

Genu Varum: A Study Highlighting the Prevalence of Genu Varum and Its Association with Different Gender

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Abstract: *The present study was conducted with the objective of finding out the status of Genu varum (Bow legs) and its association with gender in different altitude of Himalayan region. To collect the data the Himachal Pradesh state of northern Himalayan region India was chosen. The state was divided into three zones (Greater, Inner and Outer Himalayan region) based on the altitude of the situated region. A total of twelve hundred school children studying in different regions of Himachal Pradesh were treated as the sample of the study. The bow leg was measured by measuring the inter-condylar distance. Any children having more than 10 cm of inter-condylar distance was considered as bow legged. The data was analysed by employing descriptive statistics and chi square test. The level of significance was set at .05. Results of the study revealed that thirty nine (39) percent school children were suffering from the bow leg deformity. Results of the study also showed that school children in Outer Himalayan region were having more (45.64%) number of deformity than that of Greater Himalayan (41.60%) and Inner Himalayan (31.5) school children. Further analysis revealed that Male school children (44.44) were found to be more bow legged than that of their female (33.33) counterpart. Therefore it can be concluded that bow legs in Himachal Pradesh are highly associated with gender.*

Keywords: Genu varum/Bow legs, School children, Gender, Inter-condylar distance and Himalayan region.

1. Introduction

Angular deformities of the lower limbs are common during childhood. In most cases this represents a variation in the normal growth pattern and is an entirely benign condition. One of the most common angular foot deformities among children is Genu varum, a Latin term used to describe bow legs. In other words it is a deformity marked by medial angulation of the leg in relation to the thigh; an outward bowing of the legs. This condition may present from infancy through adulthood and has a wide variety of causes. As it becomes more severe, the patient may exhibit lateral knee thrust and a waddling gait. There may be associated in-toeing and secondary effects on the hip and ankle. The problem may be unilateral, with a functional limb-length discrepancy, or bilateral. The family and medical history may reveal clues to the likelihood of persistence or progression. Presence of symmetrical deformities and absence of symptoms, joint stiffness, systemic disorders or syndromes indicates a benign condition with excellent long-term outcome. In contrast, deformities which are asymmetrical and associated with pain, joint stiffness, systemic disorders or syndromes may indicate a serious underlying cause and require treatment.

2. Purpose of the Study

The primary purpose of the study was to find out the status of Bow legs among the school children of different altitude in Himachal Pradesh. The second purpose of this study was to identify the association between the gender and prevalence of bow legs among the children of different altitude in Himalayan ranges.

3. Methodology

Sample: To get the sample for the study Himachal Pradesh state in northern India was selected. The districts/cities of Himachal Pradesh was divided into three different altitude regions namely Greater Himalayas (4500 mts and above), Inner Himalayas (1500 mts to 4500 mts) and Outer Himalayas (350 mts to 1500 mts). A total twelve hundred school children were selected as the sample for the study. The distribution of the samples of study was as follows: Total sample = 1200 (male = 675, females = 525), Total sample in Greater Himalayas = 399 (Male = 207, Female = 192), Total sample in Inner Himalayas = 400 (Male = 210, Female = 190), Total sample in Outer Himalayas = 401 (Male = 258, Female = 143).

Criterion measures: The Genu varum was measured by measuring the inter-condylar distance. If found more than 10 cms, the children were kept into the category of deformed category.

Statistical analysis: The data was analysed by descriptive statistics and chi square test.

4. Results

Results of the study revealed that thirty nine percent of the children in Himachal Pradesh were having bow legs. Chi square test further revealed that the prevalence of bow legs is significantly associated with different genders in Himachal Pradesh. Here, comes the detail of the data analysis and results.

Table 1: Showing percentage of school children belonging to Bow Leg and Non bow leg Group in different regions of Himachal Pradesh

Status		Region			Total Percentage
		Greater Himalayas	Inner Himalayas	Outer Himalayas	
Bow Leg	Female	32.26	26.32	34.26	33.33
	Male	43.26	36.19	51.55	44.44
	Total	41.60	31.5	45.64	39.58
Non Bow Leg	Female	60.94	73.68	65.03	66.67
	Male	56.03	63.80	48.44	55.56
	Total	58.40	68.5	54.36	60.42

regions of Himachal Pradesh. It was found that a total of 39.58 percent school children were having bow leg and rest of the others school children were in the category of non-bow leg. It was also found that male school children were having more number of bow leg cases (44.44%) in comparison to female school children (33.33%) of Himachal Pradesh. The table also reveals that bow leg was more prevalent in the school children of Outer Himalayan region in comparison to Greater and Inner Himalayan regions of Himachal Pradesh. Figure 1 and 2 shows the comparison of bow leg incidences among different regions and different genders respectively.

Table 1 shows the percentage of bow leg and non-bow leg cases among the male and female children in different

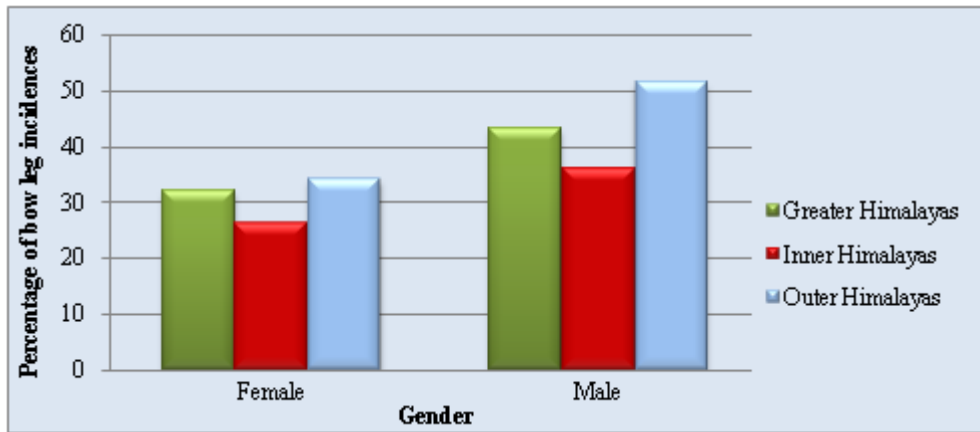


Figure 1: Comparison of bow leg deformity in different regions of Himachal Pradesh

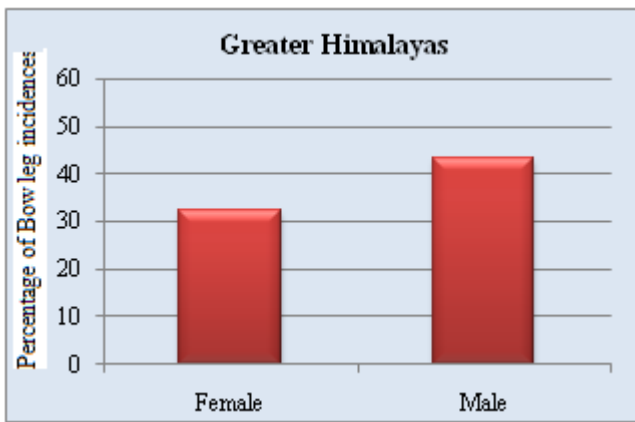


Figure 2 (a)

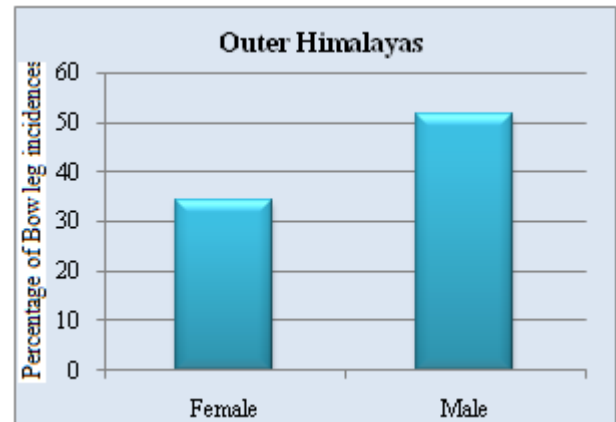


Figure 2 (c)

Figure 2: Comparison of bow leg deformity among male and female children in different regions of Himachal Pradesh

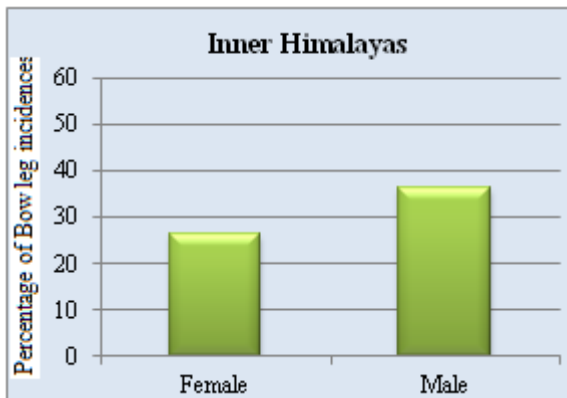


Figure 2 (b)

Table 2: Mean \pm SD for the data on inter-condylar distance (in cms) of school children in different regions of Himachal Pradesh

STATUS		REGION		
		Greater Himalayas	Inner Himalayas	Outer Himalayas
Bow legged*	Female	11.72+1.13	11.92+1.08	11.82+0.94
	Male	11.87+1.16	12.09+1.30	12.25+1.29
non bow legged	Female	8.37+1.36	8.31+1.24	8.68+1.30
	Male	8.73+1.28	8.46+1.34	8.64+1.24

*Subject having more than 10 cms inter-condylar distance was classified as bow legged

The Table 2 reveals the mean and the standard deviation of inter-condylar distance of male and female school children in different regions of Himachal Pradesh. The Figure 3(a,b), 4(a,b), and 5(a,b) shows the graphical display of inter-

condylar distance in greater, inner and outer Himalayan regions respectively.

Greater Himalayan Region

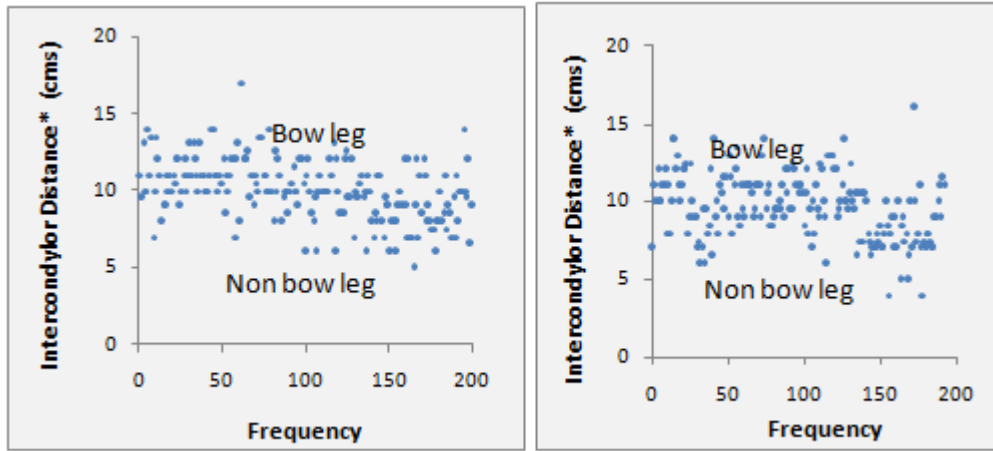


Figure 3(a): Male

Figure 3(b): Female

**The distance between the condyle bones of leg was measured. Anybody having inter-condylar distance more than 10 cm was kept into the category of Bow Legs.*

Figure 3(a&b): Showing the distribution of data on the inter-condylar distance in Greater Himalayas. The horizontal line shows the demarcation between bow leg and non-bow leg.

Inner Himalayan Region

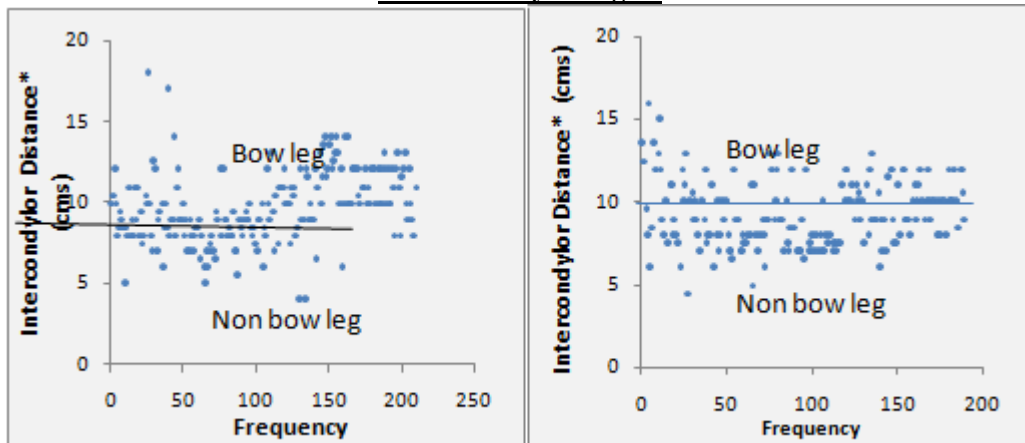


Figure 4(a) Male

Figure 4(b) Female

**The distance between the condyle bones of leg was measured. Anybody having inter-condylar distance more than 10 cm was kept into the category of Bow Legs.*

Figure 4 (a&b): Showing the distribution of data on the inter-condylar distance in Inner Himalayas. The horizontal line shows the demarcation between bow leg and non-bow leg.

Outer Himalayan Region

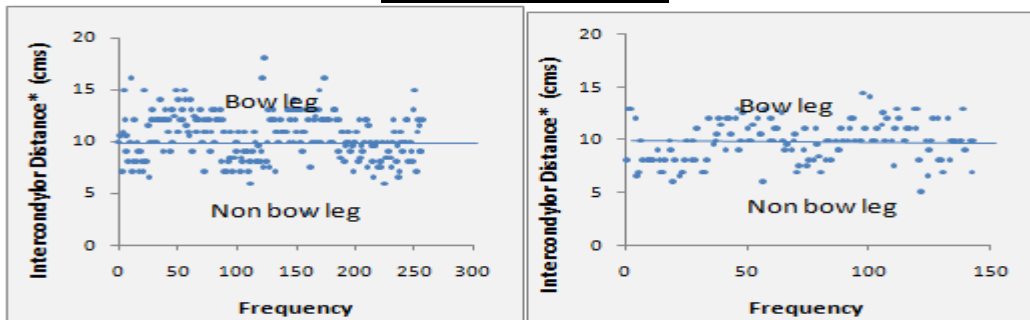


Figure 5(a) Male

Figure 5(b) Female

**The distance between the condyle bones of leg was measured. Anybody having inter-condylar distance more than 10 cm was kept into the category of Bow Legs.*

Figure 5 (a&b): Showing the distribution of data on the inter-condylar distance in Outer Himalayas. The horizontal line shows the demarcation between bow leg and non-bow leg.

- **Chi Square test to find out the association between genders and status of bow legs in Himachal Pradesh.**

Any individual having inter-condylar distance more than 10 cms was categorized into as Bow Leg category. Table 3 shows the results of the chi square employed for testing the aforesaid association.

Table 3: Chi square table for the data on incidences of Bow Legged and non-bow legged among male and female school children in Himachal Pradesh

			Status of Bow legs		Total	χ^2
			Bow legged	Non bow legged		
Gender	Male	observed	300	375	675	15.245*
		Expected	267.2	407.8	675.0	
	Female	observed	175	350	525	
		Expected	207.8	317.2	525.0	
	Total	observed	475	725	1200	
		Expected	475.0	725.0	1200.0	

$\chi^2_{0.05}(1) = 3.841$, *significant at 5% Level

The above table is showing the testing of null hypothesis (H_0) i.e. there is no association between gender and the status of bow legs in Himachal Pradesh against the research hypothesis that there is a significant association between gender and the status of bow legs in Himachal Pradesh. Results revealed a significant association, as the calculated chi square (χ^2) is 15.245 which is higher than the tabulated value of chi square ($\chi^2_{0.05}(1) = 3.841$).

Thus, it may be concluded that there was a significant association between the genders and the status of bow legs in Himachal Pradesh. In other words it may be inferred that the bow legs among the male school children were significantly higher than that of female.

5. Discussion of Findings and Conclusion

Results and findings of the study revealed that bow legs are highly prevalent among the school children of Himachal Pradesh. The results of the study also showed that females were less bow legged in comparison to male school children. Further analysis revealed those outer Himalayan regions were having more number of bow legs than the other two selected regions of Himachal Pradesh.

The reason behind the above findings may be geographical conditions in Himachal Pradesh. The state is full of high, low and steep mountainous routes. The circumstance of state makes the children to walk on these mountainous routes for

a long duration of hours, which might be leading to bow legs. Although the bow legs are basically the result of heredity and genetical trait the other reasons attributed to this deformity are bone diseases like rickets, weakening of muscles, tendons and ligaments surrounding knee joint, improper sitting and walking style. To rectify this deformity it is important to diagnose and an early treatment should be ensured.

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