



## Evaluation of the Standards associated with the Primary School Students' Backpack in Karun, Iran

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**Background:** Researches show that backpack is the most appropriate means to be carried by the primary students every day. As the weight of these backpacks may be not standard, this study aimed to evaluate the standards associated with the primary school students' backpack in Karun, Iran.

**Materials and Methods:** This cross-sectional study was done on primary school students studying in Karun, Iran in 2016. In this study, a randomized multi-stage sampling method was performed by which a total of 400 students were selected. A flat scale used to measure the students' weight and a sliding scale used to measure the students' backpack weight. Furthermore, a checklist including the questions regarding standard items of backpack was completed. Collected data through the checklists were analyzed by SPSS software using descriptive statistics.

**Results:** The results of this study showed 35.5% o (N = 142) of the students' backpack weight were between 15-10% of their body weight. Regarding other standards, there was a wide and sponge-like strap in 57.5% of the backpacks (N = 230). However, just 9 students (2/2%) had wheeled bags, and 4 students (1%) had strap bags.

**Conclusions:** According the results of this study complying with standard items of backpack for the primary students is strongly recommended.

**Keywords:** Backpack Standards, Primary Students, Iran

### Introduction

Psychologists have cited different definitions of the growth and its importance.

During the lifetime, the growth process is subjected to several changes, these changes occur in childhood and adolescence. Any deviation in the growth process in these periods of life would show its effects at the higher stages of the growth. Thus, the health is considered as an important and essential factor in the individuals' growth, especially in children and adolescence because during these periods of life, people experience the growth and developmental processes (Hong, Li & Fong, 2008). Among the social institutions, the school is considered as one of the most important

organized official institutions in which by providing a healthy environment, it is possible for community children to flourish their body and soul (Emdadi &, 2004). One of the families' concerns is the children's health. This concern includes all aspects of the growth. In this respect, physical growth is of more interest because of its apparent signs. The use of school supplies and their handling are very important in children's physical health. The inappropriate way of handling these devices is an issue which should be taken into account because the improper way of handling heavy items frequently can cause physical problems and deformities in the individuals' skeleton (Hong & Cheung, 2003). Research shows that after shoes, the most appropriate means for carrying daily needed items is a backpack since all the required equipment must be carried in a backpack; thus, backpack comfort has a great impact on a person's movement (Amiri, Dezfooli & Mortezaei, 2012). However, backpacks have experienced several changes over time, how the backpack is placed on the back is very important

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regarding the physical properties of the human back. For this purpose, a modern backpack needs to be adjustable in terms of its height and its placement on the back from the shoulder to the waist. In producing the new backpacks, even the adjustability of the shoulder strap to the shoulder width is taken into account (Tawrell, 2006). In a study conducted on the physiological effects of the backpack weight and design on the students, it was recommended that the load of an ideal backpack be centered in the middle of the waist, and its weight be no more than 10-15% of the students' body weight. It was also recommended that an ideal backpack has two straps and an air cushion and belts to prevent the injuries imposed on the shoulder (Sherry, 2001). However, carrying heavy backpacks can cause a wide majority of pains related to the musculoskeletal disorders and body malfunctions (Saeedi, Nezami asl & Mokhtar zadeh, 2015). When the backpack is too heavy for children, they arch more than normal or bend their body and head forward in order to be able to withstand the weight of the school bags. This pressure imposed on the neck and back muscles leads to the excessive fatigue and damage (Piscione & Gamet, 2006). Some studies indicated that carrying the school bags caused injuries in 23% of the primary school children and in 33% of the adolescents (Tarhani et al., 2009). About 90 % of the students use backpacks worldwide (Southard, 2005). The space between the vertebrae, the spinal curvature, the risk of nervous pain, the neck pain, and postural abnormalities are adverse effects of carrying heavy bags and backpacks (Bahrian, 1999). In some countries, the students make use of personal lockers in the schools and can hold some of the items related to the school assignments and unnecessary objects in their closets and used them when necessary. In this respect, the students should have enough time in order to be able to make use of their closets. Parents are also advised to remove children's bags unnecessary items (Tarhani et al., 2009).

The aim of this study was to evaluate the standards associated with the primary school students' bags in karun city, in terms of weight, how to load, the type of strap, and back of the backpack.

### Materials and Methods

This study was a cross-sectional study, and the study population was consisted of primary school students studying in Karun city in 1395. A total of 400 students were selected, all of them

were entered into the study with complete satisfaction.

In this study, a randomized multi-stage sampling method was performed, by which the samples were selected from Karun city girls' schools.

The instruments of collecting necessary data were a flat scale to measure the students' weight, and a sliding scale to measure the students' school bags weight. For other related issues, it was carefully made by using of a checklist consisted of a list of questions asked from the students about such things as the students' weight, the students' backpack weight and backpack sponge-like and wide strap, the existence of a sponge layer in the back of the pack, the order of books and supplies in backpacks, and the existence of a waist strap used to close it.

Information on the checklists was analyzed by SPSS software using descriptive statistics, and the frequency tables were used to describe the data.

### Results

This study was performed on 400 high school students from the first grade to the sixth grade. The results of this study showed that the percentage of the students whose backpacks weight was less than 10% of their body weight was 15.5%, the percentage of the students whose backpacks weight was between 15-10% of their body weight was 35.5%, and the percentage of the students whose backpacks weight was more than 15% of their body weight was 13%. Also, regarding other standards, there was a wide and sponge-like strap in 57.5% of the backpacks, 34.2% of the backpacks had a sponge layer on their backs, and there was standard order in books and supplies setting in 46% of the students' backpacks. These standards were taken into account in the students' backpacks. Also, 18.7% of the students were using a strap backpack. Of all the study population, 9 (2.2%) cases had wheeled bags, and 4 (1%) cases had a strap bag these results are shown in Tables 1, 2, 3, 4, and 5.

**Table 1. The frequency distribution of the standard school backpacks weight.**

The ratio of Backpack weight to the students' body weight	Number	Percent
Less than 10%	206	51.5
15-10%	142	35.5
More than 15%	52	13
Total	400	100

**Table 2. The frequency distribution of standard backpack loading by the students.**

Backpack loading method	Number	Percent
No	216	54
Yes	184	46
Total	400	100

**Table 3. The frequency distribution of the standard wide strap and foam in the students' backpacks.**

Wide strap with foam in a backpack	Number	Percent
Yes	230	57.5
No	170	42.5
Total	400	

**Table 4. The frequency distribution of the standard sponge layer in the back of the backpacks.**

Sponge layer in the backpack	Number	Percent
Yes	141	35.5
No	259	64.5
Total	400	100

**Table 5. The frequency distribution of the standard students' method of carrying backpacks.**

Method of carrying backpack	Number	Percent
Using one strap	75	18.7
Use both straps	325	81.2
Total	400	100

optimal weight of the backpacks and their carrying from the physiological view point was investigated. They showed that carrying a backpack with a weight of 10.5% of the body weight or more puts significant pressure on the cardiorespiratory apparatus. This means that systolic and diastolic blood pressures and the minute ventilation significantly increase and then put pressure on the aforementioned apparatus. In addition, carrying heavy backpacks needs to longer recovery period in order to return these variables to their initial state. In other words, the physiological function of the school students who carry heavy packs, after reaching the classroom, is still significantly impaired therefore need to the longer period of rest to normalize their body physiological function (Daneshmandi, Rahmani-Nia & Hosseini, 2008). Also, in Emdadi & Emdadi

(2004) study conducted in Hamedan city, 12% of the students used backpacks with more than the standard weight (Emdadi & Emdadi, 2004). This finding is in line with the present study's finding in which 13% of the children used backpacks with more than the standard weight. In another study by Tarhani et al. (2009) conducted in Khorramabad, 57.8% of the respondents carried heavy bags. In this study, 32.6% of the children loaded their bags properly, and 24.6% of the students only used one of the shoulder straps while in the present study, 18.7% of the respondents used one shoulder strap, and 46% of the children loaded their bags properly. The increase in the value of these variables is among the positive points of the present study (Tarhani et al., 2009). In a study, it was recommended that the backpack width be no more than the children's shoulder width (Lucas, 2011). The significance of the current study is in evaluating the types of shoulder and waist straps in the design of the backpacks used by Karon city's elementary school students, which has not been evaluated in other studies. In this study, 42.5% of students used backpacks with wide and sponge-like strap, and an average of 35.5% of the students used backpacks with sponge layer designed at the waist. According to this study and other studies in this field, the proper use of backpack has a growing trend, but no considering some points in the students is a warning to the families, school educators, and backpack designers. As an important point expressed, improper use of backpack leads to pain in the neck, spine, and other problems. So at the end, it is suggested that this issue be raised as seriously as possible and the necessary actions be taken in order to solve the problem.

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#### Conflict of Interest

There is no conflict of interest for this article.

#### Author contribution

HR; Study implementation, data collection and analysis, writing the first draft of Paper, Study design and data analysis.

FA: Editing and confirming the final draft of the paper.

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### References

- Hong, Y., Li, J. X. & Fong, D. T. P. (2008) Effect of prolonged walking with backpack loads on trunk muscle activity and fatigue in children. *Journal of Electromyography and Kinesiology*, 18 (6), 990-996.
- Emdadi, M. & Emdadi, sh. (2004) The weight of school bag and its contents in relation to the weight of elementary school students in Hamadan. *Payesh Journal*, 3 (3), 185-191.
- Hong, Y. & Cheung, C. K. (2003) Electromyographic response of back muscles during load carriage. *Gait & Posture*, 17 (1), 28-33.
- Amiri, M., Dezfooli, M. S. & Mortezaei, S. R. (2012) Designing an ergonomics backpack for student aged 7-9 with a user centered design approach. *Work*, 41(1), 1193-1201.
- Tawrell, P. (2006) *Camping & Wilderness Survival: The Ultimate Outdoors Book*. 2<sup>nd</sup> ed. Paul Tawrell.
- Sherry, D. J. (2001) Children and backpack: Load and design selection based on physiological effects. *Arizona State University*, 21, 1-6.
- Saedi, M. Nezami Asl, e. & Mokhtar zadeh, M. (2015) Evaluation factors in designing backpacks with a focus on mid-sized backpack, *Ibno sina Journal*, 1, 45-56.
- Piscione, J. & Gamet, D. (2006) Effect of mechanical compression due to load carrying on shoulder muscle fatigue during sustained isometric arm abduction: an electromyographic study. *European journal of applied physiology*, 97 (5), 573-581.
- Tarhani, F. Rashid, R. Dalvand, SH. Tarhani, S. & Saki, R. (2009) Evaluation bags standards of primary school children in Khorramabad.  *Lorestan University of Medical Sciences Journal*, 1 (39), 47-53.
- Southard, S. (2005) *Evaluating a new design for the NASA scape harness* (dissertation). Graduate Faculty of North Carolina State University in partial fulfillment of the requirement for the degree of Master of Science. *Industrial engineering Raleigh, North Carolina*.
- Bahrian, M. (1999) Let non-standard backpacks the earth. *Iran Newspaper*, 40-43.
- Daneshmandi, H., Rahmani-Nia, F. & Hosseini, S. H. (2008) Effect of carrying school backpacks on cardio-respiratory changes in adolescent students. *Sport Sciences for Health*, 4 (1-2), 7-14.
- Lucas, G. (2011) Backpacks in children. *Sri Lanka Journal of Child Health*, 40 (1), 1-3.