Samo Fošnarič, Irena Delčnjak Smrečnik: Physical overburdening of pupils with
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Informatologia, 40, 2007., 3, 207-210

207

PHYSICAL OVERBURDENING OF PUPILS WITH THE WEIGH OF SCHOOL BAGS DURING THE PERIOD OF PASSING FROM EIGHT YEAR PRIMARY SCHOOL TO NINE YEAR PRIMARY SCHOOL

FIZIČKO OPTEREĆENJE UČENIKA TEŽINOM ŠKOLSKIH TORBI U RAZDOBLJU PRIJELAZA IZ OSMOG U DEVETI RAZRED OSNOVNE ŠKOLE

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Abstract

The article shows the empirical research which was carried out to present how children are overburdened by the weight of their school bags. 107 pupils who are now in the fifth grade and this year are finishing the eight-year- primary school and next year they are continuing in the nine-year- primary school were included in the research. We confirmed the finding that at average the weight of a school bag of eleven years old pupil does not exceed 10 per cents which is the highest value at one hour burdening. At twelve years old pupils the weight of school bags increases for 3, 59 % of body weight of a pupil and that represents 13, 17 % in relation to body weight. And there the critical point is exceeded. Obviously, there is a statistical discrepancy in the weight of school bags between eleven and twelve year's old pupils. The reasons for the increase of weight should be looked for in school schedules for both grades and in the increase of the use of textbooks in the seventh grade of nine-year primary school.

Sažetak

Rad prikazuje empirijsko istraživanje, koje se provelo sa svrhom rasvjetljavanja opterećenja učenika težinom školskih torbi. U istraživanje je bilo uključeno 107 učenika, u 5. razredu osnovnog školovanja koji su narednu godinu počeli u 7. razredu, sa programom devetogodišnjeg obrazovanja. Potvrđena je hipoteza, da u prosjeku težina školskih torbi kod 11-godišnjaka ne iznosi više od 10 %, što je najviša moguća gornja granica kod jednosatnog opterećenja. Kod jednu godinu starijih učenika (12-godišnjaci) ustanovili smo, da se je težina školskih torbi u prosjeku povećala za 3,59 % tjelesne težine učenika i tako predstavlja u odnosu na tjelesnu težinu 13,17%. Ustanovljeno je da se prekoračuje kritična granica. S obzirom na to, postoji statistički značajna razlika u težini školskih torbi između jednu godinu starijim odnosno mlađim učenicima (11-godišnjaci, 12-godišnjaci). Uzroke je potrebno pronaći u nastavnim planovima obiju razreda i većem broju nastavnih gradiva u 7. razredu devetogodišnje osnovne škole.

INTRODUCTION

In recent years there are many articles and discussions about too heavy school bags which may be reasons for problems with poise or with a backbone. These problems are; fast and asymmetrical growth, too little movement and too much sitting, acquired and inborn defects in muscles and bones, and overburdening of a child in school etc.

The change of curriculum in the nine-year primary school stimulated the creation of many textbooks and other learning materials and therefore there was

created an extensive and various offer of learning materials. As a rule, there was for every obligatory and selective school subject a workbook, too. In order to achieve the most effective learning and consequently the most qualitative knowledge teachers very often demanded a workbook and some other materials. For that reason the weight of school bags from the fifth to the seventh grade appreciable increased and the problem with the weight became burning in our country, too.

Likewise Casey /1/ who made a research in Ireland reports about 15, 2% relation between the weight of a school bag and body weight of ten years olds. On average their school bag weighs 5, 16 kg. Whitfield /2/ quotes the study from the year 1965 (Malhortr, Sen Gupt) which reports the relation between the weight of a school bag and body weight is between 10 % and 12 %. He also quotes that German scientists found out that the relation between the weight of a

208

Samo Fošnarič, Irena Delčnjak Smrečnik: Physical overburdening of pupils with
the weight of school bags during the period of passing from eight year primary school to nine year primary school
Informatologia, 40, 2007., 3, 207-210

school bag and body weight was 11, 1 % on the first level, 12, 5 % on the second level and between 12, 5 % and 14, 3 % on the third level. Whitfield /3/ also quotes the results of research which was carried out in British schools (1997), where they found out that thirteen years olds carry schoolbags which present 10, 4% of their body weight and sixteen years olds 10, 2 %. Pascoe /4/ quotes that the weight of school bags in the relation to body weight presents 17 % of body weight sometimes even 22 %. Research carried out in New Zealand's primary schools included 140 thirteen years' old pupils showed similar results, that is 10, 3 % weight of a school bag in relation to body weight.

Unfortunately, most of these researches quote only the weight of school bags and neglect the duration of carrying.

The Institute of Republic Slovenia for protecting health in 2003 announced on the internet that a school bag must not exceed 10 % of pupil's body weight.

In Austria they also adopt a law which defines that a school bag must not exceed 10 % of pupil's body weight /5/. But it does not mention the duration of carrying the school bag. A similar recommendation can also be found in the USA /6/.

Beside that it must be stressed that also in The Ministry of Education in times of initiating the nine-year primary school (the fifth – the last circle / round, school year 2003/2004) focused some attention on the weight of school bags. They found out that the weight of school bags does not cause problems in the first triad because pupils leave most of their textbooks and other materials in school. Unfortunately the problem increases in higher grades. And consequently we decided to research that problem.

METHODS

We started the research with measuring the weight of school bags in the fifth grade of eight-year primary school and of the seventh grade nine-year primary school. We wanted to compare the weight of both grades, the carrying time in both grades and the number of pupils having problems with a backbone. We used descriptive and causal-nonexperimental method of empirical pedagogical research. 53 pupils from the fifth grade of eight-year primary school and 54 pupils from the seventh grade of nine-year primary school were included in the research.

We included pupils from schools which started initiating the nine-year primary school as the last ones, in the final fifth round. These pupils continue in the seventh grade of nine-year primary school after finishing the fifth grade of eight-year primary school. In the fifth grade they are eleven years old and in the seventh grade they are twelve years old. Therefore, there is only one year difference among included pupils. Body weight of the fifth graders was between 32,0 and 77,5 kg ($\bar{x}$ = 47, 93 and s = 11,36). Body weight of the seventh graders was between 32,5 kg and 90 kg ($\bar{x}$ = 51, 16 and s = 11, 26). The data was processed on the level of descriptive and inferent statistics.

RESULTS AND DISCUSSION

Table 1 shows the share of the school bag's weight according to the pupil's weight. With the fifth graders (age: 11) the average share is 9, 58 %, and once a week – on Friday it exceed 10 %. From the results of the measures in the fifth grade (χ^2 = 27, 76, α = P = 0, 01) statistically noticeable difference between different days is not seen.

Table 1: The weight of a full school bag for both grades in different days according to the pupil's weight with the result of χ^2–test

The weight of a school bag according to the pupil's weight [%] Grade		Monday	Tuesday	Wednesday	Thursday	Friday	Average
5th grade of eight-year primary school Age: 11	The lowest	6,05	7.09	7,08	7,09	6,67	6,79
	The highest	12,02	12,81	11,80	11,7	13,6	12,38
	Average	9,03	9,95	9,44	9,39	10,3	9,58
	The result of χ^2-test	χ^2= 27,76 P = 0,01					
7th grade of nine-year primary school Age: 12	The lowest	5,86	6,45	6,25	4,69	7,61	6,17
	The highest	24,43	19,74	19,15	20,13	17,39	20,16
	Average	15,14	13,09	12,71	12,41	12,51	13,17
	The result of χ^2-test	χ^2 = 32,66 P=0,14					

Samo Fošnarič, Irena Delčnjak Smrečnik: Physical overburdening of pupils with
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Informatologia, 40, 2007., 3, 207-210

209

The weight of school bags at the seventh graders (age: 12) exceed 10 % of pupil's body weight. The results higher of 10 % are noted down every day. Statistically distinctive difference in the weight of school bags on different days is also noticed (χ^2 = 32,66, α = P = 0,14). Monday withdraws among the other days of the week (χ^2 = 15,14 kg).

We sum up that on average the weight of a school bag in the fifth grade does not exceed 10 % which present the highest point at 60 minutes burdening.

On the other hand, we can ascertain that with one year older pupils the weight of school bags on average exceeds the highest allowed point of 10 % for 3,5 %. We also ascertain that the burdening of the fifth graders is much more equable during the week than of the seventh graders.

The majority of the fifth grade pupils have got a school bag which empty weighs from 700 g to 900 g (39,62 %). Many pupils also carry school bags which weigh between 400 g and 600 g. Only 24,3 % of school bags weigh 1 kg or more.

The situation is much alike in the seventh grade (Age: 12). 16,7 % of school bags weigh 1 kg or more.

Summing up, 20,5 % of the fifth and seventh grade pupils have got too heavy empty bags on average.

Table 2 shows that the average carrying time of a school bag lasts 47, 93 min at the fifth graders (s = 11,36) and 51, 16 min at the seventh graders (s = 22,22).

The difference in standard declination shows a little bit higher variability with older pupils. A supposition about homologous variances can be confirmed (F = 0, 510, α = 0, 478). There is no statistically characteristic difference noticed between the arithmetical mediums of both classes in carrying of a school bag (t = 0,510, P = 0,328). In the fifth grade only 6 pupils (11,3 %) and in the seventh grade only 5 pupils (9,2 %) carry a school bag for more than one hour a day.

We can sum up that none of the discussed groups does not carry a school bag for more than one hour a day and that may be a consequence of well organised transport.

The test of differences between arithmetical mediums (t= -5.050, a=P= 0,000= is statistically characteristic (Table 3). We ascertain that more pupils in the seventh grade of nine-year primary school have got a painful backbone than pupils in the fifth grade of eight-year primary school.

We also found out that schoolbags in the fifth grade weigh between 3, 4 and 7, 17 kg, which is 4, 87 kg on average. School bags in the seventh grade weigh between 3, 16 and 10, 30 kg, which is 6, 74 kg on average.

According to that we found out that in the fifth class the lightest schoolbag represented 6, 05 % of body weight, which is 6, 79 % in the average week and that the heaviest school bag represented 13, 6 % of pupil's body weight, which is 12, 38 % in the

Table 2: The test of homologous variances and a common t-test of differences between arithmetical mediums of duration of carrying a school bag to school and back home according to the separate grades

Body weight **[kg]** Grade	n	[minute]	s	The test of homologous variances F α	Test of differences between arithmetical mediums T P
5th grade of eight-year primary school	53	47,93	11,36	0,510 0,478	- 0,987 0,328
7th grade of nine-year primary school	54	51,16	22,22		

Table 3: The test of homologous variances (Levene F-test) and a common t-test of differences between arithmetical mediums of appearing of risky backbones according to the separate grades

Variable 'A risky backbone'	Class	n	$\overline{x}$ [%]	The test of homologous variances		Test of differences between arithmetical mediums	
	5. grade of eight-year primary school Age: 11	53	9,58	6,036	0,079	-5,050	0,000
	7. grade of nine-year primary school Age: 12	54	13,17				

Samo Fošnarič, Irena Delčnjak Smrečnik: Physical overburdening of pupils with
the weight of school bags during the period of passing from eight year primary school to nine year primary school
Informatologia, 40, 2007., 3, 207-210
210

average week. According to the study of one week's average weight we can find out that a schoolbag in the fifth grade represents 9, 58 % of pupil's body weight.

In the seventh grade the lightest schoolbag represented 4, 69 % of body weight, which is 6, 17 % in the average week and that the heaviest school bag represented 24, 43% of pupil's body weight, which is 20, 16 % in the average week. According to the study of one week's average weight we can find out that a school bag in the seventh grade represents 13,17 % of a twelve years old pupil's body weight. Statistically characteristic differences of pupils' burdening with the weight of school bags among different days are noticed.

To sum up, we can find out that on average the weight of a schoolbag with eleven years olds does not exceed 10 %, which is the highest point in one hour burdening. With one year older pupils the weight of a schoolbag enlarges for 3, 59 % of pupil's body weight and in relation to the body weight (13, 17 %) it exceeds the critical point in one hour's burdening.

In lower classes such a difference is not noticed and many researchers indicate the same in their researches /7/. There are some comparisons: 1st grade, age: 6, 7 %; 2nd grade, age: 7, 9 %; 3rd grade, age: 8, 9 %.

CONCLUSION

It is too early for setting global conclusions. It is obvious that overburdening with the weight of schoolbags has consequences of different kinds. Pains in the neck, in the back or in the shoulders are often exposed by pupils. It is found in England that about 45 % of teenagers have periodic pains in their necks and backs, and 7 % of pupils in their shoulders /8/. However, they also emphasize that heavy school bags and described pains can not be always linked together. Described pains are very often the results of too long sitting in front of TV or at a computer, sometimes also of doing some pretentious sports. Pains differ from gender (they are more often with girls), age (older teenagers have stronger pains) and some psychical factors (stress). Also some other authors /9/ emphasize that a strong link between the weight of school bags and a risk for starting pains in the back can not be made. But on the other hand, it is proved that children exposed to higher physical burdening more often complain because of having pains in the back.

Surprisingly, there are no researches which would represent some psychical consequences on teenagers' health caused by overburdening with the weight of school bags. Short-term or long-term influences because of carrying heavy schoolbags in sense of psychical burdening for teenagers have not been proved yet /10/.

Problems exist and we must not avoid them. The weight of schoolbags does not depend only on school's and teachers' work, but it is usually a consequence of pupils' and parents' work. And we should work on this relation intensely.

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