

Growth Spurt, Relative Fat Distribution and Physical Activity of Senegalese Rural Male Adolescents

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Abstract

This study examines the height growth spurt of a group of 378 adolescent boys from rural Senegal (West Africa), along with their subcutaneous fat changes through puberty. Habitual physical activity was qualitatively estimated in a subsample of 40 adolescents via a questionnaire; it was quantitatively assessed by an accelerometer worn for 3 consecutive days. Using the Preece-Baine model, a delay of about 3 years in the growth spurt was discernable compared with CDC reference data. Despite this delay, older adolescents reached a final stature of around the 50th percentile of the reference. Subcutaneous fat increased after the age at take-off, with substantial trunk fat deposition. These adolescents appeared to be fairly active, spending 38% of their time during the day performing vigorous activities. These results are in line with other African studies describing a slow and prolonged growth process. The fat regional deposition pattern also conformed to that of adolescents from industrialized countries. No significant relationship between physical activity and nutritional status was evidenced.

Key Words: Adolescence, Peak Height Velocity, Body Composition, Accelerometry, Senegal

Introduction

A pattern of slow but continuous growth was described several years ago in rural African children (Little and Johnson 1987). This resulted in a blunted spurt which was even more pronounced in boys than in girls (Little and Johnson 1987; Simondon and others 1997). Sexual maturity was also frequently delayed (Cameron and others 1993; Campbell and others 2005). A profile of leanness and slow growth would appear to be habitual in populations living in the dry savannahs of Africa (Glew and others 2003; Gray and others 2004). Likewise, more than two decades ago, a phenomenon of catch-up growth at the end of puberty was reported (Kulin and others 1982) and was later confirmed in rural Mali (Pawloski 2003). This phenomenon, sometimes termed “compensatory growth”, was concomitant with an increase in fatness, occurring mainly after the peak of height velocity (Cameron and others 1994).

Among the causes frequently advanced to explain this slow growth, chronic undernutrition is most often cited (Martorell and others 1992). Global energy dietary deprivation is widespread in rural Africa; however, certain micronutrient deficiencies (essential amino acids and zinc) could also lead to stunting (Golden 1991). This might be the case in Senegalese agricultural communities at the end of the dry season (Benefice and Simondon 1993). Indeed, physical activity is a potent regulator of energy balance and hence of nutritional status. In rural Africa, adolescents and children are continuously involved in daily tasks at the household level, and this may represent a high level of energy expenditure. This is especially evident in the case of adolescent girls (Benefice and others 2001a). Studies among African rural boys are less common, and there is a need to provide new information (Larsen and others 2004).

A paradoxical long-term consequence of stunting is the possible existence of a link with fatness or obesity