G44 The London Atlas — A New Method for Dental Age Estimation

Sakher J. AlQahtani, PhD, King Saud University, College of Dentistry, Riyadh 11451, SAUDI ARABIA; Mark Hector, PhD, Administration Office, Dental School, Park Place, Dundee DD1 4HR, UNITED KINGDOM; and Helen M. Liversidge, PhD, Queen Mary University of London, School of Dentistry, New Road, London E1 2AT, UNITED KINGDOM*

The goal of this presentation is to present a new method of dental age estimation and evaluate how it performs in comparison to other methods.

This presentation will impact the forensic science community by presenting a new method which has an electronic version that will revolutionize dental age estimation.

The purpose of this research was to develop a comprehensive, validated, evidence-based, practical, user-friendly atlas of dental age estimation and compare its performance with two widely used atlases.

Diagrams representing ages from 28 weeks *in utero* to 23 years were developed in The London Atlas based on the radiographic appearance of tooth development in 528 individuals aged 2-23 years and 176 neonates using the median stage of tooth development for each tooth in each age category/chronological year.[1]

Accuracy was determined by ageing skeletal remains/radiographs of 1,514 individuals (aged 32 weeks *in utero* to 23 years) using The London Atlas (LA), the Schour and Massler (SM) atlas, and the Ubelaker (Ub) atlas.[1-3] Estimated age was compared to real age. Bias, absolute mean difference, and proportion of individuals correctly assigned by age were calculated. Intra-observer variation (Kappa) was measured by re-assessment of 130 radiographs.

To test the application of The London Atlas, a questionnaire was used to validate its use. Ninety third-year dental students were divided randomly into three subgroups; the researcher's identity was unknown to the students. Each group used one of the three atlases to estimate the radiographic age of six individuals and complete the questionnaire.

Excellent reproducibility was observed for all three atlases (Kappa: LA 0.879; SM 0.838; and, Ub 0.857). LA showed no bias (P=0.720) and correctly estimated 53% of the cases. SM and Ub showed significant bias by consistently underestimating age (P=0.026 and P=0.002, respectively) with 35% and 36% correctly estimated for SM and Ub, respectively. The mean absolute difference for LA (0.72 years) was smaller than SM (1.15 years) and Ub (1.17 years).[4] LA was preferred over the other two atlases in all quality measures tested (clarity, design, simplicity, and self-explanation)

In conclusion, The London Atlas represents a substantial improvement over existing atlases facilitating accurate age estimation from developing teeth. Development of interactive online and mobile app versions is complete.

References:

1. AlQahtani S.J., Liversidge H.M., Hector M.P. (2010). Atlas of tooth development and eruption. *American Journal of Physical Anthropology*;142(3):481-90
2. Schour L. and Massler M. (1941). "The development of the human dentition." *Journal of the American Dental Association* 28
3. Ubelaker, D.H. (1978). Human skeletal remains: Excavation, analysis, interpretation. Chicago, Aldine Publishing Co. Inc.
4. AlQahtani, S.J., Hector, M.P., and Liversidge, H.M. (2014), Accuracy of dental age estimation charts: Schour and Massler, Ubelaker and the London Atlas. *Am. J. Phys. Anthropol.*, 154: 70–78. doi: 10.1002/ajpa.22473

Age, Estimation, Dental