GENDER COMPARISON OF BODY HEIGHT CHARACTERISTICS IN ALBANIAN CHILDREN AGED 6.5-15.5 YEARS OLD

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Abstract
Growth is a multifaceted process, where development in body size leads to morphological and functional changes. The aim of this scientific paper is to create a references database on the current status on body height of Albanian children (6.5-15.5 years old) and to compare the current status of body height by gender.
The study aimed at recruiting a large sample of Albanian children. The sample was between 6.3 and 15.7 years old and originated from 23 schools in Albania (n = 10585). Body height was measured using a digital stadiometer/scale (Health O Meter Professional 500KL, Health O Meter Products Inc., Bedford Heights, OH, USA). Height was measures to the nearest 0.1 cm. The results of this study show that the comparison between boys and girls presents significant changes ($p \leq 0.05$ *) for these age groups; boys taller than girls aged 7, 8, 8.5, 9; girls taller than boys aged 11.5- 12.5 years while boys taller than girls aged 13.5- 15.5 years, Comparison data by gender showed that boys have the highest value of the difference in the average increase in body height at the age of 15.5 years with a value of 10.5 cm ($p \leq 0.05$ *) compared to girls while girls have the highest value of the difference in the increase in the average body height in age 11.5 years with a value of 2.6 cm ($p \leq 0.05$ *) compared to boys.

Keywords: boys, body height, children, comparison

Introduction

Growth is a multifaceted process, where development in body size leads to morphological and functional changes. This process is determined by biological factors that indicate a high degree of sensitivity to environmental stimuli, which shake the expression of genetic potential (Ulijaszek, 2006; Thomis & Towne, 2006). As a result, there is a significant difference between populations in growth patterns (Eveleth & Tanner, 1990).
According to Kulaga et al., (2010) and Gelander (2006) the well-being of a child is an indicator of the health and well-being of a society as well as an overview of the general socio-economic standard (Tanner. 1987).
There is a general consensus that raising and wellbeing of children is a significant sign of health and quality of life (Molinari et al., 2004; Tanner, 1987) and therefore monitoring growth is an important public health task.
The need to develop growth charts and future studies of growth changes are still current and important. Growth charts are used in assessing the growth of healthy children and in detecting children with growth concerns and various diseases that have affected it. Also, these studies (databases) create

opportunities for epidemiological comparisons over time (Werner & Bodin 2006).

The aim of this scientific paper is to create a references database on the current status on body height of Albanian children (6.5-15.5 years old) and to compare the current status of body height by gender.

Subjects and methods

The included data are part of the Balkan Survey of Inactivity in Children project (BASIC). BASIC is a population based cross-sectional survey of Albanian children living in the four Balkan nation-states of Albania, Kosovo, North Macedonia and Montenegro (Tarp, Jarani et al., 2018).

The study aimed at recruiting a large sample of Albanian children (table 1). The sample was between 6.3 and 15.7 years old and originated from 23 schools (table 2) in Albania (n = 10585).

Table 1 Descriptive statistics for the children participation by gender (raw data)

Country	N	Boys	Girls
Albania	10585	5301	5284

Table 2 Descriptive statistics for children participating by gender and city

Country	City	Children		
		Total	Boys	Girls
Albania	Tirane	7200	3517	3503
	Shkoder	1347	684	663
	Sarande	665	324	341
	Lushnje	952	459	493
	Diber	421	210	211

Anthropometrical assessment was performed at schools by trained staff following standardized procedures. Participants were measured barefoot and wearing sports clothing. Female staff performed the measurements of female participants.

Body height was measured using a digital stadiometer/scale (Health O Meter Professional 500KL, Health O Meter Products Inc., Bedford Heights, OH, USA). Height was measures to the nearest 0.1 cm.

Statistical analysis

To compare the data by gender, ages and between the states there were used statistics as follows; T-test, Independed T-test and the one-way ANOVA and post hoc analysis “LSD test”.

Results

Table 3 below gives the average body height of boys and girls for the age group 6.5 years to 11 years. Boys for the age of 6.5 years have an average body height of 120.7 cm (4.9 DS) while for the age group 11 years the average is 142.6 cm (6.9 DS).
Girls in the age group of 6.5 years have an average body height of 120.1 cm (5.2 DS) while the average body height is 143.6 cm (7.2 DS) for the age of 11 years.

Table 4 presents the average body height of girls and boys from 11.5 years to 15.5 years. Boys have an average body height of 145.2 cm (7.4 SD) for the age of 11.5 years. Girls in the 11.5 age group have an average body height of 147.8 cm (6.8 SD)
For the age of 15.5 years' boys have an average body height of 168.9 cm (6.9 SD) while girls aged 15.5 years have an average body height of 158.5 cm (6.0 SD).

Table 5 shows the difference in the increase in the average body height of boys compared to girls from the age of 6.5 years to 15.5 years. Boys have the highest value of the difference in the average increase in body height at the age of 15.5 years with a value of 10.5 cm ($p \leq 0.05$ *) compared to girls while girls have the highest value of the difference in the increase in the average body height in age 11.5 years with a value of 2.6 cm ($p \leq 0.05$ *) compared to boys.

Table 3 Data on body height by gender for 6.5- 11 years old children

	children age group- by 0.5 years																					
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Boys/ age	6.5		7		7.5		8		8.5		9		9.5		10		10.5		11		11	6.5
	120.7	4.9	**122.8** *	5.2	125.1	5.8	**128.2** *	6.4	**131.2** *	5.8	**133.7** *	5.9	136.1	6.4	138.9	6.4	140.6	6.8	142.6	6.9
Girls/ age	6.5		7		7.5		8		8.5		9		9.5		10		10.5		11			
	120.1	5.2	121.8	5.1	124.7	5.7	126.6	5.9	130.0	6.6	132.4	6.1	135.4	6.2	138.2	7.0	141.0	7.6	143.6	7.2		

$p \leq 0.05$ * Body height- boys' vs girls

Table 4 Data on body height by gender for 11.5- 15.5 years old children

	children age group- by 0.5 years																	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Boys/ age	11.5		12		12.5		13		13.5		14		14.5		15		15.5	
	145.2	7.4	148.6	7.5	151.1	7.9	155.2	8.7	**158.4***	9.1	**160.9***	8.7	**163.8***	8.8	**166.8***	7.9	**168.9***	6.9
Girls/ age	11.5		12		12.5		13		13.5		14		14.5		15		15.5	
	147.8*	6.8	**150.1***	7.7	**153.0***	7.4	154.5	7.2	156.1	6.2	157.1	6.4	158.7	7.4	159.5	5.9	158.5	6.0

$p \leq 0.05$ * Body height- boys' vs girls

Table 5 Data on body height differences by gender for 6.5- 15.5 years old children (boys taller compare to girls)

	children age group- by 0.5 years																		
age	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5
mean (cm)	0.6	**1.0***	0.4	**1.6***	**1.3***	**1.4***	0.6	0.7	-0.5	-1.0	**-2.6***	**-1.5***	**-1.9***	0.7	**2.3***	**3.8***	**5.1***	**7.3***	**10.5***

$p \leq 0.05$ * boys taller compare to girls

Discussion

The results of this study show that the comparison between boys and girls presents significant changes ($p \leq 0.05$ *) for these age groups; boys taller than girls aged 7, 8, 8.5, 9; girls taller than boys aged 11.5- 12.5 years while boys taller than girls aged 13.5- 15.5 years, Comparison data by gender showed that boys have the highest value of the difference in the average increase in body height at the age of 15.5 years with a value of 10.5 cm ($p \leq 0.05$ *) compared to girls while girls have the highest value of the difference in the increase in the average body height in age 11.5 years with a value of 2.6 cm ($p \leq 0.05$ *) compared to boys. Data from the study of Tinggaard et al., (2014) showed that Danish boys (up to 20 years old) also have higher body heights than girls of all ages. Boys have higher body heights compared to girls and this body height increases progressively with age in European children (Wijnhoven et al., 2014; Brug et al., 2012) as well as in Polish children (Kułaga et al., 2011). The results of this study for Albanian children show that the highest value of the difference in the increase in the average body height of boys compared to girls is 10.5 cm for the age of 15.5 years ($p \leq 0.05$). The age at which girls have an increasing difference in body height average higher than boys is 11.5 years with a value of 2.6 cm ($p \leq 0.05$). The average increase in body height for Croatian boys 6.5-18.5 years (Jureša et al., 2012) is between 2.7 cm to 6.5 cm and for girls is 2.5 to 5.0 cm. The study by Nyankovskyy et al., (2018) shows that 18-year-old boys have a body height of 178.4 cm and girls 164.2 cm. Boys are taller than girls by 14.2 cm. These results are also in line with the results in WHO references (WHO, 2006). In Cypriot children, measurements of body height show a gradual increase in boys and girls aged 6-17 (Savva et al., 2001). There is a slowdown in this trend for 15-year-old boys and 13-year-old girls. In girls (Tambalis et al., 2015), body height peak measurements appear to tend to peak at 17 years of age, although around this age there is a decrease in body height. The average increase in body height for Croatian boys is 2.7 cm to 6.5 cm and 2.5 to 5.0 cm for girls (Jureša et al., 2012). The onset of the fastest rate of increase in body height in Ukrainian boys begins at the age of 10 years and 3 months and for girls at the age of 8 years and 3 months (Nyankovskyy et al., 2018). There is an increase in body height in Ukrainian children aged 7 to 18 years (Nyankovskyy et al., 2018). The highest body growth in boys is at the age of 12 years and 7 months to 13 years and 8 months with 7.22 cm while for girls the greatest increase in body height is with 6.44 cm at the age of 11 years and 7 months to 12 years and 6 months (Figure x).

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