

## Introduction

Low-energy fractures in children result from underlying metabolic or endocrine abnormalities that result in decreased bone strength, particularly in Vitamin D deficiency and thyroid dysfunction. Early identification allows timely intervention and can prevent recurrent fractures. This study aimed to evaluate the prevalence of Vitamin D deficiency and thyroid hormone abnormalities in children presenting with low-energy trauma fractures and to assess the utility of routine metabolic screening.

## Methods

A prospective observational study was conducted at Sri Guru Ramdas Medical College and Hospital, Amritsar, from 15 October 2017 to 19 October 2020. A total of 120 children aged 2–16 years presenting with fractures following low-energy trauma were enrolled. Low-energy trauma was defined as injury resulting from minor mechanisms such as falls from standing height. Exclusion criteria included high-energy trauma, pathological fractures, illnesses affecting metabolism of bone, and prior substitution of Vitamin D or thyroid hormone. Serum Vitamin D levels and thyroid function tests (T3, T4, and TSH) were measured at presentation. Abnormal biochemical findings were analyzed in relation to age, sex, fracture pattern, and clinical outcomes.

## Results

Vitamin D deficiency ( $<20$  ng/mL) was identified in 78 children (65%). Subclinical hypothyroidism is defined as TSH  $>5$   $\mu$ IU/mL with normal T3 and T4 which was observed in 20 children (16.7%). Clinical hypothyroidism is defined as TSH  $>10$   $\mu$ IU/mL with low T4 which was present in 5 children (4.2%). Vitamin D deficiency was mostly found in children aged 2–6 years (70%) and 7–12 years (70%), compared to adolescents aged 13–16 years (50%). The most common fracture sites were the distal radius (38%), proximal humerus (28%), and distal tibia (18%). Early identification enabled Vitamin D supplementation or endocrinological treatment potentially reduce the risk of recurrent fractures.

## Conclusions

A high prevalence of Vitamin D deficiency and thyroid hormone abnormalities exists among children presenting with low-energy fractures. Routine metabolic and endocrine screening facilitates prompt early intervention, better bone health, and may reduce fracture recurrence. Incorporating such screening into standard pediatric orthopedic practice should be strongly considered to improve overall bone health.