IMPACT OF CERTAIN ELEMENTS OF HANDBALL TECHNIQUE ON THE OCCURRENCE OF SCOLIOSIS IN FEMALE HANDBALL PLAYERS

Luka Posavac, Sanja Mišura, Stanislav Dragutinović and Ivana Čerkez Zovko

Abstract: Handball game is characterized by dynamism and mobility, with constant and fast changes in body position and technique elements. The asymmetric shape of burden in addition to high number of jumps and landings on hard surfaces effects adversely the loco motor system. Sudden growth in adolescent growth and inability of musculoskeletal system to support these sudden changes leads to improper body postures (scoliosis, kyphosis, lordosis). The aim of this research is to determine whether certain elements of handball play, basic passing from the shoulder, basic kicks from ground, kicks from jump of the same leg, kicks of the step next to body, kick with deflection, kick from the jump and running the ball, affect occurrence of scoliosis in female handball players of HŠRK Zrinjski. The results of this research on 20 respondents shows that six of them (30%) are with normal body posture (mostly respondents aged 2009. active in handball for one year). Left-side scoliotic posture is determined in three respondents (15%), of whom all respondents with dominant left hand. Right-hand scoliotic posture is determined in 11 respondents (55%) of whom all respondents are with dominant right hand.

Keywords: handball, scoliosis, improper posture

INTRODUCION

Handball game is characterized by dynamism and mobility, with constant and fast changes in body position and technique elements. Handball is a sport of complex polystructural movements in which there is a whole range of different movements (step, cross step...), jumps (in smash, block, shout...), throws and falls (dive, roll..), sprints, static endurance in a pose, kicks (Janković, Marelić & Janković, 2003). Due to a certain characteristics of handball as a sport (parts of techniques asym-metric due to one hand play), there is a reasonable suspicion that handball players are exposed to fac-tors that can cause development of posture deformities.

The asymmetric shape of burden in addition to high number of jumps and landings on hard surfaces effects adversely the loco motor system. Sudden growth in adolescent growth and inability of muscu-loskeletal system to support these sudden changes leads to improper body postures (scoliosis, kyphosis, lordosis). Because improper body posture can take various forms which have been defined by various authors as body posture types (Aagaard& Jørgensen, 1996.

Scoliosis, as diagnosis, is very often used in chil-dren today even in situations where there is no medical basis for it. Namely, if a child has asymmetric position of shoulder, shoulder blades or pelvic denivelation, that is not necessarily a sign of scoliosis. More often that are signs of poor posture and they occur as a results of preferring one side of body (especially seen in children in handball, but other sports as well). In order to define poor posture as scoliosis there must be specific curvature of the spine. This can be visible in vertical position, and especially visible in inclination movements when specifically elevated rib arches (gibus) are visible on one side of the back and the spine itself has line of convexity in one (side of elevated rib arches) and concavity to the other side. Then the degree of scoliosis can be accurately determined with scoliometer.

The subject of this work are certain elements of handball technique (basic passing from the shoul-der, basic kicks from the ground, kicks from step of the same leg, kicks from steps next to the body, kick with deflection, kick from a jump and running the ball).

The problem are certain elements of handball technique that can negatively affect body posture due to occurrence of muscle imbalance, because some muscle groups and topographic regions of body are not equally active and can affect the development of different types of poor posture.

The aim of this research is to determine whether certain elements of handball play, basic passing from the shoulder, basic kicks from ground, kicks from jump of the same leg, kicks of the step next to body, kick with deflection, kick from the jump and running the ball, affect occurrence of scoliosis in female handball players.

METHODS

The research is conducted on the sample of fe-male players training in the HŽRK Zrinjski (players who passed all selections in this club and are just starting from mini handball). Female handball play-ers aged 11-24 (20 in total) are tested by the Adam's forward bend test and morphological dimen-sions (arm length and dominant arm).

We used scoliometer to determine functional sco-liosis (lumbar and thoracic), and for morphological characteristics centimetre tape is used.

Adam's forward bend test: the subject comes in forward bend from standing position, chin is on the chest, palms folded, arms extended in elbows, scoliometer is placed on the top of vertebra (for

thoracic in thoracic part, for lumbar in lumbar part of the back), expressed in degrees.
Arm length: measured in standing position from the acromion point (processus acrominalis) to the top of the longest finger (daktylion point), expressed in centimetres (cm).

RESULTS

This chapter presents results of the research work. Results are obtained based on research conducted among female members of the HŽRK Zrinjski Mostar and data obtained by statistical processing.
Of the 20 respondents, six (30%) are with a normal body posture (mostly respondents aged 2009. active in handball for one year). Left-side scoliotic posture is determined in three respondents (15%), of whom all respondents with dominant left hand. Right-hand scoliotic posture is determined in 11 respondents (55%) of whom all respondents are with dominant right hand.

Table 1. Comparison of respondents' posture

RESPONDENTS	DOMINANT ARM	LEFT-SIDE POSTURE	RIGHT-SIDE POSTURE	NORMAL POSTURE
1996	Right		Yes	
1997	Right		Yes	
1997	Left	Yes		
2002	Right		Yes	
2002	Right		Yes	
2004	Right		Yes	
2004	Right		Yes	
2004	Right			Yes
2004	Right		Yes	
2005	Left	Yes		
2006	Right		Yes	
2006	Right		Yes	
2006	Right		Yes	
2006	Right			Yes
2006	Right		Yes	
2009	Right			Yes
2009	Left	Yes		
2009	Right			Yes
2009	Right			Yes
2009	Right			Yes

Of the 17 respondents with dominant right hand, 11 respondents have right-side scoliotic posture (64,7%) while the other six have normal scoliotic body posture (35,2%). All 20 respondents does not have the same length of left and right arm.

Table 2. Comparison of respondents' arm length

RESPONDENTS	LEFT ARM LENGTH	RIGHT ARM LENGTH
1996	75	77
1997	77	78
1997	76	75,5
2002	75,5	77
2002	72,5	72,5
2004	68	70
2004	71	68
2004	75	78
2004	76,5	75
2005	72	71
2006	72	73
2006	70	70,5
2006	69	68,5
2006	70	72,5
2006	70,5	70,5
2009	64	65
2009	56	55
2009	58,5	59
2009	57	58,5
2009	70,5	70,5

The dominant arm affects occurrence of thoracic (-0,57) and lumbar scoliosis (0,56). This was proved by regression analysis which is Multiple R=0,71. Error is p=0,002 meaning result is statistically significant.

Regarding the correlation between number of respondents and year of their training with lumbar and thoracic scoliosis, the results are as follows:

- correlation between respondents and thoracic scoliosis is -0,32, meaning there is statistical correlation between variables (p=0,5)
- correlation between respondents and lumbar scoliosis is -0,47, meaning there is statistical correlation between variables (p=0,5)
- year of training are statistically correlated with thoracic scoliosis (0,21) and lumbar scoliosis (0,41). This confirms error of p=0,5.

Table 3. Correlation of respondents with type of scoliosis

	THORACIC SCOLIOSIS	LUMBAR SCOLIOSIS
RESPONDENTS	-0,32	-0,47
YEAR OF TRANING	0,21	0,41

DISCUSSION

The research is conducted among all female handball players of the HŽRK Zrinjski aged 11-24. This condition is satisfied by 20 female players who participated in the assessment of body posture in the frontal plane. It is proved that right-side sociliot-ic posture prevails in 55% of players. 30% of play-ers has normal posture and 15% left-side scoliotic posture. The obtained difference is statistically significant. Respondents with dominant right hand more often had right-side scoliotic posture in regard to respondents with dominant left hand (Multiple R=0,71; p=0,002). In the general population al-most 90% of people are right-handed (Incel et al., 2002). Goldberg et al. (1990) found in right-handed correlation between use of a hand and prevalence of right-side thoracic curvature in adolescent idio-pathic scoliosis. But, this correlation was not corre-lated in left-handed children. It is determined that the direction of spine curvature in this group is ran-domly distributed.

Hans-Gerd Pieper (1998) proved that sport specific by certain one-side exertion for upper extremity, during growth can lead to changes of soft tissues and bones. The research conducted on professional tennis players showed hypertrophy of upper arm bone on X-rays on the dominant arm ie. the one that is more active in sport. The difference in cortical bone thickness of dominant and non-dominant arm is response on exercise and increased physical effort (Jones et al., 1977). The obtained difference is statistically significant.

A statistically significant difference in hand length regarding dominant arm was found in respondents with right-side scoliotic posture. Catching the ball with one hand in handball players certainly contrib-utes to this result , which affects the difference in the length of hand, especially fingers. It is proved that athletes with dominant right arm have longer right arm, longer hand and lager upper arm circumference compared to the left. All differences are also confirmed as statistically significant for left-handed athletes. Results of other researches also confirm the obtained results. Milvi and Toivo (2007) found that in handball longer fingers are correlated with more precise shots and throws. Every shot and throw is finishing with the movement of wrist and fingers. Athletes with longer fingers and larger palm are likely to have greater grip.

CONCLUSION

The main goal of the research is to determine frequency of irregularity in body posture in young female handball players. It was necessary to as-sess which type of body posture prevail in female handball players to solve possible impact of hand-ball and bilateral differences on disturbances in stato-dynamic connections in loco motor system.

In this research, scoliotic body posture was found in 70% players, 55% has right-side scoliotic posture, 15% left-side scoliotic posture, and 30% pf them has normal body posture. Female players are 80% right-handed and 20% left-handed. Assessing bilateral differences between extremities, it was found that right-handed have longer right arm which is also true for female athletes with dominant left arm. A significant prevention of right-handed with right-side scoliotic posture was determined.

The obtained results assumes that handball, in addition to positive effects on improper body posture, can have negative effect due to possible oc-currence of muscle imbalance since certain muscle groups and topographic body regions are not equally active and may affect the development of different types of improper body posture. All this sup-ports the fact that number of respondents with scoliotic posture increases with years of training (p=0,5). If we compare results of this research with results of some previous researches, it can be said that a similar contribution of certain measures and assessments of body posture was made. Results of this research on the sample of 20 female handball players show existence of certain improper body postures. It can be assumed that problem of im-proper body postures in handball players is corre-lated to regular sports.

In order to prevent on time occurrence of deform-ities of athletes' bodies, coaches are obliged to engage competent person for this and follow his/her instructions. Each training should have mo-bility exercises, muscle stretching, extensor and abdominal muscle strengthening and breathing exercises. Exercises can be performed in different positions: on the stomach, on the hip, on the back, in standing position, sitting position. To strengthen a muscle, exercises can be performed with own body load or with some aids that can help to strengthen muscle. If a body deformity occurred in athletes, then exercises should be adapted to an athlete. Exercises for scolios include different symmetrical exercises that establish proper posture reflex to strengthen abdominal and back muscles and increase spine stability, and asymmetrical ex-ercises to mobilize spine, stretch shortened muscles of concave side and strengthen muscles of pulled convex side. Physical therapy also include general fitness exercises that indirectly affects the convecture. Training should be adapted to the age of ath-lete with the emphasize on general physical prepa-ration and not just specifics of the sport.

REFERENCES

1. Janković, V., Marelić, N., & Janković, G. (2003). Suvremeni model metodike treninga odbojke u školskom sportu. 12. ljetna škola kineziologa Republike Hrvatske: zbornik radova /Delija, Krešimir (ur.). Zagreb: Hrvatski kineziološki savez, str. 147-150

2. Aagaard, H., & Jørgensen, U. (1996). Injuries in elite volleyball. Scandinavian journal of medicine & science in sports, 6(4), 228-232.

3. Incel, N. A., Ceceli, E., Durukan, P. B., Er-dem, H. R., & Yorgancioglu, Z. R. (2002). Grip strength: effect of hand dominance. Singapore medical journal, 43(5), 234-237.

4. Goldberg, C., & Dowling, F. E. (1990). Handedness and scoliosis convexity: a re-appraisal. Spine, 15(2), 61-64.

5. Pieper, H. G. (1998). Humeral torsion in the throwing arm of handball players. The American journal of sports medicine, 26(2), 247-253.

6. Jones, H. H., Priest, J. D., Hayes, W. C., Tichenor, C. C., & Nagel, D. A. (1977). Humeral hypertrophy in response to exercise. J Bone Joint Surg Am, 59(2), 204-8.

7. Visnapuu, M., & Jürimäe, T. (2007). Hand-grip strength and hand dimensions in young handball and basketball players. Journal of strength and conditioning re-search, 21(3), 923.

Corresponding author:

Luka Posavac
Faculty of Science and Education, University of Mostar
e-mail: luka.posavac@fpmoz.sum.ba