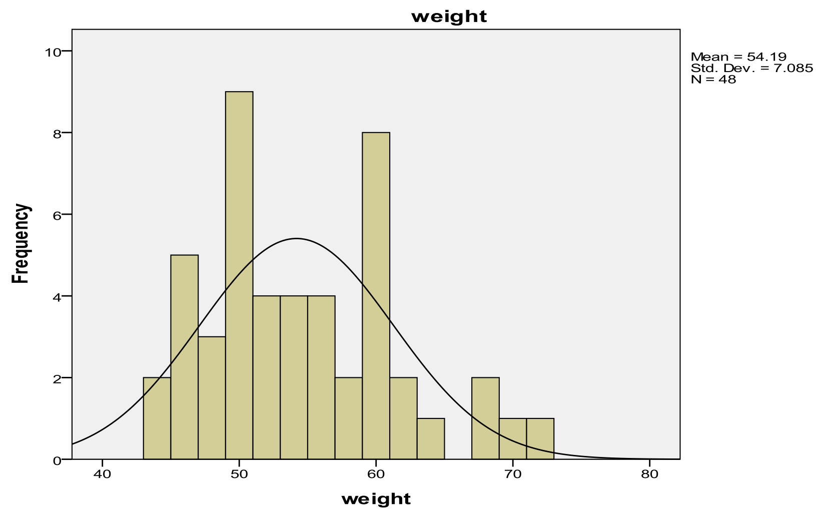

Figure 3 Frequency distribution of weight

Figure 4 Frequency distribution of self-image

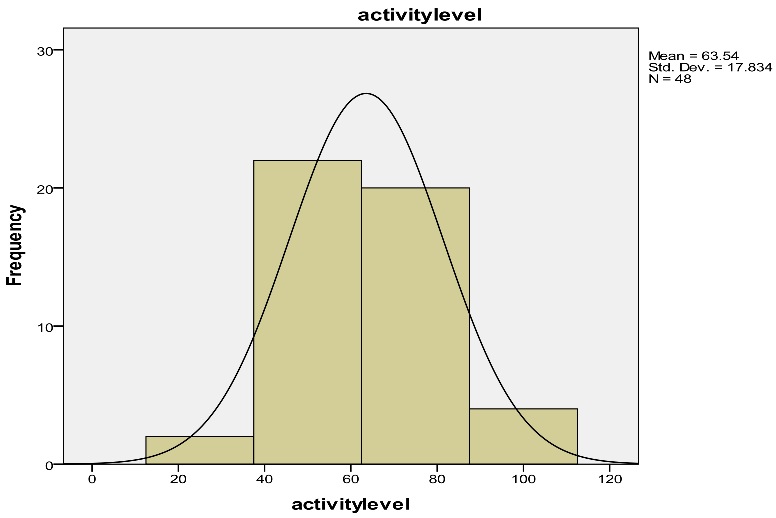

Figure 5 Frequency distribution of activity level

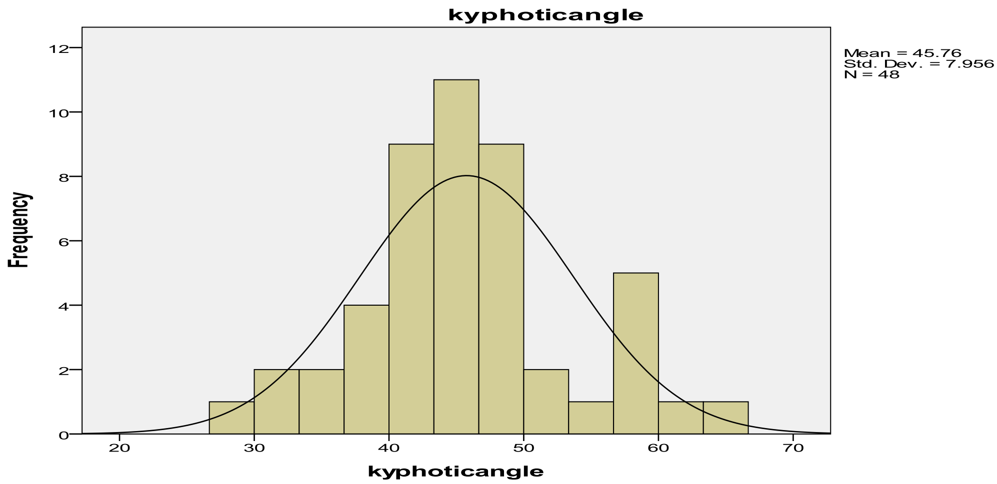

Figure 6 Frequency distribution of kyphotic angle

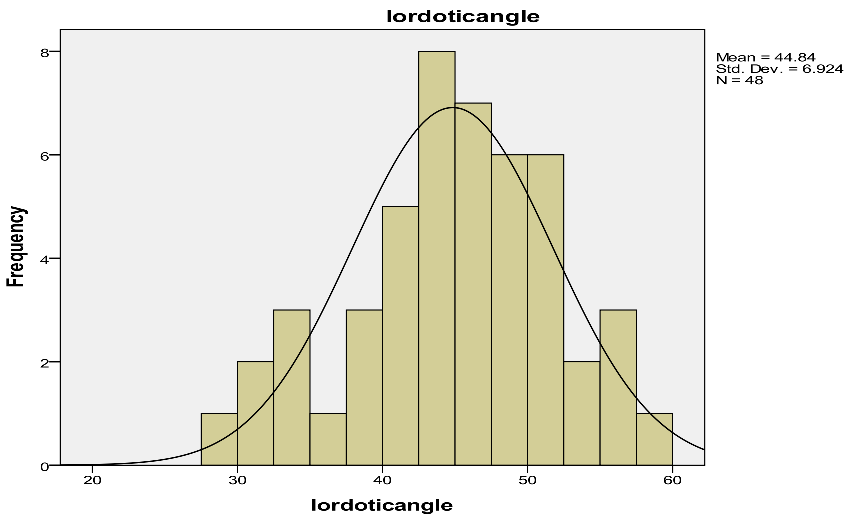

Figure 7 Frequency distribution of lordotic angle

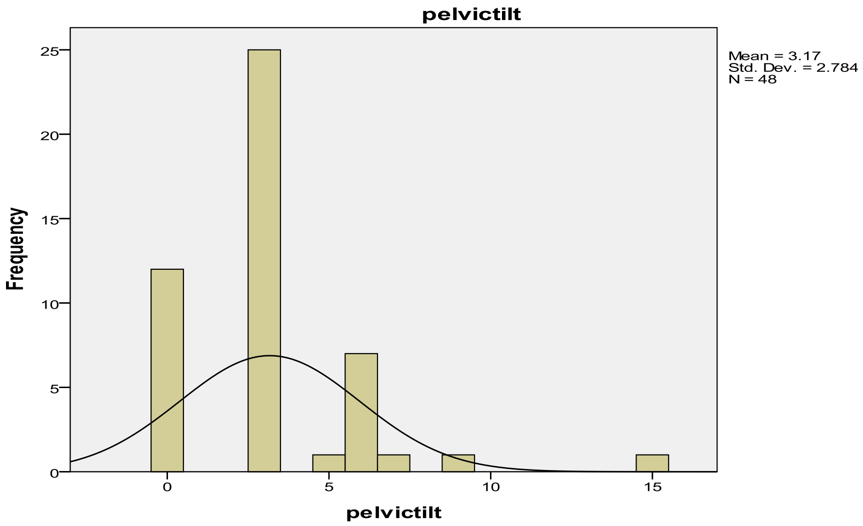

Figure 8 Frequency distribution of pelvic tilt

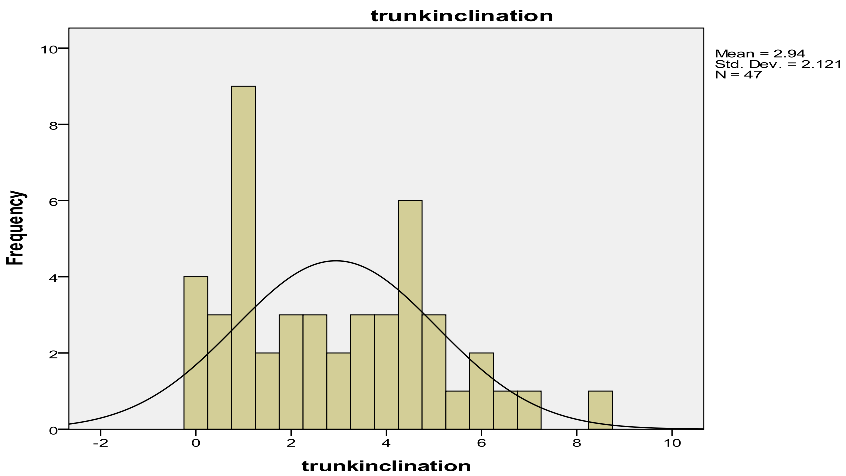

Figure 9 Frequency distribution of trunk inclination

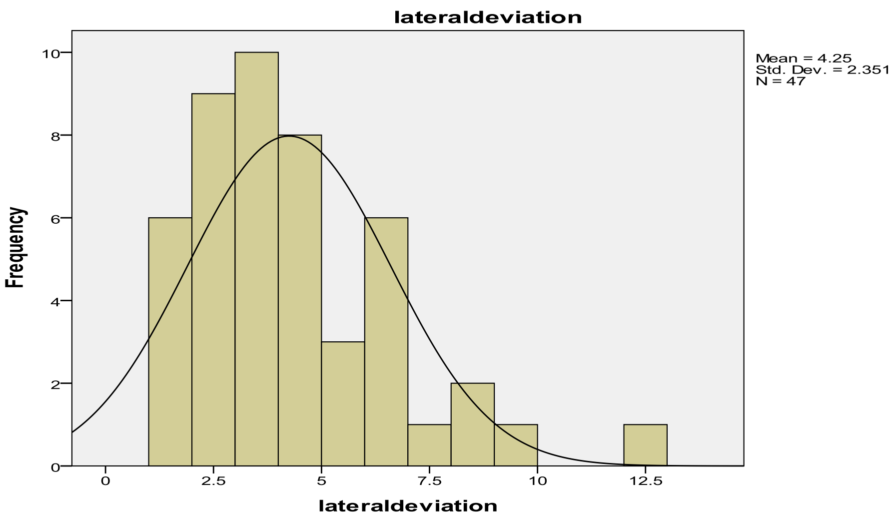

Figure 10 Frequency distribution of lateral deviation

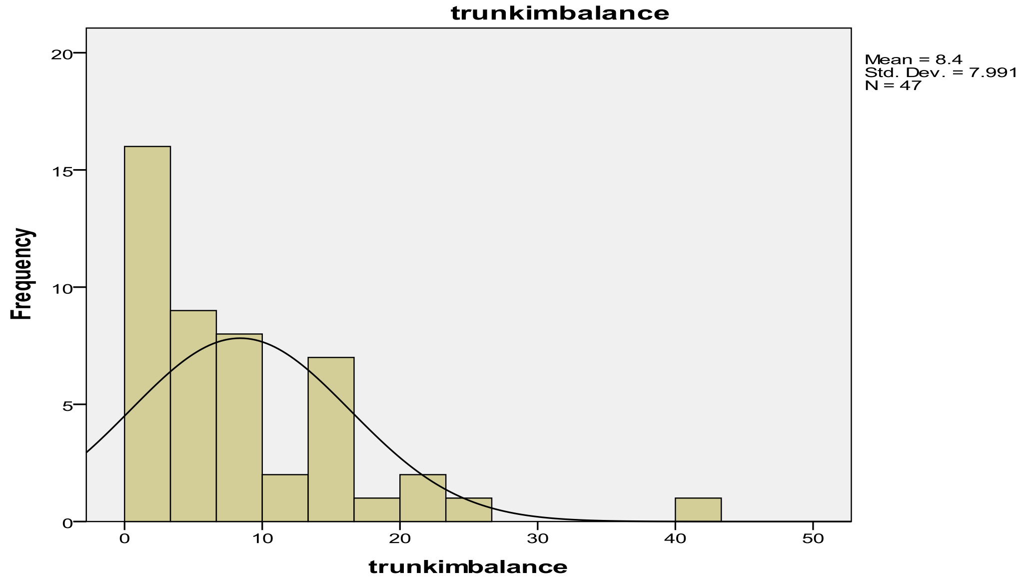

Figure 11 Frequency distribution of trunk imbalance

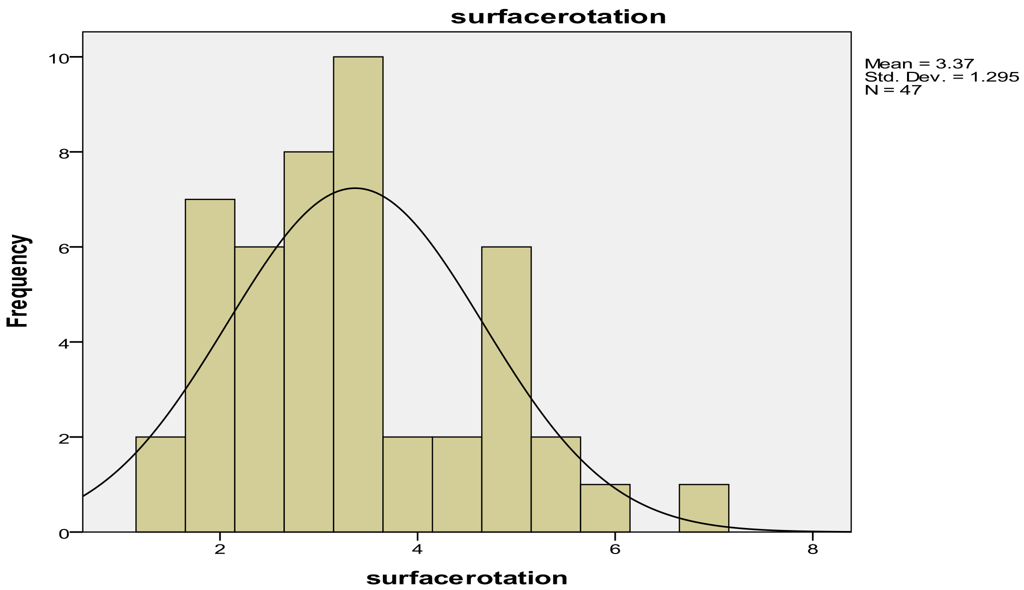

Figure 12 Frequency distribution of surface rotation

Figure 1 represents frequency distribution of age with mean of 20.35 ± 2.678, Figure 2 represents frequency distribution of height with mean of 185.56 ± 7.128, Figure 3 represents frequency distribution of weight with mean of 54.19 ± 7.085, Figure 4 represents frequency distribution of self-image with mean of 5.94 ± 2.168, Figure 5 represents frequency distribution of activity level with mean of 63.54 ± 17.834, Figure 6 represents frequency distribution of kyphotic angle with mean of 45.78 ± 7.956, Figure 7 represents frequency distribution of lordotic angle with mean of 44.84 ± 8.924, Figure 8 represents frequency distribution of pelvic tilt with mean of 3.17 ± 2.784, Figure 9 represents frequency distribution of trunk inclination with mean of 2.94 ± 2.121, Figure 10 represents frequency distribution of lateral deviation with mean of 4.25 ± 2.351, Figure 11 represents frequency distribution of trunk imbalance with mean of 8.4 ± 7.991, Figure 12 represents frequency distribution of surface rotation with mean of 3.37 ± 1.295.

Table 1 represents Pearson correlation between all parameters. It shows positive correlation between height and weight, height and self-image, weight and surface rotation, self-image and pelvic tilting, kyphotic angle and lordotic angle, pelvic tilt and trunk imbalance, lateral deviation and trunk imbalance.

Table 1 Pearson correlation between all parameters

Variables	Statistics	length	Weight	self-image	Activity level	Kyphotic angle	Lord tic angle	pelvic tilt	trunk inclination	lateral deviation	trunk imbalance	surface rotation
length	Pearson Correlation	1	0.586**	-0.303*	0.248	0.128	0.088	0.102	-0.252	-0.276	-0.19	-0.283
	Sig. (2-tailed)	-	0	0.036	0.089	0.386	0.552	0.489	0.087	0.061	0.201	0.054
	N	48	48	48	48	48	48	48	47	47	47	47
weight	Pearson Correlation	0.586**	1	-0.2	0.03	0.009	0.167	0.152	-0.091	-0.283	0.053	-0.301*
	Sig. (2-tailed)	0	-	0.173	0.84	0.953	0.258	0.302	0.542	0.054	0.724	0.04
	N	48	48	48	48	48	48	48	47	47	47	47
self-image	Pearson Correlation	-0.303*	-0.2	1	0.201	-0.033	-0.219	-0.344*	0.082	-0.054	-0.052	0.096
	Sig. (2-tailed)	0.036	0.173	-	0.17	0.823	0.134	0.017	0.582	0.717	0.729	0.519
	N	48	48	48	48	48	48	48	47	47	47	47
activity level	Pearson Correlation	0.248	0.03	0.201	1	-0.121	-0.054	0.104	-0.14	-0.161	0.159	-0.236
	Sig. (2-tailed)	0.089	0.84	0.17	-	0.412	0.713	0.484	0.347	0.28	0.285	0.111
	N	48	48	48	48	48	48	48	47	47	47	47
Kyphotic angle	Pearson Correlation	0.128	0.009	-0.033	-0.121	1	0.286*	0.054	0.083	-0.026	-0.172	-0.021
	Sig. (2-tailed)	0.386	0.953	0.823	0.412	-	0.049	0.714	0.578	0.862	0.247	0.888
	N	48	48	48	48	48	48	48	47	47	47	47
Lordotic angle	Pearson Correlation	0.088	0.167	-0.219	-0.054	0.286*	1	0.274	-0.064	0.072	0.014	-0.22
	Sig. (2-tailed)	0.552	0.258	0.134	0.713	0.049	-	0.059	0.67	0.629	0.923	0.138
	N	48	48	48	48	48	48	48	47	47	47	47
pelvic tilt	Pearson Correlation	0.102	0.152	-0.344*	0.104	0.054	0.274	1	0.031	0.086	0.389**	-0.092
	Sig. (2-tailed)	0.489	0.302	0.017	0.484	0.714	0.059	-	0.838	0.566	0.007	0.541
	N	48	48	48	48	48	48	48	47	47	47	47
trunk inclination	Pearson Correlation	-0.252	-0.091	0.082	-0.14	0.083	-0.064	0.031	1	0.038	-0.015	-0.093
	Sig. (2-tailed)	0.087	0.542	0.582	0.347	0.578	0.67	0.838	-	0.8	0.919	0.534
	N	47	47	47	47	47	47	47	47	47	47	47
lateral deviation	Pearson Correlation	-0.276	-0.283	-0.054	-0.161	-0.026	0.072	0.086	0.038	1	0.308*	0.411**
	Sig. (2-tailed)	0.061	0.054	0.717	0.28	0.862	0.629	0.566	0.8	-	0.035	0.004
	N	47	47	47	47	47	47	47	47	47	47	47
trunk imbalance	Pearson Correlation	-0.19	0.053	-0.052	0.159	-0.172	0.014	0.389**	-0.015	0.308*	1	-0.01
	Sig. (2-tailed)	0.201	0.724	0.729	0.285	0.247	0.923	0.007	0.919	0.035	-	0.948
	N	47	47	47	47	47	47	47	47	47	47	47

surface rotation	Pearson Correlation	-0.283	-0.301*	0.096	-0.236	-0.021	-0.22	-0.092	-0.093	0.411**	-0.01	1
	Sig. (2-tailed)	0.054	0.04	0.519	0.111	0.888	0.138	0.541	0.534	0.004	0.948	-
	N	47	47	47	47	47	47	47	47	47	47	47
*Correlation is significant at the 0.01 level (2-tailed); **Correlation is significant at the 0.05 level (2-tailed)												

DISCUSSION

Posture is the attitude, which is assumed by body segments in relation to each other to maintain balance with less effort and less strain during performing certain activity. Posture is an indication of muscular and skeletal balance, which protects the supporting structures of the body against injury and progressive deformity. It can be maintained by adjusting the position of the head and limbs in relation to the trunk [8]. A good posture distributes force through our body with minimum muscular effort, so that no one structure is overstressed. The nervous system, muscles, bones, and ligaments work together to exert postural control [9].

Spinal deformities may be due to poor postural habits/environments such as excessive sitting, frequently carrying heavy loads, computer/desk work, poor sleeping positions, and one-sided activities such as carrying a heavy bag, or sitting in a twisted position [9].

This study qualitatively identified the postural deviations that occur more frequently among university students in Hail University. In this study, we tried to correlate angles measured by formetric device in its assessment of posture with some anthropometric measures, psychological issues and some life style habits.

One of the findings of our research is that there is positive correlation between height and self-image which represent increased self-confidence with increasing height, and this is consistent with who reported increased self-image with increased height. Weight and surface rotation shown to be correlated in this study and this reflects effect of weight on spinal curvatures.

Self-image shown to be correlated with pelvic tilting and this reflects effect of self-image as a psychological determent on certain posture characteristics.

Kyphotic and lordotic angles shown to be correlated and this occurs as a normal compensatory mechanism to prevent losing balance or affecting visual field because of postural deviations so the person with increased kyphotic curve will compensate this increase by increasing lordotic curve in the opposite direction to maintain balance and visual field. This finding comes in agreement with who suggested deformation coupling of the back.

Pelvic tilt and lateral deviation was correlated with trunk imbalance and this occurs as a normal compensatory mechanism as mentioned with lordotic and kyphotic angles and this comes in agreement with described the gravitational line to remain fairly constant with age, however, the degree of thoracic kyphosis associated with age would shift the plumb line anteriorly with a compensatory retroversion of the pelvis increasing the pelvic tilt to keep the gravitational line constant and maintain adequate sagittal balance [10].

A number of researches have examined the relationship between position of the pelvis and alignment of the Spine. It is important to understand this relationship in normal subjects such that proper diagnostic evaluation and optimal treatment approaches for spinal deformity can be pursued. Poor integration of the spinopelvic relationship can lead to suboptimal outcome and iatrogenic pathology [11-15].

CONCLUSION

Study indicate that positive correlation between height and weight, height and self-image, weight and surface rotation, self-image and pelvic tilting, kyphotic angle and lordotic angle, pelvic tilt and trunk imbalance, lateral deviation and trunk imbalance. Because of high prevalence of abnormalities among students, it is recommended that all instructors place more emphasis on training and using corrective actions in course one of general physical education. Furthermore, teaching the correct sleeping, walking, sitting and carrying ways will stop high expenses and devoting long times for clinical remedies.

Limitations

- Refusal of some students to make postural assessment because of social and cultural factors.
- Despite its limitations, this study offers some preliminary data on postural deviations in university students in Hail University from an area particularly known for its social habits.

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