Prevalence of Musculoskeletal Pain due to Heavy Backpacks in School going Children of Karachi

Ghousia Shahid, Khalid Aziz, Abida Arif and Muhammad Faisal Fahim*

Department of Physical Therapy, Bahria University Medical & Dental College, Pakistan

Corresponding author: Muhammad Faisal Fahim, Researcher, Department of Physical Therapy, Bahria University Medical & Dental College, Pakistan, Tel: 0092-346-3160827; E-mail: faisalfahim88@hotmail.com

Received date: May 29, 2018; Accepted date: June 18, 2018; Published date: June 21, 2018

Keywords: Prevalence; Musculoskeletal pain; Heavy backpacks; School children

Introduction

The Parents, School management and different health care professionals raised the issue of carrying school bags among the children worldwide. The recommendations of bag to weight ratio was 10-15% for school going children [1]. Primary school going children's are the asset of our country. They have to use a standard backpack when going to school. The way of carrying heavy backpack effects the body posture and the musculoskeletal system must react appropriately in order to compensate for this stress [2]. Back pain in children was uncommon earlier but now it is becoming a serious problem. Some causes of back pain in children includes; gender-female is more common, age-children at 10-13 years, heavy school bags especially carried on one shoulder, incorrectly packed backpacks, sedentary lifestyle, soft tissue injuries [3]. The backpack recommendation in Europe was 10% of their body weight [4]. The American Occupational Therapy recommends a limit of 15% of body weight [5]. This 10% of body weight recommendation is also made by Health Promotion Board of Singapore [6]. Different international medical associations have advised that a child should not carry more than 10%-15% of their total body weight [7]. Ergonomics community recommends what is the lower risk charge, 10% versus 15% of the body weight. The complexity of the tasks in the classroom and student interaction with the transportation of school supplies are based in studies developed by ergonomics, anthropometry and biomechanics [8]. Individuals who use backpacks with dorsal scapular or fixture design can present a set of postural changes that initiate significant damage to musculoskeletal structures due to postural adjustments and compensatory actions that arise on the application of unbalanced load [9]. When the spine may be more susceptible to injury, proper backpack use is crucial to preventing postural deformities [10,11]. Musculoskeletal Disorders (MSDs) are injuries and disorders that affect the human body's movement or musculoskeletal system (i.e. muscles, tendons, ligaments, nerves, discs, blood vessels, etc.) [12]. School students are responsible on carrying their own schoolbag and so it is important for each student to carry their schoolbag properly in order to avoid or minimize postural problems, back pain and musculoskeletal disorder. There are proper ways on carrying a load and this is also applied on carrying a luggage or a bag. Carrying a load in a lateral position, such as carrying a suitcase by hand, requires a greater muscular effort in the contralateral muscles compared to carriage in a backpack where it requires less muscular effort in the lower back [13]. Considering the facts of heavy backpacks it is necessary to introduce locker facility in schools. This will result in less physiological strain and improve movement kinematics. This study was intended to know the prevalence of musculoskeletal pain due to heavy backpacks in school going children of Karachi.

Methodology

This was a cross-sectional study conducted on healthy male and female students from fifth & sixth grade in secondary schools of Karachi. Data collection was done between August and September.
2015. Sampling technique was systematic random sampling (every second child). At day first students are given brief introduction about the study and consent form was given which has to be signed by the parents or guardian. As soon as the researcher receives the signed consent form, only those students are considered as the participants of the study. The inclusion criteria were healthy boys and girls, who use any vehicle with no known history of any musculoskeletal problem. Excluded Students were those who walk to school from home, disabilities, other health issues and those who didn't took consent from their parents. The class of 5th & 6th grade was at first floor. It took 15-20 min to reach the class from main gate of school.

Survey was done to answer a questionnaire about the relation between the weight of the carried school bag and musculoskeletal symptoms. The student needs help to understand the information in the questionnaire, on average, the interview time and completing questionnaire took approximately fifteen minutes for each student.

The height of each student was measured by a portable height measurement scale. The body weight of each student was measured by weighing scale. After recording the height of each student and weighing each student's body as well as weighing bags by Camry weighing scale SGS certified, each student was interviewed alone in the doctor's room at school.

Data analysis

Statistical analysis was done by using the software SPSS version 23.0. All continuous variables were presented in Mean standard deviation. For categorical variable frequency and percentages were measured. Bar chart and Pie chart also used for the presentation of data.

Results

A total of 115 students were enrolled in this study. Mean age of the students were 10.90 ± 0.79 with range of 9-13 years. Body Mass Index was found to be 17.78 ± 5.2. There were 67(58.3%) male while rest were female. Mostly Students 100 (87%) carry bilateral bag when going to school (Table 1).

| Parameters (n=115) | Mean ± SD (Range)/n(%) |
|-------------------|------------------------|
| Age, Years        | 10.90 ± 0.79(9-13)     |
| HEIGHT (Meter)    | 1.38 ± 0.14(0.98-1.79) |
| Weight Of Child (Kg) | 33.46 ± 7.75(21-59)   |
| BMI (Kg/M2)       | 17.78 ± 5.2(9.9-38.0)  |
| Weight Of Child With School Bag (Kg) | 41.61 ± 7.98(27-68) |
| Weight Of School Bag (Kg) | 8.234 ± 1.45(4-10) |
| Gender            |                        |
| Male              | 67(58.3%)              |
| Female            | 48(41.7%)              |
| Type of School Bag|                        |
| Bag Pack          | 99(86.1%)              |
| Trolley Bag       | 11(9.6%)               |
| Side Bag Pack     | 5(4.3%)                |
| Way of Carrying Bag|                      |
| Side Carry        | 4(3.5%)                |
| Bilateral Carry   | 100(87%)               |
| Hand Carry        | 1(0.9%)                |
| Trolley           | 10(8.7%)               |

Table 1: Demographic characteristics.

Prevalence of musculoskeletal Pain in different parts of body was found to be 96(83.5%). Neck pain was found in 42(43.8%). Most of the students 90(93.8%) told that they feel shoulder pain while carrying bag. Back pain was noticed in 35(36.5%) students. Knee pain was experienced in 23(24%) students. Only 20(20.8%) students consult doctor while feel pain in body (Table 2).
Elbow Pain 7(7.3%) 89(92.7%) 96
Wrist Pain 6(6.3%) 90(93.8%) 96
Back Pain 35(36.5%) 61(63.5%) 96
Hips Pain 5(5.2%) 91(94.8%) 96
Knees Pain 23(24%) 73(76%) 96
Ankle Pain 15(45.6%) 81(84.4%) 96
When Pain felt did you consult Doctor? 20(20.8%) 76(79.2%) 96

Table 2: Musculoskeletal pain distribution.

Type of pain was measured through Visual Analog Scale. Maximum students (35%) were lying in the category of moderate pain, severe pain was found in (26%) while mild pain was noticed in (21%) students (Figure 1).

When asking about how often experience pain in their body. There were 42(36.52%) students who experience pain everyday followed by 34(29.56%) students experience pain few times a week (Figure 2).

Ratio of bag weight to body weight was calculated in terms of percentages. A less number 7% of students observed in 11-15% ratio while maximum students 29% were found in the ratio of 26-30% students (Figure 3).

Discussion

School going children are now supposed to be the real asset of parents and country. Heavy Backpack is nowadays more common in students of school going age. The prevention of back pain and other musculoskeletal injuries is important for student's current wellbeing and long term health [14]. The conclusion of carrying heavy backpacks will convert into musculoskeletal pain, either a student complains about pain to their parents or not it is well known. This study was intended to know the prevalence of musculoskeletal pain due to heavy backpacks in school going children at Karachi.

In the present study, Prevalence of musculoskeletal Pain in different parts of body was found to be 96(83.5%). A study done by Usman G et al. [15] reported that Back pain in children and adolescents varies from 8%- 74%. While a study done by Spiteri K et al. [16] stated that students were suffering 70% back pain due to heavy school backpacks.

Musculoskeletal disorder should be considered as three distinct entities that are the neck, upper back and lower back pain being more prominent in younger children. Hence, carrying heavy school bags by school children could cause a wide spectrum of pain related to musculoskeletal disorders and postural dysfunctions [17].

In this study Neck pain was found in 42(43.8%). Most of the students 90(93.8%) told that they feel shoulder pain while carrying bag. As compared to the study by De Paula AJF et al. [8] reported 224(24.45%) students complaint of back pain and shoulder with a minimum of two months of onset of symptoms.

Type of pain was measured through Visual Analog Scale. Maximum students (35%) were lying in the category of moderate pain, severe pain was found in (26%) while mild pain was noticed in (21%) students. The present study was similar to Mirza H et al. they reported that students feel pain while carrying heavy backpacks. They reported severe pain in 5.5% students and moderate pain in 25.69% students while 24.77% students observed with mild/no pain because they were comfortable to carry heavy bags for school [18].

In the current study, ratio of bag weight to body weight was observed in students. There were 7% students observed in 11-15% ratio which means they were carrying bag according to recommendation while maximum students 93% were found in the ratio of >15% means these students carrying heavy backpacks. The musculoskeletal pain in these students will appear in different parts of body. In comparison with the study by Al-Saleem SA et al. [19] similar results reported that only 6.2% students carrying school bags up to
10% of their body weight and rest of these students were lying > 11% of weight.

There were several studies done for confirming the backpack weight of school children if they carry >10-15% of their body weight they are more prone to develop MSDs in future [20,21]. Ramprasad M et al. [22] concluded that the craniovertebral angle significantly changed after 15% of backpack load. The head on neck and head on trunk angles changed after 15% of backpack load. Hence, carrying a backpack weighing 15% of body weight will change the postural angles in preadolescent children.

The present study indicates a great knowledge for parents regarding the prevalence of low back pain and the lifting of heavy schoolbags. The prevalence of back pain in children is now become a public health problem [23], and the efforts to prevent this problem at a young age will help to decrease the burden in older age groups. This initiative will be further supported by physiotherapists, as specialists in movement and exercise in schools [24].

Significance of study

As shown in literatures studies described only back ache in school going children due to heavy bag packs. This study reveals that heavy backpacks are the major cause of musculoskeletal pain throughout the body in school going children. Shoulder pain is the major concern found in this study. There is a need to focus on this issue of heavy backpacks for children in an underdeveloped country.

Conclusion

Prevalence of musculoskeletal pain was very high due to the carrying heavy backpacks. Shoulder pain was the most common type of pain. Moderate Pain was more found in the children. Maximum students carry >15% ratio of backpack that is an alarming issue for parents and it will cause musculoskeletal pain in future.

Recommendation

Student should follow proper time table schedule for everyday and school should provide lockers. In this way the weight of school bag will remain in safe range.

References

1. Mwaaka ES, Munabi IG, Buwembo W, Kukkiriza J, Ochien J (2014) Musculoskeletal pain and school bag use: a cross-sectional study among Ugandan pupils. BMC Research Notes 7: 1-7.
2. Al-Saleem SA, Ali A, Ali SI, Alshamrani AA, Almulhem AM, Al-Hashem MH, et al. (2016) A Study of School Bag Weight and Back Pain among Primary School Children in Al-Ahsa, Saudi Arabia. Epidemiology 6: 1-10.
3. http://www.betterhealth.vic.gov.au/bhcv2/bhcarticles.nsf/pages/Back_pain_children
4. Syazwan A, Azhar MM, Anita A, Azizan H, Shaharuddin M, et al. (2011) Poor sitting posture and a heavy schoolbag as contributors to musculoskeletal pain in children: an ergonomic school education intervention program. J Pain Res 4: 287-296.
5. Brackley HM, Stevenson JM (2004) Are children's backpack weight limits enough? A critical review of the relevant literature. Spine (Phila Pa 1976) 29: 2184-2190.
6. Nurul Asyikin MA, Shamsul BMT, Mohd Shahrizal D, Mohamad Azhar MN, Mohd Rafee B, et al. (2009) Neck, shoulder, upper and lower back pain and associated risk factors among primary school children in Malaysia. J Medical Safety 2: 37-47.
7. Cavallo CM, Hlavaty TM, Tamase MG (2003) A pilot study for the development of a primary prevention program: What is the average weight of a fourth grade's backpack? Work 20: 137-158.
8. De Paula AJF, Silva ICP, Silva CRP (2015) The influence of load imposed by the backpack school in children and teens in Brazil. Procedia Manufacturing 3: 5350-5357.
9. Jones GT, Watson KD, Silman AJ, Symmons DPM, Macfarlane GJ (2003) Predictors of low back pain in british schoolchildren: a population-based prospective cohort study. Pediatrics 111: 822-828.
10. Ramprasad M, Alias J, Raghuveer AK (2010) Effect of backpack weight on postural angles in preadolescent children. Indian Pediatr Jul 47: 575-580.
11. De Paula AJ, Silva JC, Paschoarelli LC, Fujii JB (2012) Backpacks and school children's obesity: challenges for public health and ergonomics. Work 41: 900-906.
12. http://ergo-plus.com/musculoskeletal-disorders_msd
13. Kabimiharbi , Santhirasegaram T (2017) 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 ENCON 87: 1-7.
14. Mohsenu-barpe MA, Masumeh BN, Masoud SA (2007) Nonspecific low back pain in 5000 Iranian school-age children. J Pediatr Orthop 27: 126-129.
15. Usman G, Agha S, Ameen F (2014) Effects of Heavy Bags, Plus Desks And Postural Variations Association With Lower Back Pain In School Going Children. Gomal University J Res 30: 76-83.
16. Spiteri K, Busuittil ML, Aquilina S, Gauci D, Camilleri E, et al. (2017) Schoolbags and back pain in children between 8 and 13 years: a national study. Br J Pain 11: 81-86.
17. Brackley H, Stevenson J, Selinger J (2009) Effect of backpack load placement on posture and spinal curvature in prepubescent children. Work 32: 351-360.
18. Mirza H, Zaffar Q, Hussain M, Tahir A, Kaleem M, et al. (2015) A Study to Know Association of Backpack Weight and Backache in School Going Girls of Lahore, Pakistan. PJMHS 9: 16-163.
19. Al-Saleem SA, Ali A, Ali SI, Alshamrani AA, Almulhem AM, et al. (2016) A Study of School Bag Weight and Back Pain among Primary School Children in Al-Ahsa, Saudi Arabia. Epidemiology (Sunnyvale) 6: 1-10.
20. Neuschwander T, Cutrone J, Macias B, Cutrone S, Murphy G, et al. (2010) The effect of backpacks on the lumbar spine in children: a standing magnetic resonance imaging study. Spine 35: 83-88.
21. Bauer D, Freivalds A (2009) Backpack load limit recommendation for middle school students on physiological and psychophysical measurements. Work 32: 339-350.
22. Ramprasad M, Alias J, Raghuveer A (2009) Effect of backpack weight on postural angles in preadolescent children. Indian Pediatrics 47: 572-577.
23. http://apps.who.int/medicinedocs/documents/s20245en/s20245en.pdf
24. Calvo-Muñoz I, Gómez-Conesa A, Sánchez-Meca J (2012) Preventive physiotherapy interventions for back care in children and adolescents: a meta-analysis. BMC Musculoskeletal Disorders 13:1-19.