

**PREVALENCE OF SPINAL AND POSTURAL DEFORMITIES IN  
GOVERNMENT VS PRIVATE PRIMARY SCHOOLS CHILDREN OF  
MULTAN: A COMPARATIVE STUDY**

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**Abstract**

**Background:** Children's health problems, especially those involving spinal and postural malformations, are frequent, especially in school-age children. These malformations can result in various issues, including back discomfort, breathing problems, and decreased mobility, all of which can significantly lower the quality of life for those affected. With a population of more than 1.8 million, Multan is a city in Pakistan's Punjab province. And we ought to know about health of our children.

**Objective:** To assess the prevalence of spinal and postural deformities in government vs private primary schools children of Multan.

**Methodology:** This is a cross-sectional observational study and its duration was 06 months. A sample size of 324 was taken in this study and sampling technique was simple random sampling through digital randomizer. A “Self-Administrated Questionnaire” was used to fill data and all children were examined through Forward Adam Bend Test, Plumb Line Method to assess their posture and spinal deformities. The data was taken from different govt and private primary schools of Multan. SPSS 20.0 is used to analyze the results.

**Results:** Out of a total population of 162 Govt. schools' children, 132(81.5%) were male, Meanwhile, 30(18.5%) children were female. Of private school children, out of 162 children,

80(49.4%) were male; 82(52.6%) children were female. The prevalence of spinal deformities in govt. primary schools is 6.8% and 8.6% in private primary schools. while the prevalence of abnormal spinal posture is 20.4% in govt schools and 35.2% in private primary schools.

**Conclusion:** It can be concluded that the prevalence of abnormal spinal deformities in both types of schools is relatively low, with a slightly higher prevalence in private primary schools. However, the prevalence of abnormal spinal posture is higher in both types of schools, particularly in private primary schools. One down shoulder is the most common posture abnormality in both type of schools.

**Keywords:** Prevalence, Spinal deformities, Postural deformities, Government primary schools, Private primary schools, Children, Multan

**Introduction:**

The soul of society can be patterned by observing how society is treating its children. Today's children are professionals and assets of tomorrow. Musculoskeletal disorders and discomfort in children in primary school are increasing concerns of the world. Children of Govt and private schools go to school with their heavy bags in the very morning.

Disorders of the musculoskeletal system are the most common disease among pediatric patients nowadays. In Australia, primary care is used to treat children under the age of 18 who have musculoskeletal issues. Australia may treat 880,000 kids and teenagers with musculoskeletal issues each year, according to some estimates.(1)

Screening is the best and most well-known method for the initial detection of spinal and posture disorders. Professionals can take curative and preventive measures based on the screening results. Because the prevalence of spine deformities and poor posture in children is high in our study, we recommend routine screening in clinical settings.(2)

The degree of anatomical features, as well as the child's age, determine the severity of spinal deformities. Other factors that can cause spinal deformity include distortion, location, and others. This necessitates a variety of treatment methods, starting with physical therapy and orthopaedical treatment with various braces, and if these fail, surgical correction and stabilization can be used. Treatment should begin as soon as possible to achieve the best results.(3)

Children's bad posture and spinal malformations are on the rise, according to experts from many nations. With the start of school and a change in lifestyle, the risk of postural issues and excessive body mass increases. One in five children aged 7 to 10 had additional body mass, which may be associated to lifestyle choices taken during pregnancy and during the preschool years, per various studies (4)

In Bulgaria, a screening was carried out in order to spot changes and spine deformities in adolescents as early as possible. The global problem is not novel, but with a lot of studies on youths' poor physical development, the subject of the high rate and severity of these aberrations is becoming progressively prominent. This study included 2129 children ages 6 to 11 from Blagoevgrad, Bulgaria. Medical history, somatoscopy (view), and function tests were employed

in the research to determine the level of postural problem. The percentage of incorrect postures and spinal abnormalities is concerning. The percentage of inappropriate posture in all identified cases is 58.85%, while the percentage of spinal abnormalities is 23.67%. (3)

The Center of gravity is the imagination of a line passing through the center of your body from up to down. It starts from the skull and passes the front bally and ends between both feet. It changes with respect to our position, movement, and load which is carried by our body. It is zero at its point where no weight acts but is distributed equally. If it is done in a proper way then it minimizes the effect of the weight of the object and body. If it is forward or backward from the normal position then it increases the weight. (5)

To determine the amount of consciousness of excellent posture in school-aged children and teachers from various academic institutions, and compare the level of consciousness between teachers and students. A cross-sectional study was carried out from January to April of 2013. The study's data was gathered from numerous Karachi schools. This study included 132 participants, including both students and teachers. The students' ages varied from 9 to 16. A closed-ended self-administered questionnaire was used to collect data. The Chi-square test was used to examine the relationship between occupation and lecture attendance questions. The findings also demonstrated that tutors and schoolchildren were equally aware of standing and sleeping positions, while tutors were more aware of sitting positions than pupils. (6)

Using a standard of greater than  $10^{\circ}$  spine curvature, the frequency of adolescent idiopathic scoliosis in kids aged 10 to 16 in the United Kingdom is estimated to be between 2% and 3%. Larger curves seem to form less frequently; curves greater than 40 degrees are estimated to account for 0.1% of all AIS, whilst curves between 20 and 30 degrees are anticipated to occur between 0.3 and 0.5% of the time. In a recent Japanese cross-sectional research, age groups of 11 to 12 years old and 13 to 14 years old were examined to determine the prevalence of curvature exceeding  $10^{\circ}$ . The most common musculoskeletal condition in children that results in a three-dimensional malformation of the spine is idiopathic scoliosis. Early diagnosis is essential for successful treatment of this chronic condition.(7)

One of the risk reasons for poor posture is extra body weight. The BMI index is frequently used by authors to demonstrate this reliance; however, they do not relate it to muscle mass (8)

In Pakistan, there is less data about spinal deformities and postural imbalance in school-going children due to big population and lack of resources. This research will be helpful and motivational to collect more data. On basis of data, preventions and interventions ought to take to improve public health. This research will provide areas of improvement in both govt and private schools for the betterment of the future of children regarding their health.

### **Materials and Methods:**

It is a cross-sectional study design and this physical examination was been conducted in government and private primary schools of Multan. The study took 06 months after the approval of the synopsis. The sample size of this research is 324 according to Epi tool software.(2)

The children have been chosen randomly through a digital randomizer. And the sampling technique was Simple Random Sampling. The assessment took place through a Self-administrated closed-ended questionnaire, Examination with Plumb Line which is used to detect posture both from frontal and sagittal view, Forward Adam Bend Test which is used to detect scoliosis from anterior and posterior view and to detect kyphosis from lateral view, Scoliometer is used to measure angle of deviation from normal in scoliosis, and measuring tape.

Selection of schools randomly through a digital randomizer. A list of schools was provided by CEO Education Multan. Equal opportunity for children to participate in research. Examination and putting data findings of each sample manually on Performa. Willing Children aged between 9-10 years who were enrolled in class 5 of govt and private primary schools of Multan City were included in this study.

Data has put and analyzed through SPSS [statistical package for social sciences]. All qualitative variables have been presented in frequency tables and percentages. All quantitative variables have been presented. Chi-square has been applied to compare the mean difference of variables. p-value <0.05 has been taken.

First, I took approval from Times Institute, Multan then the CEO, District Education Authority, Multan, for data collecting. Then, I selected primary schools in Multan which are located in the

city. The research aims and procedures have been reviewed with school heads or principals. The privacy of students was maintained. They consulted with teachers about this. Teachers and school administrators asked questions to children and their parents verbally about their willingness to participate in research. When all of these stakeholders agreed then research was carried out at that institution.

### **Results:**

The study shows that 56.8% of students in government primary schools walk to school, while 45.1% of students in private primary schools walk to school. Additionally, a small percentage of students in both types of schools use a cycle or an auto-rickshaw to travel to school. Interestingly, a larger proportion of students in private primary schools (44.4%) use a bike as their mode of transportation compared to students in government primary schools (34.6%). Further, only 0.6% of students in private primary schools use a car/bus to travel to school as compared to none in government primary schools.

Based on the given data, the prevalence of abnormal spinal curvature in govt. primary schools is 6.8%, with a count of 11 out of a total of 162 children observed. On the other hand, the prevalence of abnormal spinal curvature in private primary schools is 8.6%, with a count of 14 out of a total of 162 children observed. The majority of children in both govt. (93.2%) and private (91.4%) primary schools had normal spinal curvature. These results suggest that while there may be some variation in the prevalence of abnormal spinal curvature between different types of primary schools, the majority of children in both school types have normal spinal curvature.

Based on the data provided, it appears that out of 162 observations, 82 children (50.6%) had good posture with a score of 5 points, while 47 children (29.0%) had fair posture with a score of 6 points. Additionally, 33 children (20.4%) had poor posture with a score greater than 7 points in govt schools. (Table 1)

Table 1: Descriptive statistics for Spinal Posture in Govt. School Children

	Frequency	Percent
Good Posture (5 Points)	82	50.6
Fair Posture (6 Points)	47	29.0
Poor Posture (>7 Points)	33	20.4
Total	162	100.0

The study provides descriptive statistics for Spinal Posture in private Schools Children. Out of 162 children observed, 74 children (45.7%) had good posture with a score of 5 points, while 31 children (19.1%) had fair posture with a score of 6 points. On the other hand, 57 children (35.2%) had poor posture with a score greater than 7 points. (Table 2)

Table 2: Descriptive statistics for Spinal Posture in private Schools Children

	Frequency	Percent
Good Posture (5 Points)	74	45.7
Fair Posture (6 Points)	31	19.1
Poor Posture (>7 Points)	57	35.2
Total	162	100.0

The given table provides a frequency distribution of scoliosis for two different types of schools: govt. primary schools and private primary schools. The data shows that 95.7% of students in govt. primary schools do not have scoliosis, while 91.4% of students in private primary schools do not have scoliosis. Additionally, the table indicates that 4.3% of students in govt. primary schools have scoliosis, while 8.6% of students in private primary schools have scoliosis. This suggests that the prevalence of scoliosis may be higher among students in private primary schools compared to those in government primary schools. (Table 03)

Table 03: Descriptive statistics for scoliosis of Private School Children and Govt. schools' children according to scoliometer

		School type			
		Govt. Primary Schools		Private Primary Schools	
		Count	Column N %	Count	Column N %
Scoliosis	Angle less than 10 degrees	155	95.7%	148	91.4%
	Angle more than 10 degrees	7	4.3%	14	8.6%

Table 04: Descriptive statistics for spinalposture of Private School Children and Govt. schools' children according to plumb line method.

		School type			
		Govt. Primary Schools		Private Primary Schools	
		Count	Column N %	Count	Column N %
Standing	Normal	147	90.7%	141	87.0%
	Bend Forward	15	9.3%	21	13.0%
Head Position	Normal	147	90.7%	127	78.4%
	Down Forward	6	3.7%	20	12.3%
	Tilted	9	5.6%	15	9.3%
Shoulder Level	Normal	115	71.0%	114	70.4%
	One Down	47	29.0%	48	29.6%



Shoulder Shape	Normal	132	81.5%	123	75.9%
	Round Forward	30	18.5%	39	24.1%
Hip Level	Normal	144	88.9%	127	78.4%
	High Hip	18	11.1%	35	21.6%

**Table5: Descriptive statistics for Spinal Curvature of Private School Children \* Spinal Posture in Private School Children Cross tabulation (Correlations)**

		Spinal Curvature of Private School Children	Spinal Posture in Private School Children
Spinal Curvature of Private School Children	Pearson Correlation	1	.331**
	Sig. (2-tailed)		.000
	N	162	162
Spinal Posture in Private School Children	Pearson Correlation	.331**	1
	Sig. (2-tailed)	.000	
	N	162	162
**. Correlation is significant at the 0.01 level (2-tailed).			

The study provides a correlation matrix between spinal curvature and spinal posture in private school children, indicating that there is a moderate positive linear relationship between these two variables. Both correlations are statistically significant at the level of  $p < .01$  (two-tailed). Specifically, the Pearson correlation coefficient between spinal curvature and spinal posture is

.331, while the correlation between spinal posture and spinal curvature is also .331. Therefore, this data suggests that there is a bidirectional relationship between spinal curvature and spinal posture in private school children. Improving spinal posture may lead to better spinal curvature, and improving spinal curvature may lead to better spinal posture (Table 5).

### **Discussion:**

Children frequently have spinal and postural abnormalities, especially those who attend basic schools. Depending on the kind of school a child attends, the prevalence of certain illnesses may change. This literature review intends to examine recent findings on the prevalence of spine and postural abnormalities among Multan children attending government vs. private primary schools.

Previous research has also revealed that children who attend school had a higher prevalence of spinal abnormalities, particularly those who carry heavy burdens or sit for long periods of time. (9) Additionally, studies have found that there are gender differences, with females having a higher frequency of spine discomfort or abnormalities. (10)

According to previous study, In Iran, elementary school students have a high frequency of spinal problems, with 82% of research participants having some kind of spinal deformity, according to a study by (11) Scoliosis was the most typical condition, followed by scoliosis and lordosis. The study did not discover any appreciable variations in spinal deformity prevalence between government and private schools.

In another study by (12) sought to ascertain the prevalence of spinal and postural abnormalities school students between the ages of 14 to 17. The study discovered that there were spinal or postural deformities in 122 out of the 370 pupils from both types of schools. Bad neck posture was the most typical condition, followed by kyphosis and lordosis. The study also discovered that girls were more likely than males to experience similar illnesses.

Another study was conducted in Wah in which 1104 children participated between age of 8-15. Results were shocking with 61 percent students were suffering from back pain, 40 percent pupils were feeling pain in neck and 47 percent children were feeling pain in shoulder. The most typical illness was back pain. (13)

Overall, research shows that elementary school students in Pakistan, whether they attend government or private schools, have a significant prevalence of spine and postural abnormalities. However, other research indicates that there might be a higher prevalence of these disorders in public schools, possibly as a result of uncomfortable seating and insufficient medical resources. To better understand the underlying causes of these illnesses and to create effective preventative and treatment plans, more study is required.

According to the current study, more students in government primary schools walk to school as compared to private primary schools (56.8% vs. 45.1%). This finding is consistent with a study conducted by Pucher and Buehler (2008) who found that students attending public schools are more likely to walk or bike to school than those attending private schools. However, the table also reveals that students in private primary schools are more likely to use a bike as compared to their counterparts in government primary schools (44.4% vs. 34.6%). This result is not consistent with the findings of a study conducted by (14) which reported that students attending public schools are more likely to use a bike for transportation than those attending private schools.

Additionally, the table shows that only a small proportion of students in both types of schools use a cycle or an auto-rickshaw to travel to school, which implies that these modes of transportation are not widely used among primary school students in Pakistan. Furthermore, the table indicates that only a negligible number of students in private primary schools use a car/bus to commute to school, whereas none of the students in government primary schools use these modes of transportation.

According to the current study the spinal posture of school children based on their mode of transportation. The study conducted by (15) showed that walking to school was associated with a higher percentage of good posture compared to traveling by bike or auto rickshaw. However, it is important to note that the sample size for children who traveled by cycle or auto rickshaw is very small and thus, these findings cannot be generalized to the entire population.

Previous studies have also shown similar results. A study conducted by (16) found that children who walked to school had better spinal alignment compared to those who were driven or used public transportation. Similarly, a study found that cycling to school was associated with better spine posture compared to traveling by car or bus.

Overall, the findings suggest that encouraging children to walk or bike to school may have benefits for their spinal health. However, more research is needed to confirm these findings and to determine the underlying factors contributing to these differences in spinal posture among different modes of transportation.

There were some limitations, which include that it was a small sample size since it could be challenging to get a representative sample of kids from Multan's public and private primary schools. There was a lack of resources to adopt modern machines and procedures to diagnose and examine spinal and postural deformities. The study's exclusive emphasis on primary school students in a single city means that it may not be generalizable to other age groups or geographic areas. We recommended that routine health examinations of kids in public and private primary schools to catch spinal and postural anomalies early. Installing ergonomic furniture in classrooms to improve students' comfort and security during extended periods of sitting

**Conclusion:**

It can be concluded that the prevalence of abnormal spinal deformities in both types of schools is relatively low, with a slightly higher prevalence in private primary schools. However, the prevalence of abnormal spinal posture is higher in both types of schools, particularly in private primary schools. One down shoulder is the most common posture abnormality in both type of schools.

**References:**

1. Henschke N, Harrison C, McKay D, Broderick C, Latimer J, Britt H, et al. Musculoskeletal conditions in children and adolescents managed in Australian primary care. *BMC musculoskeletal disorders*. 2014;15(1):1-8.
2. Rusnak R, Kolarova M, Astaryova I, Kutis P. Screening and Early Identification of Spinal Deformities and Posture in 311 Children: Results from 16 Districts in Slovakia. *Rehabil Res Pract*. 2019;2019:4758386.
3. Popova D, Mitova S, Gramatikova M. Research of innovative system abilities for postural analysis and postural disorders assessment. *Activities in Physical Education and Sport*. 2015;5(1):30-2.
4. Wojtkow M, Szkoda-Polizuk K, Szotek S. Influence of body posture on foot load distribution in young school-age children. *ACTA of Bioengineering and Biomechanics*. 2018;20(2):101-7.
5. Kang J-H, Park R-Y, Lee S-J, Kim J-Y, Yoon S-R, Jung K-I. The effect of the forward head posture on postural balance in long time computer based worker. *Annals of rehabilitation medicine*. 2012;36(1):98-104.
6. Yasmeen S, Shahrukh M, Farooqui Z. Postural awareness in school going students and teachers. *Pakistan Journal of Rehabilitation*. 2014;3(1):39-45.
7. Sudo H, Kokabu T, Abe Y, Iwata A, Yamada K, Ito YM, et al. Automated noninvasive detection of idiopathic scoliosis in children and adolescents: A principle validation study. *Scientific reports*. 2018;8(1):1-10.
8. CARVALHO BKGd, PENHA PJ, RAMOS NLJP, ANDRADE RM, RIBEIRO AP, JOAO SMA. Age, Sex, Body Mass Index, and Laterality in the Foot Posture of Adolescents: A Cross Sectional Study. *Journal of Manipulative and Physiological Therapeutics*. 2020.
9. Chen Y-L, Mu Y-C. Effects of backpack load and position on body strains in male schoolchildren while walking. *PloS one*. 2018;13(3):e0193648.
10. Kamper SJ, Yamato TP, Williams CM. The prevalence, risk factors, prognosis and treatment for back pain in children and adolescents: An overview of systematic reviews. *Best Practice & Research Clinical Rheumatology*. 2016;30(6):1021-36.

11. Zakeri Y, Baraz S, Gheibizadeh M, Bijan Nejad D, Latifi SM. Prevalence of musculoskeletal disorders in primary school students in Abadan-Iran in 2014. *International Journal of Pediatrics*. 2016;4(1):1215-23.
12. Zaheer M, Fatima N, Riaz U, Haseeb N. Association of heavy bag lifting time with postural pain in secondary school students. *Pakistan BioMedical Journal*. 2022:64-7.
13. Sundas R, Ghous M, Sehar S. Association of Backpack Loads and Wearing Time with Musculoskeletal Disorders in School Children of Wah Cant Pakistan: Correlational study. 2019.
14. Malipatil RP. A Critical Analysis of Postural Deformities and Prevalence of School Children s of Hyderabad Karnataka Region. 2023.
15. Arima H, Yamato Y, Hasegawa T, Togawa D, Kobayashi S, Yasuda T, et al. Discrepancy between standing posture and sagittal balance during walking in adult spinal deformity patients. *Spine*. 2017;42(1):E25-E30.
16. 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.