

THE FEET STATUS OF THE SERBIAN FEMALE HANDBALL NATIONAL TEAM

(Research note)

Dejan Ilić, Zoran Valdevit, Saša Đurić

*University of Belgrade, the Faculty of Sports and Physical Education,
Belgrade, Serbia*

Abstract

To preserve good postural status within the contemporary way of life that assumes lack of physical activity, presents a very big challenge. Handball is the sports game with positive effects on correct body development, because of its equally distributed impact on all big muscle groups. So far, research has shown that a big number of children have certain postural disorders. According to statistics, disturbed body status is obvious mostly in the form of deformities of the spine and deformities of the feet. Flat feet recur in children of the youngest age. These disorders are, for the most part, caused by our modern lifestyle which contributes to insufficiently developed musculature in children. The goal of this research was to detect the frequency of fallen arches of the foot status in female handball players up to 20 years of age, from the Serbian junior female national team. The sample included 17 female handball players and the research results indicate that quite a big number of players have disturbed arches.

Keywords: *normal feet, flat feet, preventing feet, feet correction, hypokinesia, physical activity, body height, body weight, plantography, female handball, Thompson method*

INTRODUCTION

It was easy to notice ever since the first archeological discoveries, that human beings had the need for movement and action. Today's way of life reduces our movements to a minimum. Even though it is impossible to change the direction in which the civilization is going, but still it is possible, certainly, to influence human awareness about the efficiency of physical exercise and movement.

If we analyze the conditions and way of life that make the environment within which today children are growing up, it is not difficult to conclude that hypokinesia is the most important factor influencing the incorrect development of the body. Prolonged recumbence and poor physical activity, or none at all, result in low muscle tonus, poor flexibility of joints and low ligament elasticity.

Due to all stated above, it is necessary that children are involved in one of the many types of physical activity for preventive reasons, and also for corrective reasons when needed so. The handball, our subject matter of interest, is most certainly one very important form of physical activity. It can help to accomplish a comprehensive development and improvement of the en-

tire anthropologic potential in children, and above all, through development of a broad spectrum of motor and functional capabilities, to contribute toward a harmonious and correct development of the body, improvement of mental capabilities, and inducement of positive emotions and social adaptation.

Flat feet are the most common deformity of lower limbs, characterized by the loss (fall) of their physiological arches.

METHODS

The sample of respondents included 17 girls from the national junior female handball team of Serbia, as depicted in the following table:

The status of the feet was appraised by the method of plantography. Plantograms were interpreted using the Thomson's methodology and the methodology of the Russian authors.

The Thomson's methodology was conducted in the following manner: from the center of the heel, accurately determined on the plantogram, straight line was drawn towards the lateral edge of the third toe. This line represents the border line between a normal and a flattened arch, and is called Mayer's line. If the footprint

Table 1. Sample of Respondents

Name and surname	Date of birth	Body height	Body mass	Years playing	Position	Dominant hand
S.F.	JAN. 12, 1992	176 cm	61kgs	9 years	Backcourt	Right
T. G.	SEPT. 6, 1992	173 cm	74kgs	13 years	Backcourt	Right
J.S.	NOV. 25, 1993.	191 cm	82kgs	6 years	Backcourt	Right
M.A.	AUG. 9, 1995	178 cm	75kgs	8 years	Backcourt	Left
M.T.	FEB. 6, 1993	165 cm	58kgs	8 years	Backcourt	Right
N.R.	FEB. 23, 1992	176 cm	81kgs	12 years	Backcourt	Right
I.P.	FEB. 4, 1992	169 cm	64kgs	8 years	Backcourt	Right
A.J.	MAY 18, 1995	181 cm	69kgs	6 years	Backcourt	Left
J.M.	DEC. 4, 1992	180 cm	70kgs	10 years	Backcourt	Left
I.P.	JUN. 2, 1993	170 cm	65kgs	6 years	Wingmen	Right
S.R.	JAN. 15, 1994	172 cm	62kgs	10 years	Wingmen	Right
B.G.	APR. 7, 1995	167 cm	59kgs	4 years	Wingmen	Left
M.P.	MAR. 18, 1994	187 cm	92kgs	5 years	Pivot	Right
N.V.	JUL. 24, 1992	171 cm	82kgs	11 years	Pivot	Right
B.J.	JUL. 16, 1992	180 cm	76kgs	8 years	Goal keeper	Right
J.R.	OCT. 7, 1993	170 cm	74.5kgs	10 years	Goal keeper	Right
T.P.	MAY 5, 1993	177cm	69.6kgs	8 years	Goal keeper	Right

does not go over the line towards the medial edge of the foot, following the criteria of this methodology, such foot is considered as normal. Footprints going over this line indicate certain degree of flatness of the lateral arch of the foot, and further analysis of the plantogram is required. Further analysis involves drawing a tangent line connecting the outermost part of the medial edge of the heel on the footprint, with the front part of that print. After that, ruler is placed to form the right angle with Mayer's line, and used to connect with the closest part of the footprint, near the middle of its plantum (line segment A) expressed in millimeters. Then, from the same point, and from Mayer's line, perpendicular to the tangent connecting the heel and the front of the foot, line (line segment B) is drawn expressed in millimeters. After having obtained these two values, in order to calculate the index of the longitudinal foot arch, ratio of the two values is found ($A/B \times 100$). The acquired percentage denotes the measure of the longitudinal arch flatness, with the following meanings: 1-30% is degree I of foot flatness, 31-60% is degree II of foot flatness, over 61% is degree III of foot flatness.

The methodology of Russian authors is the simplest. It requires that the plantogram, from as high as the first and the fifth metatarsal bone, together with the heel footprint, is divided in five equal parts. If a footprint, viewed from outside in, does not cross over two out of five drawn fields, the foot is considered as normal. If a footprint covers three out of five drawn fields, it is degree I, four out of five is degree II, and five out of five is degree III of foot flatness.

RESULTS AND DISCUSSION

After having completed the processing, thus obtained results are presented in tables statistically, and then analyzed, and finally conclusions are presented.

Table 2. Number of Flat-footed Respondents

Sample tested	Number of respondents	Respondent evaluation
Total	17	100%
Normal feet	4	23%
flat feet	13	77%

The Results of Plantographic Study using Thomson's Methodology.

Table 3. Tabular Overview of the Arches of the Foot Flatness

Name and surname	Left foot	Right foot
S.F.	40%	40%
T. G.	6,98%	6,3%
J.S.	10%	8,9%
M.A.	0%	0%
M.T.	0%	0%
N.R.	20%	24%
I.P.	24%	24%
A.J.	20%	23%
J.M.	7%	6,38%
I.P.	0%	0%
S.R.	24%	59%
B.G.	19,5%	12,2%
M.P.	0%	0%
N.V.	0%	11,36%
B.J.	17%	22%
J.R.	12%	12%
T.P.	30%	21%

Table 4. Left Foot

Foot Status	Normal Foot	Degree I Flatness (1-30%)	Degree II Flatness (31-60)	Degree III Flatness (over 61%)
Number of Respondents	5	11	1	0

Table 5. Right Foot

Foot Status	Normal Foot	Degree I Flatness (1-30%)	Degree II Flatness (31-60%)	Degree III Flatness (over 61%)
Number of Respondents	4	11	2	0

The Results of Plantographic Analysis using the Methodology of Russian Authors.

Table 6. Left Foot

Foot Status	Normal Foot	Degree I Flatness	Degree II Flatness	Degree III Flatness
Number of Respondents	5	11	1	0

Table 7. Right Foot

Foot Status	Normal Foot	Degree I Flatness	Degree II Flatness	Degree III Flatness
Number of Respondents	4	11	2	0

Tabular and Chart Representation of Feet Status over Body Mass.

Table 8. Left Foot

Body Mass	Total No. of Respondents	No. of Respondents with Normal Feet	No. of Respondents with Flat Feet
55-75 kgs	11	3	8
75-95 kgs	6	3	3

Table 9. Right Foot

Body Mass	Total No. of Respondents	No. of Respondents with Normal Feet	No. of Respondents with Flat Feet
55 -75 kgs	11	3	8
75-95 kgs	6	3	4

It has been found that, out of the total number of respondents, 4 respondents had normal feet, and 13 of them had flattened arches (Table 2.). Table 3 shows the degree of flatness of the arches for the left and the right foot. The results in Table 4. show the degree of flatness of the left foot, from the total number of respondents, while Table 5. show the results for the right foot (using Thomson's method).

The results in Table 6. represent left foot, while the results in Table 7. refer to the right foot, all of which are obtained by processing data using the methodology of Russian authors. By comparing the results from these two methods, it may be concluded that there are no discrepancies and that the obtained results completely are matched.

Also, the research included the study of the foot status as it relates to body masses of respondents. The total number of respondents was divided into two categories (the first being 55-75kgs, the second 75-95kgs). The processing was done for the left and the right foot separately. It was found that out of 11 respondents from the first category, in respect to the left foot, 8 players had flat feet, 3 had normally developed feet. In the second category, out of 6 players, 3 had flattened arch of the foot, while 3 had well preserved foot status. The results for the right foot match the results for the left foot, within the first category. In the second category, out of 6 respondents, 4 had flat feet, and 3 had normally developed feet.

It is a well known fact that, in most sports, feet are the primary load carriers. Foot deformities, in this case foot flatness, mainly create great troubles and discomforts that should be removed in timely manner. The key of success lies in preventing deformities from occurring in the first place. Prophylactic measures should be employed from the earliest age. This is the period when undisturbed and correct development must be enabled. It is necessary that a child walks barefoot on varying terrain as frequently as possible and as long as possible. This kind of surface provokes different mechanical stimuli that activate and engage foot muscles, and especially tiny sole muscles, thus influencing the correct development of feet very favorably. Prophylactic effect by making the correct choice of shoes and socks is also important.

Preventive measures also include exercises for strengthening muscles important for the preservation of a good foot status. Exercises that are used to achieve preventive and corrective influences must be selected and conducted in such way as to increase the strength of muscles that are important for maintaining the arch, that is to say, for creating the dynamic balance of antagonist muscle groups, which will result in normal shaping and functioning of the feet. Dorsal flexor muscles must be included and especially *m. tibialis anterior*, as well as plantar extensors, and especially *m. m. peroneus longus et brevis*, *m. tibialis posterior flexor* and *hallucis longus*.

Our finding is that, out of the total number of re-

spondents, 77% have disturbed arch of the foot and it is necessary to undertake certain corrective treatments. The aim is preventive action, as well as discouraging further progression of foot deformity. The corrective treatment itself may be scheduled before training, during the introductory-preparatory training phase, and also in the final training phase. Also, it is possible to conduct a certain number of exercises in spare time, i.e., outside the training processes.

CONCLUSIONS

By processing and analyzing the results obtained through the research, it is possible to draw the following conclusions:

Big number of players has disturbed foot arches (even 77% out of the total number of respondents).

As for the foot status with respect to the body mass, the obtained results indicate that it is necessary to introduce all measures in order to prevent the progression of deformities, namely, additional arch disturbance. Regular foot inspections are needed and also corrective treatments.

The handball team requires a complete preservation of body and feet status. Considering that any handball game is a combination of speed, strength, coordination, endurance, duels of great force, and swift direction changes, any possible deformity may lead to unwanted injuries.

The existence of a single deformity, if not treated in the right way, entails series of other deformities. For this reason, prevention and correction of deformities are very important for playing sports.

The results we collected clearly indicate that feet deformities in junior female national team players are present excessively, and that they are, in a way, "neglected" by the coach, due to the age of respondents. Even though causes of this deformity are not known, nor they are the object of this research, still we believe that it is the coach who must recognize deformities and conduct necessary measures against them, in close collaboration with the physicians.

Because of huge possibilities for a wide variety of different movement contents, handball, or more accurately, schools of handball, are appropriate places for prevention and preservation of correct body status. The primary task of handball schools is the extensive development of children and enhancement of their overall anthropologic potentials. This means that coaches must be familiar with all principles and structures of the training process, but also to be well informed of the biological, psychological and sociological development of players depending on their age. The high-quality work is the precondition for achieving results, but also for maintaining the health of athletes.

REFERENCES

Бала, Г. (2006). *Физичка активност девојчица и дечака предшколског узраста* [Physical Activity of Girls and

- Boys of Preschool Age. In Serbian.] Нови Сад: Факултет физичке културе.
- Бошковић, М. (2005). *Анатомија човека: дескриптивна и функционална* [Human Anatomy: Descriptive and Functional. In Serbian.] Београд: Научна КМД.
- Илић, Д. (2012). *Корективна гимнастика* [Corrective Gymnastics. In Serbian.] Београд: Факултет спорта и физичког васпитања.
- Косић, Ј, Јонић, З., & Петровић, М. (2012). Transformation flat foot level by higher recreative exercises preeschool office „Pčelica” in Niš. *Research in Kinesiology*, 40(1), 107-112.
- Kosinac, Z. (2002). Kineziterapija sustava za kretanje [Kinesitherapy of Locomotive System. In Croatian.] Split: Sveučilište u Splitu.
- Котуровић, Љ. & Јеричевић, Д.(1988). *Корективна гимнастика* [Corrective Gymnastics. In Serbian.] Београд: Спортска књига.
- Крسمановић, Т. (2007). Постурални поремећаји и како их спречити [Postural Disorders and How to Prevent Them. In Serbian.] *Гласник Антрополошког друштва Србије*, 42, 345-351.
- Milenković, S., Bujanj, S., Živković, M., Živković, D., Bujanj, R., Ćirić-Mladenović, I., & Stojiljković, S. (2013). A Comparative analysis of postural status in two elite athletes: a preliminary study. *Research in Kinesiology*, 41(1), 44-54.
- Радисављевић, М. (2001). *Корективна гимнастика са основама кинезитерапије* [Corrective Gymnastics with Basic Kinesitherapy. In Serbian.] Београд: Факултет за спорт и физичко васпитање.
- Угарковић, Д. (1996). *Биологија развоја човека са основама спортске медицине* [Biology of Human Development with Basics of Sport Medicine. In Serbian.] Београд: Факултет физичке културе.
- Угарковић, Д. (2001). *Основе спортске медицине* [Sport Medicine Basics. In Serbian.] Београд: Виша кошаркашка школа.
- Улић, Д. (1997). *Основе кинезитерапије* [Kinesitherapy Basics. In Serbian.] Нови Сад: Факултет физичке културе.

Correspondence:

Dejan Ilić
 University of Belgrade
 Faculty of Sports and Physical Education
 Str. Blagija Parovića 156, 11030, Belgrade, Serbia
 E-mail: dejan.ilic72@gmail.com