



ISSN Print: 2664-7249  
ISSN Online: 2664-7257  
IJPEPE 2024; 6(2): 79-82  
[www.physicaleducationjournals.com](http://www.physicaleducationjournals.com)  
Received: 09-05-2024  
Accepted: 14-06-2024

**Anurag Choudhary**  
Department of Physical  
Education, Government  
College, Abohar, Punjab, India

**Dr. Dalwinder Singh**  
Department of Physical  
Education, Panjab University,  
Chandigarh, Punjab, India

**Dr. Parminder Singh**  
Department of Physical  
Education, Guru Nanak Dev  
University, Amritsar, Punjab,  
India

**Dr. Gaurav Dureja**  
Department of Physical  
Education, Guru Nanak Dev  
University, Amritsar, Punjab,  
India

**Corresponding Author:**  
**Dr. Parminder Singh**  
Department of Physical  
Education, Guru Nanak Dev  
University, Amritsar, Punjab,  
India

# International Journal of Physiology, Exercise and Physical Education

## Bow leg deformity among school students of Chandigarh: A comparative study

**Anurag Choudhary, Dr. Dalwinder Singh, Dr. Parminder Singh and Dr. Gaurav Dureja**

**DOI:** <https://doi.org/10.33545/26647249.2024.v6.i2b.121>

### Abstract

**Objective:** The study aimed to compare the prevalence of bow leg deformity among male school students of private, government model, and government schools in slum areas of Chandigarh.

**Materials & Methods:** Non-probability purposive sampling technique was used to select nine hundred (N=900) male students. Among the selected subjects, 300 each were from private, government model, and government schools in slum areas of Chandigarh. The age of the subjects ranged from 11 to 15 years. A sliding caliper was used to measure the inter-condylar distance (bowlegs). Descriptive statistics and one-way ANOVA were used to analyze the data. The level of significance was set at 0.05 level.

**Results:** The result of the study revealed that 2.4% of the students in the schools of Chandigarh suffered from bow leg deformity. Private schools had the highest percentage of students (5.3%) with bowleg deformity. They were followed by the government schools in slum areas with bowleg deformity among 1.7% of students and government model schools with bow leg deformity among 0.3% of students. The intercondylar distance among the male students in private schools was significantly higher as compared to students of government model students.

**Keywords:** Bowleg deformity, school students, male, Chandigarh

### Introduction

Posture is a state that enables the body to function to the best advantage as regards work done, health, and appearance (Morrison & Chenoweth, 1941) [10]. Posture plays an exceptionally crucial role in the functioning of the human body. If a child develops good posture in his early childhood, it is not only beneficial for proper growth and development but also helpful in maintaining good health and ensuring a high quality of life throughout their life span (Gao *et al.*, 2018) [4]. Good posture is a state of muscular and skeletal balance that protects the supporting structures of the body against injury or progressive deformity. Under these conditions, the muscles function most efficiently, and the structures are aligned for the most efficient movements with minimal energy costs (Whittman, 2011) [18]. On the other hand, poor posture throws the whole body out of balance, irritating the nervous system and sometimes even causing harm to internal organs (Minoos *et al.*, 2003) [9]. Poor posture can result from any one or combination of factors such as ignorance, environmental conditions, genetics, physical or growth abnormalities, or psychological conditions (Davis & Logan, 1961) [2].

Lower extremity bowing of legs known as genu varum (GVR). It is a normal physiological process that commonly occurs in walking children under the age of 2 years (Cheema *et al.* 2003) [1]. Maximal bowing is observed in children at age 6 months and this bowing is gradually resolved to a neutral knee angle (0 degrees) by age 18 months (Heath & Stahili, 1993) [6].

Many studies have been conducted to assess the occurrence of bow leg deformity in school-going children as Peter *et al.* (2020) [13] conducted a cross-sectional study to assess the prevalence of genu varum in children aged 6-10 years in Urhobo, Delta State, Southern Nigeria and found 4.3 percent children were suffering from genu varum deformity. Ganeb *et al.* (2021) [3] reported 0.09 percent of students had bow leg deformities in primary schools in Egypt. Shahpuri *et al.* (2019) [15] also conducted a study to determine the prevalence of lower

extremities' postural disorders among school children of 6 to 7 years in Qom province, Iran. Where the result revealed that 351 children out of 1450 were diagnosed with genu verum deformity. Karimi *et al.* (2005) [17] designed a cross-sectional study to find the prevalence of genu varum and genu valgum in 3000 Iranian school children aged between 7 to 11 years and the result revealed that 7.9 percent of students had genu varum deformity.

There are few studies that were conducted on Indian students to assess the prevalence of bowleg deformity. Sharma (2015) [16] reported bowleg deformity among 39% of students in the state of Himachal Pradesh. Qureshi and Pagare (2015) [14] studied postural deformities in the students of private, government grant-in-aid, and government schools in Maharashtra, India, and reported that 8.75% of the students were suffering from bowleg deformity. Maiti and Samanta (2016) [8] reported bowleg deformity among 13% of boys and 9.5% of girls studying in the CBSE schools of Pune city of India. Most of the Indian studies that studied the prevalence of bowleg deformity were conducted on a small sample size therefore the present study has been designed to assess the prevalence of bowleg deformity among school students with a large sample size. Moreover, the study was conducted on students of the different types of schools in Chandigarh i.e. private schools, government model schools, and government schools in slum areas. These schools were visited by students of different socio-economic backgrounds. Therefore, the school was taken as an indicator of students' socio-economic background to evaluate the impact of socioeconomic backgrounds on the occurrence of bowleg deformity.

## Material and Methods

**Design of the study:** A cross-sectional study was designed to compare the bow leg deformity among male students of

private schools, government model schools, and government schools in the slum areas of the Chandigarh.

**Selection of Subjects:** Non-probability purposive sample technique was used to select nine hundred (N=900) male school students. Among the selected subjects, three hundred (n=300) each were from private schools, government model schools, and government schools in the slum areas of Chandigarh. The age of selected subjects ranged from 11 to 15 years. The written permission was acquired from the District Education Officer to collect the required data for the study. Further, consent from the school authority was also taken. Before the collection of the data, the study's objectives were explained to the selected students.

**Bowlegs (Intercondylar Distance):** The distance between the medial condyles while the medial malleoli touch each other was measured with the help of a sliding caliper. The students were instructed to adduct their limbs slowly until the knees or ankles touched each other. The Intercondylar distance of more than 5cm was classified as bowleg deformity (Sharrard, 1976) [17]. If the knee and ankles touched simultaneously, alignment was recorded as neutral. The Intercondylar distance was rounded off to the nearest 0.5cm.

**Statistical Analysis:** Descriptive statistics was applied to analyze the data. The One-way Analysis of Variance (ANOVA) was used to compare intercondylar distance among male school students of Chandigarh. The post hoc test (LSD) was worked out to find out the paired differences, where the 'F' ratio was found to be significant. The level of significance was set at 0.05.

## Results

**Table 1:** Prevalence of bowleg deformity among male school students of Chandigarh

Groups	Private schools		Government model schools		Government schools in slum areas		Total	
	F	%	F	%	F	%	F	%
Normal legs (Below 5 cm)	284	94.7	299	99.7	295	98.3	878	97.6
Bowlegs (Above 5 cm)	16	5.3	1	.3	5	1.7	22	2.4
Total	300	100.0	300	100.0	300	100.0	900	100.0

(F= Frequency) (%= Percentage)

Table 1 depicts the prevalence of bowleg deformity among male students from private schools, government model schools, and government schools in slum areas of Chandigarh. The result of the study showed that 2.4% of the students of Chandigarh suffered from bow leg deformity, whereas 97.6% had normal legs. The private schools had the

highest percentage 5.3% of students with bowleg deformities and they were followed by the government model schools with bowleg deformities among 1.7% of students and government schools in slum areas with bowleg deformities among 0.3% of students.

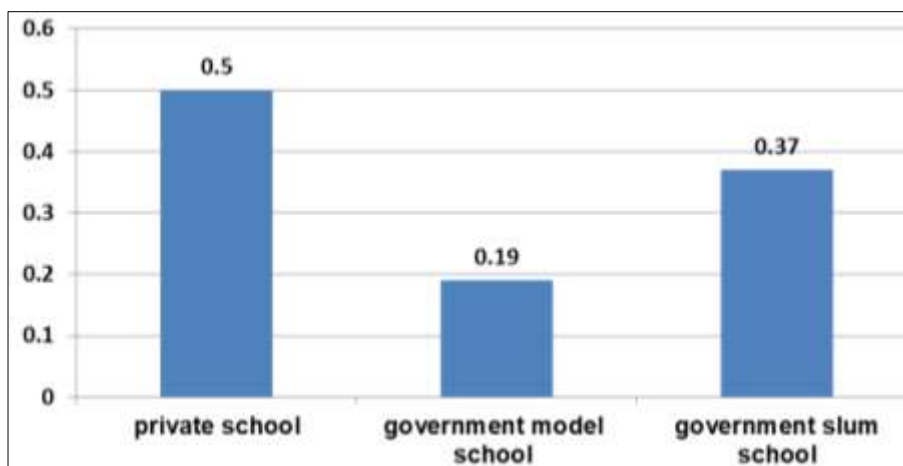
**Table 2:** Mean, Standard deviation, and f- ratio of bowleg deformity among male school students of Chandigarh

Variable	Private school	Government model school	Government slum school		
	Mean (SD)	Mean (SD)	Mean (SD)	F ratio	Sig.
Bowlegs (Intercondylar Distance - cm)	.50 (1.64)	.19 (.76)	.37 (1.05)	5.14	.006

Level of significance 0.05

Table 2 illustrates that there was a significant difference in intercondylar distance (F=5.14,  $p<.006$ ) among the male students of private schools, government model schools, and government schools in slum areas. The highest intercondylar

distance was diagnosed among the male students of private schools which were followed by the government school in slum areas and government model schools respectively.



**Fig 1:** Mean comparison of intercondylar distance among male students of Chandigarh

**Table 3:** Pair-wise difference among the male school students of Chandigarh in the intercondylar distance

Variable	Private schools v/s Government model schools	Private schools v/s Government schools in slum areas	Government model schools v/s Government schools in slum areas
Bow Legs (Intercondylar distance- cm)	.32*	.14	.18

Table no. 3 depicts that the male students of private schools had significantly higher intercondylar distance as compared to students of government model schools, whereas the differences among the other groups were non-significant.

### Discussion

The result of the study shows that 2.4% of male school students of Chandigarh had bow leg deformities. Shahpuri *et al.* (2019) [15] reported that 24.20% of children in the Qom province of Iran had bowleg deformity. Karimi *et al.* (2005) [7] studied the prevalence of genu varum and genu valgum in 3000 Iranian school children aged between 7 and 11 years and revealed that 7.9 percent of students had genu varum deformity. Ganeb *et al.* (2021) [3] also reported leg deformities among 0.09 percent of the Egyptian primary school students. Patil *et al.* (2021) [12] reported bowleg deformity among 6.7% of students in the Dhule District of Maharashtra. Ghandi *et al.* (2012) [5] reported the prevalence of bowleg deformity among 2.53% of students in primary school, 6.98% of students in junior high school, and 16.33% of students in senior high school in Arak City, Iran.

The result of the study revealed that the private schools (5.3%) had the highest percentage of students with bowlegs as compared to government schools in slum areas (1.7%) and government model schools (.3%). The mean value of the intercondylar distance (Bowlegs) in private school students was significantly greater than the government schools in slum areas and government model schools. The prevalence of bowleg deformity may be associated with a hypokinetic lifestyle and unhealthy eating habits which are more popular among children of high socioeconomic class and most of the students at the private schools belong to the high socioeconomic section of society. The students in private schools spend most of their time indoors in the A.C. rooms. The limited sun exposure may also lead to Vitamin D deficiency in students of private schools. Vitamin D deficiency is one of the factors for the misalignment of the lower limb of the body. On the other side, the government school students had more exposure to sunlight. Therefore, government school students had a low rate of bowleg deformity than private school students.

### Conclusion

The result of the study reveals that bowleg deformity was more pervasive among school students at private schools as compared to government schools. Socioeconomic background may be one of the factors that can contribute to the development of bowleg deformity.

### References

- Cheema JI, Grissom LE, Harcke HT. Radiographic characteristics of lower extremity bowing in children. *Radiographics*. 2003;23(4):871-80. doi:10.1148/rg.234025149.
- Davis EC, Logan GA. *Biophysical value of muscular activity*. Dubuque: Wm C. Brown Co; c1961.
- Ganab SS, Egaila SE, Younis AA. Prevalence of lower limb deformities among primary school students. *Egypt Rheumatol Rehabil*. 2021;48(34):2-70. doi:10.1186/s43166-021-00082-1.
- Gao Z, Chen S, Sun H, Wen X, Xiang P. Physical activity in children's health and cognition. *Biomed Res Int*. 2018;2018:8542403. doi:10.1155/2018/8542403.
- Ghandi AR, Hadi HA, Behruzi AR, Holakooie AR. The prevalence of genu-varum in students aged 7–16 in Arak city. *Arak Med Univ J*. 2012;15(4):63-8.
- Heath CH, Staheli LT. Normal limits of knee angle in white children--genu varum and genu valgum. *J Pediatr Orthop*. 1993;13(2):259-62.
- Karimi MM, Kashefipour A, Yousfnejad A. The prevalence of genu varum and genu valgum in primary school children in Iran 2003-2004. *J Med Sci*. 2005;5:52-4. doi:10.3923/jms.2005.52.54.
- Maiti S, Samanta D. A survey of postural characteristics of school children in Pune. *Int J Physiol Nutr Phys Educ*. 2016;1(1):55-7.
- Minoos D, Nasser B, Mahmood S. Prevalence and causes of postural deformities in upper and lower extremities among 9-18 years old school female in Golestan province. *Eur J Exp Biol*. 2013;3(6):115-21.
- Morrison WR, Chenoweth LB. *Normal and elementary diagnosis*. Philadelphia: Lea & Febiger; c1941.

11. Ningthoujam R. Postural deformities in government slum school extremities among school children. *Int J Phys Educ Health Sports Sci.* 2014;3(1):78-84.
12. Patil H, Rathod CL, Pawar V. Survey of selected postural deformities in school children of Dhule District, Maharashtra. *Vidyabharati Int Interdiscip Res J.* 2021;12(1):241-5.
13. Peter DO, John NP, Emmanuel T. Cross-sectional study of prevalence of genu varum in children 6-10 years of age in Urhobo, Delta State, Southern Nigeria. *Saudi J Biomed Res.* 2020, 5(3). doi:10.36348/sjbr.2020.v05i03.005.
14. Qureshi RH, Pagare SB. Prevalence of bowlegs and knock knee deformity in school-going children. *Int J Sci Res Publ.* 2015;5(6):1-4.
15. Shahpouri J, Aghaali M, Aghaei M. Prevalence of lower extremities' postural deformities in overweight and normal weight school children. *Iran J Pediatr.* 2019;29(5). doi:10.5812/ijp.89138.
16. Sharma P. Genu varum: A study highlighting the prevalence of genu varum and its association with different gender. *Int J Sci Res.* 2015;4(9):1336-9.
17. Sharrard WJ. Knock knees and bow legs. *Br Med J.* 1976;1(6013):826-7. doi:10.1136/bmj.1.6013.826.
18. Whittman K. Functional movement: practical therapeutic exercise for peripheral joint range of motion. Orthoverse Publication; c2011. Available from: <https://books.google.co.in/books>.