

Correlation between Heavy School Bags and Upper Limb Disabilities among School Going Children

UMER ILYAS¹, SHOAIB WAQAS², ZAHID MEHMOOD BHATTI³, WAJIDA PERVEEN⁴, MISBAH AMANAT ALI⁵

¹Senior Lecturer, PSRD College of Rehabilitation Sciences, Lahore.

²Associate Professor at Lahore college of Physiotherapy, LMDC, Lahore.

³Associate Professor/ HOD at Bakhtawar Amin College of Rehabilitation Sciences, Multan.

⁴Assistant Professor/ HOD/ Programme Director DPT, Sialkot College of Physical Therapy, Amin Welfare & Teaching Hospital, Sialkot.

⁵Assistant Professor Sialkot College of Physical Therapy, Amin Welfare & Teaching Hospital, Sialkot.

Correspondence to Shoaib Waqas Email: shoaib.waqas@lmdc.edu.pk, Contact: 0092-302-45572109

ABSTRACT

Aim: To find out correlation between heavy school bags and upper limb disabilities among school going children.

Methods: This descriptive cross-sectional survey, using non-probability convenience sampling, was conducted on 396 students of 11 to 15 years after ethical approval in 6 months. Height (in cm) and weight (in Kg) were noted and BMI was calculated. Students with the normal BMI were included in the study. Weight of the students were recorded with their shoes off while the weight of the bags was calculated with all the stationary included. Quick DASH scale score was calculated and correlated with the weight of the bag by applying Chi-Square test.

Results: The mean age of the participants was 13.49 ± 1.12 years. The mean weight of the school bag was 6.10 ± 2.1 Kgs while the students were carrying more than one-quarter of their body weight. The disability calculated from the quick DASH scale was as high as 40%. Chi-square showed a significant correlation between the upper limb disabilities and the weight of the bag.

Conclusion: The study showed that there is a significant correlation that the use of heavy school bags can cause upper limb disabilities in children.

Keywords: Heavy School Bags, Upper Limb Disabilities, Children, Disabilities of Arm Shoulder and Hand

INTRODUCTION

Students could be carrying school bags ranging from 10% to as heavy as 25% of their body weight¹ and if the school bag is 15% of student's body weight it changes all the postural mechanics of the student² carrying 15% of their body weight, the child body can adapt to these biomechanical stress inflicted on them which leads to the increase in musculoskeletal injury risk¹.

The weight of the school bag is strongly correlated with the occurrence of upper limb musculoskeletal discomforts³ not only in the spine it also changes the head mechanics⁴ in which the forward head position is one of the commonest which elongates the cervical flexors and shorten the cervical extensors⁵. As students carry school bags on daily basis there is no defined weight guideline for the weight of the school bag⁶. The students carry their books, stationery items, and other study-related material in the schoolbags as it is the easiest and most convenient way of carrying the load on their way to school⁷.

Children age 10 to 19 years undergo rapid growth and maturation of soft tissues and the musculoskeletal system. Any undue stress or external force on their body can alter their posture and alignment of the body. In a study conducted in 2019 concluded while carrying a school bag 18% of their body weight decreases the craniovertebral angle by 24.51° as compared to 40.62° while standing with no school bag while the angle decreases when a student was moving which indicates the adaptation of forward head posture and sagittal shoulder posture was twice the normal values after dynamic activity. These values indicate towards the more rounded shoulders than normal while

their daily compute to or in the school environment⁴.

In Kuwait, a study was conducted on high school children age 14 to 19 years to make a relation between school bags and lower back pain. It was estimated that 70% of the students have experienced back pain at least once at some point in their life. Whereas 49% and 31% experienced it within 6 months and one month back respectively⁸.

The researchers were not able to find out a single study that can measure the correlation between heavy school bags and upper limb disabilities among school-going children in Pakistan, and it's a very challenging topic to be researched both in the context of the researcher and students.

The rationale of the current study is to find out the correlation between heavy school bags and upper limb disabilities.

METHODS

This descriptive cross-sectional survey, using non-probability convenience sampling, was conducted in six months after ethical approval. The sample size is estimated as 396, using google calculator⁹. Permission from IRB and parents was achieved to include the students in the study. Data was collected from Umer Public School Sialkot & St. Mary's high school Sialkot. Height and weight were noted and BMI was calculated. Students of the classes (6th, 7th, 8th) Age 11 to 15 years with a BMI of 18.5 to 24.9 Kg/m^2 were included while Any participant with visible deformity, Vitamin D deficiency, Metabolic disorders or Type I diabetics were excluded from the study.

Weight of the students were recorded with their shoes off while the weight of the bags was calculated with all the stationary included. Quick DASH scale was used to collect

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data. Chi-Square test was used to find correlations and P value less than 0.05 was considered statistically significant.

RESULTS

The mean age of the students was 13.49±1.1 years ranging from 11-15 years. But most of the students were lying in the age group of 13 years. Majority of the students were females. The mean weight of the students was 45Kgs±4.34 SD ranging from 28-80 Kgs. The average height of the students was 1.5 meters ± SD 0.13 ranging from 1.2-1.81 meters. The average mean of the student BMI was 20.04 Kgs/m²±1.85. Ranging from 18.42-24.99 Kgs/m². The trend shows that most of the students are in the lower range of normal BMI. The weight of the bag was 6.1Kgs ±2.1SD with a range of 2 to 15 Kgs.

The average weight of the bag relative to the body weight was 14.25%±4.5%SD. Out of 396 students, 355 were carrying more than 10% of their body weight. The mean disability index of the students was 14.21% ± 8.7 SD and reaching as high as 40%. Nearly half of the students experienced different levels of pain in the arm shoulder or arm and those students who experienced pain around 4% experienced severe pain. 48.7% of the students experienced difficulty in sleeping and of these 73.5% had mild, 12% had moderate, 11.3% had severe difficulty in sleeping and 0.5% of the 396 students were unable to sleep in the past week due to the arm shoulder or hand pain. Chi-square was applied to the data and it showed a significant correlation between the upper limb disabilities and the weight of the bag (Table 1).

Correlation between the total score in the DASH scale and the weight of the bag was also observed as the significance is less than 0.05. The value is less than 0.05 which shows a correlation between the weight of the school bag and upper limb disability.

Table 1: Correlation between DASH score and weight of the bag

Chi-Square Tests			
Statistics	Values		
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	372.28	323	.03
Likelihood Ratio	288.40	323	.91
Linear-by-Linear Association	.95	1	.32
N of Valid Cases	396		

Table 2: Correlation between the weight of the school bag and UL disability

	Weight	Disability index
Chi-Square	385.81	258.54
Df	19	17
Asymp. Sig.	0.00	0.00

DISCUSSION

In our study An association was observed between DASH score and weight of the bag and age while no association was found between height, gender, and BMI. The average weight of the school bag ranges from 10% to 25% of the body weight in our research the weight carried by the student was more than 33% which was much higher than the study conducted in 2018¹.

The average weight of the school bag was 15% is enough to change the mechanics of the body and as in our

study the students were carrying around 33% of their body weight and the correlation of disability index and weight of the bag relative to the weigh of the student was also observed².

In 2013 a study on the secondary students suggested that the female students are more prone to MSK issues but our study suggested that there is no correlation between gender and upper limb disabilities¹⁰. However, as the child progresses through school and pursues higher education the musculoskeletal problem increases. This research done in 2016 correlates with our study¹¹.

The research reported in 2014 suggested that students experienced a sharp pain in the shoulder which radiates into the arm and our research also suggested the nearly half of the students had shoulder arm or hand pain in the past week¹².

CONCLUSION

There is an increased prevalence of incapacities in school going children because of the weight of their school bags. Majority of the students had some degree of disability in their UL related to the heavy school bag. The weight of the bag also affects the sleep of a child.

Conflict of interest: Nil

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