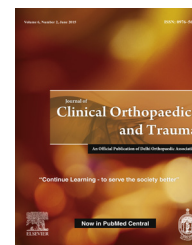


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## Original Article

# Prevalence of skeletal deformity due to nutritional rickets in children between 1 and 18 years in tea garden community



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## ABSTRACT

**Introduction:** The present study was undertaken to find out the prevalence of skeletal deformity due to nutritional rickets in children aged 1–18 years in tea garden community in Dibrugarh District of Assam.

**Methodology:** It was a cross-sectional study and two-stage cluster sampling was used. In the selected tea gardens, all the children aged 1–18 years were screened for skeletal deformity by house-to-house visit.

**Results and observations:** The overall prevalence of skeletal deformity was 2.7 per thousand. Majority of children with deformities (57.27%) were between 7 and 12 years of age. Widening of wrists and ankle was the most frequent symptom (53.8%). Most of the children with deformity had moderate malnutrition (77.27%). Most of the children with skeletal deformity belong to lower (v) (45.45%) grade of Kuppuswamy's grading scale. Bilateral genu valgus deformity (54.54%) and bilateral genu varum (25.92%) deformity were the most common deformities. Widening of wrists and ankle was the most frequent symptom (61.66%).

**Conclusion:** Of the 16,274 tea garden children included in our study (male and female) in the age group 1–18 years, 44 had skeletal deformity due to nutritional rickets. The prevalence of skeletal deformity due to nutritional rickets was found to be 2.7 per thousand children, which are significantly higher when compared with the only other such study, which was on general population in Bangladesh.

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## 1. Introduction

Information available on prevalence of rickets and its consequent skeletal deformities in different communities and areas of the world is limited and the importance of the problem has not so far been recognized.<sup>1</sup> This paucity of information is even more so in the tea garden community in which the incidence is supposed to be even higher. There are 160 tea gardens in Dibrugarh District and Assam Medical College & Hospital, Dibrugarh is a referral center for almost all of them, It has been seen that a sizeable number of rickets patients come to Assam Medical College & Hospital, Dibrugarh from the tea garden community for their management; till now, there is no published study on prevalence and associated factors, which may be responsible for the large number of patients of the community suffering from rickets.

We take up this study so that the prevalence can be determined, possible etiological factors can be identified, and preventive measures can be formulated for the future.

## 2. Methodology

The present study was undertaken to find out the prevalence of skeletal deformity due to nutritional rickets in children between 1 and 18 years in the tea garden community in Dibrugarh District under the guidance of Department of Orthopaedics, AMCH Dibrugarh. The study was conducted in 20 randomly selected tea gardens (random table technique) out of 160 tea gardens in Dibrugarh district from April 2012 to March 2013. It was a cross-sectional study and two-stage cluster sampling was used in the selected tea gardens. All the children aged 1–18 years were screened for skeletal deformity by house-to-house visit. All children of 1–18 years age were selected and those who did not give informed consent were excluded from the study. After obtaining ethical clearance, data were registered in predesigned and pretested schedule.

History of nutritional status, family income, family diet, sunlight exposure, similar deformity in siblings, and other points as per Performa were recorded. Clinical evaluation like weight for height and BMI (body mass index) was done and socioeconomic status was assessed using Kuppuswamy's scale. Laboratory investigations of serum calcium, serum phosphate, serum alkaline phosphatase, serum urea, serum creatinine, hemoglobin, and urine routine were conducted. Serum 25(OH) and 1,25(OH)<sub>2</sub>D are not available in Dibrugarh and Assam Medical College & Hospital, Dibrugarh, so that was excluded from the study. Radiological investigations of posterior and anterior radiographs of the wrist and X-rays of the deformed part were taken. Performa was used, which included all details including dietary history, sunlight exposure, drug history, family history, income, siblings, thorough clinical examination for signs of malnutrition, and rickets (craniotabes, bossing of skull, delayed closure of anterior fontanelle, rachitic rosary, pigeon chest, Harrison sulcus, and protruding abdomen). Skeletal abnormalities (knock knees, bow legs, wind swept deformities, anterior bowing of tibia and femur, coxa vara, kyphosis and scoliosis, and lordosis). Systemic examination of all systems was done. To rule

out renal rickets clinically, following signs were seen – alopecia, hyperpigmented macules, hematuria and urinary tract infections.

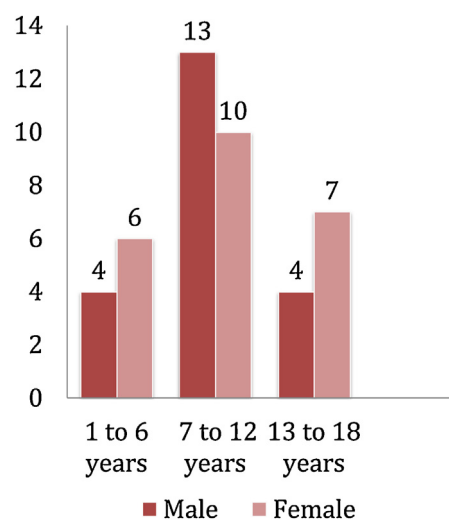
### 2.1. Statistical analysis

Data were presented in terms of percentage and mean  $\pm$  SD and also in the form of diagrams; t-test for testing the difference between two proportions was applied to find out the difference between sex-wise prevalence; *p* value of  $<0.05$  was considered as statistically significant.

## 3. Results and observations

The overall prevalence of skeletal deformity due to nutritional rickets in children 1–18 years in tea garden community in Dibrugarh District is 2.7 per thousand. Prevalence of skeletal deformity in males is 2.54 per thousand, and in females, it is 2.87 per thousand; however, the difference between their prevalence was not significant. Majority of children with deformities (57.27%) were between 7 and 12 years age group (Graph 1). Widening of wrists and ankle was the most frequent symptom (53.8%) and rachitic rosary (15.3%) and protruded abdomen (15.3) were the second most common symptom observed (Table 1).

Most of the children with deformity had moderate malnutrition 77.27% and only 13.6% of the children had normal nutrition (Table 2). Most of the children with skeletal deformity belong to lower (v) 45.45% and upper lower (IV) 29.45% grade of Kuppuswamy's grading scale (Graph 2). Bilateral genu valgus deformity (54.54%) and bilateral genu varum (25.92%) deformities were the main deformities found among all the deformities (Table 3). Serum calcium and phosphate were in normal range in all the subjects but serum alkaline phosphatase (which is a marker of osteoblastic activity) levels were raised in all the children. Serum levels of urea and creatinine were in normal range, which shows that there is no renal rickets component (Tables 4 and 5).



Graph 1 – Age-wise distribution of skeletal deformities due to nutritional rickets.

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