Puberty Timing Remains Unchanged

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Contents

Background
Description of Large Surveys
Evidence Supporting a Trend Toward an Earlier Puberty
Major Topics that Confound Claims of a Trend of Earlier Puberty
Conclusions: Evidence of a Continuing Secular Trend of Puberty
References

Summary

It has been presumed by the media and the public that puberty is occurring earlier now than in past decades. This is the result of reports of earlier breast development in girls (Tanner stage 2, Br2) and earlier genital development (Tanner genital stage 2, G2) in boys. Nonetheless, owing to the lack of representative data, the intra- and inter-observer variability in Tanner staging, and the fact that initial sex hormone-driven physical changes do not always indicate the onset of puberty, bona fide evidence of an earlier pubertal onset is not available. The gold standard verifying pubertal onset involves documentation of hormonal responsiveness of the hypothalamic–pituitary–gonadal (HPG) axis. The evidence cited for an earlier onset of puberty involves the age of the first physical changes of puberty. In girls, the appearance of breast may simply be due to fatty tissue deposition, particularly in overweight children; alternatively, breast tissue may be a consequence of non-HPG-stimulated estrogen production. In males, genital staging is poorly defined and therefore subjective and prone to significance within and between observer disagreements. Inexperienced observers, unacquainted with the normal variation in prepubertal genital size and appearance, may erroneously assign G2 based on size alone. This is a possible explanation of recent studies showing a high percentage of 9-year-old boys in G2 in recent surveys in contrast to findings in the last 1970s. Data remain insufficient because of problems with sample size and selection, race, socioeconomic status (SES), assessment, and statistical methods to conclude that there is a significant continuation of the secular trend toward an earlier pubertal onset in boys or girls.

Key Words: Secular change; Puberty; Menarche; Tanner stages.
BACKGROUND

More than 5 years ago (October 30, 2000), *Time* magazine ran a cover story that suggested that a trend toward earlier puberty in American children 30 years ago was certain. This type of media coverage has led the perception by most, both within and outside the medical community, that this trend has been unquestionably confirmed. Therefore, most would probably find it surprising that this claim of a trend toward earlier puberty in America has not been, and perhaps cannot be, substantiated. To explore this issue further, we present both the supporting and contradictory evidence regarding this issue.

It is clear that a secular trend toward earlier puberty took place over the time interval from the early 1800s to 1960s based on the progressive decline in age of menarche in European countries (1–3). This shift has been attributed to the effects of improved nutrition, control of infectious disease, and a progressive improvement in socioeconomic and public health conditions. In contrast to the convincing trend of earlier puberty that appears to have plateaued in the 1960s, contemporary controversy about pubertal timing revolves around whether this trend has continued.

One complexity of the modern information age is that the effects of isolated events and individual cases tend to be amplified, influencing the public, clinicians, and researchers. Furthermore, given that the current research climate discouraging visual examination of pubertal development has prompted the use of survey tools such as adolescent self-reporting of pubertal development [as planned for the next National Health and Nutrition Examination Survey (NHANES)], the ability to determine the epidemiological trends in pubertal development in the American population may never be answered with certainty. This switch to self-reporting will introduce a new set of uncertainties given what is already known about the behavior of adolescent girls involved in longitudinal studies to falsify age of menarche.

The data used to assess whether there have been changes in the age of puberty from the 1960s to the present come from large surveys, primarily from US government-sponsored programs. To help give the reader a better understanding of the available data sources, and the limitations inherent to them, we have described the three largest population studies from the United States since the 1960s.

DESCRIPTION OF LARGE SURVEYS

Large national surveys of pubertal staging in the United States include: (i) National Health Examination Survey (NHES) (1966–1970), (ii) the Hispanic Health and Nutrition Examination Survey (HHANES) (1982–1984), and (iii) the NHANES III (1988–1994). Pubertal stages were included for ages 12–17 years for NHES, 10–18 for HHANES, and 8–18 years for NHANES III. HHANES included Mexican Americans, Cuban Americans, and Puerto Ricans and can be compared with NHANES III Mexican Americans.

NHES cycles II–III were conducted from 1963 to 1970 (4–6) by the Centers for Disease Control and Prevention (CDC) and provide the first pubertal timing data of US children from these national surveys. Although Tanner stage data were not collected in NHES II, information on Tanner staging was collected in NHES III (1966–1970) for children 12 years of age and older.