

# Growth, nutritional status, and signs of rickets in 0–5-year-old children in a Kashin–Beck disease endemic area of Central Tibet

Shancy Rooze · Michèle Dramaix-Wilmet ·  
Françoise Mathieu · Pascale Bally · Dikki Yangzom ·  
Jin Zhong Li · Philippe Goyens

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**Abstract** In order to describe the growth of 0–5-year-old Tibetan children living in a Kashin–Beck disease (KBD) endemic rural area and to examine the relationship between anthropometric indicators and clinical signs of rickets, we analyzed the baseline data of a cohort of 668 children enrolled in a prospective program of calcium and vitamin D supplementation. Tibetan children suffer from growth retardation. Z score of weight-for-age, height-for-age, weight-for-height was below  $-2$  in 32.5%, 27.7%, and 12.1% of the children, respectively. Clinical signs of severe rickets are highly prevalent. Underweight, stunting, and clinical rickets increases with age. Prevalence of malnutrition was higher in the presence of

signs of rickets. The proportion of children with a head circumference Z score  $< -2$  was lowest when signs of rickets were observed. **Conclusion:** Stunting and underweight are frequent and probably associated with rickets.

**Keywords** Underweight · Stunting · Wasting · Infants

## Abbreviations

HC	Head circumference
KBD	Kashin–Beck disease
MUAC	Mid upper arm circumference
P25	25th percentile
P50	50th percentile
P75	75th percentile
SD	Standard deviation
TAR	Tibet Autonomous Region
WHO	World Health Organization

## Introduction

Infants and young children are in a nutritionally vulnerable stage of the life cycle. Malnutrition is a major predisposing factor for morbidity and mortality. Adequate nutrition avoids failure to reach biological potential to growth [15]. Growth reflects the well-being and the development of the child. Around the world, 30% of the children under 5 years of age present with stunting or underweight [11]. Malnutrition rates are highest in Sub-Saharan Africa and in South Asia [21]. While in India, every third child is underweight, and in the Indian part of the Himalaya, only one-fifth of the children are nutritionally normal [5].

S. Rooze (✉) · P. Goyens  
Nutrition and Metabolism Unit,  
University Children's Hospital Queen Fabiola,  
Brussels, Belgium  
e-mail: srooze@ulb.ac.be

M. Dramaix-Wilmet  
Department of Biostatistics, School of Public Health,  
Université Libre de Bruxelles,  
Brussels, Belgium

F. Mathieu · P. Bally  
Kashin–Beck Disease Fund,  
Gent, Belgium

D. Yangzom  
Kashin–Beck Disease Foundation,  
Tibet Autonomous Region Lhasa, People's Republic of China

J. Z. Li  
Centre for Disease Control and Prevention,  
Tibet Autonomous Region Lhasa, People's Republic of China