

COMPARISON OF FOOT POSITION AND SOME ANTHROPOMETRICAL DIMENSIONS FOR PRESCHOOL CHILDREN IN CRETE (HERAKLION) AND BELGRADE#

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SUMMARY

To compare the position of foot (flat feet) in relation to body weight and body height in children of preschool age (5-6 years) in both towns was the main object of the study. The sample comprised 273 children. The variables utilized were body weight, body height and footprints. Comparisons were made in terms of age, gender, left/right foot position, and place of residence. For the statistical processing of results, four indices were utilized: mean, standard deviation, coefficient of variation, range. The analysis revealed that children from Belgrade manifested higher figures for body weight and body height, and lower figures for flat-feet in comparison with their counterparts from Heraklion. On the basis of the results, we concluded that the application of a special kinesitherapy programme (branch of physical education) is required to help obstructing and obliterating the development of flat-feet in the children of Heraklion.

Key words: Foot position, anthropometry, preschool children, flatfeet

ÖZET

GİRİT (HERAKLION) VE BELGRAD'LI OKUL ÖNCESİ ÇAĞDAKİ ÇOCUKLARIN AYAK POZİSYONU VE ANTROPOMETRİK ÖLÇÜMLERİNİN KARŞILAŞTIRILMASI

Ayak pozisyonunun (düztabanlık) vücut ağırlığı ve boya göre Heraklion ve Belgrad'da yaşayan okul öncesi (5-6 yaş) çağındaki çocuklarda

This paper was presented at the 13th Balkan Sports Medicine Congress, April 29-May 2, 2004, Drama, Greece

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karşılaştırması bu çalışmada hedeflendi. Örneklem 273 çocuktan oluşuyordu. Karşılaştırmalar yaş, cinsiyet sol/sağ ayak pozisyonu ve yaşanan yere göre yapıldı. İstatistiksel analiz için ortalama standart sapma, varyasyon katsayısı ve veri aralığı kullanıldı. Sonuçta Belgrad'lı çocukların Heraklin'dekilerden daha uzun ve ağır oldukları; düşük oranda düztaban oldukları gözlemlendi. Buna göre, özel bir kineziterapi programının bir uygulaması (beden eğitimi dalı) Heraklion'daki çocuklarda düz tabanlılığın gelişmesini engellemek ve azaltmak için gerekli görünmektedir.

Anahtar sözcükler: Ayak pozisyonu, antropometri, okul öncesi çağı çocuk, düztabanlık

INTRODUCTION

The phylogenetic evolution of the human being is also marked by the evolution of the shape of the leg. The latter changed from an auxiliary grasp organ to a permanent organ for support and motility of the human frame. Consequently, walking became a most important biological and social function for man. The particular evolutionary engineering of the human leg ascribes to humans a distinct place among all other inhabitants of the animal kingdom.

The majority of researchers in the field have identified three stages in flat-feet: **I.** Minor flat-feet: this is associated with lack or retraction of muscles and also is referred to as *pes valgus* (the longitudinal arch is absent). **II.** If no corrective measures are taken, then the flexible *pes valgus* foot, which is severely deformed as a result of damage to the connective tissue and muscle, will further deteriorate to a condition known as *pes plano valgus*. **III.** The third stage is known as *pes transverso-planus* where there is a marked loss of functionality in the muscles and joints of the foot, which results in total obliteration of the arc and retraction of the metatarsal heads.

Numerous research work on flat-feet conclude that the condition describes a deformity in the human frame. This deformity afflicts 50 - 80% of people in urban centers and is more common in adult females as well as in children. This issue has been investigated in children of school age, in athletes and students of sports academies, but less in children of preschool age.

Preschool training centers, kindergartens and children-stations could provide fertile ground for multifaceted physical and psychological

support in relation to all kinds of physical deformity. The Yugoslavian Institute of Physical Education & Sports Medicine has monitored and analyzed physical deformities in children at preschool age since 1983. Researchers report that the percentages of flat-feet among children drop with the application of well-designed physical exercises (orthotics management programmes) in the course of their physical growth. Such programmes are non-existent in Greece, particularly on the island of Crete, where there is a plethora of children's stations and kindergartens. In addition, the staff of these stations are not trained to tackle the issue of physical deformities. This research, in support of the recommendations of researchers who have studied the condition of flat-feet, underlines the necessity for close cooperation between specialized physical education instructors and kindergarten instructors.

The object of the present research is to investigate the relationship between foot position, body weight, and body height in children of preschool age from two different countries: Belgrade (Yugoslavia) and Heraklion (Crete, Greece).

MATERIAL AND METHODS

The sample comprised 273 children of 5-6 years, from Belgrade and Heraklion, Crete. The Heraklion sample comprised 122 children of which 54 were 5 years old and 68 were 6 years old. The Belgrade sample comprised 151 children: 71 of which were 5 years old and 80 of which were 6 years old. The variables assessed were body height (BH), body weight (BW), plantogram of left foot (PLF) and plantogram of right foot (PRF).

BH was measured by asking the subject to stand straight with the head positioned such that the Frankfurt plane is horizontal, feet are together, and knees are straight, and the heels are in contact with the vertical surface of the stadiometer. The values were recorded to the nearest 0.5 cm.

BW was measured by asking the subjects to stand on a scale (accurate to 0.5 kg) wearing lightweight indoor clothing. The footprints were assessed using the Thomson plantogram, which is considered to be one of the most accepted methods of assessing flat feet. Results are represented in percentages of obliteration of the foot arc (I: 1-30% obliteration, II: 31-60%, and III: over 61%).

For statistical purposes; mean, standard deviation, coefficient of variation, and range are given.

RESULTS

The results of the study, as well as the comparative analysis of the results, are presented below in terms of BH, BW and the position of the foot and obliteration of the arc are given in Tables 1-4.

From the comparison of BH and BW figures with to respect the two towns, we can conclude that the 5-year old children of Belgrade are slightly taller and heavier than the children of Heraklion of same age. In total, the children of Belgrade manifest a lower grade of flat feet in relation to the children of Heraklion. Grade I is more prevalent in children of Belgrade while both grades I and III are prevalent in Heraklion.

Comparing BH and BW figures of children from the two towns, we can conclude that the 6-year old children of Belgrade are slightly taller and heavier than the children of Heraklion of same age. It can be also said that the 6-year old children of Belgrade manifest a lower grade of flatfeet in comparison to their counterparts of Heraklion.

Table 1. Anthropometric comparison of 5-year old children of Belgrade and Heraklion.

Variable	Town	M	S	V	X_{\min}	X_{\max}	R
BH	Belgrade	112.9	4.9	4.3	100.5	125.5	25.0
	Heraklion	111.1	6.0	5.4	100.0	122.0	22.0
BW	Belgrade	20.07	3.18	15.84	15.0	30.0	15.0
	Heraklion	19.67	2.93	14.89	15.0	26.5	11.5

Table 2. Comparison of flatfeet grade of 5-year old children of Belgrade and Heraklion.

Grade of flatfeet	Town	PLF		PRF	
		fd	%	fd	%
I	Belgrade	38	53.5	40	56.3
	Heraklion	18	33.3	18	33.3
II	Belgrade	10	14.1	7	9.9
	Heraklion	8	14.8	10	18.5
III	Belgrade	15	21.1	11	15.5
	Heraklion	24	44.4	20	37.0
Total	Belgrade	63	88.7	58	81.7
	Heraklion	50	92.6	48	88.9
Mean	Belgrade	30.9		26.5	
	Heraklion	46.3		42.2	

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Table 3. Anthropometric comparison of 6-year old children of Belgrade and Heraklion.

Variable	Town	M	S	V	X_{\min}	X_{\max}	R
BH	Belgrade	120.3	5.4	4.5	108.5	133.5	25.0
	Heraklion	117.2	4.5	3.8	108.5	130.0	21.0
BW	Belgrade	23.38	3.98	17.04	16.0	36.0	20.0
	Heraklion	22.24	3.93	17.66	16.0	40.0	24.0

Table 4. Comparison of flatfeet grade of 6-year old children of Belgrade and Heraklion.

Grade of flatfeet	Town	PLF		PRF	
		fd	%	fd	%
I	Belgrade	41	51.3	37	46.3
	Heraklion	21	30.9	31	45.6
II	Belgrade	10	12.5	10	12.5
	Heraklion	12	17.7	9	13.2
III	Belgrade	7	8.8	8	10.1
	Heraklion	29	42.7	23	33.8
Total	Belgrade	58	72.5	55	68.8
	Heraklion	62	91.2	63	92.7
Mean	Belgrade	19.9		19.6	
	Heraklion	47.4		41.3	

CONCLUSIONS

1. The children of Belgrade, irrespective of age, are taller and heavier in comparison to their counterparts from Heraklion. The boys are taller and heavier comparing with girls in both towns.

2. The boys in Belgrade and Heraklion manifest higher mean flatfeet grades than girls in the respective towns, except in the sample of Heraklion for the age of five years where the mean values for boys and girls are the same.

3. Irrespective of age, the left foot is more prone to flat-foot condition than the right foot.

4. On the average and irrespective of age, the children of Heraklion manifest a higher grade of flat feet than their counterparts in Belgrade. The difference between the children in these towns increases with age, i.e. the arc in the 6-year olds of Belgrade tends to be corrected, but not

in the children of Heraklion of the same age, in which flatfeet grade stays the same.

5. Grade I flatfeet is prevalent in Belgrade, while Grades I & III are prevalent in Heraklion.

We can propose that five- and six-year old children with flatfeet from Heraklion, and from Greece in general, should go through a systematic corrective programme (orthotics). However, before such programme is applied, kindergarten instructors should receive the required training, as is the case with their colleagues from Belgrade.

Acknowledgements

I would like to thank the following individuals for helping me with the technicalities of this research: Mrs. Mary Maniou, kindergarten instructor; Mrs. Georgia Dermitzaki, literature teacher; Mrs. Christina Koukaki, secretary; Mr. George Trialonis, translator.

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