

Physical growth, biological age, and nutritional transitions of adolescents living at moderate altitudes in Peru

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Background: Peru is experiencing a stage of nutritional transition where the principal characteristics are typical of countries undergoing development. **Objectives:** The objectives of this study were the following: (a) compare physical growth patterns with an international standard; (b) determine biological age; and (c) analyze the double nutritional burden of adolescents living at a moderate altitude in Peru. **Design:** Weight, standing height, and sitting height were measured in 551 adolescents of both sexes (12.0 to 17.9 years old) from an urban area of Arequipa, Peru (2328 m). Physical growth was compared with the international standard of the CDC-2000. Biological age was determined by using a non-invasive transversal technique based on years from age at peak height velocity (APHV). Nutritional state was determined by means of weight for age and height for age. Z scores were calculated using international standards from the CDC-2000. **Results:** Body weight for both sexes was similar to the CDC-2000 international standards. At all ages, the girls' height ($p < 0.05$) was below the standards. However, the boys' height ($p < 0.05$) was less at ages, 15, 16, and 17. Biological age showed up in girls at age 12.7 years and for boys at 15.2 years. Stunted growth (8.7% boys and 18.0% girls) and over weight (11.3% boys and 8.8% girls) occurred in both groups. A relationship existed in both sexes between the categories of weight for the age and stunted growth by sex. **Conclusions:** Adolescents living at a moderate altitude exhibited stunted linear

growth and biological maturation. Furthermore, adolescents of both sexes showed the presence of the double nutritional burden (stunted growth and excessive weight). © 2015 by the authors; licensee MDPI, Basel, Switzerland.

Adolescents

Biological age

Nutritional transitions

Physical growth

adolescence

age

altitude

growth

maturation

nutrition

adolescent

age

age distribution

altitude

Article

body height

body weight

child

controlled study

cross-sectional study

female

growth rate

human

major clinical study

male

nutritional status

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Peru

school child

scoring system

sex difference

sitting

standing

stunting

urban area

aging

nutritional status

physiology

Arequipa [Arequipa (DPR)]

Arequipa [Peru]

Peru

Adolescent

Aging

Altitude

Body Height

Body Weight

Child

Female

Humans

Male

Nutritional Status

Peru