

# OVERLOADED BAGS OF SCHOOL CHILDREN- A PRECURSOR TO “SCHOOL BAG SYNDROME”?

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## Paediatrics

Manuscript reference number  
NJMDR\_5110\_16

Article submitted on: 30 Nov. 2016  
Article accepted on: 02 Dec. 2016

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### Abstract:

**Introduction:** Our children are forced to carry heavy bags, which may lead to “School bag syndrome”. Though common, the magnitude of this problem is not well studied in India.

**Objectives:** To assess the magnitude of overloaded school bags among school children in Thrissur district.

**Materials & Methods:** 3105 students from Classes I to VII enrolled in forty schools (including 8 government, 13 aided and 19 unaided schools) in Thrissur district of Kerala participated in this school based cross-sectional study. One third of the students from each Class were weighed. Their bag weight on the day of data collection was also recorded. If the bag weight was more than 10% of the body weight of the child, then the bag was considered to be overloaded.

**Results:** Bag weight ranged from 4kg to 9kg and bag weight as a percentage of body weight ranged from 21% to 31%, which is very high. There was no difference in the bag weights and bag weight percentage between different types of schools or gender. Proportion of overloaded bags was more in lower primary classes. The most common reasons for overloaded bags included extra books, water bottle, umbrella and weight of the bag itself. 65% of the schools had taken some form of action to reduce bag weight.

**Conclusion:** It is concluded that heavy school bags is a problem in all schools alike. Children are forced to carry heavy bags, which may lead to “School bag syndrome.”Stringent measures need to be undertaken to reduce the bag burden and protect the health of children.

**Keywords:** School Bag, Overloaded bags, School Bag Syndrome, school children

### Introduction

In this era of reforms in school education, changes are happening everywhere including India. The method of admission to schools, syllabi for our children, examination system, mode of conduct of examinations, types of evaluation –are all changing.

One of the important “health” changes that

have happened during the last few years is change in the work load for our students and so also change in the weight of school bags. It is very common to see our children carrying heavy school bags. To an extent, it is due to the overloaded curriculum but it may also be due to carelessness of school authorities or overenthusiastic parents. It is a routine to see school children visiting Pediatrics outpatient department with complaints related to this like backache,

headache, school phobia, etc. According to the U.S. Consumer Product Safety Commission there were more than 21,000 backpack-related injuries treated at hospital emergency rooms, doctors' offices, and clinics in the year 2003.<sup>1</sup> Injuries ranged from contusions, sprains and strains to the back and shoulder, and fractures.

Back pain in children is not so uncommon anymore. Recent studies suggested that 10-30% of healthy children experience back pain, especially low back, by their teenage years.<sup>2</sup> One common suspect for back pain in children is the school backpack, which has also received a greater deal of attention in the past few years.

The problem of overloaded bags was not well studied in India until lately<sup>3</sup> and so, data on burden of this problem is lacking. Hence this study was conducted to assess the magnitude of the problem of overloaded bags in schoolchildren in Corporation area of Thrissur district of Kerala.

#### **Aim:**

1. To assess the burden of overloaded school bags in school children in Corporation area of Thrissur district, Kerala
2. To identify the reasons for overloaded school bags in these children.
3. To find out the measures taken by parents and schoolteachers, in reducing the bag weight, after school visits and sensitization.

#### **Materials and Methods:**

A cross sectional study was conducted among 3105 children studying in classes I Std to VII Std of Government, Aided and Non aided schools in Thrissur Corporation. Children belonging to 40 schools were included in the study after obtaining the requisite permission from the school authorities, parental consent and assent of the students.

Operational definition: A schoolbag was considered overweight/overloaded if it weighed more than 10% of body weight of the child to whom it belongs.

**Study Period:** January 2014 to September 2014

#### **Inclusion Criteria:**

Children studying in classes I to VII of schools located within Thrissur Corporation limits.

#### **Exclusion Criteria:**

1. Schools who had not given permission to conduct the study
2. Wards of those parents who were not willing to participate in the study
3. Students with disabilities and health problems
4. Students who did not give their assent for the study

#### **Procedure:**

After obtaining clearance from Institutional Ethics Committee, permission from the school managements in case of Non-aided and Aided schools, and the District Education Officer in case of Government schools, the investigator visited the schools located within the limits of Thrissur Corporation and distributed the consent forms among the students to get their parents' consent and the students' assent. The filled forms were collected by the school authorities and the investigator was intimated over the phone regarding this. Then the investigator visited the schools at a random date without any further notice to the school authorities. One third of the students from each class of each standard in each school were selected from the class attendance register using the systematic random sampling technique. The weights of these children were taken using a standard electronic weighing scale with an accuracy of 100 grams. The school bags were weighed using an electronic weighing scale with accuracy up to 10grams. We also put forward our suggestions to improve the situation and re-visited the schools in next academic year

#### **Results:**

40 schools (8 Government, 13 aided and 19 non-aided schools) were visited during the study period. Non-aided/private schools constitute the major share of schools in Kerala and this was reflected in the study sample also (47%).

**Table 1: Distribution of students based on school-type**

Class of study	Type of school			Total
	Govt	Aided	Non-Aided	
I	64	154	216	434
II	67	159	222	448
III	70	157	218	445
IV	72	156	209	437
V	76	155	220	451
VI	69	152	222	443
VII	79	153	215	447
Total (%)	497 (16)	1086 (35)	1522 (49)	3105 (100)

It is seen that the bag weight as a percentage of body weight of the school children is much above the recommended levels irrespective of the class they study in (Table 2) or

the school they belong to (Table 3). The children of aided and non-aided schools had higher Bag Wt/Body Wt% compared to government school children (Table 3).

**Table 2 : Class-wise distribution of study population according to bag weight as a percentage of body weight**

Class of study	Mean Child Body Wt (Kg)	Mean Bag Wt (Kg)	Bag Wt / Body Wt (%)
I	16.50	4.25	25.75
II	18.00	4.75	26.39
III	21.25	6.00	28.23
IV	23.50	6.75	28.72
V	25.50	7.00	27.45
VI	27.00	7.75	28.70
VII	29.00	9.25	31.89

**Table 3: Comparison of bag weight between Government, Aided and Non-aided schools**

Class of study	Government			Aided			Non Aided		
	Mean bag wt	Mean body wt	Bag wt/ body wt (%)	Mean bag wt	Mean body wt	Bag wt/ body wt (%)	Mean bag wt	Mean body wt	Bag wt/ body wt (%)
I	3.00	16.0	18.0	4.25	16.5	25.8	4.50	16.5	27.3
II	3.75	18.0	20.9	4.50	18.0	25.0	5.00	18.5	27.0
III	4.75	21.0	22.6	6.00	21.0	28.6	6.50	21.5	30.2
IV	5.50	23.0	23.9	6.50	23.0	28.2	7.00	24.0	33.3
V	6.00	25.0	24.0	7.00	25.0	28.0	7.50	26.0	28.8
VI	6.75	26.5	25.5	7.50	27.0	27.8	8.25	27.5	30.0
VII	8.25	28.0	29.5	9.00	28.5	31.2	9.50	30.5	31.4

We also observed that students of the same class were carrying bags with different weight. The bag weight ranged from 4 kg among first graders to 9.5kg in higher classes.

We compared the class-wise difference in bag weight as a proportion of body weight between government, aided and non- aided schools but this difference was not statistically significant.(Table 4)

**Table 4 : Comparison of bag weight as a proportion of body weight between Government, Aided and Non-aided schools**

Class	Govt.		Non-aided		P value
	Bag wt/ body wt %	No of students	Bag wt/ body wt %	No of students	
1	18.0	64	27.3	216	0.13
2	20.9	67	27.0	222	0.31
3	22.6	70	30.2	218	0.21
4	23.9	72	33.3	209	0.13
5	24.0	76	28.8	220	0.41
6	25.5	69	30.0	222	0.47
7	29.5	79	31.4	215	0.75
Class	Govt		Aided		P value
	Bag wt/ body wt %	No of students	Bag wt/ body wt %	No of students	
1	18.0	64	25.8	154	0.21
2	20.9	67	25.0	159	0.50
3	22.6	70	28.6	157	0.34
4	23.9	72	28.2	156	0.49
5	24.0	76	28.0	155	0.51
6	25.5	69	27.8	152	0.72
7	29.5	79	31.2	153	0.79
Class	Aided		Non-aided		P value
	Bag wt/ body wt %	No of students	Bag wt/ body wt %	No of students	
1	25.8	154	27.3	216	0.74
2	25.0	159	27.0	222	0.66
3	28.6	157	30.2	218	0.73
4	28.2	156	33.3	209	0.29
5	28.0	155	28.8	220	0.86
6	27.8	152	30.0	222	0.64
7	31.2	153	31.4	215	0.96

Our study revealed that the reasons for excessive bag load were extra tuition books, heavy water bottles, unwanted books and of course, due to the bag itself (Table 5).

**Table 5: Reasons for heavy school bags**

Reasons	No. of students (%)
Tuition books	1677 (54)
Water bottles	2608 (84)
Unwanted books	1490 (48)
Umbrella	2235 (72)
Heavy bag itself	2018 (65)

After educating the school authorities regarding the measures to reduce bag weight, we revisited the schools in the next academic year. Surprisingly 65% of the schools implemented strict checking of bags by parents and teachers. Most schools had taken up one or the other effective measure to reduce the bag burden (Table 6). Some

schools had introduced more than one measure of bag weight control.

**Table 6: Measures undertaken by schools to reduce the Bag weight**

Measures taken to reduce bag Wt.	No. of schools
Filing system	5
Term-wise Books	6
Provision for drinking water	24
Small water bottles	12
Strict checking of bags by parents and teachers	26

### Discussion:

Of late, there is an increasing incidence of low backache and cervical pain in younger age group. We speculate that one reason for this early onset of adult disease in a young individual maybe due to carrying of heavy school bags in their younger age.

School children carry heavy bags which can lead to many health problems like headache, shoulder pain etc due to which they are unable to attend classes properly. They may develop school phobia also. We would refer to these problems collectively as the “school bag syndrome”.

A general guideline of 10% body weight, initially proposed by Voll and Klimt in 1977 continues to be the recommended guideline when carrying a backpack style school bag.<sup>4</sup> The American Academy of Orthopaedic Surgeons recommends that a child’s backpack should weigh no more than 10 to 15 percent of the child’s body weight. Although public health efforts globally endorse decreasing the present weight of student backpack, recommendations as to the percentage to body weight differ among organizations. The American Orthopaedic Association recommended wearing backpack no more than 15% of student body weight as this is a feasible yet prudent goal and it is better to be limited at 10%.<sup>5</sup> Studies in 2008-2009 recommend and emphasized that the backpack load should be limited to 10% of body weight because an increase to 15% to 20% may lead to posture change, heart rate change, and lower limb dynamics change for children while walking.<sup>6-9</sup>

In our study, the mean bag weight/ body weight percentage was 27.5% and 29.4% in lower primary (classes 1-4) and upper primary (Classes 5-7) classes respectively. The mean bag weight in our study is lesser than that found by

Whittfield et al<sup>10</sup> who measured both third (7kg) and sixth graders (6.3kg) and that of Negrini et al.<sup>11</sup>, who found that the mean school bag weight was 9.3 kg with a maximum of 12.5 kg. In contrast, other studies found lower bag wt/body weight percentages of 8.2%, 8.84% ,<sup>12-13</sup> and 10% for students in Saudi Arabia.<sup>14</sup> On the other hand, some studies found considerable higher percentages of bag weight/body weight: 30%,<sup>11</sup> 17%,<sup>15</sup> 19% for fifth grade, 21% for sixth grade, 14% for seventh grade, and 15% for eighth graders.<sup>16</sup> Unlike other studies, our study also included students from grade 1 to grade 4 also.

Pascoe *et al.*, in 1997 reported that 11-13 year old students carried school bag weighing 17% of body weight which had detrimental effects to the child's physical abilities. The researchers considered the effect of carrying a school bag on posture and gait of 11-13 year old children and found that carrying a school bag decreases stride length, increases stride frequency and encourages a forward lean of the trunk.<sup>15</sup>

In our study, we also observed different bag weights for the students of the same class. This is mainly due to the difference in weight of school bags themselves or water bottles. School authorities can instruct parents to bring simple and light bags and water bottles in future.

Individual schools can implement effective measures to lower the bag weight. Keeping the books in school itself (for lower classes), making separate books for each term (for higher classes) and the filing system (high school) can be easily implemented. Uniform school bags, simple water bottles, avoiding homework in lower classes, provision for providing safe and clean drinking water are other effective measures. Many measures should arise from the level of school authorities/ Education department/ Government itself. This includes fixing the minimum age for kindergarten admission as 4yrs, no second language up to 4<sup>th</sup> grade ,no class after 2pm in kindergarten classes, bring about an ordinance to reduce bag weight, scrapping formal examinations in pre-primary classes, etc to name a few.

#### **Limitation of the study:**

This study did not attempt to quantify the extent of medical illness due to overloaded schoolbags. It only aimed at assessing the magnitude of the problem of overloaded bags.

#### **Conclusion:**

Bag weight is a problem in all schools alike. Our children are forced to carry heavy bags, which may lead to "School bag syndrome." Many effective measures can be implemented to reduce bag weight like filing system, use of term-wise books, practice of keeping books in school, strict checking of school bags by teachers, providing safe water in schools etc.

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