

# Neck, Shoulder, and Back Pain with Carrying Heavy Back Packs among the Spirit School Children in Lahore

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**Abstract:** School children experience neck, shoulder and back pain due to carrying heavy bags. Heavy back packs negatively affect spine as well as cause other musculoskeletal symptoms. **Objective:** The aim of this study was to determine the frequency of neck, shoulder and back pain in spirit school children carrying heavy back packs. **Method:** This cross sectional survey was conducted among 135 students of private school in Pakistan, Lahore in 2016. Modified Nordic musculoskeletal questionnaire (Extended version) was used, asking about neck, shoulder and back pain and its details. Weights of the children were measured. Weights of bags were measured and its percentage with respect to body weight was also calculated. **Results:** Results showed that most prevalent musculoskeletal symptom was shoulder pain (44.4%) followed by neck (29.6%), low back (23%) and upper back (3%). **Conclusion:** Weight of school bags was strongly related to neck, shoulder and back pain in school children. Students who used double straps and carrying bags on both shoulder showed less symptoms.

**Keywords:** Children, school bag weight, shoulder pain, neck pain, posture

## 1. Introduction

### 1.1. Overview

Carrying heavy school bags is frequently related with many musculoskeletal discomforts(1). School children using improper method of carrying bags are at risk of musculoskeletal disturbances and tiredness.(2)It is stated that heavy school bags can alter the normal alignment of body by putting the body in stress condition(2)

Previous researches stated that the weight brought by school children is higher than the normal range. (3).Prolonged use of carrying heavy bags affect growing bones and causes stress injuries. While carrying back packs, it shifts the center of gravity of child in same direction as load. Child tilts himself opposite to the direction of weight to compensate this. For example, a child wearing bag on sacrum will precede the head and trunk in forward direction.(4)

Children between the ages of 12-14 years need special concerns because spine is yet at the stage of development. Children facing musculoskeletal disorders are highly associated with using heavy back packs as heavy bags can alter posture or body alignment. (3)

A study administered that there is significant alteration in body position, rate of perceived exertion and muscle strain. These occurs when school bag weight go up to 10% of body weight(5). This study investigated only the association of low back pain with carrying heavy school bags. It didn't explain other musculoskeletal disorders related to carrying high loaded school bags.

In present years, a greater involvement at school level is shown by the parents regarding heavy school bags.

Particularly parents revealed that problem as at individual level or through any organization. Furthermore, students as well as teachers have spoken out their level of discomforts or agitation related to heavy bags. These heavy bags put extra burden on children and responsible for fatigue.

Previous studies investigated the association of heavy bags with low back pain in school children. This research investigated three variables in relation to carrying heavy bags. It explored the occurrence of shoulder pain, neck pain and low back pain in school children due to carrying heavy bags.

### 1.2. Objective

The aim of this study was to determine the frequency of neck, shoulder and back pain in spirit school children carrying heavy back packs, low back pack or high back pack conditions pressure is at 10%, 20% and 30% of body weight on right and left shoulder is higher than that pressure which causes occlusion of cutaneous blood flow. (10)

### 1.3. Rationale

Outcome of this study will helpful in raising awareness regarding the effects of heavy back packs on neck, shoulder and back pain and would thus help developing preventive strategies of carrying school bags.

### 1.4. Operational Definition

#### 1.4.1. Nordic Questionnaire

Modified Nordic musculoskeletal questionnaire (Extended version) was used to assess pain (neck, shoulder and back pain).It is a questionnaire based tool which is used

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for specifically neck, shoulder and back pain. It is to mention that it is not used for clinical diagnosis. Reliability of NMQ ranges from 0 -23%. Sensitivity of this tool is 66 - 92% while specificity is between 71 -88%. (6)

**1.4.2. Weighing scale**

A digital weight scale CAMRY (modal EB 9320) was used for objective measurement of weight of bags and body weight of students.

**1.5. Material and Methods**

**1.5.1. Study Design**

This study was descriptive (cross sectional study).

**1.5.2. Duration**

This study was completed in estimated period of 3 months after the approval from ANMC research committee.

**1.5.3. Setting**

Data was collected from spirit schools Lahore. Following schools was included in this study:

- The spirit school Wapda town Lahore.
- The spirit school Johar town Lahore
- The spirit school Faisal town Lahore
- The spirit school Riawind Road Lahore

**1.5.4. Sample size**

The sample size will be calculated using the online Raosoft sample size calculator.

$$X = \frac{Z^2(c/100)^2 r(100-r)}{E^2}$$

$$N = \frac{N_x}{((N-1)E^2 + x)}$$

$$E = \text{Sqrt}[\frac{(N-n)x}{n(N-1)}]$$

In this formuln = sample size, E = Margin of error, N= Population size, r =fraction of responses, Z(c/100) = critical value for the confidence level c., In this sample size formula, we calculated sample size by taking following values:,E( margin of error) = 5%, Confidence level: 95%, N = 5000,r = 90%,It gave 135 as sample size.

**1.5.5. Sampling technique**

Simple random sampling technique

**1.5.6. Sample Selection**

**1.5.6.1. Inclusion criteria**

- School going students of class 5<sup>th</sup> to 8<sup>th</sup>
- Carrying bags on one or both shoulders
- Both male and female students
- Ability to stand on weighing scale independently

**1.5.6.2. Exclusion criteria**

- Pathological, orthopedic or genetic causes of musculoskeletal symptoms.
- Metabolic or neoplastic disorders.

**1.5.7. Data Collection Procedure**

A descriptive cross sectional study was done in five spirit schools of Lahore during 2015 to 2016 including students of grade 5<sup>th</sup> to 8<sup>th</sup> grade. An informed consent firstly was taken from school administration by telling the aims and

objectives of this study. The students were selected on the basis of simple random sampling technique.

Firstly questionnaire will record demographic information such as age, gender, class, type of school bags and carrying style of bag. Modified Nordic Musculoskeletal Disorders Questionnaire was used. It included human picture where respondent pointed out the areas of discomfort.

Questionnaire data was entered in SPSS version 21. Descriptive statistics and Frequency tables were used to analyze data.

**1.5.8. Participants Rights**

It was a cross sectional study. Students were voluntarily involved after an informed consent from students as well as teachers. It was not an experimental study so no treatment was applied on any student. Study had no any physical, social or psychological harm to students. All medical ethics were considered.

**2. Results**

**Table 1:** Frequency distribution of age, gender and school years among students:

		Frequency	Percentage
Age	9-12	72	53.3
	13-16	63	46.7
Gender	Male	65	48.1
	Female	70	51.9
School year	5 <sup>th</sup>	2	1.5
	6 <sup>th</sup>	53	39.3
	7 <sup>th</sup>	39	28.9
	8 <sup>th</sup>	41	30.4

Mostly students (53.3%) had ages between 9-12 years followed by 13-16 years (46.7%).Female students were more recruited (52%) as compared to male (48%).Most of the students were from 6<sup>th</sup> class (39.3%) with minimum value of 5<sup>th</sup> class (1.5%).All the participants responded back.

**Table 2:** Frequency distribution of body weight without bags

	Groups	Frequency	Percentage
Body weight without bags	21-30kg	10	7.4
	31-40kg	61	45.2
	41-50kg	44	32.6
	51-60kg	13	9.6
	61-70kg	7	5.2

Most of the students (45.2%) had body weight between 31-40kg with minimum value (5.2%) of 61 -70kg.

**Table 3:** Frequency distribution of body weight with bags:

	Groups	Frequency	Percentage
Body weight with bags.	21-30kg	1	.7
	31-40kg	36	26.7
	41-50kg	58	43.0
	51-60kg	30	22.2
	61-70kg	8	5.9
	71-80kg	2	1.5

Highest frequency (43%) of weight between 41-30 kg (with bags) was measured and minimum frequency was of 21-30kg (0.7%).

**Table 4:** Descriptive statistics for weight of bag and percentage of bag with respect to body weight:

	Mean±SD
Weight of bag	5.74±1.298
Percentage of bag with respect to body weight	14.43±3.885

Mean±SD of weight of bag was 5.74±2.98. Mean±SD of percentage of bags according to body weight was 14.43±3.885.

**Table 5:** Frequency distribution of type of school bag  
 65.2% of school children use double strap bags while 34.8% use single strap bags

Type of school bag	Frequency	Percentage
Single strap	47	34.8
Double strap	88	65.2

**Table 6:** Frequency distribution of reasons of carrying study material in school bags:

Reasons of carrying study material	Frequency	Percentage
His or her own choice	61	45.2
Teachers	36	26.7
According to schedule	38	28.1

Maximum school children (45.2%) carried study material by their own choice. 26.7% of students carried material because of their teachers.

**Table 7:** Frequency distribution of way of carrying bags

Way of carrying bags	Frequency	Percentage
on one shoulder	66	48.9
on both shoulder	68	50.4
rolling trolley by hand	1	.7

50.4% of students carry bags on both shoulder and 48.9% of students carry bags on one shoulder.

**Table 8:** Frequency distribution of lean forward posture during carrying bag:

Lean forward during carrying bags	Frequency		Valid percent
	Yes	No	
	56	79	41.5
			58.5

58.5% of students exhibited lean forward posture during carrying bags.

**Table 9:** Region wise frequency distribution of pain

Region	Ever had pain (N=135)	
	No	Yes
Neck	95(70.4%)	40(29.6%)
Shoulder	74(54.8%)	60(44.4%)
Upper back	131(97%)	4(3%)
Low back	104(77%)	31(23%)

Maximum students (44.4%) showed shoulder pain. Least frequency (3%) was shown in upper back pain.

**Table 10:** Frequency distribution of "have you any pain during last 12 months"

Region	Pain during last 12 months (N=135)	
	No	Yes
Neck	111(82.2%)	24(17.8%)
Shoulder	103(76.3%)	32(23.7%)
Upper back	130(96.3%)	4(3%)
Low back	112(83%)	23(17%)

During the last 12 months most of the participants had experienced pain in shoulder region (23.7%). Least number of subjects (3%) had experienced pain in upper back during last 12 months.

**Table 11:** Frequency distribution of "have you any pain during last 4 weeks"

Region	Pain during last 4 weeks (N=135)	
	No	Yes
Neck	96(71.1%)	39(28.9%)
Shoulder	80(59.3%)	55(40.7%)
Upper back	131(97%)	4(3%)
Low back	105(77.8%)	30(22.2%)

During the last 4 weeks most of the students (40.7%) experienced pain in shoulder region. Least of participants showed pain in upper back (3%) during last 4 weeks.

**Table 12:** Frequency distribution of "have you seen any clinician"

Region	Seen any clinician (N=135)	
	No	Yes
Neck	119(88.1%)	16(11.9%)
Shoulder	121(89.6%)	14(10.4%)
Upper back	133(98.5%)	2(1.5%)
Low back	126(93.3%)	9(6.7%)

Maximum students (12%) had seen clinician due to neck pain. Only a few (1.5%) students had seen clinician due to upper back pain.

**Table 13:** Frequency distribution of "have you taken medication because of pain"

Region	Taken medication (N=135)	
	No	Yes
Neck	115(85.2%)	20(14.8%)
Shoulder	116(85.9%)	19(14.1%)
Upper back	133(98.5%)	2(1.5%)
Low back	121(89.6%)	14(10.4%)

Most of students (14.8%) had taken medications due to neck pain. Minimum students (1.5%) had taken medications due to upper back pain.

### 3. Conclusion

This study concluded that weight of school bags was strongly related to neck, shoulder and back pain in school children. Students who used double straps and carrying bags on both shoulder showed less symptoms.

### 4. Discussion

This study showed the frequency of neck, shoulder and back pain in school children due to carry heavy bags. A study was done in Tehran, Iran. Which showed the results which closely resembles to our research. That previous study showed that most common symptoms of musculoskeletal symptoms were shoulder pain (38.1%), neck pain (27.6%) and back pain (16.7%). A study was done in 2015 which showed that 88.2% students showed neck, shoulder and back pain among musculoskeletal symptoms. (3)

Another study was done to find out musculoskeletal symptoms in school children. Study revealed that there was shoulder pain (42.1%), neck pain (24.5%), back pain



(35.7%). This percentage was very similar to our findings. Moreover in our studies as well as studies in other countries showed that shoulder pain is more prevalent in school going children. (14).

In our study it has been seen that children who carry weight of bags less than 10% of BW also experience neck, shoulder and back pain. In addition our research findings match with a research conducted in Iran (15). Same conclusion was found previously in a study done in 2015 (Drzal-Grabiec et al., 2015). Another study was done in Iran to find out safe limit of weight of bags. It was suggested that the current limit of weight of bags (10-15% of body weight) is not a safe limit to carry bags. (Drzal-Grabiec et al., 2015). Prevention is better than treatment. Parents should check the bags on daily bases. Second line of prevention should start from school level. Children should be provided with lockers to keep their bags and other materials to prevent from discomforts. In addition choose the right bag with respect to body weight and comfortable level, skip unnecessary items, choose padded double straps and carry on both shoulders.

This study is limited to Lahore population. Rural children are not getting involved in this study. It does not represent these musculoskeletal symptoms in rural population. Finally there is no comparison between rural and urban school going children.

It does not describe the exact safe limit of weight of bags with respect to BW. So further studies should be done to evaluate safe limits of weight of bags.

Another limitation of this study is it is a cross sectional study. There is no evaluation of association of cause and effect. Therefore results are the general demonstration of problem.

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