



CODEN [USA]: IAJPBB

ISSN: 2349-7750

**INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES**<http://doi.org/10.5281/zenodo.3592882>Available online at: <http://www.iajps.com>

Research Article

**ASSOCIATION OF SCHOOL BAG WEIGHT & CARRIAGE
STYLE WITH SHOULDER PAIN AMONG MIDDLE SCHOOL
STUDENTS**¹Husna Haroon, ²Prof. Dr. Ashfaq Ahmad, ³Syed Amir Gilani, ⁴Shahzaib Hussain¹MS. OMPT, Senior Lecturer, University Institute of Physical Therapy
University of Lahore²PhD in Physical Therapy, Associate Dean/ Head of Department, Faculty of Allied Health
Sciences, University of Lahore³MS. OMPT, Assistant Professor, University Institute of Physical Therapy, University of
Lahore⁴DPT, Physical Therapist, University of Lahore, Lahore,⁵Physical Therapist, District Head Quarter, Bakhar, Pakistan**Abstract:**

Objective: The aim of the study was to determine the association of schoolbag weight and carriage style with shoulder pain in middle school students of Lahore. **Methodology:** It was a cross sectional study for which data was collected from 338 participants. 152 boys and 186 girls within age of 9 -14 years from 6th, 7th & 8th class of local schools of Lahore from 2nd January 2018 to 28 June 2018 through convenient non random sampling technique. Digital weighing scale and inch tape was used to measure the weight (schoolbag and students' body) and student's height respectively. The questionnaires were filled by students which included the demographics details and questions related to school bag use and carrying style followed by Shoulder pain and disability index (SPADI). SPSS 20 was used for chi square tests to analyze data. **Results:** Results for chi-square test for association between relative school bag weight and shoulder pain produced a value $\chi^2_{(2)} = 3.11$, $p = 0.21$ with $p > 0.05$. showing no significant association. Whereas, chi-square result $\chi^2_{(1)} = 0.013$, $p = 0.91$ showed no association between methods of carrying school bag and shoulder pain either as $p > 0.05$. **Conclusion:** The results showed that there was no significant association between the weight of the school bag and the style of carrying it with the shoulder pain among middle school students.

Keywords: Body mass index, School bag weight, School bag carriage style, Shoulder pain, School students

Corresponding author:**Husna Haroon,**

MS. OMPT,

Senior Lecturer, University Institute of Physical Therapy

University of Lahore

E-Mail: husnaharoon@gmail.com

QR code



Please cite this article in press Husna Haroon et al., Association Of School Bag Weight & Carriage Style With Shoulder Pain Among Middle School Students., Indo Am. J. P. Sci, 2019; 06(12).

INTRODUCTION:

Demands of modern education system has increased the overall contents of the school bags which contain various materials including textbooks, notebooks, geometry box and lunch box⁽⁴⁾. These heavy school bags and inappropriate methods to carry bags have become a cause of mental and physical stress for the students resulting in musculoskeletal (MSK) problems⁽⁶⁾ most commonly effecting Neck, shoulder and low back areas.⁽¹³⁾ while complaint of shoulder pain is higher than the other regions^(10, 14)⁽¹²⁾. Shoulder pain is most commonly reported among the school going students^(3, 14, 18) due to high range of motion and low stability of shoulder joint⁽¹⁷⁾. The major concern is the weight of school bag that lead to the shoulder postural problems⁽²⁰⁾. The female students are more prone to neck, shoulder and back pain than the male students⁽⁸⁾

There are many factors which contribute in the development of these MSK problems. Physical factors include school furniture, incorrect posture, improper ways to carry school bag, mode of transport, carrying duration, lifestyle and daily habits⁽¹¹⁾ The psychosocial factors comprises of student's perception related to weight of school and of perceived level of tiredness and contributing factors are variety in school bags, sedentary lifestyle, rate of growth and development. Psychosocial factors have a strong association with the musculoskeletal pain, with students who reported pain showed declining school performances.⁽¹⁵⁾

Many different ways have been used by students to carry backpacks but equal weight distribution on shoulders have showed decreased chances of spinal curvature deformities in growing students but if weight is increased it can cause forward leaning posture.⁽¹⁶⁾ To lessen the musculoskeletal symptoms among the middle school students ergonomically designed school furniture, limited load carriage in school bags and manufacturing of school bags that are light in weight is required⁽⁶⁾ The aim of this study is to find out the association between the school bag weight and carriage methods with shoulder pain among the middle school students.

The early adolescence is the age ranged from 9-14 years and this age is considered as the stage of higher musculoskeletal development and growth⁽³⁾ therefore, the students selected for this study were from the same age group.

METHODOLOGY:

It was a cross sectional study design in which data was collected from a number of local schools across Lahore after the approval of Board of Studies from 2nd January 2018 to 28 June 2018. A convenient non-random sampling technique was used to select

a total of 338 participants comprising 152 boys and 186 girls within age of 9 -14 years from 6th, 7th & 8th class.

The study decorum was approved by the board of studies of University of South Asia. The permission to approach the school for conducting the study was taken from school administration by visiting the schools and providing the study procedure details to the administration of school. For seeking the permission from the participants, a written consent form was signed by each participant.

The inclusion criteria for the study was the students of 6th to 8th Grade, Age 9 to 14 , Both genders (Male & Female), who are able to carry school bag and have ability to stand/wall independently were selected^(3, 5, 14, 26) while students with recent injury to neck and shoulder region, recent Foot injury, and students who didn't carry school bag or had attendants carry their schoolbags were exempted from the study^(10, 12, 27)

On an unannounced day, the data was collected from the participants. Prior to data collection, the study objective and procedure were explained to the participants. The data collection was done in the class rooms as per the schools' permission. To measure the student's and schoolbag weight CAMRY digital weighing scale Model EB 9360 with accuracy ± 0.5 was used. To measure the height of student's inches' tape was used. The measurement zone was created by placing the weighing machine in corner of classroom and fixing the inches tape with wall for measuring the height of participants. The BMI was calculated from the weight and height measurements.

The screening of students was done on the basis of inclusion and exclusion criteria of the study. For data collection, the measurements were taken by the researcher. The student stood on the weighing machine barefooted, without carrying any load.

The self-reported questionnaire comprising of two sections was completed by the students. The first section was to record the demographic data of the participants with information related to the schoolbag type, carrying style, mode of transportation to/from school, perception of schoolbag based on the relevant literature. The second section was to specify the shoulder pain among the school children; the shoulder pain and disability index was used. The time taken for the completion of whole questionnaire was approximately 10 minutes.

RESULTS:

From 377 questionnaires, only 338 questionnaires were filled completely by the students. The mean

age of students was 12.2 ± 1.0 years. The mean body weight of student was 40.13 ± 20.3 kg (Fig 1). The mean height of students was 148.5 ± 9.0 cm. From 338 participants, the data was collected from 45% (N=152) male and 55% (186) female students. The absolute mean school bag weight was 6.4 ± 1.6 kg for male students and 6.3 ± 1.5 kg for female students. The relative schoolbag weight for male was 17.9 ± 6.4 % BW and for females was 17.1 ± 6.3 % BW.

The data collected showed that 9.47% participants carry schoolbag below 10% of BW, while 27.81% carry between 10 to 15% of BW and 62.72% carry above 15% of BW. (Fig 2)

65.6% of students who carried schoolbag less than 10% of their body weight reported shoulder pain, 70.2% of students with shoulder pain carried 10-15% of BW although 77.4% students with shoulder pain carried schoolbag weighing more than 15% of BW. The chi square test was applied to find the association between relative school bag weight and shoulder pain and value was $\chi^2_{(2)} = 3.11$, $p = 0.21$ which showed that it was non-significant as $p > 0.05$. (table 1)

Results further showed that 73.9% student who carried schoolbag on one shoulder complained shoulder pain while 74.4% students who carried the schoolbag on both shoulders complained about shoulder pain. The chi square value was $\chi^2_{(1)} = 0.013$, $p = 0.91$ which describes no association between method of carrying school bag and shoulder pain as $p > 0.05$. (table 2)

DISCUSSION:

The study was conducted to find the association between schoolbag carriage characteristics with shoulder pain as main results of the study describes that males have more pain score than females and majority carried schoolbag more than 15% BW, no association was found between shoulder pain and schoolbag weight as well as other schoolbag carriage variables. The study results shows that more pain reported in males than females contrarily to the findings in which it is mentioned that female reported more pain than males ^(10, 23)

The current findings narrate that male carried heavier backpack to body weight ratio (17.9 ± 6.4 % BW) than females (17.1 ± 6.3 % BW). Conversely with the findings of other studies in which females carried heavier backpack than male ^(3, 13)

The results state that most of students used backpack type of school bag and more preferably carry on both shoulder despite on one shoulder as same results supporting in many other studies ^(5, 9, 10, 14, 24)

The guidelines suggest school bag weight should be in limits of 10-15% BW but 62.7% carried schoolbag more than 15% of their BW, 27.8% carried 10-15% of BW and 9.4% carried less than 10% of BW according to the current study relatively quite similar results shown in the study conducted in Iran relatively according to previous study about 30.8% of pupils had bags which weighed in excess of 10% of their body weight⁽⁵⁾ resembling with results of present study. Contrarily, minority of students carried schoolbag more than 15% BW moreover fewer percentages of students carried bag weight between 10 -15% BW ^(3, 21)

The shoulder pain is more prevalent in those who put on schoolbag on both shoulders. Similar results were reported in another study ⁽²³⁾

The 74.3% participants were presented with shoulder pain ^(2, 5, 6, 14), on the contrary the shoulder pain percentage is very low in findings of studies ^(9, 18)

According to the results, 48.52% pain reporters carried schoolbag weighing more than 15% of BW, similar results found in other study conducted in school going students ⁽³⁾

The results of study narrate that there was no significant association found in school bag weight and shoulder pain and this was verified by other studies. ^(12, 13) Conversely the association was found between the relative bag weight and shoulder pain^(2, 9). However, no significant association was found in school bag carriage variables with shoulder pain seeing the similar results in another study⁽⁹⁾

CONCLUSION:

Male students were more likely to experience shoulder pain than female students. Majority of students (94.3%) use the backpack. 67.2% carried schoolbag on both shoulders complained about shoulder pain because weight of school bags carried by students exceeded from the recommended limits. No association was found between the shoulder pain among middle school students and weight of school bags and methods of carrying it.

REFERENCES:

1. Ismaila S. Safe backpack weight limit for secondary school students in Ibadan, Southwestern Nigeria. Alexandria Engineering Journal. 2017.
2. Dianat I, Javadivala Z, Allahverdiipour H. School bag weight and the occurrence of shoulder, hand/wrist and low back symptoms among Iranian elementary schoolchildren. Health promotion perspectives. 2011;1(1):76.
3. Panicker RK, Sandesh T. Prevalence of Musculoskeletal Pain in School Going

- Adolescents Using School Bags: A Correlational Research. *International Journal of Therapies and Rehabilitation Research*. 2014;3(4):1.
4. Kabilmiharbi N, Santhirasegaram T, editors. A Study on Relationship Between Carrying Schoolbags and The Prevalence of Neck and Back Pain Among 7–9 Year Old Students. *MATEC Web of Conferences*; 2017: EDP Sciences.
 5. Mwaka ES, Munabi IG, Buwembo W, Kukkiriza J, Ochieng J. Musculoskeletal pain and school bag use: a cross-sectional study among Ugandan pupils. *BMC research notes*. 2014;7:222.
 6. Whittfield J, Legg SJ, Hedderley DI. Schoolbag weight and musculoskeletal symptoms in New Zealand secondary schools. *Applied ergonomics*. 2005;36(2):193-8.
 7. Dockrell S, Simms C, Blake C. Schoolbag weight limit: can it be defined? *The Journal of school health*. 2013;83(5):368-77.
 8. van Gent C, Dols JJ, Carolien M, Sing RAH, de Vet HC. The weight of schoolbags and the occurrence of neck, shoulder, and back pain in young adolescents. *Spine*. 2003;28(9):916-21.
 9. Dianat I, Sorkhi N, Pourhossein A, Alipour A, Asghari-Jafarabadi M. Neck, shoulder and low back pain in secondary schoolchildren in relation to schoolbag carriage: Should the recommended weight limits be gender-specific? *Applied ergonomics*. 2014;45(3):437-42.
 10. Dockrell S, Kane C, O'keefe E. Schoolbag weight and the effects of schoolbag carriage on secondary school students. *Ergonomics*. 2006;9(1):216-22.
 11. Azabagic S, Spahic R, Pranjic N, Mulic M. EPIDEMIOLOGY OF MUSCULOSKELETAL DISORDERS IN PRIMARY SCHOOL CHILDREN IN BOSNIA AND HERZEGOVINA. *Materia socio-medica*. 2016;28(3):164-7.
 12. Dockrell S, Simms C, Blake C. Schoolbag carriage and schoolbag-related musculoskeletal discomfort among primary school children. *Applied ergonomics*. 2015;51:281-90.
 13. Papadopoulou D, Malliou P, Kofotolis N, Emmanouilidou MI, Kellis E. The association between grade, gender, physical activity, and back pain among children carrying schoolbags. *Archives of Exercise in Health and Disease*. 2013;4(1):234-42.
 14. Khan R, Jabeen H, Arshad HS. Neck, Shoulder, and Back Pain with Carrying Heavy Back Packs among the Spirit School Children in Lahore. *Age*. 2016;9(12):13-6.
 15. Adamson G, Murphy S, Shevlin M, Buckle P, Stubbs D. Profiling schoolchildren in pain and associated demographic and behavioural factors: a latent class approach. *Pain*. 2007;129(3):295-303.
 16. Lai JP-h, Jones AY-m. The effect of shoulder-girdle loading by a school bag on lung volumes in Chinese primary school children. *Early human development*. 2001;62(1):79-86.
 17. Amerah M, Nabaa AA, Jararaa A, Eshtayeh E, Qadous MS, Alkaissi AAE. Effect of Schoolbag Weight and Carrying Way on Neck, Shoulder, and Back on Primary School Students in Nablus City
 18. Dianat I, Alipour A, Asgari Jafarabadi M. Risk factors for neck and shoulder pain among schoolchildren and adolescents. *Journal of paediatrics and child health*. 2017.
 19. Daneshmandi H, Rahmani-Nia F, Hosseini S. Effect of carrying school backpacks on cardio-respiratory changes in adolescent students. *Sport Sciences for Health*. 2008;4(1):7-14.
 20. Puckree T, Silal S, Lin J. School bag carriage and pain in school children. *Disability and Rehabilitation*. 2004;26(1):54-9.
 21. Amerah M, Nabaa AA, Jararaa A, Eshtayeh E, Qadous MS, Alkaissi AAE. Graduation Project.
 22. Poursadeghiyan M, Azrah K, Biglari H, Ebrahimi MH, Yarmohammadi H, Baneshi MM, et al. The effects of the manner of carrying the bags on musculoskeletal symptoms in school students in the city of Ilam, Iran. *Annals of Tropical Medicine and Public Health*. 2017;10(3):600.
 23. Hamzat T, Abdulkareem T, Akinyinka O, Fatoye F. Backpack-related musculoskeletal symptoms among Nigerian secondary school students. *Rheumatology international*. 2014;34(9):1267-73.
 24. Dianat I, Javadivala Z, Asghari-Jafarabadi M, Asl Hashemi A, Haslegrave CM. The use of schoolbags and musculoskeletal symptoms among primary school children: are the recommended weight limits adequate? *Ergonomics*. 2013;56(1):79-89.

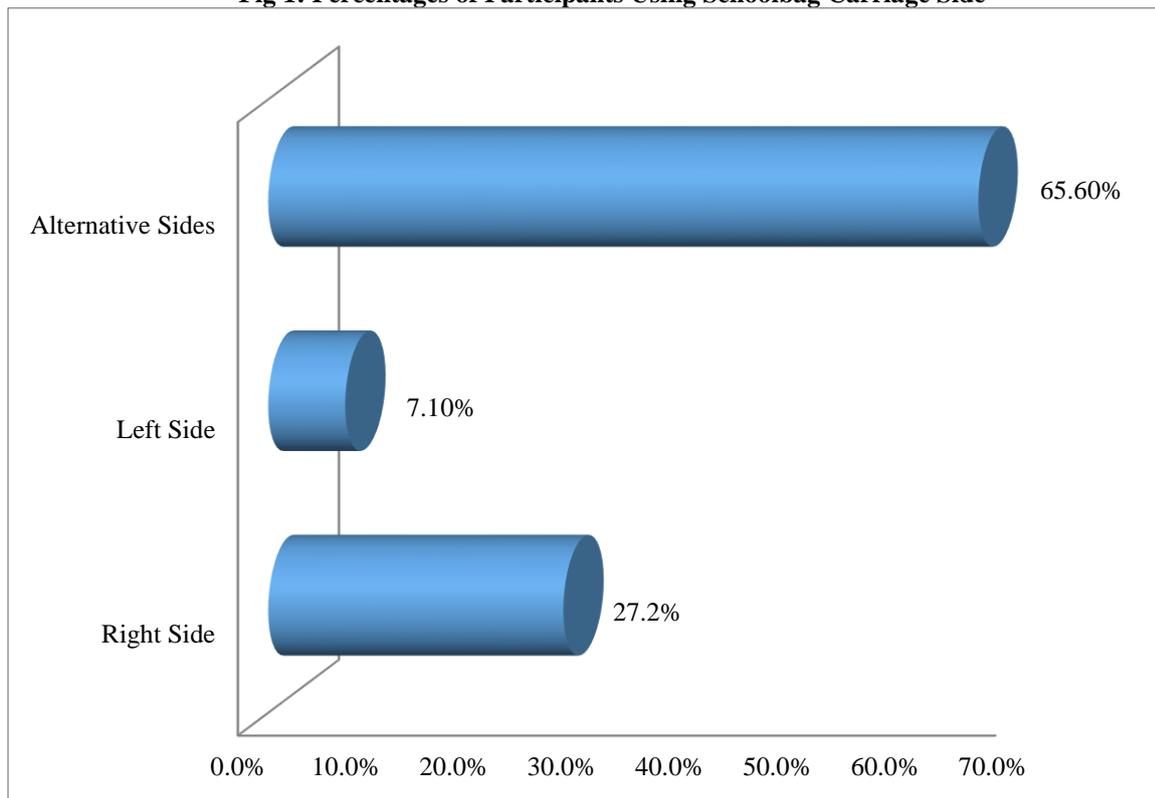
Fig 1: Percentages of Participants Using Schoolbag Carriage Side

Fig 1 describes that the students use different side for carrying schoolbag. The 27.2% (n=92) students use right shoulder, the 7.1% (n=24) students use left shoulder, and 65.7% (n=222) students use alternative sides.

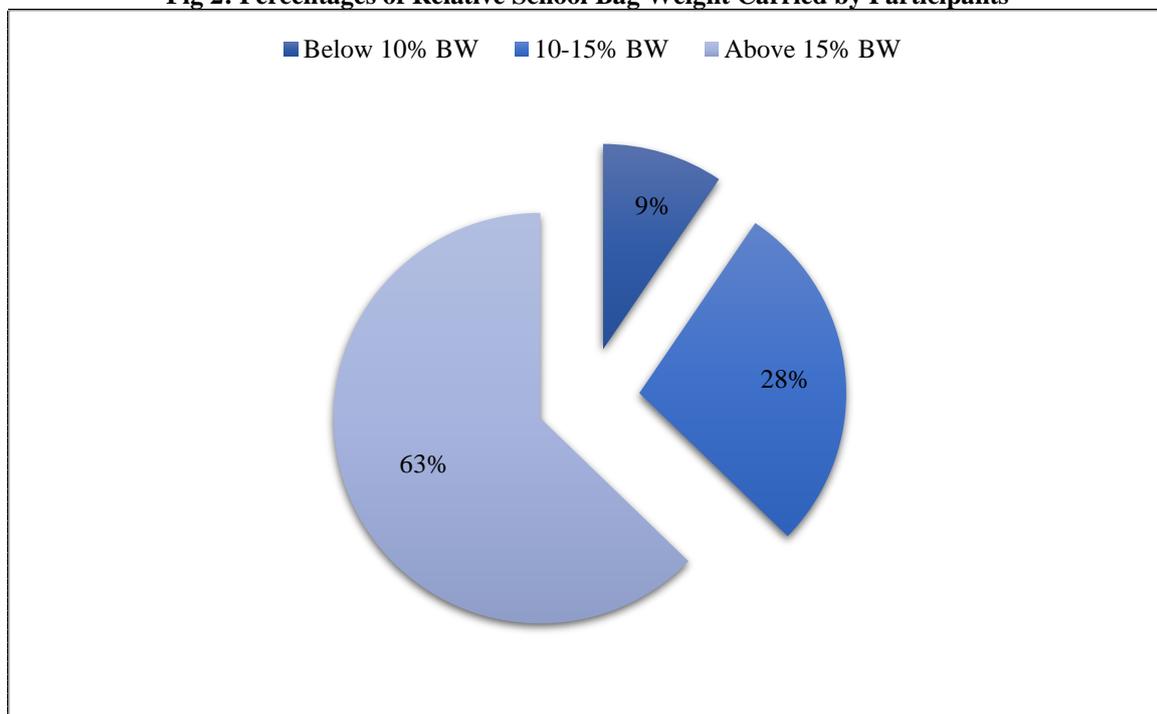
Fig 2: Percentages of Relative School Bag Weight Carried by Participants

Table 1: Chi Square & Cross-tabulation Between Relative Bag Weight and Shoulder Pain

Table 1 describe 65.6% of students who carry schoolbag less than 10% of their body weight report shoulder pain, 70.2% of students present with shoulder pain carried 10-15% of BW although 77.4% students carry schoolbag weighing more than 15% of BW complaint about shoulder pain. The chi square test applied to find the association

			Shoulder Pain		Total	Pearson Chi Square (χ^2)
			Yes	No		
Percentage of bag weight/body weight	BELOW 10%	Count	21	11	32	$\chi^2_{(2)} = 3.11$ $p = 0.21$
		% within Percentage of bag weight/body weight	65.6%	34.4%	100.0%	
	10 - 15%	Count	66	28	94	
		% within Percentage of bag weight/body weight	70.2%	29.8%	100.0%	
	ABOVE 15%	Count	164	48	212	
		% within Percentage of bag weight/body weight	77.4%	22.6%	100.0%	
Total	Count	251	87	338		
	% within Percentage of bag weight/body weight	74.3%	25.7%	100.0%		

between relative school bag weight and shoulder pain and value was $\chi^2_{(2)} = 3.11$, $p = 0.21$ which states that it was non-significant as $p > 0.05$.

Table 2: Chi Square & Cross tabulation Between Method of Carrying School Bag & Shoulder Pain

			Shoulder Pain		Total	Pearson Chi Square (χ^2)
			Yes	No		
Method of Carrying School Bag	One Shoulder	Count	82	29	111	$\chi^2_{(1)} = .013$ $p = .910$
		% within Method of Carrying School Bag	73.9%	26.1%	100.0%	
	Both Shoulder	Count	169	58	227	
		% within Method of Carrying School Bag	74.4%	25.6%	100.0%	
Total	Count	251	87	338		
	% within Method of Carrying School Bag	74.3%	25.7%	100.0%		

Table 2 depicts that 73.9% student who carried schoolbag on one shoulder complaint shoulder pain while 74.4% students carry the schoolbag on both shoulders' complaint about shoulder pain. The chi square value was $\chi^2_{(1)} = 0.013$, $p = 0.91$ which describes no association between method of carrying school bag and shoulder pain as $p > 0.05$.