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Frequency of Neck, Shoulder and Back pain due to Heavy Backpacks among Private School Children of Islamabad: A Descriptive Survey

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ABSTRACT

School going children carry heavy back pack on daily basis. Heavy backpack can place extra pressure on shoulder, neck and back that can lead to pain in these regions of body. **Objective:** To explore the occurrence of neck, shoulder and back pain in school going children because of carrying heavy bag. **Methods:** A cross-sectional descriptive survey was conducted amongst school children of Islamabad from April 2023 to July 2023. A total of 274 school going children from various private schools of Islamabad region were the part of this study. School going children aging from 10 to 17 years of age of either gender with no history of musculoskeletal problems were included in the study. Data collection questionnaire incorporated standard Nordic Musculoskeletal disorder tool. Data were analyzed on SPSS version 25.0. **Results:** Children who carry back pack weight more than 10% showed more musculoskeletal symptoms in neck, shoulder and back. Results showed that frequency of musculoskeletal symptoms such as back pain was 171 (62.4%) and 97 (35.4%) students out of 100 who claimed no pain in back due to heavy backpack. In addition, the frequency of neck pain was 184 (67.2%) and 84 (30.7%) students who responded no neck pain due to heavy backpack. The frequency of shoulder pain was 86 (31.3%). **Conclusions:** Students with heavy back pack are more prone to develop musculoskeletal disorders including neck, shoulder and back pain.

INTRODUCTION

School going children carry heavy back pack on daily basis. Heavy backpack can place extra pressure on shoulder, neck and back that can lead to pain in these regions of body [1]. Secondly, this has a deleterious impact on the physical as well as psychological health. It increases their level of fatigue. It also reduces their performance in extracurricular activities [2]. The recommended ratio for bag to weight for school children was 10-15%. The musculoskeletal system and body posture is affected by the way of carrying backpacks for school [3]. Most of the children wear single strap of backpack that puts an extra stress on that particular side. It is due to unequal weight shifting on shoulders [4]. School students usually carry their bag by themselves so, it is significant for each student to carry their schoolbag conferring to their weight in order

to avoid or minimize musculoskeletal pains [5]. Shoulder, neck and back pain are mild musculoskeletal conditions but recently it has turn out to be a foremost health problem and it also has enforced a negative effect on the person. It has a higher prevalence in comparison to other common health related problems like asthma, alcohol and drug abuse [6]. Children as well as teenagers of developing countries are more commonly affected by this. The data from various studies attributed that, the occurrence of neck pain in the overall population ranges from 0.4 to 86.8% in the worldwide [7]. According to study, neck or shoulder pain was stated 28.6% among 11-14 year-old children in Iran. Various studies highlighted that lifestyle patterns, multiple physical, psychological, and social factors along with improper sitting posture are the risk factors linked



with neck and shoulder pain among students [6, 7]. For children it is well thought-out as a possible risk factor for health related problems during adulthood. Hence, understanding and properly detecting the pain as well as its effective management during childhood is crucial [7]. Carrying heavy back packs leads to musculoskeletal discomforts in schools children. Improper method of carrying Back pack leads to musculoskeletal disturbances and tiredness. Heavy back packs can change the anatomical position of body structures and making the body more prone to stress conditions [8]. Literature from previous researches is indicative of the fact that the weight carried by school children in the form of bag packs is higher than the standard range. Continual use of heavy school bags distress developing bones and can lead towards injuries due to stress [8]. These heavy school bags are responsible of changing the center of gravity of the child in towards the direction of weight. In order to compensate this, child typically tilts his body against the direction of load. For instance, if a child is wearing bag on sacrum he will precede his head and trunk in forward direction [9]. In past few years the weight of student's back pack has become a growing concern to the persons who have interest or are involved in educational aspect [10]. Heavy back packs aren't only the cause of back injuries, though that is the major concern, in fact they are also been found to be associated with causing neck pain as well as shoulder strain, headaches and a generalized sense of exhaustion [9]. According to children's health, heavy back packs can lead towards the upper and lower back pain along with neck strain. Bad posture, which is the resultant of backpack along with the back pain, can worsen the problem [11]. Roughly 90% of school going children carries backpacks to transport their belongings to and from school around the globe [12]. Prolonged use of carrying such heavy backpacks can be the source for musculoskeletal symptoms in school going children, along with added stress on rapidly growing spinal structures [13]. The American Occupational Therapy Association, The International Chiropractic Pediatric Association and The American Academy of Orthopedic Surgeons suggested that weight of backpacks must not be more than 10% of total body weight of the child while the American Physical Therapy Association suggested it to be 15% of total body's weight [14]. Number of problems that can be arise due to the use of heavy backpacks can lead towards the deformation in the natural curvature of the back causing muscle strain along with irritation to the rib cage leading to chronic back and neck pain, shoulder strain, generalized sense of exhaustion, ankle injuries, pain in the elbow, wrist and even in knee [15]. Musculoskeletal pain is a public health problem occurring in both males and females. It is considered as a common and costly occupational health problem in both

developed and underdeveloped countries. It can cause significant personal discomfort due to pain. It also causes impairment of quality of life [16]. In this era everything is fast with new and innovative technologies, our life styles are becoming sedentary [16]. Children are significantly affected by this as their childhood outdoor games are replaced by smart phone games, causing them to become physically less active with weaker bodies and physical problems [17]. Among these physical problems, back pain is getting more common and therefore needs special attention by parents and community itself [17]. Previous available literature focused on either neck pain or shoulder pain never combined but our study specifically focused on neck, shoulder and back pain.

Current study aimed to highlight the occurrence of neck, shoulder and back pain in school going children carrying backpacks.

METHODS

A descriptive cross section study was carried out at University of Lahore Islamabad campus, after getting approval in April 08, 2023 from the Institutional Review Committee (IRC) / Ethical Review Board (ERB) of The University of Lahore, Islamabad Campus (IRB-IIUI-FAHS/DPT/1022-1137) within the duration of 6 months from April 2023 to August 2023. Sample was calculated by Slovin's formula i.e. Confident interval (CI): 95% Margin of error (a-error): 0.05, $n = N / (1 + Ne^2)$, where n= sample size, N= actual population, e= margin of error; N=1000, e=0.05; n =285. Non probability convenience sampling technique was used and data were collected using a semi-structured questionnaire that consisted of two parts, one was related to demographic features including age, gender, weight, height of the children and weight of the bag while second part incorporated standard Nordic Musculoskeletal disorder tool. This NMQ can be used as a structured interview or a questionnaire as it qualitative scale highlighting the areas of pain in past 12 and 07 months. It has no scoring since it is subjective or qualitative tool and all questions are answered in yes or no options. School going children aging from 10 to 17 years of age of either gender with no history of musculoskeletal problems were included in the study. Those having any history of trauma in past six months or having any diagnosed musculoskeletal disorder were excluded from the study. Analysis of data was done using SPSS version 25.0. All the categorical as well as qualitative variables were represented in frequency and percentages while continuous variables were presented in means and standard deviation.

RESULTS

Out of 285 samples, 11 were excluded based on inclusion criteria. Mean age of the sample size of 274 came out to be 13.32 ± 1.41 years. In Table 1 the demographic

characteristics and BMI distribution in a study population of 274 individuals. It includes age group distribution, with 51.8% falling in the 10-13 years category and 48.2% in the 14-17 years category. Gender distribution shows 52.9% male and 47.1% female participants. BMI distribution reveals that 73% of the population is underweight, 23% falls within the normal weight range, 2.9% is overweight, and 1.1% is obese.

Table 1: Demographic Characteristics and BMI Distribution among Study Population (n=274)

Demographic Characteristics	Category	N (%)
Age Group	10-13years	142 (51.8)
	14 -17years	132 (48.2)
Gender	Male	145 (52.9)
	Female	129 (47.1)
BMI	Underweight	200 (73)
	Normal Weight	63 (23)
	Overweight	8 (2.9)
	Obese	3 (1.1)

Table 2 presents the frequency and percentage distribution of body weight without backpacks among the study population. The weight categories include 21-30kg, 31-40kg, 41-50kg, 51-60kg, and 61-70kg. The majority of individuals (35.4%) fell into the weight category of 31-40kg, followed by 24.8% in the 41-50kg category. The smallest group (9.1%) had a body weight ranging from 61-70kg.

Table 2: The Frequency of Body Weight without Bag Packs

Weight Category	N (%)
21-30kg	45 (16.4)
31-40kg	97 (35.4)
41-50kg	68 (24.8)
51-60kg	39 (14.2)
61-70kg	25 (9.1)

Table 3 displays the frequency and percentage distribution of body weight with backpacks among the study population. The weight categories include 21-30kg, 31-40kg, 41-50kg, 51-60kg, and 61-70kg. The largest proportion of individuals (46.3%) fell into the weight category of 31-40kg when carrying a backpack, followed by 21.5% in the 41-50kg category. The smallest group (4.3%) had a body weight ranging from 61-70kg while wearing a backpack.

Table 3: The Frequency of Body Weight with Bag Packs

Weight Category	N (%)
21-30kg	35 (12.7)
31-40kg	127 (46.3)
41-50kg	59 (21.5)
51-60kg	41 (14.9)
61-70kg	12 (4.3)

Table 4 presents the mean values and standard deviations (S.D) for the weight of the backpack, weight of the child, and the bag-to-weight ratio within the study population. The mean weight of the backpack was 5.70 kg with a standard

deviation of 3.18. The mean body weight of the children was 39.30 kg with a standard deviation of 9.81. The bag-to-weight ratio, calculated by dividing the bag weight by the body weight, had a mean value of 0.15 with a standard deviation of 0.09.

Table 4: Mean Weight of Bag Pack, Weight of Child and Bag to Weight Ratio

Items	Mean ± S.D
Bag weight in KG	5.70 ± 3.18
Body weight in KG	39.30 ± 9.81
Bag to weight ratio	0.15 ± 0.09

Figure 1 illustrates the frequency of neck pain reported by the study population over a period of 12 months. Out of the total study population, 182 children (67.2%) experienced neck pain. This figure provides a visual representation of the prevalence of neck pain within the study population, highlighting the significant proportion of children affected by this condition.

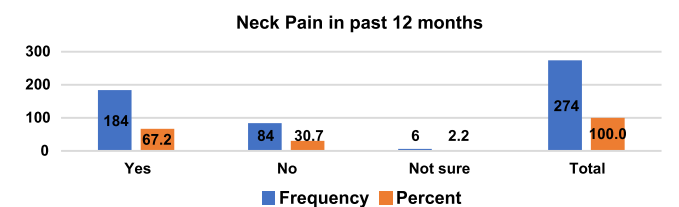


Figure 1: Frequency of Neck Pain in the Past 12 Months among Study Population

Figure 2 depicts the frequency of shoulder pain reported by the study population within the past 12 months. Among the study population, 86 individuals (31.3%) have experienced shoulder pain.

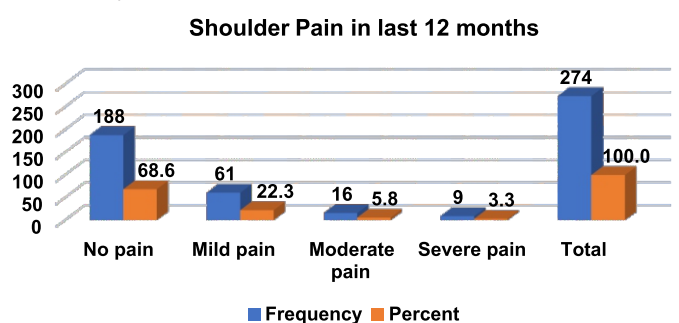


Figure 2: Frequency of Shoulder Pain in the Last 12 Months among Study Population

In figure 3 showing back pain in last 12 months among study population according to which 171 (62.4%) children experiences back pain.

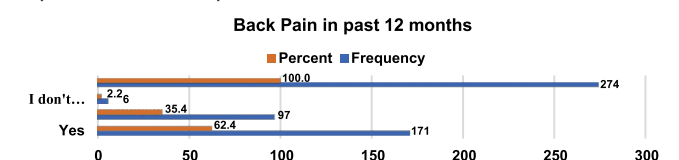


Figure 3: Frequency of Back Pain in the Past 12 Months among Study Population

DISCUSSION

The school going children are the real assets of our nation. It is necessary to ensure the physical health status of school going children [5]. Heavy backpack is very common emerging problem among the students. That should not be overlooked by our families and schools [9]. The prevention of neck, shoulder and back pain is very important for the better performance in education as well as for the daily life activities in students [10]. The current study aims to explore the occurrence of neck, shoulder and back pain in school children of twin cities due to carrying heavy school bags. This study included age group of 10-17 and grades 5-10. Moreover, it focused the schools in the region of Rawalpindi/Islamabad. Including both genders males and females like previous studies [12]. Children who carry back pack weight more than 10% showed more musculoskeletal symptoms in neck, shoulder and back. Study conducted by Khan et al., in 2016 concluded that children who carry back pack of weight more than 10% showed more musculoskeletal symptoms in neck, shoulder and back [18]. In the current study the mean \pm SD of bag to weight ratio is 0.15 ± 0.09 supporting of the results of current study. Results of the present study showed that frequency of back pain in past 12 months was 171 (62.4%). In addition, the frequency of neck pain was 184 (67.2%) among study population. While, the 188 students (68.6%) responded no shoulder pain and there were 61 students (22.3%) responded mild pain in shoulder. The 16 students (5.8%) were responded moderate pain due to heavy backpack. There were 9 students out of 274 (3.3%) responded severe pain in shoulder that affected their performance in education and daily life activities badly. Another study was conducted in Karachi by Mirza et al., in 2020, that included school going children of age group 9-13 revealed that the musculoskeletal symptoms were neck pain (43.8%), shoulder pain (93.8%) and back pain (36.5%) [19]. Moreover, this current study also showed the major effects on neck, shoulder and back pain due to carrying heavy backpack among school children are prevalent. Study conducted by Chowdhury et al., in 2018 in Lahore, included students of grade 5th to 8th. According to their results, musculoskeletal symptoms were neck pain (27.6%), shoulder pain (38.1%) and back pain (16.7%) [20]. While current study was conducted in Islamabad displayed the occurrence of back pain 171 (62.4%), neck pain 184 (67.2%) and shoulder pain (31.3%).

CONCLUSIONS

Current study concluded that students with heavy back pack are more prone to develop musculoskeletal disorders including neck, shoulder and back pain. This study is limited to the urban areas of Islamabad. It does not represent the musculoskeletal problems in rural areas of

Rawalpindi/Islamabad. It is recommended that children should be given cabinets to keep their bags to prevent discomfort.

Authors Contribution

Conceptualization: SH

Methodology: P, UR, HB

Formal analysis: RA

Writing, review and editing: SH

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

The authors declare no conflict of interest.

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