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THE RATIO OF THE WEIGHT OF SCHOOLBAG TO BODY WEIGHT OF STUDENTS IN AHVAZ CITY

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INTRODUCTION

This study aimed to determine the average weight of the backpacks that students carry to school and also to determine the ratio of the weight of schoolbag to weight of the student body in the city of Ahvaz. Materials and methods: This is a descriptive cross-sectional study conducted during October 2010 to June 2011 in Ahvaz city. Samples were selected by a random and two-stage cluster sampling. The weight of schoolbag was measured in three states. Then the data including demograghic characteristics, type of access to the school, the student's weight, the weight of the bag were collected in a separate questionnaire. Results: The average age of the total 500 students chosen for the study was 9 years. In the study, the average weight of girl and boy students was respectively 31.09 ±9.0=61 kg and 31.73±/ 10. 28 kg. The results of the study showed that in all three states, significant differences were observed between boys and girls in the bag's weight (P 0.001). Conclusions: Due to the high percentage of students, who their school bag weight ratio was more than 10 percent of their body weight, measures on the part of the parents, administrators and health caregivers toward weight loss of the schoolbag seems essential.

KEYWORDS: student, schoolbag, body weight.

INTRODUCTION

The weight of the bag for students can impose them irreparable damages such as neck pain, back pain, abnormal spinal spine, and abnormal increase in spinal spine even in some cases, damage to the nerve backbone strings. This issue is most important in children because the vertebrae are growing and underlie scoliosis (abnormal curvature to the parties). As well as stretch marks from carrying bags cause transient or even persistent harms in the nerve roots of shoulder, hands and neck.

Standard of weight bags less than 10% of the weight of the child for the students was suggested by Vol and Klimt for the first time in 1997[1] but even this could not be the exact amount because many children do not even endure the weight.[2] Also, the researchers see the increasing evidence of the back pains of the students as a strong reason for the need to limits on the weight of their backpacks. The Ontario Chiropractic Association in Canada believes that elementary school students should not carry a bag more than 10% of their weight, and in high school their load, and this ratio should not be more than 15 per cent of body weight of students.[3] Laurie Tasel director of the Australian Chiropractic Association also in an article warns to parents about the backpack's weight that kids will carry and believes that 70 percent of the students due to the bad design of the backpacks and carry their inaccuracy are at the problems of the vertebral column. He also believes that many of the adult spine discomfort and even in the elderly are due to the childhood injuries.[4]

Therefore, with regard to the effect of the weight of students ' schoolbag on the health status of their musculoskeletal system, this study aimed to determine the average weight of the backpacks that students carry to school and also to determine the ratio of the weight of schoolbag to weight of the student body in the city of Ahvaz.

MATERIALS AND METHODS

This is a descriptive cross-sectional study conducted during October 2010 to June 2011 in Ahvaz city. Samples were selected by a random and two-stage cluster sampling. The research environment has four education districts. Firstly, on the basis of clustering of the first phase, two districts (2 and 4) among the four districts were selected. Then, on the basis of the second phase clustering in each of the selected districts, the 10 girls' schools and 10 boys' schools were chosen. In the final step in each school, based on the alphabetic list of students' names, 25 students were chosen randomly from every educational first to fifth base. In this study, the

percentage of students who have weight of bags to their body weight ratio in Beheshtipour's study[5] was more than 10% of the standard, was selected as the benchmark of sample size.

Sample size of the study population was calculated using formula: $n= \frac{(z_{1-\frac{\alpha}{2}})^2 pq}{d^2}$ and a 95% confidence coefficient **(**with a 5% error), p= 0.35.1, d=0.05, z=1.96, 350 girls and 350 boys.

After the approval of the research by the Research Ethics Committee of Ahvaz Jundishapur University of Medical Sciences, Coordination was done with the authorities of the regional education offices and the schools for performing the study. After explaining the objectives of the study and obtaining the written informed consent, samples entered the study. A flat digital scale with a precision of 50g for measuring the body weight and a full digital scale with a precision of 5g to determine the weight of students ' bags were used. At the beginning of each day before starting weighing, scales were calibrated with a weight of one kg as a control weight. The weight of students was measured without a coat and shoes and bulky clothing such as jackets. In this study, the weight of schoolbag was measured in the early hours of the morning (before 10: 00 a.m. when students usually used their nutrition) in three states of weights of bags with all the accessories along with nutrition that students have brought from home to school; weights of bags without nutritional ingredients that students have brought from home to school; and weight of bags that students must brought in accordance with class schedule. Then the data, including age, gender, education of mother and father, the location, the type of access to the school, the student's weight, the weight of the bag, presence or absence of physical pain when carrying bags, the location and intensity of physical pain to any student were collected in a separate questionnaire.

The data were entered in the SPSS version 18 and analyzed statistically. In this study, T- test was used to calculate the average difference between the two groups; analysis of one-way variance was used for comparison between several groups; and Chi-square was used to compare the quality of the frequency difference of two quality traits.

RESULTS

The average age of the total 500 students chosen for the study was 9 years. In the study, the average weight of girl and boy students was respectively 31.09 ±9.0=61 kg and 31.73±/ 10. 28 kg.

The results of the study showed that in all three states, significant differences were observed between boys and girls in the bag's weight in terms of the average weight of the bags brought from home to the school with all the accessories along with nutrition, the average weight of the bags brought from home to the school without nutrition, and the average weight of the bags brought from home to the school according to the program without nutritional materials (P 0.001) (table 1).

In addition to the weight of school bags, type of going and coming students from home to school also was taken into consideration in this study. The results showed that 51.2 % of the female students and 66.4% male students walked the path of home to school with 5 minutes to more than an hour daily (figure 1 and table 2).

The findings of the study showed that the bag weight of 60.4% of students is more than 10% of their body weight and a significant difference was observed in the two genders ($P < 0.05$) (table 1).

Figure 2 shows the frequency distribution of the type of bags used by students separated by gender. 81.2% of girl students and 86% of boys used two-sided backpacks while about 19 % of girl students and about 13% of boys did not have standard bags.

The findings of the study showed that 26.4% of girls and 29.6% boys complain the physical effects caused by the weight of school bag (table 3). On the other hand, the most frequency of pain location among the girl students was the shoulders (36.36%) and in the boy students was the neck area (28.37%).

In this study, students were examined in the terms of a spinal symmetrical postural deviation of shoulders and walk condition when carrying bags; its results show that 52.8% of female students and 52 % of boys when carrying schoolbag were bent to the front, left and right (figure 3). Moreover, 36 % of girls and 29.2% of boys were with the asymmetry of the shoulders.

DISCUSSION

In our study, average body weight of students was higher than in the other studies[6, 7, 8, 9, 10] which can be caused by differences of nutritional factors, level of income, family and genetic factors of Ahvazian students compared to the students in other studies. The findings of

the study revealed that the average weight of the bags brought to school was more than the weight of the bags that students used in the studies by Emdadi and Beheshtipur (3 and 5).

In several studies[3, 5, and 11] the weight of the girls' bag was higher than the weight of the boys' bag that its cause in Ahvaz is this gender's tendency to have larger and heavier bags, The use of wheeled bags more than boy students, their tendency to use the large 1-1.5 liter bottles of water, carrying more food, more use of non-essential goods and educational books. The Ontario Chiropractic Association in Canada defined students' bag weight ratio equal to 10% of their body weight.[4] In this study, despite the average proportion was not very high (12% of girls and 11% in boys), but 60 percent of the students had bag weight higher than 10% of body weight that was much higher than in the previous studies that could be due to the more use of wheeled bags as well as the use of mineral water bottles with a weight of one liter and carrying the tuition books for each lesson by Ahvazian students. In this context it is the emphasized that the training managers and staff must take actions for preparing and installing the proper water treatment device in the elementary schools and for stopping the unnecessary use of educational books in the classroom and hence the weight of the students ' bags, and for solving the physical problems caused by the heavy bags.

Our study showed that boy students more than girls were complaining about the physical effects caused by the weight of school bags; its cause might be that a higher percentage of boys than girls, walk path from home to school. So the time of carrying bags also increases and naturally, its complications for male students will be more, as well; although in most studies, the physical effects resulting from carrying the bags in the girls will be more.[5, 3, 12]

The results of this study showed that more than half of the students were complaining about the physical problems caused by school bag and when carrying schoolbag were bent to the front, left and right. However, a small percentage of them have referred to a physician to resolve their physical pain. In this context increasing awareness of students' parents by health caregivers for a visit to the doctor in a timely manner in the field of early detecting the skeletal and muscular problems can be effective.

Table 1: Age, body weight, bag weight, schoolbag weight to body weight ratio of students studied by gender in Ahvaz in 2009-2010

Type of variable	Gender	Number	Average	Standard deviation	P-value
Age	Female	250	9	1.42	1*
	Male	250	9	1.42	
Body weight	Female	250	31.73	10.28	0.47*
	Male	250	31.09	9.61	
Schoolbag weight with all appliances, along with nutrition	Female	250	3.51	0.91	P<0.001
	Male	250	3.11	0.87	
Schoolbag weight without nutritional ingredients	Female	250	3.31	0.83	P<0.001
	Male	250	3.01	0.84	
A schoolbag weight that students must brought in accordance with class schedule	Female	250	2.94	0.56	P<0.001
	Male	250	2.62	0.55	
The ratio schoolbag weight to all parts of their body weight with nutrition	Female	250	0.12	0.04	P<0.001
	Male	250	0.11	0.03	
The ratio schoolbag weight without nutrients to body weight	Female	250	0.11	0.03	P<0.01
	Male	250	0.10	0.03	
The ratio of schoolbag weight (without nutritional ingredients) that students must brought in accordance with class schedule to body weight	Female	250	0.10	0.03	P<0.001
	Male	250	0.09	0.02	

*Alpha level of less than 0.05 was considered as significant.

Table 2: Distribution of students by gender, according to the duration of walking to school in the elementary schools of Ahvaz in 2009-2010

The duration of the walk to school	Sex			
	Girl		Boy	
	Frequency	Percentage	Frequency	Percentage
5 to 15 minutes	81	62.8	84	50.6
15 to 30 minutes	44	34.9	58	34.9
30 to 45 minutes	2	1.6	18	10.8
45 to 60 minutes.	1	0.8	3	1.8
More than an hour	0	0	3	1.8
Total	128	100	166	100

Table 3: Frequency and relative frequency values of the students who are complaining about physical symptoms caused by the weight of schoolbag by the gender in the elementary schools of Ahvaz in 2009-2010

Do students complain of health complications caused by the weight schoolbag?	Sex			
	Girl		Boy	
	Frequency	Percentage	Frequency	Percentage
Yes	66	26.4	74	29.6
No	184	73.6	176	70.4
Total	250	100	250	100

Table 4: Distribution area of pain when carrying the schoolbag by gender in the elementary schools in Ahvaz in 2009-2010

Location of pain	Sex			
	Girl		Boy	
	Frequency	Percentage	Frequency	Percentage
Neck	18	27.27	21	28.37
Shoulder	24	36.36	15	20.27
Back	15	22.72	13	17.56
Elbow	2	3.03	6	8.10
Wrist	7	10.60	19	25.67
Total	66	100	74	100

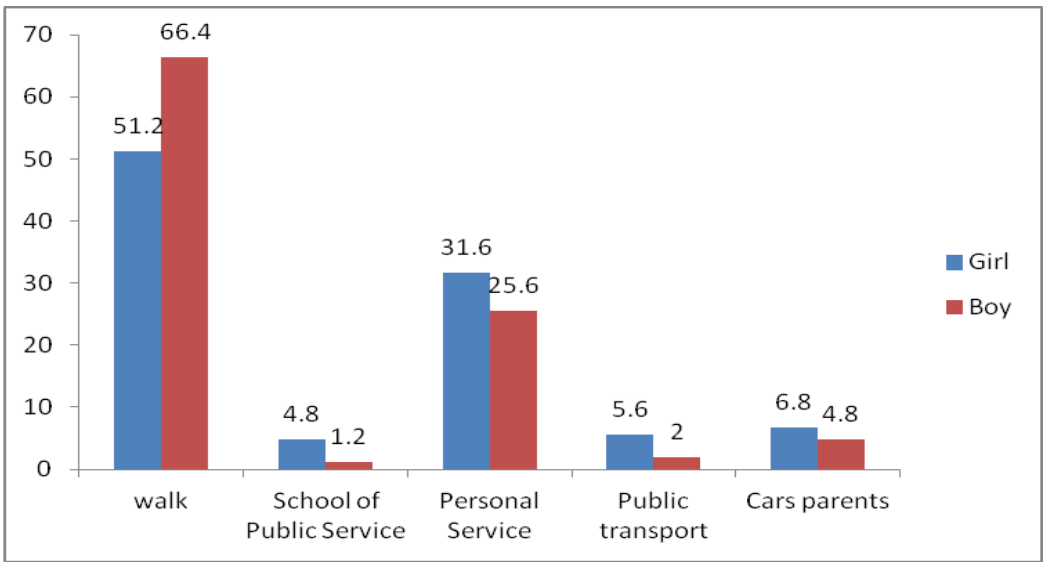

Figure 1- The distribution of types of school traffic of students by gender in the elementary schools in Ahvaz in 2009-2010.

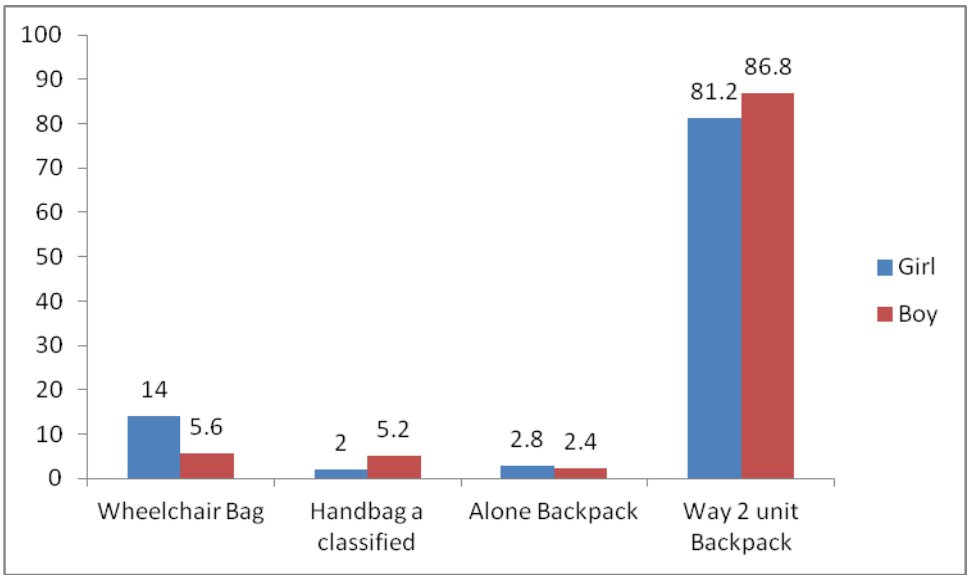

Figure 2: Distribution of bags used by students by gender in Ahvaz in 2009-2010.

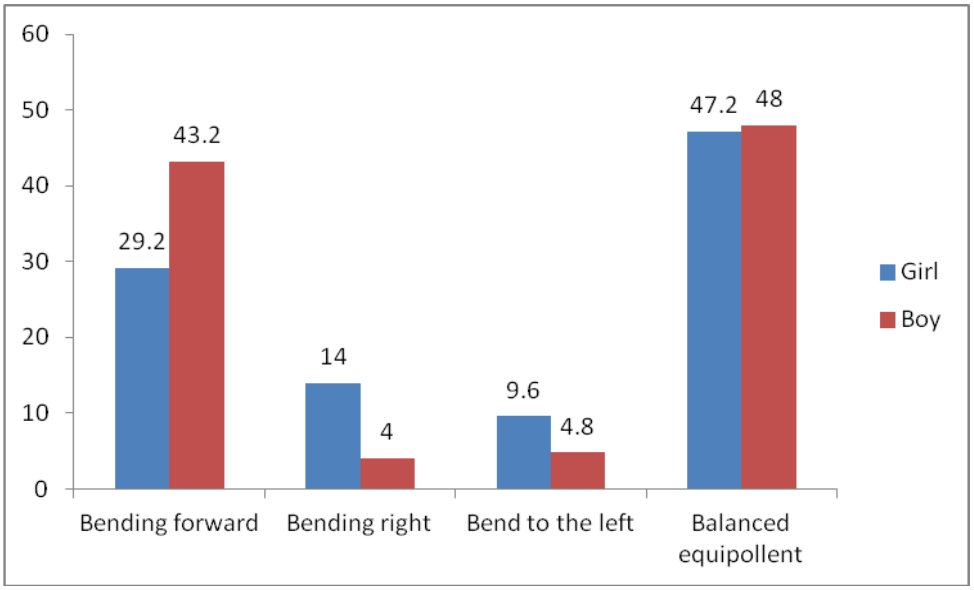

Figure 3: Status of students walking while carrying school bag by gender in elementary schools in Ahvaz in 2009-2010.

CONCLUSIONS

Due to the high percentage of students, who their school bag weight ratio was more than 10 percent of their body weight, measures on the part of the parents, administrators and health caregivers toward weight loss of the schoolbag seems essential.

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