

Varying Role of Vitamin D Deficiency in the Etiology of Rickets in Young Children vs. Adolescents in Northern India

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Summary

The relative importance of calcium vs. vitamin D deficiency in the etiology of nutritional rickets in the tropics may be different in children compared with adolescents. We studied calcium intake, sun exposure, serum alkaline phosphatase, and 25 hydroxy vitamin D in 24 children and 16 adolescents with rickets/osteomalacia. The values were compared with those obtained in control subjects (34 children and 19 adolescents). We found that young children with rickets had lower calcium intake compared with controls (285 ± 113 vs. 404 ± 149 mg/day, $p < 0.01$), but similar sun exposure (55 ± 28 vs. 56 ± 23 min-m²/day) and 25 hydroxyvitamin D (49 ± 38 vs. 61 ± 36 nmol/l), in contrast to one of 16 adolescents. Adolescent patients had low calcium intake vs. controls (305 ± 196 vs. 762 ± 183 mg, $p < 0.001$), and lower sunshine exposure (16 ± 15 vs. 27 ± 17 min-m²/day, $p < 0.01$) and serum 25 hydroxyvitamin D (12.6 ± 7.1 vs. 46 ± 45.4 mol/l, $p < 0.001$). The odds ratio for developing rickets with a daily calcium intake below 300 mg was 4.8 (95 per cent CI, 1.9 - 12.4, $p = 0.001$). Subjects with rickets were randomized to receive 1 g calcium daily, with or without vitamin D. Children showed complete healing in 3 months, whether they received calcium alone or with vitamin D. Adolescents showed no response to calcium alone, but had complete healing with calcium and vitamin D in 3-9 months (mean 5.3 months). Thus deficient calcium intake is universal among children and adolescents with rickets/osteomalacia. Inadequate sun exposure and vitamin D deficiency are important in the etiology of adolescent osteomalacia.