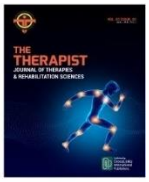
DOI: https://doi.org/10.54393/tt.v2i2.27

THE THERAPIST
JOURNAL OF THERAPIES & REHABILITATION SCIENCES
https://thetherapist.com.pk/index.php/tt
Volume2, Issue 2(July-Dec2021)



Original Article

Assessment of Postural Changes Among School-Going Children Due to Heavy Backpacks in Lahore

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Key Words: Posture, School Bags, Heavy bags, Load, Heavy backpacks, Musculoskeletal

How to Cite:
Jameel, W., Batool, S., Ashraf, H. S., Sohail, M., Manglani, N., & Safdar, Z. (2021). Assessment of Postural Changes Among School-Going Children Due to Heavy Backpacks in Lahore. *THE THERAPIST (Journal of Therapies &Amp; Rehabilitation Sciences), 2*(2). https://doi.org/10.54393/tt.v2i2.27

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Article History
Received: 17th November 2021
Accepted: 20th December 2021
Published: 30th December 2021

ABSTRACT

Posture is a matter a big concern. Because of increased workload the weight of school bags is also increasing day by day. The weight of bags with heavy books can develop many spinal deformities in young children. **Objective:** To assess the postural changes happening in school going kids because of heavy backpacks. **Methods:** It is a cross sectional study and was conducted on different schools in Lahore, within the time period of three months from 1st November 2019 to 1st February 2020. The sample size was 145 and the survey followed convenient sampling technique. Children per inclusion criteria were selected from different government schools to collect data and informed consent was taken before data collection. REEDCO scale was used to examine the postural disturbance. **Results:** Results showed head posture as 3.4% poor & 13.1% fair, neck posture as 6.2% poor & 16.6% fair, shoulder posture as 5.5% poor & 15.2% fair, upper back posture as 3.4% poor & 38.6% fair, trunk posture as 10.3% poor & 46.2% fair, abdominal posture as 5.5% poor & 14.5% fair, hip posture as 0.7% poor & 5.5% fair and the ankle posture as 1.4% poor & 26.9% fair. **Conclusion:** This study concluded a significantly frequent postural problems in trunk region because of carrying heavy loaded school backpacks which is neither good in present time nor in future, as with the passage of time, postural changes become irreversible. Along with that, hip region prominently perceived least postural changes according to current study.

INTRODUCTION

Posture is big matter of concern. With increased workload the weight of the bags is also increasing day by day. Many spinal deformities can occur because of oversized bags with a lot of heavy books. Because of heavy backs the various musculoskeletal symptoms are observed in school going children. Heavy bags not only give rise to body pains but also develop incorrect posture in children [1]. There are many postural changes observed in children like increase in forward head position and increase in forward lean of the trunk. Pelvic positions and gait pattern are also disturbed in children with heavy bags. Asymmetrical alignment of spine during mechanical loading and disc degeneration were also reported. Studies have shown an association between heavy back packs and disturbed measurable kinematics and physiological responses [2].It has been advised by American Occupational Therapy Association that students should not carry bags that are more than 20% of their body weight. Nowadays children are complaining about pains because of this trend of heavy backpacks. It is observed that in most of the school girls are carrying bags that are about 40% of their body weight. To carry heavy bags children have to lean forward to support heavy weight which will bring posture changes and cause various injuries related to back and neck [3]. Daily bag carrying is the most prevalent cause of discomfort in school going kids according to an international study.79.1% of the kids felt their bags are heavy.65.7% complained about fatigue and 46.1% had back pain [4]. A few investigations have been directed in schools about the pervasiveness and related variables with disarranges [5]. Prof Dega defines that body posture also includes shoulder, lower limb and feet rather than incorporating only with torso arrangement. Shape of abdominal walls also integrate in body posture [6]. Schools are vital social establishments that include around 20% of the dynamic individuals from social orders [7]. In light of the aftereffects of screening thinks about

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among understudies, postural structure variations from the norm have been profoundly common among understudies [8]. In a study it was found that heavy bags enhance the risk of back pain. The prevalence of school kids carrying heavy bags is very high. Measures should be taken to prevent issues related to heavy backpacks [9]. Major parts of human body are also assisted by body balance to stabilize them. Body balance also preserves body center of mass within ground base of support. Assimilation of information arising from proprioceptive, vestibular and visual systems is also necessary for body balance [10]. School understudies are mindful on conveying their own schoolbag thus it is imperative for every understudy to convey their schoolbag legitimately with a specific end goal to evade or limit postural issues, back agony and musculoskeletal issue [11]. Heavy backpacks carried on regular basis can change the curvature of the spine. Children with heavy bags will have to move forward to balance their center of gravity which will result in kyphosis [12]. Due to heavy bags students experience musculoskeletal pains quite early in their life. Heavy bags may also affect the normal growth and development of children and cause many postural changes. Awareness should be created about appropriate weight and placement of bags to avoid musculoskeletal pains in children[13]. Even after taking off the heavy bags the bad posture developed by the weight of the bags become habitual. That's why the authors want to observe this issue more closely. Therefore, the objective of this study is to assess the postural changes in school going kids carrying heavy bags on daily basis and their effect on posture.

METHOD

The study was a cross sectional survey with sample size of 145. Convenient sampling technique was used in the study. School going children both male and female up to age of 12 years without any congenital abnormality were included whereas children with history of trauma, any musculoskeletal disease or deformity, Nutritional disorders, Neurological or developmental problems were excluded from the study. Study was conducted in three months from 1st November 2019 to 1st February 2020. Children were selected from different government schools of Lahore named as Government High School Township, Government Central Model High School for Girls, Government Primary School for Boys, and Government Kinnaird Girl's High School for collection of the data. Written permission and ethical approval were taken from University Institutional Review Board, University of Lahore and informed consent was taken from schools' headmaster/principal and parents of children before data collection. A detail description of posture was given to students and staff of school. REEDCO scale [14]. for posture assessment was used to examine the postural disturbance. These questionnaires were distributed and measurements were taken by observing posture in standing position.

Data was analyzed from statistical package for social sciences (SPSS) version 22.0. Frequencies and percentages were calculated for qualitative variables like gender and regional bases postural assessments whereas mean & standard deviation were analyzed for quantitative variable like age.

RESULTS

In this study, mean age of the participants was 7.59 years with standard deviation of ±2.44 years. (Table-1)

Gender	Mean	Standard Deviation
Age	7.59	±2.44

Table 1: Descriptive statistics for age. (n=145)

In 145 participants, 40.3% were male and 59.7% were females. Results were made by assessing posture, from head to toe, in standing position from anterior, lateral and posterior view. Head region showed that 3.4% students had poor (head twisted markedly to one side), 13.1% fair (head twisted slightly to one side) while 83.4 % good head posture (erect head). Afterwards, Neck region was checked which showed that 6.2% students had poor (neck markedly forward and chin markedly out), 16.6% fair (neck slightly forward and chin slightly out) whereas 77.2% good (erect neck, chin in, head in balance directly above shoulders) neck posture. Shoulder assessment showed 5.5% students were having poor (one shoulder markedly higher than other), 15.2% fair (one shoulder slightly higher than other) while 79.3% good shoulder posture (both shoulders horizontally at same level).Upper back highlighted 3.4% students with poor (upper back markedly rounded), 38.6% with fair (upper back slightly more rounded or flattened) whereas 57.9% with good upper back posture (upper back normally rounded). Trunk posture assessment described that 10.3% students were of poor (trunk markedly inclined to rear-

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marked posterior pelvic tilt), 46.2% of fair (trunk slightly inclined to rear- slight posterior pelvic tilt) and 43.4% of good (trunk erect) trunk posture. Abdominal posture assessment showed that 5.5% children were with poor (abdomen is protruding and sagging), 14.5% with fair (abdomen is protruding) and 80.0% with good (abdomen was flat) abdominal posture. Lower back was also observed for postural changes, results of that observation evaluated that poor posture (lower back markedly hollow/flattened- marked anterior pelvic tilt) was among 4.8% students, fair posture (lower back slightly hollow/flattened- slight anterior pelvic tilt) was in 19.3% students whereas good posture (normal lower back curve) was in 75.9% participants. When overall spine was noticed, it interposed that only 1.4% children among all had poor posture (spine markedly curved laterally), 4.8% students were having fair posture (spine slightly curved laterally) while good posture (straight spine) was inspected in 93.8% participants. Hip assessment for posture gave results that 0.7% participants had poor (one hip markedly higher than other), 5.5% fair (one hip slightly higher than other) whereas 93.8 % good posture (both hips horizontally at same level). When ankles were checked, it revealed 1.4% students with poor (feet pointed out markedly and ankle sag in {pronated}), 26.9% with fair (feet pointed out) and 71.7% students with good ankle posture (feet pointed straight ahead). (Table-2)

Variable	Construct	Frequency	Percentage
Gender	Male	59	40.3%
	Female	86	59.7%
Head posture	Poor	5	3.4 %
	Fair	19	13.1 %
	Good	121	83.4 %
Neck posture	Poor	9	6.2 %
	Fair	24	16.6 %
	Good	112	77.2 %
Shoulder posture	Poor	8	5.5 %
	Fair	22	15.2 %
	Good	115	79.3 %
Upper back posture	Poor	5	3.4 %
	Fair	56	38.6 %
	Good	84	57.9 %
Trunk posture	Poor	15	10.3 %
	Fair	67	46.2 %
	Good	63	43.4 %
Abdomen posture	Poor	8	5.5 %
	Fair	21	14.5 %
	Good	116	80.0 %
Lower Back posture	Poor	7	4.8 %
	Fair	28	19.3 %
	Good	110	75.9 %
Spine Posture (Overall)	Poor	2	1.4%
	Fair	17	4.8%
	Good	136	93.8%
Hip posture	Poor	1	0.7 %
	Fair	8	5.5 %
	Good	136	93.8 %
Ankle posture	Poor	2	1.4 %
	Fair	36	26.9 %
	Good	104	71.7 %

Table 2: Descriptive statistics for gender and region based postural assessment of participants. (n=145)

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DISCUSSION

In the study 145 participants were included in which 40.3% were male and 59.7% were female. Mean age of participants was 7.59 ±2.44. The aim of the study was to investigate the postural changes among the children wearing heavy back packs. The study observed that due to heavy back packs postural changes were seen in shoulder, neck, thoracic and hip region. The most affected region observed in the study is thoracic region while the least affected region is hip region. These postural changes will cause posture problem in present and irreversible postural changes in future. Postural changes in thoracic can lead to Scoliosis. According to a study the weight of back pack should be 10-15% of the body weight of the individual [13]. Though now a day's trend of heavy backpacks is common and due to these postural issues are very common. REEDCO scale was used for postural assessment, in which three categories were assigned as good, fair and poor posture. According to results in this study, most parts of body showed good postural balance but some areas as trunk which showed fair postural balance, 46.2 % were fair and 10.3% were poor and 43.4 % good, these results indicating that heavy backpacks alter the mechanics of trunk curvature that's why scoliosis is very common in children. According to a study postural deviations and load on spine can be prevented by reducing weight of bag packs and the duration of wearing the bags [15].

Similar to the current study other studies finds that with variation in the weight of bags after one schooling year changes were found in the postures especially in parameters of rotation. Asymmetry in back packs straps were noticed in girls affecting posturometric parameters. Kyphosis angle was increased in 36.8% of boys and 48.5% of girls. Bags with 7.5% of body weight will cause changes in the head posture. Heavy bags will give rise to pain and can also develop bad posture in children. Shoulder pain was most prevalent and forward head posture was commonly present in children carrying heavy bags [1,16,17]. In contrast to the above studies a study found that there is no association between heavy bags and oversize bags with scoliosis. The study showed that students who sit and stand with wrong posture were 2.39 times more prone to low back pain [18]. The current study indicates that posture is highly prone to be affected by heavy backpacks especially the trunk region.

CONCLUSION

This study concluded a significantly frequent postural problems in trunk region because of carrying heavy loaded school backpacks which is neither good in present time nor in future, as with the passage of time, postural changes become irreversible. Along with that, hip region prominently perceived least postural changes according to current study.

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