

# Vitamin D in adolescents: a comprehensive review of guidelines and recommendations

## Introduction

- Vitamin D plays a key role in **bone health** of adolescents and has also **potentially certain extra-skeletal health benefits**.
- Hypovitaminosis D in adolescence is highlighted as a global public health concern.
- **Practical guidelines** help clinicians make their preventive and therapeutic choices and improve care management.

## Objectives

To **collect and synthesize available recommendations** concerning vitamin D in adolescents, mainly vitamin D thresholds, dietary requirements, prophylactic supplementation and treatment of deficiency. To **explore their level of consensus** or the potential discrepancies.

## Methods

- **Systematic review** and narrative synthesis of the literature
- Search design: **clinical recommendations** published by scientific societies and organizations as well as official reports published by the **departments of health** of different governments from different regions of the world
- Search terms: (vitamin D OR nutritional rickets) AND (guideline OR recommendation OR consensus OR statement)
- Selection criteria: Publications specifically targeting adolescents (defined as those from 10 to 19 years)  
Publications about general population with a reference for the adolescent subgroup  
Publications regarding full range of childhood (from birth to 18 years)  
Languages: English and French. Publication until December 31, 2017
- Outcomes-Four thematic axes: 1. Vitamin D thresholds, 2. Nutritional intake, 3. Prophylactic supplementation, 4. Treatment of deficiency

## Results

- ❖ **31 documents**. Most of them targeted the general population, not specifically adolescents
- ❖ Almost one reference for each and every continent (Europe, America, Australia, Asia)
- ❖ 3 study groups issued guidelines applicable to patients with chronic diseases (rickets, chronic kidney disease, cystic fibrosis)
- ❖ Publications concerned either healthy populations or subgroups at risk for deficiency

### Definition of vitamin D status

- Lack of consensus in defining 25(OH)D normal values
- Agreement on 25(OH)D > 25-30 nmol/L to avoid poor bone health
- Lack of consensus on the optimal 25(OH)D concentration values to aim for, levels varying between 25 nmol/L and 125 nmol/L
- Study groups who consider the higher levels for optimal vitamin D status are based also on its potential pleiotropic functions

### Prophylactic vitamin D supplementation

- Agreement on the need for a preventive dose for adolescents at risk  
Doses are debated, ranging from doses equal to DRIs (400-1,000 IU/d) to doses at least 2 to 3 times higher (2,000 IU/d)
- Lack of consensus on the need to supplement healthy adolescents  
Recommended doses vary between 400 IU/d and 1,000 IU/d depending on sun exposure, consumption of vitamin D fortified foods, skin pigmentation and body weight

### Dietary Reference Intakes (DRIs)

- No true consensus, values varying between 200 IU/d and 1,000 IU/d
- DRIs in accordance with the relevant 25(OH) sufficiency threshold:
  - 400 IU/d if sufficiency cut-off level is set to 25-30 nmol/L
  - 600 IU/d if sufficiency cut-off level is set to 50 nmol/L
  - 1,000 IU/d if sufficiency cut-off level is set to 75 nmol/L
- Agreement on Upper Intake Level (UL) estimated at 4,000 IU/d

### Treatment of vitamin D deficiency

- Agreement on oral vitamin D (ergocalciferol/D2 or cholecalciferol/D3)
- Several daily therapeutic regimens proposed. Duration 1-3 months  
1,000-2,000 IU/d if 25(OH)D between 50 and 75 nmol/L  
3,000-10,000 IU/d if 25(OH)D < 50 nmol/L  
*Alternatively:* weekly doses: 50,000 IU per week for 6-8 weeks  
monthly doses: 1 single dose of 300,000 IU or  
2 doses of 150,000 at a 6-week interval

## Conclusions

- At present, there is no true consensus among different societies and different countries about vitamin D in adolescence.
- In clinical settings, this lack of consent makes decisions difficult or problematic, at least under certain clinical conditions.
- Strong guidance is needed to establish homogenous, evidence-based recommendations. Our findings could promote further research concerning the use of valid tools in order to evaluate the development process of the current guidelines.

### Indicative Bibliography

- Holick MF, Binkley NC, Bischoff-Ferrari HA, Gordon CM, Hanley DA, Heaney RP et al; Endocrine Society. Evaluation, treatment, and prevention of vitamin D deficiency: an Endocrine Society clinical practice guideline. J Clin Endocrinol Metab. 2011; 96: 1911-30
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- Society for Adolescent Health and Medicine. Recommended vitamin D intake and management of low vitamin D status in adolescents: a position statement of the society for adolescent health and medicine. J Adolesc Health. 2013; 52: 801-3