WHAT DOES A SCHOOLBAG OF PRIMARY SCHOOL GIRL PUPILS LOOK LIKE?

Živorad Marković[1], Zoran Bogdanović[2] and Drena Trkulja-Petković[3]

[1] Faculty of Pedagogy in Jagodina, Serbia
[2] University of Novi Pazar, Department of sport and rehability, Novi Pazar, Serbia
[3] University of Zagreb, Faculty of Kinesiology, Croatia

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Abstract
The goal of this research was to examine the weight of a schoolbag which female pupils carry to school every day, i.e., percentage ratio of schoolbag weight in relation to the body weight which is recommended by World Health Organization and which must not be more than 10% of body weight. The research was realized on the sample of 114 girl pupils, divided into eight sub samples according to grade. The research included body weight, schoolbag weight and percentage ratio of schoolbag weight in relation to body weight. Analysis of variance indicates statistically significant differences for each variable in relation to grade. Percentage ratio of a schoolbag weight in relation to body weight is the smallest in seventh and biggest in first grade.

Key words: *schoolbag, girl pupils, primary school*

Introduction

The World Health Organization recommends that pupils do not carry schoolbags which are heavier than 10% of their body weight, but Serbian primary school pupils stumble under three times bigger schoolbag's weight. In recent years there have been talks about the problem of a heavy schoolbag related to different types of improper posture, pain in the back and neck and naturally spinal deformities (Wigram 2002). Some countries respecting the proposed schoolbag weight recommendation by World Health Organization have passed laws which denote maximal weight that children are allowed to carry. It is considered that children must not carry more than 10% of their body weight. The Ministry of Education of Austria decided that schoolbags should not be heavier than 10% of children's body weight in 1996. It is reported by Polish media that Polish Sanitation Inspection (SANEPID) will start to measure schoolbag's weight to check if the recommendation of World Health Organization is respected, so that books, notebooks and stationary on pupils' backs do not go over 10% of children's body weight. Schoolbags in Poland are becoming heavier every year, and while a child weighing 20 kilograms should carry only two kilograms, average schoolbag in Poland weighs six kilograms. Apart from regular controls of SANEPID, the Ministry has announced a new regulation by which schools will be obliged to enable pupils to leave overweight material from their schoolbags at schools and not to carry them home. A schoolbag weight which children carry to school is from 4.00 to 7.70kg in different research results (Casey & Dockrell, 1996; Pascoe et al., 1997; Winfield; Grimmer et all., 1999). If it is expressed in percentage of children's body weight the value is between 10% and 20%. The research done in Ireland (Casey, 2003) has recorded the average schoolbag weight of 5.16kg which represented 15.20% in relation to average schildren's body weight.

In their neighbourhood, in Great Britain this relation in research (Kath, et al., 002) was 10.40% for younger pupils (thirteen year old pupils) and 10.20% for older pupils (sixteen year old pupils). Similar results were recorded in Germany (Voll & Klimmt, 1977). For the youngest pupils the relation between schoolbag weight and children's body weight was 11.10%. later, in the second level of education that relation was 12.50%, and in the third level of education the relation was from 12.50% to 14.30%. The research results (Grimmer et al, 1999) recorded the average schoolbag weight in Australian children of 5.3 kg which was about 10% of body weight. Although the ratio was about the recommended standard of 10%, even 50% of pupils were over this average value. In the research Pascoe et al., (1997) done in the USA, average schoolbag weight was 17% of the total children's body weight. Some values were even up to 22%. In another research (Meckenzie, 2003) in the USA, the average ratio of schoolbag weight and children's body weight was from 15-20%.

The Hong Kong Society for Child' Health and Development recorded middle average value of a schoolbag weight of 20.20% from the total pupil's body weight. They also recorded that 45 pupils oout of 812 who had participated in the research had certain spinal deformities. The research in Croatia which included all lower grade pupils, has recently showed that the average schoolbag weight in relation to average pupil's weight is between 12.50 and 13.80% (Paušić and Kujundžić, 2008). In Slovenia the average ratio of schoolbag weight and pupil's weight is 13.17%. And while this problem is being discussed, the research indicates that one third of school children in Serbia has some kind of spinal deformity. If we add to the schoolbag weight physical inactivity, the best result would be bad posture and slightly bended shoulders, which is an alarm that something has to be done. Children as well as grown ups have a sedentary way of life and they have weak back muscles.

If they carry heavy schoolbag every day, this will have bad influence on their body growth and development. The goal of this research was to evaluate a schoolbag weight which female pupils carry every day, i.e., percentage ratio of a schoolbag weight in relation to body weight which must not be over 10% of a body weight by the recommendation of World Health Organization.

Methods

This is an empirical transversal research realized in primary school „Jovan Jovanovic Zmaj" in Svilajnac during 2010/11 school year.

The research included 114 female pupils, divided into eight characteristic sub samples according to their age. Variables which were used are: pupil's body weight, pupil's schoolbag weight and percentage ratio of pupil's schoolbag weight in relation to pupil's body weight.

Measures were realized in sports hall during regular physical education lessons. Measures were realized by physical education teachers. Descriptive statistics and analysis of variance were used in the processing of data. Results were presented in tables, with dendogram and interval elypsis of trust.

Results

Table 1. Central and dispersion parameters and measure of asymmetry and flatness of female pupils' body mass from the first to the eighth grade

Grade	M	SD	Min	Mah	Cv	Int	Pov	Skew	Kurt	p
First	25.82	3.92	21.00	37.00	15.19	23.93	27.71	1.19	1.45	.706
Second	30.61	6.18	21.50	39.00	20.20	25.86	35.37	-.20	-1.25	.993
Third	34.58	1.77	33.00	37.00	5.13	32.72	36.44	.47	-1.50	.910
Fourth	35.75	7.98	22.50	50.00	22.32	30.68	40.82	.10	-.81	.971
Fifth	42.08	12.20	25.00	72.00	28.99	36.01	48.15	1.09	.49	.209
Sixth	50.75	12.63	30.00	72.50	24.88	43.46	58.04	.50	-.65	.406
Seventh	53.03	9.15	42.50	73.00	17.26	48.61	57.44	.51	-.78	.583
Eighth	53.26	8.22	41.00	71.00	15.44	49.03	57.49	.45	-.53	.488

Table 2. Central and dispersion parameters and measure of asymmetry and flatness of female pupils' schoolbag weight from the first to the eighth grade

Grade	M	SD	Min	Mah	Cv	Int	Pov	Skew	Kurt	p
First	3.34	.54	2.00	4.10	16.20	3.08	3.60	-.49	-.13	1.000
Second	3.07	.45	2.40	4.00	14.65	2.73	3.42	.58	.24	.781
Third	2.89	.46	2.20	3.50	15.81	2.41	3.37	-.19	-.24	.999
Fourth	3.80	.88	2.50	5.70	23.05	3.24	4.35	.67	.14	.817
Fifth	3.93	.57	2.90	4.80	14.53	3.64	4.21	-.22	-.99	.987
Sixth	3.60	1.30	1.00	5.80	36.21	2.85	4.36	-.50	-.31	.982
Seventh	2.35	.60	1.10	3.70	25.41	2.06	2.63	.06	.47	.541
Eighth	3.13	1.01	1.80	5.80	32.13	2.61	3.63	1.46	1.48	.247

Table 3. Central and dispersion parameters and measure of asymmetry and flatness of percentage ratio of a schoolbag weight in relation to pupils' weight from the first to the eighth grade

Grade	M	SD	Min	Mah	Cv	Int	Pov	Skew	Kurt	p
First	13.05	1.94	9.00	16.00	14.87	12.11	13.99	-.50	-.64	.999
Second	10.49	2.85	6.90	14.40	27.13	8.30	12.86	.09	-.27	.875
Third	8.39	1.43	6.00	10.30	17.05	6.89	9.89	-.41	-.40	.987
Fourth	11.06	3.11	6.10	15.90	28.09	9.09	13.03	-.14	-.93	.991
Fifth	9.80	2.29	5.90	16.50	23.36	8.66	10.94	1.29	2.70	.294
Sixth	7.43	3.22	2.30	14.50	43.40	5.57	9.29	.41	.09	.780
Seventh	4.53	1.35	2.00	8.30	29.82	3.88	5.18	.68	1.70	.425
Eighth	5.96	1.92	3.90	11.00	32.21	4.97	6.94	1.18	.89	.475

Table 4. Significance of differences for female pupils from the first to the eight grades in relation to body weight, schoolbag weight and ratio of schoolbag weight in relation to pupils' body weight

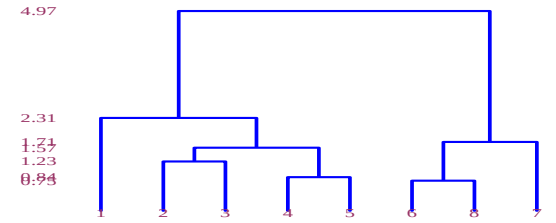
Analysis	F	p
Body weight	22.26	.000
Schoolbag weight	6.95	.000
Percentage ratio of schoolbag weight and body weight	25.70	.000

Table 5. Discriminative coefficients in relation to body weight, schoolbag weight and percentage ratio of schoolbag weight and body weight of female pupils

Variables	Discriminative
Body weight	80.14
Schoolbag weight	118.20
Percentage ratio of schoolbag weight and body weight	4671.78

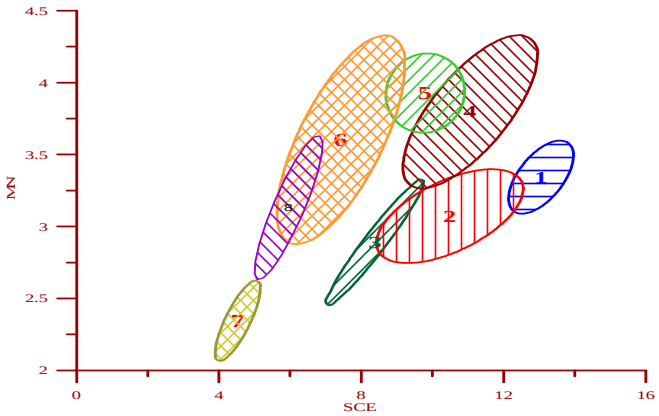
The values of univariant analysis of variance indicate that for all three variables there are statistically significant differences in relation to age, with the level of statistical significance of p=.000. In Table 1. it can be seen that the values of body weight is not over the average values for the age. It is evident that the increase of body weight is more expressed from the fifth to the eighth grade comparing it to the period between the I. and the IV. grade. In table 2. it can be seen that the values of standard deviation indicate heterogeneity of the results, for sixth grade pupils, since the schoolbag weight which is carried varies from 1.00kg to 5.80 kg. All results are normally distributed because the skunis values for all grades are in the interval between -1 to +1, except for the eighth grade.

Kurtosis is for all researched variables less than three, which indicates the homogeneity of the results for all nine researched variables and leptokurtic of the curve. The distribution of the values is in the framework of normal distribution for all grades which is indicated by Kolmogorov-Smirnoff's test. Percentage ratio of a schoolbag weight in relation to body weight by grades is represented in table 3. The highest value is in the first grade and it is 13.04%. In the second and in the fourth grade it also goes over recommended maximum of 10%. The thing that attracts attention are maximal percentage values which in all grades except for the seventh grade, go over recommended maximum. In the first, fourth and fifth grade they go over 15%. The biggest contribution to difference for female pupils from the first to the eighth grade is in percentage ratio of schoolbag weight and body weight with the discriminative coefficient of 4671.781 (Table 5).



Dendrogram 1. Distances between female pupils in grades in relation to body weight, schoolbag weight and percentage ratio of schoolbag weight and body weight

/First grade (1), second grade (2); third grade (3); fourth grade (4); fifth grade (5); sixth grade (6); seventh grade (7); eighth grade (8)/



Graph 1. Ellipses (interval of trust) of grades in relation to schoolbag weight and percentage ratio of schoolbag weight and body weight

/First grade (1), second grade (2); third grade (3); fourth grade (4); fifth grade (5); sixth grade (6); seventh grade (7); eighth grade (8); schoolbag weight and percentage ratio in relation to body weight/

On the basis of dendogram 1. it can be seen that the closest are sixth and third grade with the distance of 0.75.

The biggest difference is between first and seventh grade with a distance 4.97. On the basis of graph of ellipses (interval of trust) position and characteristics of each grade can be seen in relation to most discriminative states, and these are: percentage ratio of schoolbag weight in relation to percentage ratio of schoolbag weight to body weight. The value of percentage ratio of schoolbag weight in relation to body weight was presented on apcis and values of schoolbag weight were presented on ordinate. It is possible to notice that percentage ratio of schoolbag weight and body weight is the lowest in seventh grade, and it is highest in first. In relation to schoolbag weight seventh grade has the lowest and first grade the highest value.

Discussion

Average values of schoolbag weight in this research are less on average than average values in similar researches (Casey & Dockrell, 1996; Pascoe et al., 1997; Withfield; Grimmer et al., 1999). Percentage ratio of schoolbag weight in relation to body weight was for younger pupils from 4.53% to 13.05%. These values are in the framework of the results of similar research. Maximal values are up to 16.50% and they are similar to researches (Pascoe et al., 1997; Meckenzie,2001) in which the values of 15% were recorded, in most researches the values are from 10%-14% (Withfield, 2007; Fosančić, 29007; Paušić & Kujundžić, 2008; Kath et al., 2002; Voll & Klimmt, 1977). In the research (Grimmer et al., 1999) which had almost identical results as this research, it is quoted that for 50% of female pupils schoolbag weight is over 10% of the total weight.

A significant trend of smaller values is noticeable in seventh grade and eighth grade. Recommendations to parents, teachers, pedagogues, psychologists, school doctors, principals, school boards and to Ministry of Education would be as follows: It is necessary to check what is in schoolbags everyday. It should be a normal thing to check what kids have in their schoolbags. The schoolbag weight depends on its size as well as big pencil cases with sufficient stationery, pencils and markers, sometimes weighing a kilogram. Experts think that when choosing notebooks parents should choose smaller ones – A5, and not A4, because most teacher request pupils to have bigger notebooks.

Six A4 notebooks are twice heavier than six A5 notebooks. Schoolbag should be light and anatomically shaped, made of quality impregnable material, not wider than child's shoulders, the bottom of the schoolbag should be made of firm material with strengthening on the sides, schoolbag strips should me wide and soft, schoolbag should be carried on both shoulders, not on one shoulder or in hand, it should have more pockets so that the weight could be shared evenly, it should have catadiopters so that a child should be noticeable in traffic, without metal additions, sharp edges and application of hard plastic.

Conclusion

The research indicates that the results in primary school are similar to other results in the world. The thing that worries are the large variations between female pupils of the same grade, even from the same class. Schools should provide space for pupil's wardrobes, so that some books, which are not needed for homework and studying, should be left at school. The Ministry of Education can lessen curricula for 30% and in this way it will not affect the knowledge students should acquire in primary education. Children's health should be in the first place during the whole period of schooling in all countries in the world.

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KAKVA JE ĐAČKA TORBA UČENICA OSNOVNOŠKOLSKOG UZRASTA?

Sažetak

Cilj istraživanja je bio da se istraži masa torbe koju učenice svakodnevno nose, tj. procentualni odnos mase đačke torbe u odnosu na masu tela koji po preporuci Svetske zdravstvene organizacije ne sme da prelazi 10% mase tela. Istraživanje je realizovano na uzorku od 114 učenica, podeljenog na osam subuzoraka u odnosu na razred. Istraživanjem je obuhvaćena masa tela, masa torbe i procentualni odnos mase đačke torbe u odnosu na masu tela. Analiza varijanse ukazuje na statistički značajne razlike za svaku varijablu u odnosu na razred. Procentualni odnos mase torbe u odnosu na masu tela je najmanji u sedmom, a najveći u prvom razredu.

***Ključne riječi**: đačka torba, učenice, osnovna škola*

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Correspondence to:
Stevo Popović
Univerzitet Crne Gore
Fakultet za sport i fizičko vaspitanje
84000 Nikšić, Narodne omladine bb, Crna Gora
Tel: 00 382 (40) 235 207
E-mail: stevop@ac.me

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