Routledge
Taylor & Francis Group

Economic Research-Ekonomska Istraživanja

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rero20

Analysis of the existing condition and a suggestion for obesity prevention in early school-age children

Petra Miš Čak, Biljana Trajkovski & Ivana Jurjević Jovanović

To cite this article: Petra Miš Čak, Biljana Trajkovski & Ivana Jurjević Jovanović (2020) Analysis of the existing condition and a suggestion for obesity prevention in early school-age children, Economic Research-Ekonomska Istraživanja, 33:1, 1194-1199, DOI: 10.1080/1331677X.2019.1710231

To link to this article: https://doi.org/10.1080/1331677X.2019.1710231

Published online: 23 Mar 2020.

ECONOMIC RESEARCH-EKONOMSKA ISTRAŽIVANJA
2020, VOL. 33, NO. 1, 1194–1199
https://doi.org/10.1080/1331677X.2019.1710231

Routledge
Taylor & Francis Group

Analysis of the existing condition and a suggestion for obesity prevention in early school-age children

Petra Miš Čak[a], Biljana Trajkovski[b] and Ivana Jurjević Jovanović[c]

[a]Elementary School Kantrida, Rijeka, Croatia; [b]Faculty of Teacher Education, University of Rijeka, Rijeka, Croatia; [c]Education and Teacher Training Agency, Rijeka, Croatia

ABSTRACT

Due to the importance of the role of this topic in the lives of children, but also adults, this paper tackles numerous studies that have explored the same issue. The research findings were analyzed with regards to the examined morphological characteristics (body height, body mass, body mass index, skin folds, body fat content) and activities of younger children in the city of Rijeka. The research was conducted in the Elementary School 'Pehlin' and the Elementary School 'Kozala' on a sample of 245 pupils enrolled in the lower four grades. It was found that younger school children in Rijeka have a moderate body mass, but the percentage of body fat in boys and girls suggests increased caution. A comparison between boys and girls in terms of the morphological characteristics resulted in no statistical differences. It has also been confirmed that children engaged in sports activities show better morphological characteristics, lower body mass as well as a lower body mass index, skin folds, and body fat than children who do not play sports. After the established condition, a preventive kinesiological program was proposed as well as advice that should be followed regarding the diet and the manner in which children spend their leisure time.

ARTICLE HISTORY
Received 12 September 2019
Accepted 23 December 2019

KEYWORDS
Excess weight; obesity; morphological characteristics; nutrition; leisure

JEL CLASSIFICATIONS
I12; I18; I19; I21

Introduction

Data collection and their analysis in the field of the health status of the population are important for determining the increased occurrence of food disorders, i.e., gaining insight into the overall health status of the population. The obtained results help to analyze physical activity and nutritional habits and, consequently, the impact of these two factors on health. Based on the analysis and conclusions that arise therefrom, policies should be developed at the local, regional, and national levels with the aim of improving the quality of children's lives. Monitoring childhood nutrition is particularly pronounced in this field of research. Children, as a vulnerable group in terms of the quality of life, are undergoing a perdiod of growth and development, and their

CONTACT Biljana Trajkovski biljana.trajkovski@uniri.hr; biljana.trajkovski@ufri.uniri.hr

health is considered to be extremely important, even crucial for their development. With regards to excessive weight and obesity, research has been indicating worrying results over the last thirty years. This negative trend has been recorded in many countries around the world, and it is particularly concerning that it has also been confirmed on the sample of early school-age children (Chinn & Rona, 2001; Ogden et al., 2002). In this regard, early school-age prevention programs are of great importance and this is reflected in the aforementioned specificity of that life period for the development of each individual. Apart from the physical development, during that period, children develop attitudes and habits, which often remain the backbone of their personality throughout their lives (Hajdić, Gugić, Bačić, & Hudorović, 2014).

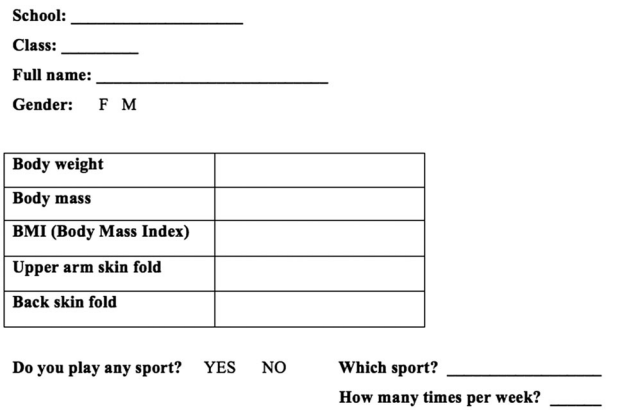
In addition to the norms for the mentioned morphological characteristics, the norms for other morphological dimensions should also be determined, such as the dimensions of subcutaneous fat tissues and the stomach and hip circumference, which enable the monitoring of school-age children's growth and development. In this case, it might be possible to notice the occurrence of the accumulation of body fat sooner and, consequently, react more promptly in order to prevent the development of excessive weight. In these cases, it is suggested to include the child in preventive programs that imply an additional and better organization of leisure time, dietary change, and educating the parents about the problem and the tools for its suppression.

As a result of this, it is extremely important to consider this topic, analyze the morphological characteristics (height, weight, body mass index, skin folds) of early school-age children as well as to propose a preventive program that combats obesity (diet, physical activity, leisure time).

Methods

Obesity research was performed on a randomly selected sample of 245 pupils enrolled in the lower four grades of elementary school. Research participants were pupils attending two elementary schools in the Primosko-goranska County – Elementary School 'Pehlin' and Elementary School 'Kozala'. 101 pupils attending the Elementary School 'Kozala' and 144 pupils attending the Elementary School 'Pehlin' took part in the research, of which 64 were first-graders, 57 were second-graders, 61 were third-graders, and 63 were fourth-graders. In the total sample, there were 110 boys and 135 girls. Anthropometric measurements of body height, body mass, and upper arm and back skin folds were performed on this sample. Values of the body mass index and the body fat content were also recorded. In addition to the measurement values, the data form, shown in Figure 1, contained several questions that the survey participants were asked to answer. The questions referred to the manner in which leisure time is spent, i.e., which activity/sports the child engages in, and their structure was adapted to the age of the participants. In accordance with the rules of the Ethical Code for research with children, each parent gave their written consent for their child's participation in the research.

The collected data were processed using the standard statistical method for basic statistical indicators, whereby the analysis relied on the calculations of arithmetic


School: _____
Class: _____
Full name: _____
Gender: F M

Body weight	
Body mass	
BMI (Body Mass Index)	
Upper arm skin fold	
Back skin fold	

Do you play any sport? YES NO Which sport? _____
How many times per week? _____

Figure 1. Data form.

Table 1. Measurement results of morphological characteristics in boys and girls (BMI = body mass index; AM = arithmetic mean; SD = standard deviation; MIN = minimum score; MAX = maximum score).

VARIABLES	GENDER	AM	SD	MIN	MAX
Body height	M	138.45	9.91	118.00	160.50
	F	137.09	9.74	117.5	158.5
Body mass	M	35.73	10.45	20	77
	F	34.44	10.99	19.50	76.50
BMI	M	18.30	3.48	11.50	32.30
	F	17.98	3.95	11.5	31.2

means (AM) and standard deviations (SD), as well as the minimum (min) and maximum (max) values. The T-test for independent samples identified differences in morphological characteristics with regards to gender, and the T-test for dependent samples established differences in morphological characteristics between the sports and non-sports groups.

Results and discussion

Table 1 shows the results of descriptive statistics.

The average value for the average body height in younger school-age boys is 138.45 cm, while the average body mass value is 35.73 kg. Given these values, the average calculated body mass index is 18.30 kg/m2. When comparing these results with the body mass index for particular age and gender, wiht the aim of determining the risk for excessive body mass, i.e., obesity (Cole, Belizzi, Flegal, & Dietz, 2000), it can be concluded that boys of this age do not belong to the category of excessively heavy children; however, the fact that they show borderline results calls for additional caution.

The results obtained in girls indicate that the average body height in girls at this age is 137.09 cm, while the average body weight is 34.44 kg. The average body mass index is 17.98 kg/m2, which is less than the mean value calculated for girls aged 6.5 to 10 years, which is 18.6 kg/m2. (Cole et al., 2000) Furthermore, this finding suggests that, in the sample of participants from the city of Rijeka, girls of this age are not

Table 2. Results of skin fold measurements in boys and girls (KNN = upper arm skin folds; KNL = back skin folds, KNN + KNL = sum of skin folds; AM = arithmetic mean; SD = standard deviation; MIN = minimum score; MAX = maximum score).

VARIABLES	GENDER	AM	SD	MIN	MAX
KNN	M	18.19	7.23	5	36
	F	19.01	6.87	5	36
KNL	M	12.60	8.16	4	37
	F	13.91	8.94	3	38
KNN + KNL	M	30.79	14.4	9	69
	F	32.93	14.7	10	70

overly heavy, but rather show borderline results, as do the boys, which calls for additional caution.

In addition to the aforementioned morphological characteristics, skin folds (upper arm and back skin folds) were measured in boys and girls, and their sum was calculated to determine the body fat, which is also one of the indicators of obesity in early school-age children. The obtained results, Table 2, were compared with the percentages of body fat for school-age children and young people (6 to 17 years of age), which were determined on the basis of back and upper arm skin folds of American children's population (Lohman, 1987 according to Mišigoj-Duraković, 2008).

The mean value of the sum of skin folds in boys points to the fact that, on average, boys have a high percentage of body fat and, when observing the whole sample, it can be noticed that no participant showed a low percentage of measured body fat. The percentage of body fat was determined on the basis of the obtained values on the scale between 29 and 38 mm (according to Lohman, 1987), which is interpreted as a high proportion of body fat.

For girls, the average value of skin folds is 32.93 mm, indicating a moderately high body fat content. The borderline value between 28 and 35 mm in girls (according to Lohman, 1987) represents a moderately high body fat content.

Although in the city of Rijeka, according to the average values of the body mass index, younger school-age boys and girls are not characterized by excessive weight, the values of the measured skin folds show that there are indicators pointing to the risk of excessive weight and obesity in children's further development.

The results of the T-test for independent samples, which determined the differences in the measured characteristics (body height, body mass, body mass index, upper arm and back skin folds, sum of skin folds) between boys and girls, are presented in Table 3.

In all measured variables, the obtained values lead to the conclusion that there are no statistically significant differences between boys and girls in the morphological characteristics; the aforementioned suggests that boys and girls at this age have similar characteristics regarding their morphological structure. The findings do not support those research results that allude to higher values of skin folds in girls, i.e., greater body mass and body volume values in boys (Bala & Katić, 2009).

Based on the answers to the research questions, it was found that almost one third of the participants do not participate in any sport, i.e., are not part of any organized physical activity. More favorable morphological characteristics were observed in 165 pupils. By comparing the obtained values, it can be observed that children who are

Table 3. Differences in the morphological characteristics between boys and girls – T-test for independent samples (AMM = arithmetic mean for boys; AMF = arithmetic mean for girls; t-value = t-test; p = significance level).

VARIABLES	AMM	AMF	T-value	p
Body height	138.45	137.09	1.08	0.28
Body mass	35.73	34.44	0.93	0.35
BMI	18.30	17.98	0.66	0.51
KNN	18.19	19.01	−0.91	0.36
KNL	12.6	13.91	−1.19	0.24
KNN + KNL	30.79	32.93	−1.14	0.25

Table 4. Differences in the morphological characteristics between children not participating and participating in sports (SPORT-NO = non-sporting children; SPORT-YES = sporting children; T-value = t-test p = significance level).

VARIABLES	SPORT-NO	SPORT-YES	T-value	p
Body height	137.7	137.69	0.00	1.00
Body massa	37.34	33.90	2.38	0.02
BMI	19.27	17.57	3.41	0.00
KNN	20.65	17.67	3.16	0.00
KNL	16.16	11.95	3.69	0.00
KNN + KNL	36.81	29.62	3.72	0.00

engaged in sports activities have on average a lower body mass and body mass index as well as skin folds, i.e., body fat. In addition, the T-test showed to a difference in all morphological characteristics, except in body height, between the pupils who take part in sports activities and those that do not, as shown in Table 4.

Conclusion

In the last few years, excessive weight and obesity have been mentioned as problems which children and the youth face increasingly often. Alarming warnings and the rise in the number of preventive programs offered by experts have sparked a large body of research, whose findings show that the number of overweight and obese people has increased over the years in almost all generations, especially children. The main reasons for this problem may be found in the greater availability and consumption of unhealthy foods, as well as the children's decreasing need to spend their leisure time in a fun and physically-active way.

This research conducted on a sample of pupils from the city of Rijeka showed that young school-age children have a moderate body mass, but in spite of this, the values show that the body fat content indicates a need for additional caution. Based on the measured morphological characteristics, it was found that there are no differences between boys and girls in morphological characteristics and that children who spend time in sports activities have a lower body mass index and body fat.

After determining the existing condition, a number of guidelines are provided, which serve as preventative steps with the aim of reducing the number of children facing excessive weight and obesity for the purpose of quality and healthy development and life of each child. The guidelines include a healthier diet and a more active lifestyle, which implies a whole range of tasks that parents and other adults, who are

caring for the child, should perform to make the child adopt, accept, and further practice the described way of life.

Disclosure statement

No potential conflict of interest was reported by the authors.

References

Bala, G., & Katić, R. (2009). Sex differences in anthropometric characteristics, motor and cognitive functioning in preschool children at the time of school enrolment. *Collegium Antropologicum*, *33*(4), 1071–1078.

Chinn, S. I., & Rona, R. (2001). Prevalence and trends in overweight and obesity in three cross sectional studies of British children, 1974 – 1994. *BMJ*, *322*(7277), 24–26. doi:10.1136/bmj.322.7277.24

Cole, T., Belizzi, M. C., Flegal, K. M. I., & Dietz, W. H. (2000). Establishing a standard definition for child overweight and obesity worldwide: International survey. *BMJ*, *320*(7244), 1240–1243. doi:10.1136/bmj.320.7244.1240

Hajdić, S., Gugić, T., Bačić, K. I., & Hudorović, N. (2014). Prevencija pretilosti u dječjoj dobi. *Sestrinski Glasnik*, *19*(3), 239–241.

Lohman, T. G. (1987). The use of skinfolds to estimate body fatness on children and youth. *Journal of Physical Education, Recreation & Dance*, *58*(9), 98–102. doi:10.1080/07303084.1987.10604383

Mišigoj-Duraković, M. (2008). *Kinantropologija-biološki aspekti tjelesnog vježbanja*. Zagreb: Kineziološki Fakultet Sveučilišta u Zagrebu.

Ogden, C., Flegal, K., Carroll, M., & Johnson, C. (2002). Prevalence and trends in overweight among US children and adolescents. *JAMA 2002*, *288*(14), 1728–1732.