

Prevalence of Postural Musculoskeletal Disorders and Associated Risks among School Going Children.

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ABSTRACT

Background:

The Postural problems like forward head posture and rounded shoulders, whereas musculoskeletal disorders such as neck ache, backache and shoulder pains are common in school going children. This is a leading cause of absenteeism in school arena effecting quality of education and can also be a reason of adult MSD.

Objectives:

The objective was to determine the prevalence of postural musculoskeletal disorders and associated risks among school going students.

Methodology:

It was a descriptive cross sectional study. It was performed in duration of seven months in Gujranwala. This study was completed in three months after approval of synopsis. Simple random sampling technique was used. Sample size was of 135. Rapid Entire Body Assessment was used to evaluate whole body.

Results:

It was reported that Out of 135 students, 3 were at low risk. 102 were at Medium risk. While 23 were at high risk

Conclusion:

Prolonged sitting in not ergonomically designed class rooms was an independent risk factor for postural musculoskeletal disorders. Students were at risk of postural and musculoskeletal problems.

Key words:

Postural musculoskeletal disorders, Risks, school going students.

I. INTRODUCTION

Posture is an upright position that is generally kept against the gravity. (1) Body posture is influenced by many factors including general health, musculoskeletal alignment, body endurance, muscle strength, weight, height, fatigue, state of mind, and age etc. (2) The perfect collaboration between segments of the body is called good posture. The imperfect collaboration between segments of the body is called bad posture. (3) Abnormal body posture can cause various musculoskeletal disorders along with headache, fatigue, cervical and lumber pain.

(4) In 12 – 18 years of age children undergo rapid musculoskeletal development and any appliance of external forces (school bags) cause musculoskeletal disorders. (5)

The prevalence of musculoskeletal disorders in school going children can be reduced by macro and micro ergonomic approach such as postural awareness, furniture design and bag pack loads carriage. (6)

School pupils sit for the majority of their classroom lessons and adopt different postures. An inappropriate body posture can destroy a student's interest, even during the most stimulating lecture. (7) Postural alterations may lead to musculoskeletal disorders such as back injury by stressing the muscles and ligaments in the back, or by changing the forces applied to the intervertebral discs. (8) Persistent flexed posture for long time stresses the spine tissue and causing increased risk for spine deformity like scoliosis and kyphosis. (9)

Classroom furniture is usually not designed to accommodate the dimensions of the individual user. There is a mismatch between student body dimensions and school furniture. The mismatch in desk height, seat height and seat depth is occurs for 99% of students. (10) Without ergonomically designed furniture, sitting requires greater muscular force and control to maintain stability and equilibrium. This results in greater fatigue and discomfort which lead to poor postural habits as well as neck or back complaints. (11)

Repeated carrying of heavy school back packs place extra stress on growing adolescent spine structures, making them prone to postural musculoskeletal disorders.

(12) Along with heavy weight the inappropriate carrying method of school bags also put the pupils at risk of musculoskeletal problems and changes of body postures. (13)

The postural deformities are gradual in development, leading to musculoskeletal disorders. At first functional disorder occur then structural changes occur that effect boney and joint structures. (14) Shoes can also cause postural abnormalities leading to deformities like flat foot deformities, Genu valgum, and Genu varum. (15) According to a study approximately 30% of younger school children and 10% of preschool children in Czech Republic have poor posture. (14) The result of this study might help to establish the importance of normal posture right from early years of age

A. Objective

The aim of this study was to determine the Prevalence of postural musculoskeletal disorders and associated risks among school going children.

B. Study Gap

There was no awareness regarding the proper sitting posture, ergonomically designed furniture and proper way of carrying school bag packs.

No study had been conducted on risks of postural musculoskeletal disorders among school going students in Gujranwala

C. Rationale

Outcome of this study may help in raising awareness regarding the prevalence of postural musculoskeletal disorders and associated risks among school going students

and further it may help in developing preventive strategies for postural correction of school going students in order to control musculoskeletal disorders in children.

II. LITERATURE REVIEW

Katarzyna Walicka Cuprys et.al. (2015) determined the influence of backpack weight on spinal curves. Subjects were selected from 7 years old children. Conclusion of study was having a backpack weighting more than 10% of child's body mass could cause increase concavity of lumbar spine and the sacrum tend to be in vertical position.

Ramananda Ningthoujam (2014) assessed the postural deformities in lower extremities among school going children. Subjects were selected from school children of 5th standard of Manawadi area. It was a cross sectional study in which 3.33% of students were suffering from flat foot deformities (FFD). It was concluded that students wearing flat shoes had higher chances of suffering from flat foot deformity.

Janakiraman Balamurugan (2014) determined the prevalence of musculoskeletal pain and their relationship with weight, and carrying method of school bags. From 7 primary schools children were included in this study, between 6 to 12 years of age taking into consideration their sensitive body growth. This study found that there was a strong association between school bag weight and presence of pain and the most affected areas were back and neck.

Avantika Rai et.al. (2013) conducted a study on effect of backpack weight and location on posture of school going children. It was a cross sectional study. It was concluded that

carrying a school bag weighing 20% of the body weight results in kyphosis, kyphoscoliosis and kypholordosis. The position of the school bag also changes the posture and postural stability.

Shyamal Koley et.al. (2010) conducted a study to explore the relationship between the weight of backpacks and body postures that is lumber flexion, lumber lateral flexion and lumber extension in secondary school students of 6 to 15 years of age from Amritsar, Punjab, India. It was a cross sectional study. Children's backpack was outlined to be 7.48% to 16.83% of their body mass. They concluded a strong correlation exist between backpack mass and body posture of studied students.

Salah R. Agha (2010) compared the school pupil's anthropometry to the size of school furniture. Students were in age of 6 to 11 years. They measured shoulder height, elbow seat height, buttock popliteal length, knee height and popliteal height. They concluded that there is a significant inequality between student body dimensions and class room furnishings.

Jana Kratenova et.al. (2007) conducted a study on prevalence and chief risk factors of poor posture in school going children. It was a cross sectional study. Poor posture was diagnosed in 38.3% children and it was concluded that there is a lack of guidance and cooperation between health care professionals and educators regarding how to prevent poor posture.

Geldhof et.al. (2007) conducted a study on schoolroom posture of 8-12 years old children in Flanders. It was a longitudinal study. They concluded that postural behavior

of students partly depends on components of class room environment and lengthen fixed hunch sitting without the use of backrest is prevalent in primary school children, assumed with spinal load.

Philipp Grimes et.al. (2003) reviewed the school going children musculoskeletal disorders as a risk factor of musculoskeletal disorders in adults in their working life. It was a systematic review. Population was students from 5 years old through to university. They concluded that providing a range of furniture sizes, postural education, task variation, modifying teaching schedules improved poor posture and other MSDs.

Claudia Parcels et.al. (1999) examined inequality of class room furniture and student body anthropometrics. The sample was from 6th to 8th grade. They concluded that school need to encourage the traditionally designed furniture to provide at least as much as variety of students size in order to prevent postural deformities.

III. METHODOLOGY

Study Designs

This study was descriptive cross sectional study.

Duration

This study was completed in estimated period of 3 months after approval of synopsis.

Setting

Data was collected from Allied schools Gujranwala.

Following schools were included in this study:

- The Allied school Musa Campus Sui Gas Road Gujranwala.
- The Allied school Model Town

Campus Gujranwala

- The Allied school Allama Iqbal Town Gujranwala
- The Allied school Gt Road Campus Gujranwala
- The Allied school Satellite Town Campus Gujranwala
- The Allied school Dc Road Campus Gujranwala

Sample size

The sample size was calculated using the online Raosoft sample size calculator.

$$\begin{aligned} X &= Z(c/100)2r(100-r) \\ N &= Nx/((N-1)E^2 + x) \\ E &= \text{Sqrt}[(N - n)x/n(N-1)] \end{aligned}$$

In this formula

n = sample size

E = Margin of error

N= Population size

r =fraction of responses

Z(c/100) = critical value for the confidence level c.

In this sample size formula, we calculated sample size by taking following values:

E = 5%

Confidence level: 95%

N = 5000

r = 90%

It gave 135 as sample size

Sample selection

Sample was selected from school going children of class 5th -8th.

Sampling technique

Simple random sampling technique was used.

Inclusion Criteria

School going students of class 5th to 8th were included.

Both male and female students were included.

Exclusion Criteria

Pathological, Orthopedic or genetic causes of musculoskeletal symptoms were excluded. Metabolic or neoplastic disorders were also excluded.

Tool of Data Collection

Rapid entire body assessment was used to assess the prevalence of postural musculoskeletal disorders and associated risks among school going children. It is one of the most popular and widely used observational ergonomic evaluation tools in a variety of services and industries (16).

Score	Level of MSD Risk
1	negligible risk, no action required
2-3	low risk, change may be needed
4-7	medium risk, further investigation, change soon
8-10	high risk, investigate and implement change
11+	very high risk, implement change

Figure: 1 Statical Analysis

Statistical Analysis

Questionnaire data was entered in SPSS version 16. Pie charts and bar charts were used to analyze data.

IV. RESULTS

The study was completed and returned by 135 students from all over the branches of Allied school in Gujranwala Pakistan.

Participant’s Characteristics

Frequencies/ percentage distribution of age are represented in the given figure with tabular values.

- Out of 135 students, 88(65.2%) students aged between 9-12 years.

- While 47(34.8%) subjects aged between 13-15 years.

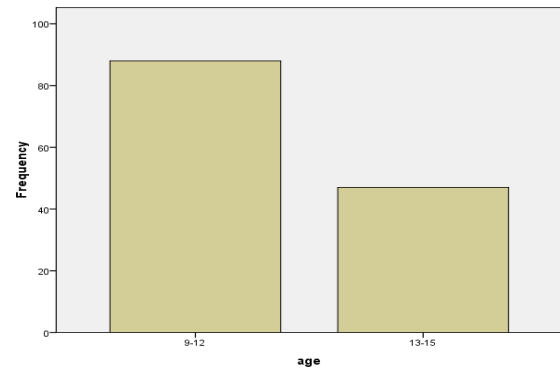


Figure 2: Frequencies/ percentage distribution of age

- Out of 135 students males were 62(45.9%) and females were 73(54.1%).

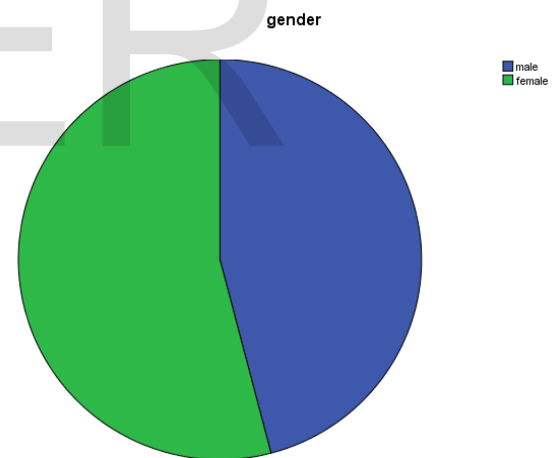


Figure 3: Frequencies/ percentage distribution of gender

- Out of 135 students, 73(54.1%) were in 5th-6th class
- 62(45.9%) were in 7th-8th class.

The table of above results is given below

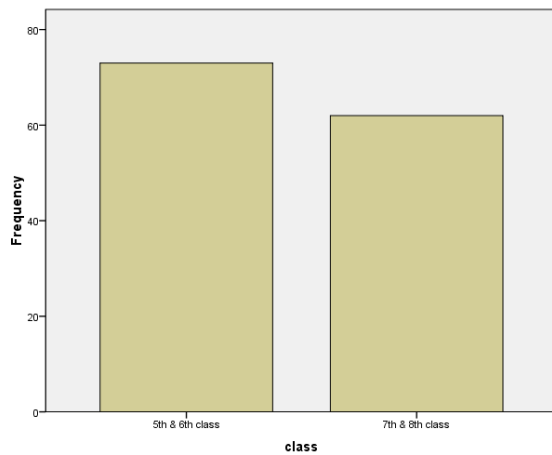


Figure 4: Frequencies/ percentage distribution of class

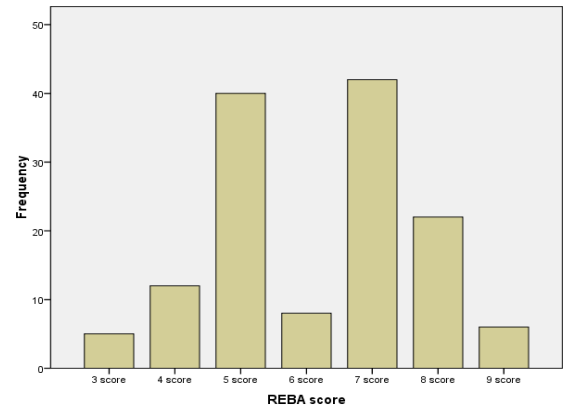


Figure 5: Frequencies/ percentage distribution of REBA score

- Out of 135 students, 3 were at low risk.
- 102 were at Medium risk.
- While 23 were at high risk.

age * REBA score Cross tabulation

Count		REBA score							Total
		3 score	4 score	5 score	6 score	7 score	8 score	9 score	
age	9-12	5	9	29	6	31	8	0	88
	13-15	0	3	11	2	11	14	6	47
Total		5	12	40	8	42	22	6	135

Table 1: Frequency distribution of age and REBA score

- Out of 88 students of age 9-12, 5 students were at low risk.
- 75 were at medium risk, while 8 students were at high risk.
- Out of 47 students of age 13-15 no one was at low risk.
- 27 students were at medium risk and 20 students were at high risk.

gender * REBA score Cross tabulation

Count									
		REBA score							
		3 score	4 score	5 score	6 score	7 score	8 score	9 score	Total
gender	Male	2	7	19	5	15	10	4	62
	female	3	5	21	3	27	12	2	73
Total		5	12	40	8	42	22	6	135

Table 2: Frequency distribution of gender and REBA score

- Out of 62 male students 2 were at low risk, 46 students were at medium risk and 14 were at high risk.
- Out of 73 female students 3 were at low risk, 56 were at medium risk and 14 were at high risk.

V. DISCUSSION

The main purpose of the study was to inquire the prevalence of risks of postural musculoskeletal problems among school going students in Gujranwala. Results of the research showed that prolonged sitting position in school going students make them prone to various risk factors of poor posture leading to musculoskeletal disorders.

Respondents were selected from different branches of Allied schools who were sitting for 8\24 hours daily in their schools. Participants were 45.9% males and 54.1% females. In choosing school students main focus was long duration of sitting position followed by poor posture, small periods of break, heavy bags and non-ergonomically designed furniture.

In this study we found that 20.7% pupils were at high risk of postural problems where as 75.6% pupils were at Medium risk and in accordance to other studies the prevalence of

poor posture was 56.25%. (17) In Czech Republic a study was conducted in 2007 to identify the prevalence and the main risk factors of poor posture in school children. (14) In 2009 a study was done to determine the changes in various postural angles with different backpack weights, concluded that Carrying a backpack weighing 15% of body weight change all the postural angles in preadolescent children. (18)

In comparison to this a study was conducted in 2014 in India, which only focused on lower limb postural deformities, and concluded that 5.3% students are found to be suffering from selected Postural Deformities. (15) A postural analysis was done to see the effects of dietary intake and physical activity on posture, according to which the percentage of poor posture was 56.25%. (17) In 2010 a match between school furniture and students anthropometry was done in Gaza. The results indicated a mismatch between body dimensions of the students

who participated in this study and the school furniture available to them. It is seen that seat depth, seat height and desk height all have a mismatch percentage of 99.8. (10)

VI. CONCLUSION

We concluded that in sitting position attending lectures and doing class work in non-ergonomically designed furniture's students are prone to risk of postural problems leading to musculoskeletal disorders. It is reported that 3.7% pupils were at low risk, 75.6% pupils were at Medium risk, further investigations and changes are required in sitting positions, while 20.7% pupils were at high risk of Musculoskeletal disorders required urgent investigations and changes in positions.

VII. LIMITATIONS & RECOMMENDATIONS:

Limitations:

- We collected data on the basis of observation, which was very time consuming and children were less cooperative and were continually changing their postures.
- The management of some schools was hesitant to allow us for data collection due to security issues.

Recommendations:

- You can collect data by making videos and pictures to see the overall posture and sitting patterns of selected samples for whole eight hours of class room.
- Get security clearance from higher authorities before collection of data.

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