

PREVALENCE OF MUSCULOSKELETAL PAIN AND POSTURAL DISORDERS IN UPPER LIMB AMONG SECONDARY SCHOOL STUDENTS DUE TO UNILATERAL BAG PACK CARRYING

Dr. Erum Ghaffar¹, Mishal Azeem¹, Fatima Mazhar¹, Rimsha Tariq¹, Muqaddas Shafiq¹, Aneeqa Aqdas¹, Aqsa Razaqat¹, Amna Razaqat¹, Barjees Ahmed¹, Iqra Shehzadi¹,

Department of Physical Therapy, Hajvery University, Pakistan
Corresponding Author: Dr. Erum Ghaffar

Abstract- Background: Upper limb joints provide us a wide range of movements due to their unique arrangement of bones and its musculatures. There are number of risk factors contributing in pain and postural abnormalities including unilateral bag pack carrying.

Objective: Evaluate the prevalence musculoskeletal pain and postural disorders in upper limb among school students as a result of carrying unilateral bag packs.

Methods: A descriptive cross-sectional study is conducted to evaluate the musculoskeletal pain and postural disorders among secondary school students due to unilateral bag packs. Rapid Upper Limb Assessment (RULA) questionnaire is used to collect data.

Results: Results shows that female students carry unilateral bag packs more often than male students. Average age of secondary school students is between 12.5-16.5 years. On average 36.3% students report moderate postural changes, positioning their Upper arm at 20° flexion, Forearm at 40° -90° flexion, Neck at 20° of flexion or more, Trunk at 0-20° of flexion and 40.1% students report musculoskeletal pain in upper limb.

Conclusion: This study shows that there is a high prevalence of musculoskeletal pain and postural disorders in upper limb among secondary school students due to carrying unilateral bag packs.

Index Terms- Musculoskeletal Pain, Postural Disorder, Body Mass Index, Rapid Upper Limb Assessment

I. INTRODUCTION

Musculoskeletal Pain at upper limb have been of concern for many years due to its prevalence, effects and role in our

daily life. Multiple studies shows their prevalence as well as effects on the body. Almost every person would face pain at upper limb at least once a life time (1).

Almost 16-20% of population report upper limb pain yearly in highly developed countries (2).

There are approximately 8.0 to 8.6 million girls and 10.5 million boys enrolled in primary school level in Pakistan and it drops to 2.8 million girls and 3.6 million boys at lower secondary level (3). Many students face musculoskeletal related disorders which includes body pain, headache, shoulder pain, neck pain, back pain, legs pain etc. causes of these conditions includes physical as well as psychological aspects. Malnutrition is also one of the leading cause of musculoskeletal pain and postural disorders (4).

Studies suggest that musculoskeletal pain are the most leading cause of long term muscular pain and postural defects in well-developed as well as developing countries. This study concludes that postural defects is one of the leading cause of musculoskeletal disorders. Student's poor posture is due to its sitting position, bag caring style, walking distance, school bag weight etc (5).

About 35% of student's complained about musculoskeletal pain due to bag packs. About 37% student complained about back pain due to heavy school bag packs (6).

There are multiple types of school bag packs used by students. A school bag pack is defined as a body/structure that is used to carry books especially for schools. Bags are generally designed with shoulder straps to carry on shoulders, and they may also have rolling wheels for easy transportation (7).

There are multiple types of bags: mainly carried on shoulders having two straps, mostly used to carry books. This type of bag may have two straps or may be single. Single strap bag is used for carrying lesser weight as compared to double strap bags. Rolling school bags consist of wheels, having trolley like structure and easily carried by students (8).

Yasmin Qureshi and Eric Shamus et al (2012) conducted a study on unilateral shoulder bags. They concentrated on the method of carrying the bag in order to reduce postural asymmetry. The purpose of this study was to investigate whether there is any way to treat postural defects with the help of carrying a unilateral bag. They took sixty-five college students who had volunteered for this study. All the participants were instructed to carry a school bag on their dominant and non-dominant shoulder respectively. They concluded that the participants where their right hand was dominant, when instructed to carry the bag on the dominant side and the bag is in cross style tends to lead to more equal weight distribution on lower extremities. Hence, they suggested that it is possible to correct postural defects by applying asymmetric bag carrying and improve loading on body. They suggested that there is a need of awareness to almost all the aspects of society about backpacks, shoulder bags, loading and postural defects as well as their associated risk factors that can be developed in the near future due to biomechanical issues (9).

Yi-Lang Chen, Hong-Tam Nguyen and their associate's et al, (2021) conducted a study to evaluate the influence of the effect of school bag loadings and bag carrying methods on body strain in young male students. The study focused on the types of school bags and on the method of carrying school bags. For this study they took 12 university students. This study concluded that method of carrying school bags and the load in school bags majorly effects the body posture. This study concluded that side bags carrying method should be avoided due to relatively shoulder tilt, spine and trunk flexion. Also due to one sided bag carrying lumbosacral angle becoming low? One sided bag carrying method can cause unbalance load on one side of body and cause disturbance in posture which will lead to muscular strains, lower back pain, shoulder and neck pain. This study suggest that it's better to carry bags on both of the shoulder instead of one single side (10).

A study was conducted by Samia Ali EI-Nagar and Maha Mahamed Mady et al (2017) on use of school bags, behavioral and postural habits and its effect on back pain occurrence among school children's in Shebin EI-Kom, Egypt. For this study students were chosen from ten different governmental preparatory schools from both rural and urban areas of Menoufia Governorate, Egypt. Total 598 students including 359 girls and 239 boys of 12-15 years old were included in study. Back pain assessment questionnaire, self-administered structured questionnaire, behavioral habit questionnaire, back pain and body posture assessment instrument, physiological measurements and school bag use questionnaire were used in order to collect data for this study. Results shows that about 74% of total school going children's report back pain. There was a significant increase of

back pain among female students from male students by five times. This study recommended that there is a need of development and implementation on programs in schools about the importance of good posture, effect of school bag carrying methods (11).

This study evaluates the prevalence of musculoskeletal pain and postural disorders in upper limb among secondary students due to unilateral bag pack carrying. There is limited research on prevalence of musculoskeletal pain and postural disorders among secondary school students. The prior research didn't place much attention on this.

II. IDENTIFY, RESEARCH AND COLLECT IDEA

This is a descriptive cross-sectional study to check out the prevalence of musculoskeletal pain and postural disorders in upper limb among secondary school students due to unilateral bag pack carrying. Non-propability convenient sampling technique was used to select sample size. This study is carried out at 4 different schools in Lahore. It includes Govt. Central Model School Rattigan road, Queen Merry School, The Educators Allama Iqbal Campus, The Quest Schools. Sample size is 377 students selected by Rao Soft software with 95% confidence level and 5% error margins (12). Basic demographics includes age, gender (13), and intensity of pain measured by Visual Analogue Pain Scale (VAS) and Rapid Upper Limb Assessment (RULA) questionnaire (14). Data was collected by using basic demographic based questionnaire along with visual analogue pain scale (15). SPSS 20 is used to analyze frequency and percentage. It is used to draw Charts and graphs (16).

Results

Descriptive statistics were calculated for 377 students. A cross-sectional survey was done to find the prevalence of Musculoskeletal pain and postural disorders among secondary school students due to unilateral bag pack carrying. The mean age of students was between 12.5 and 16.5 years. Out of total surveyed students, participants with healthy BMI were taken in this study. Most students exhibit poor posture. On average 36.3% of secondary school students report moderate postural changes and 40.1% of secondary school students report moderate musculoskeletal pain in upper limb due to unilateral bag pack carrying.

Table 1 shows pain intensity among secondary school students due to unilateral bag packs carrying noted on visual analogue scale. 40 students report no pain, 93 students report mild pain, 151 students report moderate pain and 93 students report severe pain.

Figure 1 shows geographical presentation of pain intensity. 10.6% students report zero or no pain, 24.7% students report mild pain, 40.1% students report moderate pain and 24.7% students report severe pain.

Table 2 shows the overall RULA score. 35 students report acceptable posture, 105 students report need of mild postural changes and further investigation, 137 students report need of further investigation and moderate changes, 100 students report bad posture and immediate need to implement changes.

Figure 2 shows geographical presentation of students percentage to overall RULA score. 9.3% students report score 1-2, 27.9% students report score 3-4, 36.3% students report score 5-6 and 26.5% students report score 7-7+.

Table 1: Shows pain intensity among students noted on visual analogue scale.

Pain Intensity	Frequency	Percentage
No pain	40	10.6
Mild Pain	93	24.7
Moderate Pain	151	40.1
Severe Pain	93	24.7
Total	377	100

Figure 1: shows the graphical presentation of pain intensity among students.

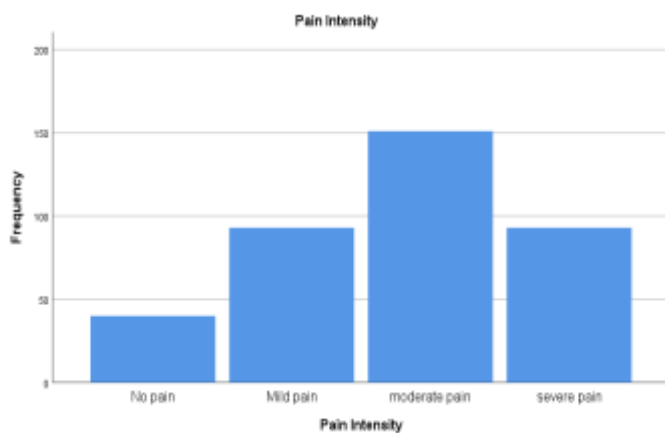
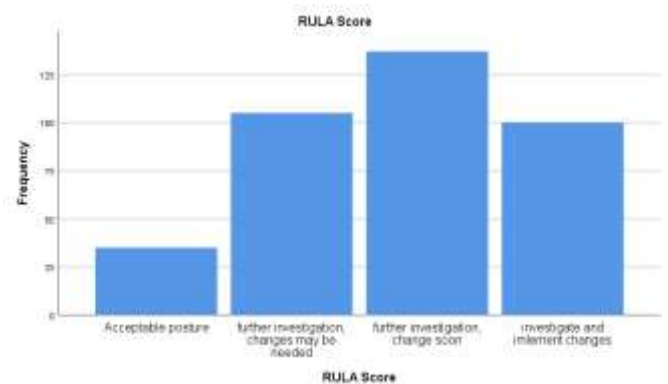


Table 2: shows the overall RULA score among students.

RULA Score	Frequency	Percentage
Acceptable Posture	35	9.3
Further Investigation, Mild changes maybe needed	105	27.9
Further Investigation, Moderate changes needed	137	36.3
Investigate and Implement changes	100	26.5
Total	377	100

Figure 2: shows the geographic presentation of overall RULA score.



Discussion

Musculoskeletal pain and postural disorders can be associated with school bag packs. Macias, Brandon R and their associates conducted a study on loading pattern of symmetrical and asymmetrical school bags. They concluded that almost both type of bag carrying can cause abnormal loading on shoulder and spine. This abnormal loading causes postural changes and fatigue among students. Unilateral bag carrying tends to put more load on carrying side and also cause bending of spine on the loading side (19). Our study shows similar results as above mentioned. The following factors: school bags, their load, carrying patterns, student’s general health, BMI, upper limb positioning matter in order to control musculoskeletal pain and postural disorders among students.

Yi-Lang Chen, Hong-Tam Nguyen and their associate's et al conducted a study to evaluate the effect of school bag loading and carrying methods on body strain in young male students. Results of this study shows that side bags carrying method should be avoided due to relatively shoulder tilt, spine and trunk flexion. Due to one sided bag carrying lumbosacral angle becoming low. This study suggest that its better to carry bags on both of the shoulder instead of single side (10). Our results also possess similar results as in above mentioned article. Unilateral bag packs are actual cause of tilting and misbalancing of body. This leads to development of multiple musculoskeletal conditions includes muscle pain, strain and fatigue etc. This study recommended that there is a need to reduce bag pack weight, provide training and workshops to develop awareness about the importance of school bag carrying methods and their impacts on body (20). This study is limited to only Lahore city and only focused on upper limb only, verbal questioning and answering may cause mistakes (21).

Conclusion

This study shows that there is a high prevalence of musculoskeletal pain and postural disorders in upper limb among the secondary school students due to unilateral bag pack carrying.

REFERENCES

- [1] Terry GC, Chopp TM. Functional anatomy of the shoulder. *Journal of Athletic Training*. 2000;35(3):248.
- [2] Evans G. Identifying and treating the causes of neck pain. *Medical Clinics*. 2014;98(3):645-61.
- [3] Sain ZH. Revitalizing Education in Pakistan: Challenges and Recommendations. *International Journal of Higher Education Management*. 2023;9(2).
- [4] Grimes P, Legg S. Musculoskeletal disorders (MSD) in school students as a risk factor for adult MSD: a review of the multiple factors affecting posture, comfort and health in classroom environments. *Journal of the Human-Environment System*. 2004;7(1):1-9.
- [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;7:1-7.
- [6] Mitchell C, Adebajo A, Hay E, Carr A. Shoulder pain: diagnosis and management in primary care. *Bmj*. 2005;331(7525):1124-8.
- [7] Malhotra M, Gupta JS. Carrying of school bags by children. *Ergonomics*. 1965;8(1):55-60.
- [8] CAMBRIDGE. What are the types of school bags? . 2023.
- [9] Qureshi Y, Shamus E. Unilateral shoulder bags: Can they be worn in a way to reduce postural asymmetry? *Internet Journal of Allied Health Sciences and Practice*. 2012;10(4):5.
- [10] Chen Y-L, Nguyen H-T, Chen Y. Influence of school bag loads and carrying methods on body strain among young male students. *International Journal of Industrial Ergonomics*. 2021;82:103095.
- [11] El-Nagar SA, Mady MM. School bag usage, postural and behavioral habits and its effect on back pain occurrence among school children. *Am J Nurs Sci*. 2017;6:218-31.
- [12] Raosoft. Sample size calculator. 2024.
- [13] Yusuf F, Martins JM, Swanson DA. Demographic Information. *Methods of Demographic Analysis*. 2014:7-20.
- [14] McAtamney L, Corlett N. Rapid upper limb assessment (RULA). *Handbook of human factors and ergonomics methods*: CRC Press; 2004. p. 86-96.
- [15] Le May S, Ballard A, Khadra C, Gouin S, Plint AC, Villeneuve E, et al. Comparison of the psychometric properties of 3 pain scales used in the pediatric emergency department: Visual Analogue Scale, Faces Pain Scale-Revised, and Colour Analogue Scale. *Pain*. 2018;159(8):1508-17.
- [16] Pallant J. *SPSS survival manual: A step by step guide to data analysis using IBM SPSS*: Routledge; 2020.
- [17] Cline ME, Herman J, Shaw ER, Morton RD. Standardization of the visual analogue scale. *Nursing research*. 1992;41(6):378-9.
- [18] Namwongsa S, Puntumetakul R, Neubert MS, Chaiklieng S, Boucaut R. Ergonomic risk assessment of smartphone users using the Rapid Upper Limb Assessment (RULA) tool. *PLoS One*. 2018;13(8):e0203394.
- [19] Macias BR, Murthy G, Chambers H, Hargens AR. Asymmetric loads and pain associated with backpack carrying by children. *Journal of Pediatric Orthopaedics*. 2008;28(5):512-7.
- [20] Dockrell S, Blake C, Simms C. Guidelines for schoolbag carriage: An appraisal of safe load limits for schoolbag weight and duration of carriage. *Work*. 2016;53(3):679-88.
- [21] Alshenqeeti H. Interviewing as a data collection method: A critical review. *English linguistics research*. 2014;3(1):39-45.

AUTHORS

First Author – Dr. Erum Ghaffar, DPT, MS-OMPT, Lecturer at Hajvery University Pakistan,

Second Author- Mishal Azeem, DPT, Hajvery University Pakistan,

Third Author – Fatima Mazhar, DPT, MS-OMPT, Lecturer at Hajvery University Pakistan

Fourth author-Rimsha Tariq, DPT, MS-NMPT, Lecturer at Hajvery University Pakistan

Fifth Author -Muqaddas Shafiq, DPT, Hajvery University Pakistan

Sixth Author- Aneeqa Aqdas, DPT, MS-WHPT, Lecturer at Hajvery University Pakistan

Seventh Author – Aqsa Razaqat, DPT, Hajvery University Pakistan

Eighth Author – Amna Razaqat, DPT, Hajvery University Pakistan

Ninth Author – Barjees Ahmed, Demonstrator at Hajvery University Pakistan.

Tenth Author – Iqra Shehzadi, DPT, Hajvery University Pakistan

Correspondence Author – Dr. Erum Ghaffar, DPT, MS-OMPT,
Lecturer at Hajvery University Pakistan,