

Backpack - Bad Pack an Issue, Backpack Usage and its Implications on Indian School Children, an Observational Study on the Impact of Backpack Between Rural and Urban School Children

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ABSTRACT

Objective of the study

To observe the amount of weight carried by the Indian school children and also to identify the complications out of it. This study also focuses on to check whether there is any difference between the school children in the urban and rural area regarding the usage of backpack and its implications.

Methodology

Total of 400 children (207 children from urban school and 193 from rural school) aged between 6 to 13 years from the class II to VIII were selected using stratified random sampling method. Self made questionnaires are filled, which had personal details, physical characteristics and mode of transport, carrying frequency and method of carrying.

Results

The study shows that mean bag weight carried by the urban school children are 7.1 kg which is 17% of their body weight and rural school children are 3.2 kg which is 12% of their body weight. Among the urban school children (n= 201) 62.3% of them are having pain due to backpack out of that 42.55% are having shoulder pain and 19.8 % have back pain. In comparison with rural school children it is only 17% of which 11.4% with shoulder pain and 6.2% with back pain.

Conclusion

The backpack had its impact on the Indian school children, especially the urban school children are affected more when compared with the rural school children, it is mainly because of the syllabus pattern, and extra load in the form of lunch where the rural school children are provided with mid day meal. In addition to the extra load the urban school children have extra curricular activities. It is high time to make a safety guideline to avoid any complication out of backpack.

Introduction

Each school year millions of children walk to, from and around school carrying a significantly greater amount of weight in their backpacks and for a longer period of time. Children have to carry a full day's class schedule of school books, in addition to other items and supplies, through out the day¹. The average student carries a backpack weighing almost one fourth of his or her body weight. Three out of 10 students typically carry

backpacks weighing up to one third of their body weight at least once a week. Negrini S, Carabalona R, Sibilla P (1999)² Using a back pack allows a person to carry more items than would be possibly by the arms and hands alone. But the usage of this heavy backpack can injure kids, when a heavy weight like a backpack filled with books is incorrectly placed on the shoulders, the weight's force can pull the person backward¹. To compensate this, the person will bend forward at the hips or arch the back which will cause the spine to compress unnaturally.

The heavy weight can cause shoulder, neck and back pain. Kids who walk to and from school are also more likely to suffer back pain from heavy

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packs because duration of use increases the risk of injury³. Musculoskeletal problems were reported by 77.1% of the students. Symptoms were most prevalent in the neck, shoulder, upper back and lower back⁴. Nonspecific mechanical back pain was found to be highly prevalent, and the reported severity and chronicity of pain were high². Forward head posture increased when carrying a backpack, especially one with a heavy load⁵. Carrying a backpack weighing 15% of body weight appeared to be too heavy to maintain standing posture for adolescents⁶. There is a growing concern that youngsters may have long term back problems from trudging about with such heavy loads. A significant change in the cranio vertebral angle was found at every year level, when comparing standing posture with no backpack posture when carrying a backpack. The change was greatest for the youngest students⁷. The combined effect of heavy load and position of the load on the body size and shape of the load and load distribution time spent in carrying, physical characteristics and physical condition of the individual were hypothesized as factors which were associated with problems⁸. A recent study has shown a significant association between spinal pain and heavy backpack weight.

The guideline recommends that backpacks not exceed 10 to 20 percent of the child's body weight (American Academy of pediatrics). American occupational therapy association recommended that a loaded backpacks weigh no more than 15% (about one-sixth) of a student's body weight (for a student weighing 100 pounds, this means that the backpack should weigh no more than 15 pounds) Negrini.S, Carabona.R (2002)⁹. The American occupational therapy association, American chiropractic association, American physical therapy association and American academy of orthopedic surgeons have similar recommendations to limit backpack weight to 15 percent of a child's weight. There are lots of studies concerning this but little are available targeting the Indian school children. On 8th December 2006, our government has passed a bill, The Children School Bags Limitation of Weight Bill Number LXXXVI of 2006 to provide for limitation on the weight of school bags, duties and responsibilities of the school to ensure the compliance of the limitations so imposed and to

there are educated by on this issue. It is high time that in India we have to gather information regarding the weight carried by the school children from various parts of the country both urban and rural school levels. And identify the problem regarding the backpack carried by the school children. This will help the school children, parents and public to realize the real depth of the problem and necessity to make rectification in this issue. So, the need of the study was felt on this issue and observational study was conducted.

Methods

Study design: Stratified random sampling

Participants: A total of 400 children 207 children from urban school and 193 from rural school aged between six to 13 years from the class II to VIII.

Inclusion criteria: Children between 6 to 13 years of age, studying from II to VIII

Exclusion criteria: Children below 6 years and above 13 years

Procedure: The children from both the schools were made to participate in the morning session during the assembly hour. Informed consent was obtained from the respective school headmistress. In this session the children were given a self made questionnaire comprised of 13 questions. The questionnaire consist of personal details like name, age and class, physical characters like height, children weight and bag weight. The subjects weight were measured with a weighing scale accurate to be within 0.1 kg to 120 kg. Standard height was measured with measuring tape secured to the wall the student stood bare foot, chin retracted and eye looking straight ahead. The school bag was also weighed. It also had details of child's mode of transport to school; carrying frequency and method they adopt to carry the bag. It also classified the pain or discomfort is due to bag carriage and how long it will persist and whether they experience the pain only during carrying or even after that.

Statistics: Questionnaires were statistically analyzed by SPSS (version 10.0) software. Descriptive Statistics N= 207

Components	Mean	Standard Deviation
Height	4.47	0.53
Weight	7.08	1.82
Bag Weight	33.69	10.93

Comparison	Pearson Correlation	P-Value
Height vs Bag Weight	0.529	0.000
Weight vs Bag Weight	0.452	0.000
Class vs Bag Weight	0.585	0.000

Logistic Regression

Components	B	Odds Ratio	P-Value
Height	0.831	2.296	0.02
Bag Weight	0.284	1.329	0.01

Descriptive Statistics N = 193

Components	Mean	Standard Deviation
Height	131.04	12.1
Weight	27.09	23.04
Bag Weight	3.16	1.36
Age	11.36	13.07

Comparison	Pearson Correlation	P-Value
Height vs Bag Weight	0.557	0.000
Weight vs Bag Weight	0.279	0.000
Class vs Bag Weight	0.596	0.000
Age vs Bag Weight	0.205	0.000

Logistic Regression

Components	B	Odds Ratio	P-Value
Bag Weight	0.66	1.934	0.000

Descriptive Statistics N = 400

Components	Mean	Standard Deviation
Height	129.24	11.15
Weight	30.51	18.11
Bag Weight	5.19	2.54
Age	10.68	9.21

Comparison	Pearson Correlation	P-Value
Height vs Bag Weight	0.101	0.000
Weight vs Bag Weight	.0333	0.000
Class vs Bag Weight	0.197	0.000
Age vs Bag Weight	0.066	0.000
Pain vs Bag Weight	0.53	0.000

Logistic Regression

Components	B	Odds Ratio	P-Value
Bag Weight	0.66	1.934	0.000

Results

The study shows that mean bag weight carried by the urban school children are 7.1 kg which is 17% of their body weight and by rural school children are 3.2 which is 12% of their body weight respectively. Among the urban school children (n =201) 62.3% of them are having pain while carrying the bag out of which 42.55% are having shoulder pain and 19.8 % are having back pain. The mean weight of the children among the urban school is 33.7 and rural school children are 27.1 respectively. The amount of pain level in the

rural school (n= 193) is only 17% in which 11.4% of them are having shoulder pain and 6.2 % of them are having back pain. Comparing the urban school to rural school, the amount of bag weight carried by the urban school children are higher and hence pain level in the urban school children are higher (62.35%). Logistic regression method of analysis shows that among the causes, bag weight and height of the children influence the pain significantly. By using logistic regression method for urban (n = 207) height and bag weight influences pain and for rural (n= 193) bag weight alone influences the pain.

Table 1: Cross Tabulation for Class with Pain Category

Class	Pain			Total
	No Pain	Shoulder Pain	Back Pain	
2nd	27 (90.0%)	3 (10.0%)	0	30
3rd	17 (56.7%)	13 (43.3%)	0	30
4th	8 (29.6%)	13 (48.1%)	6 (22.2%)	27
5th	5 (17.2%)	13 (44.8%)	11 (37.9%)	29
6th	7 (22.6%)	16 (51.6%)	8 (25.8%)	31
7th	8 (26.7%)	15 (50.0%)	7 (23.3%)	30
8th	6 (20.0%)	15 (50.0%)	9 (30.0%)	30
Total	78 (37.7%)	88 (42.5%)	41 (19.8%)	207

Table 2: Cross Tabulation for Class with Bag Weight

Class	Bag Weight			Total
	1.00 - 5.00	5.01 - 9.00	9.01 - 13.00	
2nd	24 (80.0%)	6 (20.0%)	0	30
3rd	1 (3.3%)	29 (96.7%)	0	30
4th	1 (3.7%)	26 (96.3%)	0	27
5th	1 (3.4%)	24 (82.8%)	4 (13.8%)	29
6th	0	30 (96.8%)	1 (3.2%)	31
7th	2 (6.7%)	25 (83.3%)	3 (10.0%)	30
8th	0	20 (66.7%)	10 (33.3%)	30
Total	29 (14.0%)	160 (77.3%)	18 (8.7%)	207

Fig 1: Highest pain perceived in shoulder and low back among the urban school students

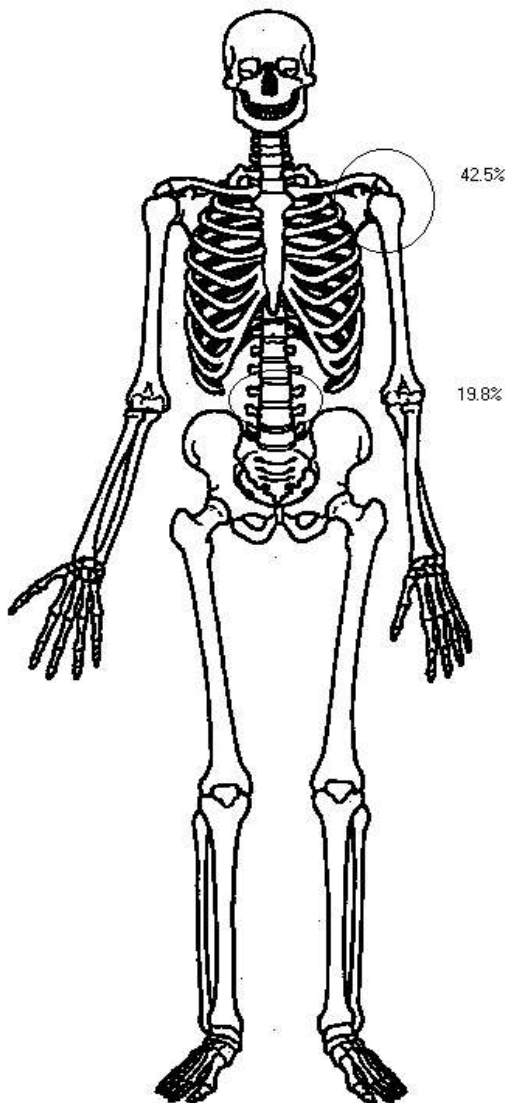
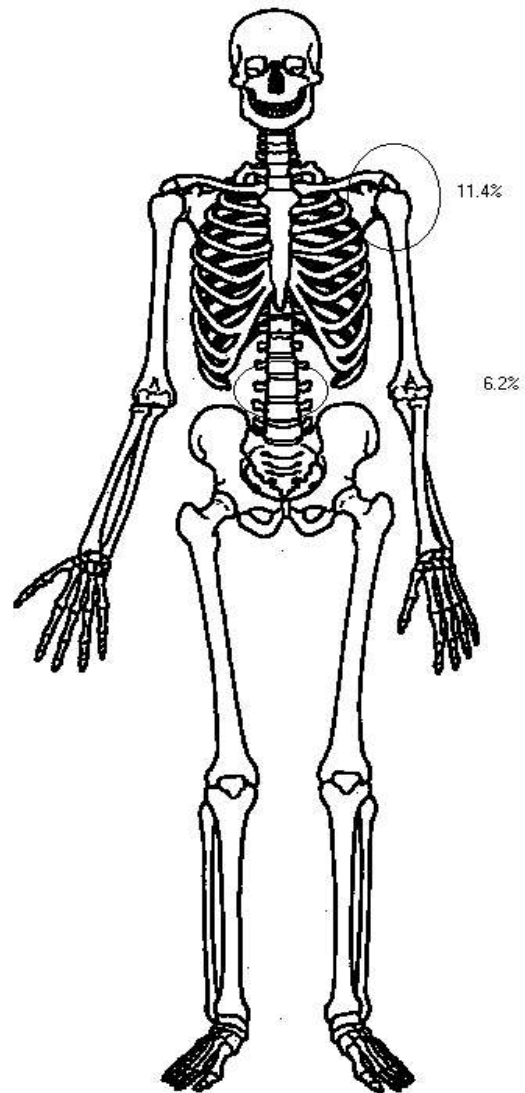


Fig. 2: Highest pain perceived in shoulder and low back among the rural school students



Discussion

As mentioned earlier carrying heavy weight as backpack is the common prevailing problem among the school children worldwide. Many articles have noted the various consequences of usage heavy backpack. Only very few articles are available about the amount of weight carried among Indian school children especially the rural community school children.

The weight of the school bag expressed in percentage of body weight was found to be consistent with studies done by Shruti. R. Iyer and Pascoe et al. They found that Indian children carry school bag weighing 18.5% of their body weight (Shruti. R. Iyer) and in America it was found that mean weight of school bag carried by school children in the age group of 11 - 13 years was 17% of their body weight (Pascoe et al) respectively.

This study supports the prior results that most of the Indian children in the age group of 6 to 13 years of age carried school bag weighing 12% to 21% of their body weight. The rural school children mean bag weight is 12% of their body weight and urban school children mean bag weight is 21% of their body weight.

The mean weight of the school bag carried by the children was found to be 7.1 kg which is 21% of their body weight for urban school children and 3.2 kg for rural school children which is 12% of their body weight. The combined value is 5.2 kg which is 17% of their body weight.

Though the weight carried by the rural school children is comparatively lower to urban school level but is still more than 10% of their body weight and correlate with the pain percentage. Our government has passed a bill on 8th December 2006 which noted that children carrying bags weighing more than 10 percent of their body weight have been found to have poorer lung function. And many recent studies also recommend that bag weight should not exceed 10 % of the body weight. In this study the bag weight carried by the school children are more than 10 percent and the students also reported shoulder and back pain.

The causative factor for the higher level of weight carriage among the urban school children could be excess load in the form of lunch bag

when compared with the rural children who provided with free mid day meals in the school. And the variation in the syllabus pattern are also the major factor which make the urban school children to carry lot of books and materials this will add up the bag weight further. The urban school children are also engaged with lot of extra curricular activities which make them to carry heavy loads. The limitation of this study includes that only small population was included and also single school in each category was selected. This study was also not focused on the postural deviation out of backpack usage and information about the way of carrying the bag in detail.

Conclusion

In a study on the effect of backpack education on student behavior and health, nearly 8 out of 10 middle-school students who changed how they loaded and wore their backpacks reported less pain and strain in their backs, necks, and shoulders¹⁰. This study also proves that there is a positive relation between backpack and its complications. As the heavy load directly affects the growing child it is necessary to make safety measures to avoid further complications out of it. Risk factors for musculoskeletal discomfort associated with schoolbag carriage include the combined effects of heavy loads, load shape and size, time spent carrying the load and position of the load on the body by addressing all these criteria it is possible to make a solution to this problem.

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