IJBAHR

EFFECTS OF HEAVY BACKPACK LOAD ON POSTURE OF YOUNG SCHOOL CHILDREN

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Abstract: Prevalence and Effects of heavy backpack on the posture of young school children Hyderabad region, given study is conducted through Questionnaire and measurement tool such as Plumb line, Weight machine, height and BMI calculator. It was Descriptive cross sectional study, which were conducted on both genders Male and Female, total population was 105 with normal BMI and disability free. Data were collected by Posture Measuring and individual Questionnaire based. Result shows that most of the students were prone to the Postural and musculoskeletal conditions among those all we were founded Forward Head Posture-FHP and Rounded Shoulders many children were suffering from these conditions, related to spinal curvatures on the base of measurement we founded 9.5% were suffering from scoliosis. School management, parents and students were not aware about these side effects of heavy backpack and we delivered short awareness session during data collection. Management assured we will follow safety precautions for better health of children, will reduce heavy bags burden according to our curriculum and guidelines.

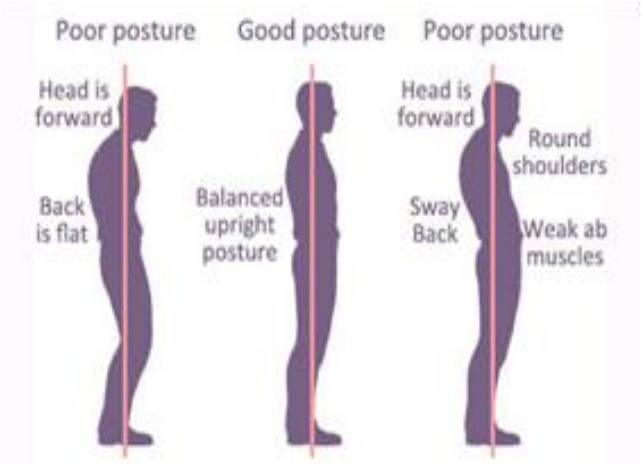
Key words: Plumb Line, Young Children, Heavy Backpack, Forward Head Posture

INTRODUCTION

The upright arrangement of body parts that supports the body against gravity is known as posture. Posture is defined by the correct alignment of the bones, joints, and muscles that work together to support the body. Erroneous postures result from any kind of impairment in the muscles, connective tissues, or joints. In contrast, pain plays a significant role in changing a person's typical posture into an abnormal one. Constant pain and discomfort can cause impairments, which can further deteriorate posture. Unusual forces resulting from prolonged or repetitive activities when in a regular faulty postural alignment can be the cause of many musculoskeletal injuries (Grimmer *et al*, 2002)**.**When compared to unloaded posture, standing posture changes due to heavy backpack loads. The sagittal plane of standing posture is impacted by these heavy backpack-loaded positions. The impact on body posture increases with the lower the rucksack is worn. Postural deviation is typically linked to the application of external forces to the body, such as a backpack. Due to shifts in the centre of gravity, posterior loads on the body inevitably alter posture; the more a person carries their rucksack load posteriorly, the less of an impact it has on posture. The most popular backpacks lack internal pack framing, back support, internal compartments, shoulder strap adjustment only, waist or chest straps, and load-compressing features, among other internal and external modifications. On the other hand, age or gender has no bearing on rucksack carrying. Back packs of the same raw weight are typically carried by them.

Children in the same age range frequently exhibit postural deviations, which frequently do not require medical attention. These variations result from different body segment growth rates and varying balancing requirements. These deviations are typically corrected as the body matures due to the balance of forces and the proportionate growth of body structures. In this study, we like to find a relationship between forward head posture, age, and BMI. Studies showed that the forward head posture is more noticeable in younger children. According to musculoskeletal (MSK) theory, older kids typically make up for abnormalities in head-to-trunk alignment by compensating in other parts of the spine and hips (Van der Ploeg and Oosterhuis, 2001). However, the age group of 13 to 15 years old had a higher prevalence of forward head posture, according to our study. Environmental factors are probably responsible for this change. Prior studies looked at elementary school students' posture in class and how it related to the lack of appropriate school furniture (Candotti, *et al*.2011). The findings showed that 50% of chairs and 38% of tables were too low for eighth-grade students. Consequently, these kids frequently

had to keep their heads and trunks flexed. Furthermore, the study found that flexion postures were nearly 30 degrees about 10% of the time, which could be harmful to the children's health. Since children spend roughly 30% of their waking hours in school, it is plausible that the positions they adopt in the classroom may contribute to the development of postural deviations.



The prevalence of scoliosis in adolescents ranges from 0.5 to 5.2%. Idiopathic scoliosis, the most prevalent kind of scoliosis, primarily affects women and is seen in children and adolescents. Its pathophysiology is unclear, but it may involve multiple factors, including musculoskeletal injuries, aberrant bone development, genetics, the environment, and life cycle. Adolescent scoliosis differs from that of children. Their bodies are different from those of normal people; they may be thinner and leaner (Haryono and Prastowo, 2019). Backpack weights have garnered international attention, which has highlighted how heavy school bags contribute to back pain in students. Today, 90% of kids are seen with backpacks. Back pain in school-age children is a widespread problem that is becoming worse. Several studies have shown that carrying more than 15–25% of a child's body weight increases the risk of postural disorders, MSK injuries, gait abnormalities, and spine pain (Noll *et al.* 2016). Most kids put greater weight on their backpacks, which is bad for their health. When young children go to school, they usually carry 10 to 40 kg of weight on their shoulders, which has long-term implications and causes a number of physical issues for them as well as reducing their productivity (Karl *et al*. 2017) According to the American Occupational Therapy Association, wearing a rucksack improperly can cause stress and damage to the back and abdominal muscles. Your child may be pulled backward by a rucksack that is too loosely worn. Poor posture and other posture-related problems can arise from an uneven weight distribution caused by an improperly sized rucksack for your child (Rai and Agarawal, 2013). These issues can be made worse by improper backpack wear, which alters posture and gait. According to Singh and Koh's 2009 study, it's important to comprehend how kids' growing bodies impact the weight of their backpacks. As the body attempts to adjust for the posterior shift in the centre of gravity, the additional load may have an impact on both static and dynamic posture (Rai and Agarawal, 2013). A study found that most schoolchildren spend most of their time carrying heavy backpacks full of school supplies; the heavier the bag, the more weight it holds. When carrying a rucksack load on the spine, the forward trunk lean angle increases in comparison to a normal gait cycle. It is well known that as the weight of the load increases, so do the pressures and forces acting on various foot parts. The weight of the rucksack alters a person's gait. Planter pressure, which is initially elevated in childhood, is caused by the backpack carriage. No study had previously looked into the connection between backpack and foot posture (Alfageme-García *et al*., 2020). Children between the ages of 9 and 12 may undergo rapid growth phases, which can cause major changes in their body proportions and have an impact on muscle tightness and flexibility. Children's posture may be affected by these changes. Compared to the adult lower back region (L5-S1), children in this age group have proportionately larger heads and a raised centre of mass around the T12 region. This disparity in height and centre of mass may make it more difficult to maintain a stable balance and increase instability (McEvoy and Grimmer**.** 2005)

MATERIALS AND METHODS

Study type/design

Descriptive cross sectional survey.

Study setting:

Data were collected from different public and private schools.

Study duration:

Duration of study was six months.

Sampling method and sample size:

Conventional, 105

Sample size technique:

Inclusion criteria

1.Children aged between 9 to 14 years with normal BMI
2.Children with normal BMI
3.Both genders are included

Exclusion criteria

1.Children with any congenital anomaly and Handicap
2.Children with recent trauma
3.Children with most absenteeism

Data analysis process

Data analyzed by using SPSS (Statistical Package for Social Sciences) 25 version.

RESULTS

Table 1. Frequency and percentage of affected and non-affected students

VALID	FREQUENCY	PERCENTAGE
NO	67	63.8%
YES	38	36.2%
Total	105	100.0%

Table 2. Frequency and percentage of affected and non-affected students by forward head posture

VALID	FREQUENCY	PERCENTAGE
NO	46	43.8
YES	59	56.2
Total	105	100

Table 3. Frequency and percentage of affected and non-affected children by rounded shoulders

VALID	FREQUENCY	PERCENTAGE
NO	12	11.4
YES	93	88.6
Total	105	100

Table 4. Frequency and percentage of affected and non-affected population by thoracic kyphosis

VALID	FREQUENCY	PERCENTAGE
NO	86	81.9
YES	19	18.1
Total	105	100.0

Table 5. Frequency and percentage of Lordosis and Lordosis free children

VALID	FREQUENCY	PERCENTAGE
NO	61	58.1
YES	44	41.9
Total	105	100

Table 6. Frequency and percentage of affected and non-affected of Leg Length Discrepancy

VALID	FREQUENCY	PERCENTAGE
NO	75	71.4
YES	30	28.6
Total	105	100

Table 7. Frequency and percentage of total students had trouble in neck in last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	96	91.4
YES	9	8.6
Total	105	100

Table 8. Frequency and percentage of students having trouble in shoulder during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	83	79.0
YES	22	21.0
Total	105	100

Table 9. Frequency and percentage of students having trouble in elbows during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	105	100
YES	0	0.0
Total	105	100

Table 10. Frequency and percentage of students having trouble in wrists/hands during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	104	99.0
YES	1	1.0
Total	105	100.0

Table 11. Frequency and percentage of students having trouble in upper back during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	95	90.5
YES	10	9.5
Total	105	100

Table 12. Frequency and percentage of children had trouble in lower back during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	85	81.0
YES	20	19.0
Total	105	100

Table13. Frequency and percentage of students had trouble in thighs/hips regions during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	97	92.4
YES	8	7.6
Total	105	100

Table14. Frequency and percentage of children having trouble in knees during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	92	87.6
YES	13	12.4
Total	105	100

Table 15. Frequency and percentage of total population which having trouble in ankle/feet during last 12 months

VALID	FREQUENCY	PERCENTAGE
NO	97	92.4
YES	8	7.6
Total	105	100.0

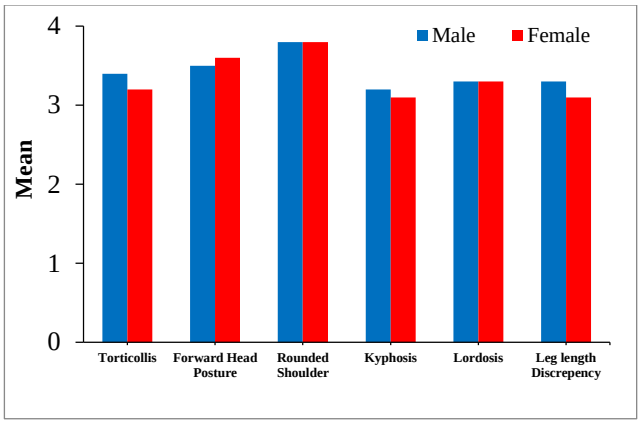


Figure 1. Mean between Male and Femal with different conditions

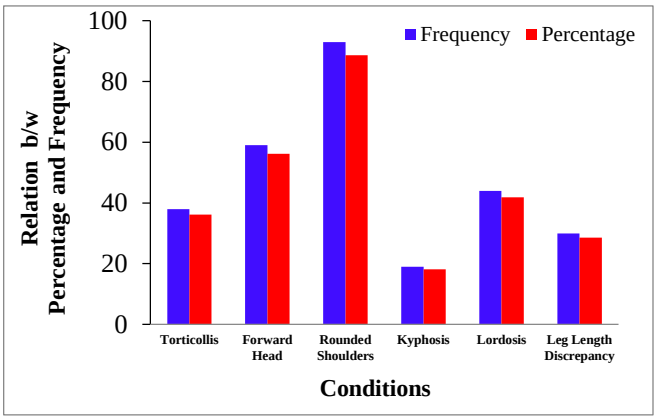


Figure 2. Relation between percentage and frequency with different conditions

DISCUSSION

According to the study's findings, children's mental, physical, and emotional well-being is negatively impacted by heavy school bags, but they also frequently experience musculoskeletal discomfort and other health issues. As our study's age range is 09–14, which is a child's developmental and growing stage, it poses a risk of future health issues because heavy backpacks cause students to lose interest in learning, creative, social, and environmental activities. They consider themselves a failure if they lose interest and are unable to accomplish their goals. According to a study, children in this age group who carry heavy bags that weigh more than 15% of their body weight often complain of musculoskeletal pain. They also primarily have postural disorders, which can lead to more serious complications in the future, such as Forward Head Posture, Rounded Shoulders, and other musculoskeletal disorders. Additionally, the study revealed that carrying weights greater than 15% of one's body weight causes psychological and biomechanical issues, resulting in a variety of physical symptoms, including musculoskeletal pain, fatigue, redness, and swelling (Karim, *et al.*, 2021). Our study revealed that the majority of students from private school sectors had scoliosis, rounded shoulders, and forward head posture.

Among school-age children, the study found a noteworthy prevalence of abnormalities. Notably, 88.6% had rounded shoulders, 18.1% had kyphosis, 41.9% had lordosis, 56.2% had forward head posture, and 36.2% had torticollis. In addition, 21% reported shoulder pain, 8.6% had neck problems and 28.6% had a leg length discrepancy. In addition, 1% reported hand and wrist pain, 9.5% reported upper back pain, 19% reported lower back pain, and 7.6% reported thigh and hip pain. In addition, 7.6% reported foot and ankle pain, and 12.4% reported knee pain. Two female students and eight male students suffered from scoliosis. Furthermore, 16 male students and 18 female students were found to be underweight, while 6 male students and 5 female students were found to be overweight. These findings demonstrate the variety of weight-related concerns and musculoskeletal disorders seen in the student body.

CONCLUSIONS

Impact of heavy backpacks on young schoolchildren's posture and to alert parents, students, and school administration to postural abnormalities brought on by heavy backpacks. The majority of students in our study had multiple postural disorders. Checking the prevalence of kyphosis, lordosis, rounded shoulders, forward head posture, and torsoollis was part of our study plan. The two conditions that were most prevalent among all of these postural disorders were rounded shoulders and forward head posture. There have been a few positive outcomes regarding musculoskeletal discomfort in the past 12 months, including discomfort that was above average, which will subsequently result in future musculoskeletal complications.

Conflict of interest

Authors declare no conflict of interest.

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