Evaluation of Body Mechanics of Top Class Bahraini Soccer Players

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ABSTRACT

Forty-three top-class Bahraini football players and fifty randomly selected male Bahraini university students were studied to investigate the occurrence of postural deviations specific to football. The standing posture of the subjects was measured utilising the Skan-a-graph posture test and the New York State Posture Rating test from photographs and in vivo. The comparison between active players and the control group revealed no significant difference between the two groups. The results of these data suggest that a longitudinal study is necessary to establish both the cause and the time when postural deformities appear during the growth period of the long bones.

Evaluative studies of human posture are a common practice in current research in biomechanical analysis. A survey of selected studies revealed the following interesting results. Moriarity and Irwin[1] reported a significant relationship between poor posture and certain physical and emotional factors that included; selfconciousness, fidgeting, restlessness, timidity, fatigue, underweight condition, disease, heart defects, hearing problems and asthma. Cyriax[2] reported that a poor dorso-cervical posture which induces cardiac impairment may cause sudden heart failure, angina and functional heart troubles. However, Alden and Top [3] did not find significant relationships between posture and the factors of weight, vital capacity and intelligence.

Coppock[4] reported that tightness of the pectoral muscles did not correlate significantly with round shoulders. Fox [5] found that faulty pelvic tilt was not associated with any appreciable weakness in the abdominal muscles, nor was swayback related to weak abdominal musculature. Flint [6] did not find a significant relationship between lordosis and strength of the abdominal muscles or back extensors, or between lordosis and hip/trunk flexibility. While in the study by Flint and Diehl [7], they found that the trunk strength balance, abdominal strength and back extensor strength all were significantly related to antero-posterior alignment. The findings of Hutchins[8] study support Flint and Diehl's results. She found that the balance of strength between trunk flexor and trunk extensor muscles and other muscle groups was an important factor in antero-posterior alignment.

In studies of children that investigated the postural development, Maple[9] concluded that the head is not held completely errect until the age of six or seven years, that the scapulae do not lie flat until after ten years of age, and that the sacral angle increases markedly from three to six or seven years. Anderson[10] found that more than 90% of high school subjects had postural deviations.

The results of a study by DiGiavanna[11] revealed a relationship between athletic achievement and posture. Conversely, Davies[12] found that weak relationships exist between motor ability and Judge's ratings of postural divergencies. However, the literature reviewed did not reveal studies that were concerned with postural deviation in a specific sport activity, although the nature of the sport may cause a postural deviation[13].

It is the purpose of this study to investigate if there are postural deviations among soccer players.

METHODS

Top class Bahraini soccer players were randomly selected as a sample for the present study. Forty-three players completed the measuring protocol. Characteristics of the sample are listed in Table I.

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The standing posture of every subject was examined by Skan-a-graph posture test (App. 1) and the New York State Posture Rating Test. The measurements were obtained from two planes of photographs and in vivo. The position of subjects to compare these measurements is presented in Figure 1. The same techniques were used to measure a control group (n=50) of a similar age and body size, selected randomly from students at the University College of Bahrain (Table 1).

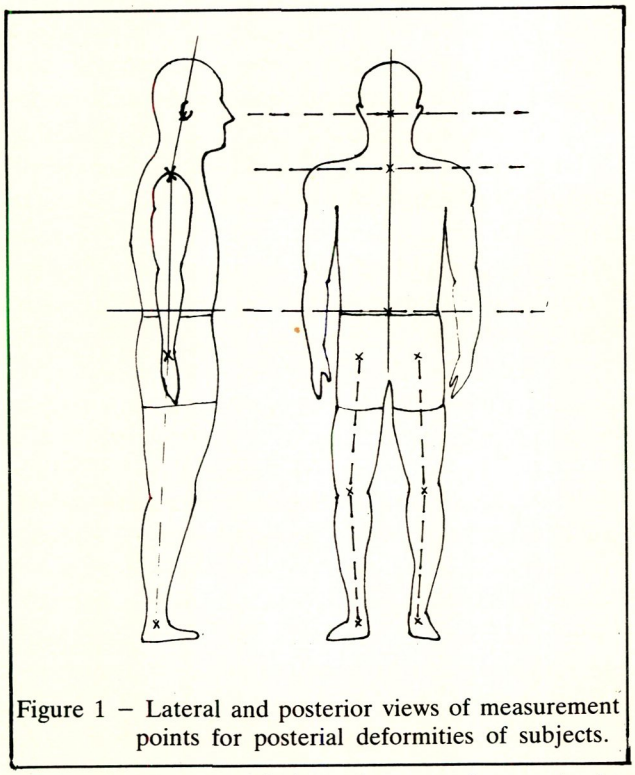

Figure 1 – Lateral and posterior views of measurement points for posterial deformities of subjects.

The percentages of the existence of every body defect were calculated to indicate the common posture defects of the studied samples.

TABLE 1
Basic Characteristics of the Sample

		Players		Control Group	
		$\bar{X}$	SD	$\bar{X}$	SD
Height	(CM)	169.0	5.21	168.5	4.32
Weight	(KG)	65.5	4.32	66.2	5.50
Age	(Years)	22.3	5.20	22.6	1.20
Training Age		11.4	2.60	00.0	0.00

$\bar{X}$ = *Population mean* *SD* = *Standard deviation*

RESULTS AND DISCUSSION

There is an agreement among several authors about the general indicators of good standing posture [14,15,16,17,18,19]. The indicators agreed upon are based upon the location of body landmarks with respect to the line of gravity.

In the errect posture the line of gravity should run through (a) the mastoid process (in front of the atlanto-occipital articulation) through (b) a point just in front of the shoulder joint descending through (c) to hip joint to (d) a point just in front of the centre of the knee joint, and ending at (e) a point 3-7cms in front of the ankle joint.

Regarding the frontal plane, the New York Posture Evaluative Chart takes into account the horizontal alignment of the body landmarks which should be perpendicular with the vertical axis. The application of these landmarks are presented in Table II, which show that the subjects were free from the majority of the postural defects. This may be due to the healthy muscles they have developed through practice which have a significant role in maintaining good posture.

The subjects were compared with a control group of similar age and physique. No significant difference was found between the two groups ($P< 0.05$), Table II. However, this finding does not eliminate the possibility that these postural defects are not a result of long-term soccer football participation. It would be necessary to investigate the possibility of these defects being sport induced through a longitudinal study that would commence with subjects at an age where long bone growth was still a critical factor.

The existence of these defects may be interpreted in two ways. First, the player may have had a defect before his participation in the activity and still have the defect after a considerable time which suggests that there is not always a remedial effect from physical activity for these types of deformities. Secondly, the defect may simply be caused by practising soccer skills for a number of years.

TABLE II
Percentage of Deformities

Deformity	Soccer Players %	Soccer Players Sx	Control Group %	Control Group Sx	Z
Twisted head	0.0	0.0	0.0	0.0	0.0
Chin out	2.22	2.20	10.0	4.24	−1.570
Round shoulders	4.44	3.07	5.0	3.08	−1.034
Low shoulder	0.0	0.0	0.0	0.0	0.0
Kyphosis	6.67	3.72	8.0	3.84	−1.410
Lordosis	33.33	7.03	40.0	6.93	−0.673
Scoliosis	0.0	0.0	0.0	0.0	0.0
Tilted pelvis	0.0	0.0	0.0	0.0	0.0
Low hip	0.0	0.0	0.0	0.0	0.0
Bow legs	40.0	7.30	35.0	6.75	0.503
Knock knees	0.0	0.0	1.0	1.41	0.0
Pronated foot	35.55	7.14	30.0	6.48	0.577
Flat foot	2.22	2.20	3.0	2.41	−0.915

Sx = Standard error of the mean Z = Z score

The side-loads encountered when executing a tackling movement generates bending moments on the knee joint which may lead to bow legs. Lordosis may be attributed to the preparatory phase in shooting which involves hyperextension in the low back area. While the occurrence of pronated feet may result from the side step shooting and passing. Additionally, Lowman[20] found that postural deviations are often a primary source of injuries caused by either unilateral asymmetries, bone anomalies, abnormal bone alignments, or poor mechanics of movement. When possible, the trainer should seek to eliminate bad postural conditions through therapy, working under the direction of qualified medical personnel. Remedial work of this type can complement the training programme and, in most instances, may assist in maintaining sufficient bilateral development to minimise the more obvious undesirable effects of intensive unilateral development.

CONCLUSION

It is not possible to conclude whether the cause of these defects is a congenital or acquired defect, or was caused by the physical demands of the activity as there was no significant difference between the two groups. These findings suggest that a longitudinal study of these problems is required, using randomly selected younger subjects.

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