

Pubertal development in Medieval England: the human skeletal evidence

Dr Fiona Shapland and Dr Mary Lewis



The Leverhulme Trust

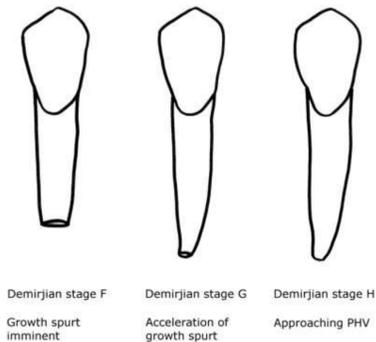
Introduction

Adolescence marks the transition from childhood to adulthood in modern society and it is likely that it also represented a significant threshold in past societies. Nevertheless, the process of puberty is rarely studied in bioarchaeology. Based on modern data, it is possible to identify specific dental and skeletal maturation events that correspond with the progress of the pubertal growth spurt. Presented here are the results of an application of these methods to two skeletal collections from Medieval England: Barton-upon-Humber, Lincolnshire and St Mary Spital, London.

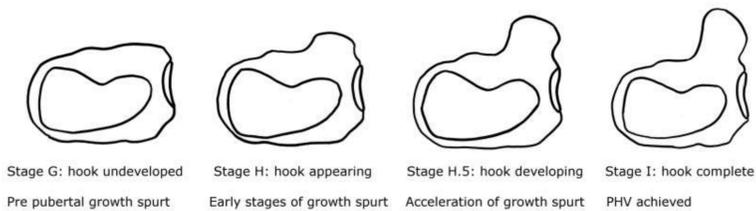
Method and Materials

Dental and skeletal indicators of pubertal stage

- The later stages of mineralisation of the canine root have been found to correspond with the onset and acceleration of the growth spurt up to the approach of peak height velocity (PHV) (1).



- The development of the hook of the hamate has been found to occur within the acceleration phase of the growth spurt (2).



- The fusion of the hand phalangeal epiphyses commences shortly after PHV, during the deceleration phase of the growth spurt. The fusion of the distal epiphyses occurs earliest, and has been found to correspond with the timing of first menstruation in girls (2,3,4).
- The iliac crest ossifies at around the time of first menstruation in girls, and during the deceleration phase of the growth spurt in both sexes (4).
- The distal radius epiphysis commences fusion within the final year of the growth spurt, and completes fusion after the end of the growth spurt (5).

Age estimation and sex assessment

- Age at death was assessed using dental development (excluding the mandibular canine). Sex was assessed wherever possible using methods developed for non-adults based on pelvic, distal humerus and cranial morphology (6,7).

Materials

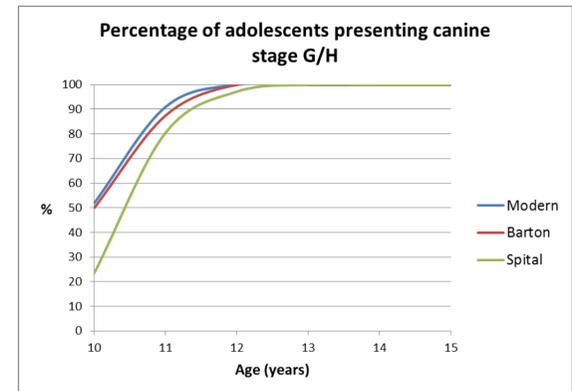
- Barton-upon-Humber, Lincolnshire. A wealthy small town cemetery with burials dating from the 11th to 17th century. Number of adolescents (age 10-20 years) for whom dental age could be calculated and pubertal stage estimated: 87
- St Mary Spital, London. A hospital cemetery thought to include poor and migrant workers, with burials dating from the 12th to 16th century. Number of adolescents for whom dental age could be calculated and pubertal stage estimated: 441

References

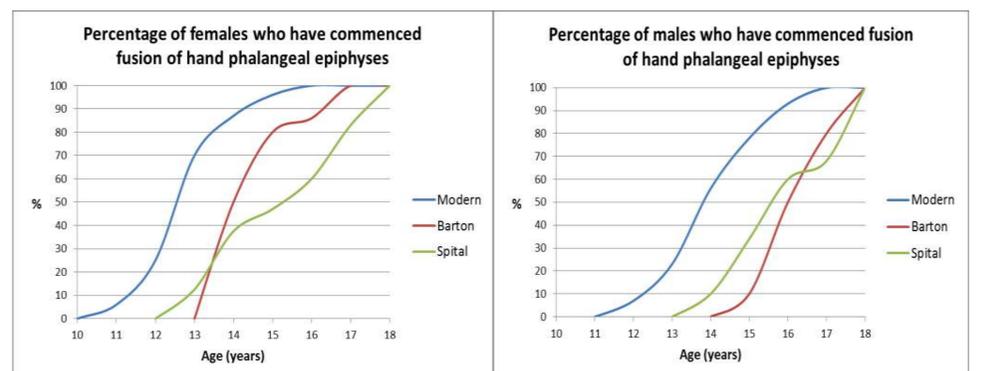
- Chertkow S. 1980. Tooth mineralization as an indicator of the pubertal growth spurt. *Am. J. Orthod.* 77:79-91
- Grave KC, and Brown T. 1976. Skeletal ossification and the adolescent growth spurt. *Am. J. Orthod.* 69:611-619
- Frisancho AR, Garin SM, and Rohmann CG. 1969. Age at menarche: a new method of prediction and retrospective assessment based on hand x-rays. *Hum. Biol.* 41:42-50
- Buehl CC, Pyle SI. 1942. The use of age at first appearance of three ossification centers in determining the skeletal status of children. *J. Pediatr.* 21:335-342
- Hägg U, Taranger J. 1982. Maturation indicators and the pubertal growth spurt. *Am J Orthod* 82:299-309
- Schutkowski H. 1993. Sex determination of infant and juvenile skeletons. I. Morphological features. *Am J Phys Anthropol* 90:199-205
- Rogers TL. 2009. Sex determination of adolescent skeletons using the distal humerus. *Am J Phys Anthropol* 140:143-148

Results

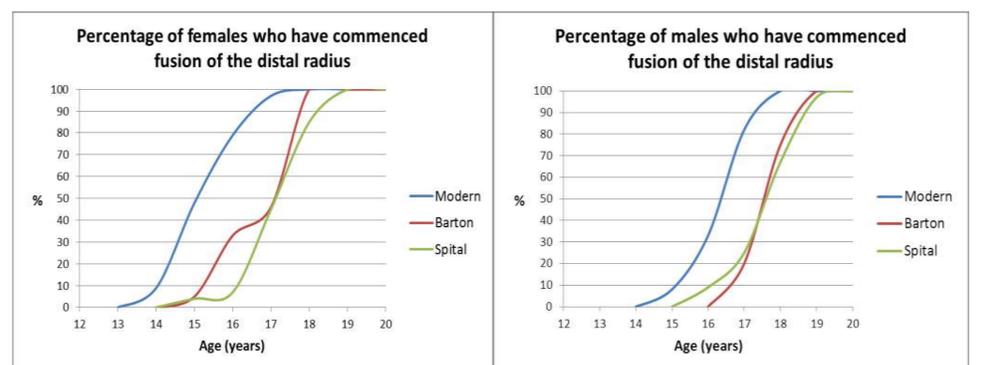
- The canine and hamate data suggest that the majority of individuals at both sites entered the growth spurt at 10-11 years old, a similar age to modern adolescents, although this stage was achieved by fewer 10 year olds at St Mary Spital.



- The hand phalangeal data suggest that PHV was being delayed at both sites in comparison with modern standards, particularly for females at St Mary Spital. This and the iliac crest data suggest that first menstruation occurred by 14-15 years for the majority of girls at Barton and by 16-17 years at St Mary Spital.



- The distal radius fusion data suggests that completion of the growth spurt was delayed for adolescents at both sites by around two years in comparison to modern western populations, most notably in the females at St Mary Spital.



Discussion and Conclusions

This analysis provides the first picture of pubertal development in Medieval England. In both populations studied, the onset of puberty appears to be occurring at a similar age to 20th century adolescents, but the later stages of puberty were significantly delayed. It appears that average age at menarche was higher than in modern populations, particularly at St Mary Spital. It seems likely that the progress of the pubertal growth spurt was being delayed by environmental factors such as poor nutrition, exposure to infection and physical labour.

Acknowledgements

- The authors would like to thank the Leverhulme Trust for funding this research.
- Thanks to Kevin Booth and English Heritage for facilitating access to the Barton remains, and to Rebecca Redfern and the Museum of London for facilitating access to the St Mary Spital remains.

Contact information

- Email: f.c.shapland@reading.ac.uk
- www.reading.ac.uk/research/Projects/arch-ML-adolescence-medieval-england.aspx