

## ORIGINAL SCIENTIFIC PAPER

# Comparison of Body Weight between Albanian Children and European Peers in Primary Schools

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## Abstract

One of the biggest health challenges today is controlling body weight gain which leads to overweight and obesity. In order to anticipate and monitor the possible problem of overweight/ obesity, this study was undertaken in Albanian children to identify the current status of body weight in primary schools and to compare the children of the same age in Europe for the weight status. A total of 1888 elementary school children (939 boys and 949 girls) aged 6-9 years old) were enrolled in this study. Body mass were measured using a Health O Meter 402 KL professional physician beam scale. The results from this scientific work show that boys in Albania have a higher body weight ( $p \leq 0.05$ ) compared to girls (6-9 years). Comparative data from this study on body weight between Albanian and European children show that Albanian boys and girls in elementary school (ages 6-9) are ranked among the lower body weight children compared to European counterparts. This data would be a great help in creating a clear picture of the trends of body weight growth over the years in Albanian children. These data are very important for the consequences on public health given that overweight children have a tendency to become overweight adults.

**Keywords:** children, body weight, overweight, obesity, health, school

## Introduction

The growth of children is influenced by internal and external factors, such as genetic potential, lifestyle and diet. Some of them can change over time and cause increasing tendencies of body weight and height. According to Kulaga et al., (2010) and Gelander (2006) child well-being is an indicator of health and well-being as well as an overview of the overall socio-economic standard of a society (Tanner, 1987). Over the past two decades in Europe, social changes and lifestyles have influenced the behaviour of children in the unhealthy way of eating and sedentary living (Orsi, Hale, & Lynch, 2011). Kelishadi et al., (2017) in their paper show that high technological progress leads to reduced daily calorie expenditure and consequently to a high sedentary lifestyle. The problem of weight gain poses a threat to public health and further leads to consequences in reducing quality of life (Forhan & Gill, 2013), increasing health care costs (Buchmueller & Johar, 2015) and increasing the morbidity of population (Lenz, Richter, & M<sup>u</sup>hlhauser, 2009).

One of the biggest health challenges today is controlling body weight gain which leads to overweight and obesity as one of the major health problems which starts in childhood (Ozden et al., 2011). Studies have emphasized the fact that overweight children have a predisposition to be obese over the years as adults (Franks et al., 2010; Han, Lawlor, & Kimm, 2010). Over the years, treating the problem of overweight and obesity becomes very difficult and the most effective way to curb this major health problem is to prevent it (Zwiauer, 2000). One of the most effective preventions is the early identification of this problem in children (Dietz, 1994; Nader et al., 2006). During childhood, excessive body weight can become an obstacle to the development of motor abilities and further engagement in sports activities (D'Hondt, Deforche, De Bourdeaudhuij, & Lenoir, 2008; Gentier et al., 2013). Also, gross motor coordination represents a peak development phase in this period. Children with excessive weight (overweight/obesity) show poorer motor coordination performance (D'Hondt et al., 2011). Many studies have emphasized the strong positive correla-



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tion that exists between motor performance with physical activity and fitness with regard to children (Gattuzzo et al., 2016; Lima, Bugge, Pfeiffer, & Andersen, 2017), which leads to the impact and importance that has excessive weight in motor performance (Lima, Bugge, Ersbøll, Stodden, & Andersen, 2019).

Numerous studies highlight the effect on children being overweight/ obese, with regard participating in physical activity, fitness and motor performance. In order to anticipate and monitor the possible problem of overweight/ obesity, this study was undertaken in Albanian children to identify the current status of body weight in primary schools. Also in Albania there is a lack of data or norms in years, which lead to the problem comparing the performance of anthropometric, motor or health parameters with regards to children. In order to have a clear picture about the current status of body weight in Albanian children, this scientific work was undertaken to compare the children of the same age in Europe for the weight status. This paper reflects data on the body weight of Albanian children and European children obtained from the project COSI (European) 2009/2010 for the age of 6-9 years (Wijnhoven et al., 2014). The Regional Office of the World Health Organization (WHO) for Europe has set up the Childhood Obesity Surveillance Initiative (COSI) to monitor changes in overweight in primary school children. COSI routinely regulates the overweight and obesity of primary school children aged 6-9, in order to monitor progress in curbing excess body weight in this population group and to allow comparisons between countries within the European Region of WHO.

## Methods

This study is a cross sectional and is part of a project where children will be monitored in health related variables, fitness components, gross motor coordination and the level of physical activity at baseline (year 2015) followed at intervals over five con-

secutive years (till 2025). Data presented for body weight in this study are from year 2015 (Jarani, 2020).

A total of 1888 elementary school children (939 boys and 949 girls) aged 6-9 years old) were enrolled in this study. The elementary school (N=24) were randomly selected from 192 schools placed Albania. Body height and body mass were measured. Body height and body mass were measured using a Health O Meter 402 KL professional physician beam scale. Values were recorded to the nearest 0.1 cm and 100 g, respectively.

## Statistical Analysis

Descriptive statistics (mean and standard deviation) were calculated for the variable assessed in this study. Independent T tests were used for the comparison between boys and girls separately for each age group. Two-Sample T-Test from Means and SD's was used to compare data between Albanian children (Jarani, 2020) and European counterparts (Wijnhoven et al., 2014). This test procedure computes the two-sample t-test and several other two-sample tests directly from the mean, standard deviation, and sample size. Mean difference, and standard deviations were also computed. In this statistical analysis hypothesis tests were included and produced for both one- and two-sided tests as well as equivalence tests. The level of significance was equivalent to the alpha level ( $p \leq 0.05$ ). P-values of  $\leq 0.05$  were considered statistically significant. All analysis was performed using the statistics software SPSS 26.0.

## Results

Data from Table 1 present the mean values and standard deviation for Albanian children 6-9 years old divided by years and gender. The table also shows the statistical comparison by gender for body weight. In all age groups boys have statistically higher values for body weight compared to girls.

**Table 1.** Body weight in Albanian children by age and gender

Children 6-9 yrs.		Boys		Girls	
Age	Mean $\pm$ SD	Mean $\pm$ SD	N	Mean $\pm$ SD	N
6	24.3 $\pm$ 5.2	*25.1 $\pm$ 5.6	172	23.4 $\pm$ 4	189
7	26.7 $\pm$ 5.5	*27.2 $\pm$ 6	272	26.2 $\pm$ 5.2	236
8	30.1 $\pm$ 6.2	*31.2 $\pm$ 6.5	253	29.2 $\pm$ 6.4	270
9	33.4 $\pm$ 7.8	*34.6 $\pm$ 8.3	242	32.5 $\pm$ 6.8	254

Legend: Statistical analysis for gender differences: \*  $p \leq 0.005$

Table 2 shows the mean body weight values of children in Albania and other European countries (Wijnhoven et al., 2014) such as Slovenia, Spain and Belgium for boys and girls aged 6 years. Albania has a mean body weight of 25.1 $\pm$ 5.6 kg for boys followed by Slovenia with a lower value of 24.9 $\pm$ 4.6 kg. As for Spain the mean body weight of boys is 24.9 $\pm$ 4.6 kg which turns

out to be the same as Slovenia. Belgium has the lowest mean body weight for boys at 23 $\pm$ 3.7 kg. Spain ranks first as the country with the highest mean body weight with a value of 24.5 $\pm$ 4.6 kg for girls followed by Slovenia which has a value of a mean body weight of 24.4 $\pm$ 4.6 kg for girls aged 6 years old. Albania ranks third in the ranking according to body weight with a value of 23.4 $\pm$ 4 kg

**Table 2.** Mean body weight values of 6 years' children in Albania and other European countries by gender

Table 2. Mean body weight values of 6 years children in Albania and other European countries, by gender											
Body weight (6 year olds)											
Boys						Girls					
		Mean±SD	N	t	p			Mean±SD	N	t	p
1	Albania	25.1±5.6	172			1	Spain	*24.5±4.6	917	3.35	0.010
2	Slovenia	24.9±4.6	1801	0.45	0.065	2	Slovenia	*24.4±4.6	1834	3.22	0.013
3	Spain	24.9±4.6	901	0.44	0.066	3	Albania	23.4±4	189		
4	Belgium	23±3.7	26542	4.91	0.091	4	Belgium	*22.7±3.9	26105	2.39	0.017

Legend: Statistical analysis for differences between Albania vs each Country: \*  $p \leq 0.005$

for 6-year-old girls. Belgium presents a mean body weight of  $22.7 \pm 3.9$  kg for girls aged 6 years and which turns out to have the lowest mean compared to other countries listed in the table.

Table 3 gives the mean body weight of 7-year-old boys and girls for different European countries, ranking according to the highest body weight. Greece ranks first with the highest mean body weight at  $29.5 \pm 5.8$  kg for boys and  $29.1 \pm 6.1$  kg for girls. The country that follows Greece is Spain which shows a mean body weight of  $28.5 \pm 5.7$  kg for 7-year-old boys and  $27.9 \pm 5.8$  kg for girls of the same age.

Slovenia presents a mean body weight of  $27.8 \pm 5.7$  kg for boys ranking third and  $27.1 \pm 5.8$  kg is the mean body weight for girls ranking fourth. Lithuania has a mean body weight for boys with a value of  $27.6 \pm 5.3$  kg which is ranked fourth according to the table while for girls this result is  $27 \pm 5.5$  kg being ranked fifth. The boys from Northern Macedonia and Latvia have a mean body weight of  $27.6 \pm 6.4$  kg and  $27.4 \pm 5.3$  kg, ranking fifth and sixth, respectively.

While the girls of Northern Macedonia and Latvia have a mean body weight of  $26.5 \pm 6.4$  kg and  $26.3 \pm 5.3$  kg making them ranked sixth and eighth. Albania has a mean body weight of  $27.2 \pm 6$  kg for boys being in seventh place and  $26.2 \pm 5.2$  kg is the result for girls being ranked ninth. Portugal eighth place and Hungary ninth place represent a mean body weight of  $27 \pm 5.5$  kg and  $26.7 \pm 5.5$  kg for boys aged 7 years while for girls of the same age this mean body weight is  $27.2 \pm 5.7$  kg (Portugal; third place) and  $26.4 \pm 5.8$  kg (Hungary; seventh place).

The Czech Republic and Ireland, concretely ranked 10th and 11th, have a mean body weight of  $26 \pm 4.8$  and  $26 \pm 4.2$  kg for boys, while for girls this ranking varies as the Czech Republic occupies twelfth place with a result of  $25.3 \pm 5.1$  kg and Ireland in eleventh place with a result of  $25.6 \pm 4.6$  kg. The last remaining country is Belgium which ranks last in terms of mean body weight of boys with a value of  $25.8 \pm 5$  kg and for girls this value is  $25.7 \pm 5.4$  kg occupying the tenth place.

The following Table 4 presents the mean body weight of

**Table 3.** Mean body weight values of 7 years' children in Albania and other European countries by gender

Body weight (7 year olds)											
Boys						Girls					
		Mean $\pm$ SD	N	t	p			Mean $\pm$ SD	N	t	p
1	Greece	*29.5 $\pm$ 5.8	1293	5.779	0.001	1	Greece	*29.1 $\pm$ 6.1	1259	7.638	0.038
2	Spain	*28.5 $\pm$ 5.7	1106	3.232	0.013	2	Spain	*27.9 $\pm$ 5.8	1101	4.462	0.017
3	Slovenia	*27.8 $\pm$ 5.7	2759	1.580	0.011	3	Portugal	*27.2 $\pm$ 5.7	903	2.577	0.010
4	Lithuania	*27.6 $\pm$ 5.3	1648	1.035	0.03	4	Slovenia	*27.1 $\pm$ 5.8	2493	2.514	0.011
5	N. Macedonia	*27.6 $\pm$ 6.4	1429	0.996	0.031	5	Lithuania	*27 $\pm$ 5.5	1794	2.206	0.027
6	Latvia	27.4 $\pm$ 5.3	1381	0.512	0.061	6	N. Macedonia	*26.5 $\pm$ 6.4	1315	0.785	0.043
7	Albania	27.2 $\pm$ 6	272			7	Hungary	26.4 $\pm$ 5.8	682	0.494	0.062
8	Portugal	27 $\pm$ 5.5	910	0.491	0.062	8	Latvia	26.3 $\pm$ 5.3	1457	0.273	0.078
9	Hungary	*26.7 $\pm$ 5.5	553	1.156	0.025	9	Albania	26.2 $\pm$ 5.2	236		
10	Czech Republic	*26 $\pm$ 4.8	638	2.924	0.035	10	Belgium	*25.7 $\pm$ 5.4	6841	1.450	0.014
11	Ireland	*26 $\pm$ 4.2	534	2.951	0.033	11	Ireland	*25.6 $\pm$ 4.6	466	1.500	0.013
12	Belgium	*25.8 $\pm$ 5	7804	3.802	0.014	12	Czech Republic	*25.3 $\pm$ 5.1	633	2.281	0.022

different states being ranked according to the highest value for 8-year-old boys and girls. Italy ranks first for boys and girls in terms of the highest mean body weight with values of  $32.3 \pm 7.3$  kg and  $31.6 \pm 7.3$  kg. Slovenia boys are ranked second for the mean body weight with a value of  $31.8 \pm 7$  kg while girls are ranked third with a value of  $31.1 \pm 7.1$  kg.

The girls of Spain occupy the second place for the mean body weight with the figure of  $31.5 \pm 6.7$  kg and for the boys

this mean is  $31.7 \pm 6.4$  kg occupying the third place. The boys of Albania have a mean body weight of  $31.2 \pm 6.5$  kg, occupying the fourth place. The mean body weight of girls in Albania is  $29.2 \pm 6.4$  kg ranking fifth. Norway (fifth place) and Belgium (sixth place) give a mean body weight of  $30.2 \pm 5.7$  kg and  $29.3 \pm 5.5$  kg for boys aged 8 years. While the girls of Norway and Belgium show a mean body weight of  $29.6 \pm 5.6$  kg being ranked fourth and  $29.1 \pm 5.9$  kg being ranked sixth (last).

**Table 4.** Mean body weight values of 8 years' children in Albania and other European countries by gender

Body weight (8 year olds)											
Boys						Girls					
		Mean $\pm$ SD	N	t	p			Mean $\pm$ SD	N	t	p
1	Italy	*32.3 $\pm$ 7.3	13197	2.659	0.008	1	Italy	*31.6 $\pm$ 7.3	12812	6.079	0.012
2	Slovenia	*31.8 $\pm$ 7	2690	1.394	0.016	2	Spain	*31.5 $\pm$ 6.7	1047	5.214	0.021
3	Spain	*31.7 $\pm$ 6.4	1083	1.104	0.026	3	Slovenia	*31.1 $\pm$ 7.1	2599	4.593	0.045
4	Albania	31.2 $\pm$ 6.5	253			4	Norway	*29.6 $\pm$ 5.6	1286	0.953	0.034
5	Norway	*30.2 $\pm$ 5.7	1335	2.286	0.022	5	Albania	29.2 $\pm$ 6.4	270		
6	Belgium	*29.3 $\pm$ 5.5	23632	4.647	0.035	6	Belgium	29.1 $\pm$ 5.9	23171	0.255	0.079

Table 5 shows the mean body weight of 9-year-old boys and girls for different countries such as Greece, Spain, Lithuania, Albania, Slovenia, Italy, Ireland and Belgium. Greece presents a mean body weight of  $38.4 \pm 8.9$  kg for 9-year-old boys and  $37.6 \pm 9.1$  kg for girls of the same age, ranking first as the highest mean. Spain ranks second as the country with the highest mean body weight with values of  $35.9 \pm 7.7$  kg for boys and  $35.2 \pm 7.7$  kg for 9-year-old girls.

The boys from Lithuania and Albania have a mean body weight of  $34.7 \pm 7.5$  kg and  $34.6 \pm 8.3$  kg, ranking third and fourth, respectively. Regarding the state of Slovenia (fifth place)

and Italy (sixth place) the mean body weight is  $34.2 \pm 7.9$  kg and  $33.9 \pm 7.8$  kg for boys aged 9 years. The mean body weight of the Irish boys is  $33 \pm 6.3$  kg and for the boys of Belgium the result is  $32.8 \pm 7.3$  kg being the last two places in the ranking.

Slovenia and Lithuania have an mean body weight of girls worth  $33.8 \pm 8$  kg and  $33.7 \pm 7.3$  kg occupying the third and fourth place. For countries like Belgium and Italy a mean body weight of  $32.9 \pm 7.6$  kg and  $32.9 \pm 7.6$  kg is shown ranking in fifth and sixth place. The last two places in the ranking according to the highest body weight of girls are Albania and Ireland with figures of  $32.5 \pm 6.8$  kg and  $32.2 \pm 6.9$  kg.

**Table 5.** Mean body weight values of 9 years' children in Albania and other European countries by gender

Body weight (9 year olds)											
Boys						Girls					
		Mean $\pm$ SD	N	t	p			Mean $\pm$ SD	N	t	p
1	Greece	*38.4 $\pm$ 8.9	1288	6.458	0.014	1	Greece	*37.6 $\pm$ 9.1	1429	10.41	0.012
2	Spain	*35.9 $\pm$ 7.7	749	2.155	0.031	2	Spain	*35.2 $\pm$ 7.7	752	5.286	0.015
3	Lithuania	34.7 $\pm$ 7.5	1659	0.177	0.085	3	Slovenia	*33.8 $\pm$ 8	810	2.544	0.011
4	Albania	34.6 $\pm$ 8.3	242			4	Lithuania	*33.7 $\pm$ 7.3	1620	2.588	0.012
5	Slovenia	*34.2 $\pm$ 7.9	952	0.675	0.049	5	Belgium	*32.9 $\pm$ 7.6	9256	0.921	0.035
6	Italy	*33.9 $\pm$ 7.8	8280	1.301	0.019	6	Italy	*32.9 $\pm$ 7.6	7383	0.917	0.035
7	Ireland	*33 $\pm$ 6.3	488	2.644	0.003	7	Albania	32.5 $\pm$ 6.8	254		
8	Belgium	*32.8 $\pm$ 7.3	9805	3.341	0.003	8	Ireland	32.2 $\pm$ 6.9	498	0.569	0.056

## Discussion

Over the last three decades, a trend of weight gain has been observed (Lobstein, Baur, & Uauy, 2004), explained by the increase in body height as well as the association that reflects the worldwide epidemic of overweight and obesity in children and adolescents. The results from this scientific work show that boys in Albania have a higher body weight ( $p \leq 0.05$ ) compared to girls (6-9 years). The conclusions drawn from this study are in line with studies in European children. At all ages 4-18 in Greek children (Tambalis et al., 2015), boys have higher body weight values compared to girls (all values  $p < 0.01$ ). Boys also have higher body weight compared to girls, and this body weight increases progressively with age in European children (Wijnhoven et al., 2014; Brug et al., 2012) as well as in Polish children (Kulaga et al., 2011). According to a study by Tinggaard et al., (2014) Danish boys (up to 20 years old) have higher body weight than girls in all age groups.

Comparison results from this study show that Albanian 6 years old boys are ranked first with regard to body weight, while the third for 6-year-old girls compared to European children.

Albania has a mean body weight of 27.2 kg for boys (7 years old), being in seventh place and 26.3 kg for girls, ranking ninth. The mean body weight of girls (8 years) in Albania is 29.2 kg, ranking fifth, while boys have a mean body weight of 31.2 kg, ranking fourth. Spain ranks second with the highest body weight with values 35.9 kg for boys and 35.2 kg for girls (9 years old). Albania's boys have a mean body weight of 34.6 kg, ranking fourth.

Comparative data from this study on body weight between Albanian and European children show that Albanian boys and girls in elementary school (ages 6-9) are ranked among the lower body weight children compared to European counterparts.

According to Rockholm et al. (2010) the increase in excess body weight in children and adolescents has spread to high-income countries, but continues in low-income and middle-income countries.

In terms of the progress over the years of the trend of body weight of European children, it is clear that there is a significant increase over the years. Italian children of 2001-2002 compared to children of 1974-1975 (Toselli, Ventrella, Franzaroli, & Brasili, 2006) have an increase in body weight in boys and girls aged 6-9 years. In 6-year-old boys (2001-2002 compared to 1974-1975) the increase in body weight is from 1.8 kg (6 years) to 5 kg (9 years). In girls, the increase in body weight decreases from 9.5% (6 years) to -2.2 kg (9 years). Norwegian school-age children (4-17 years old) weigh more (Júliússon et al., 2009) compared to 1970s children (between 1970-1980 and 2003-2006). The study of Simsek, Ulukol and Gulnar (2005) in children of 1993 and 2003 in Turkey shows an increase in body weight of 2.7-6.3 kg. According to a study by Wikland, Luo, Niklasson, and Karlberg (2002) Swedish children have an increase in body weight by comparing them in years (1955-1958 with those born 1973-1975) respectively; 19-year-old boys with a weight gain of 5.7 kg and girls a 3.4 kg increase.

The presented data and results should be interpreted in the light of the following limitations. We do not possess data to verify and make comparison with the relevant databases of studies undertaken in Europe. Also another limitation is the fact in some of the European countries there are differences in the number of children (sample) taken in the study that leads to decrease the power of statistical comparison analysis.

In Albania there is no systematic valid data to give us the opportunity to compare over the years how has been the trend of body weight in children by comparing it from generation to generation. This data would be a great help in creating a clear



picture of the trends of body weight growth over the years in Albanian children. This is a suggestion for further studies in the field of this study in Albania. These data are very important for the consequences on public health given that overweight children have a tendency to become overweight adults (Deshmukh et al., 2006).

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#### Conflict of Interest

The authors declare that there are no conflicts of interest.

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