G35 A Comparison of Dental Age Estimations From Two Radiographic Methods of Metric Analysis in North Indian Young Adults

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Learning Overview: After attending this presentation, attendees will better understand the comparison between the efficiency and accuracy of two methods for age estimation based on the same factor/principle but with different forms of measurement of the pulp chamber area. This presentation will also apprise attendees of the population-specific variations present in the reduction of the pulp chamber with age.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by exploring the variations in the deposition of secondary dentine, believed to be genetic-based and population-specific. This would also encourage scientists to formulate a standard formula/method suitable for all populations, which is a need of the hour due to the admixture of races and globalization.

Age estimation is one of the important components of the biological profile of an individual. Numerous dental age estimation methods have been suggested by different researchers, based either on gross tooth specimens or the radiographs of the deciduous or permanent teeth, either fitted in the jaw sockets or dislodged ones. Radiological analysis is a non-invasive technique that has played a very crucial role in forensic age estimations of both living and dead individuals required for various purposes. The radiographic method has its own advantages, being less time consuming, non-destructive in nature, and providing precise estimates. Forensic age estimation is no longer limited to the identification of the dead or skeletonized remains, but has been commonly warranted by law enforcement agencies for age estimation of even living individuals in cases such as age-related frauds, crimes to avail certain social or legal benefits, etc. Teeth are the ideal evidence in most of such forensic scenarios due to their slow rate of decomposition and higher resistance to morphological or taphonomic degradations compared to other osseous parts of human body.[1] They are the reservoirs of biological information of the individuals, being least affected by external factors. Radiographical assessment of teeth, a non-invasive technique, further augments their significance for age evaluation in the living individuals as well.[2] Estimating age in children is an easier task since the development stages follow more or less a definite pattern, unlike adults, whose teeth undergo degenerative changes at a much slower rate than the formation stage and depict wide variations due to environmental, nutritional, and genetic factors.

This present study is based on radiographic quantification of the intrinsic changes occurring in the teeth in the form of deposition of secondary dentin in the pulp chamber with advancing age, thus leading to area reduction in the latter.[3] Such variations in pulp width is measured using two radio-metric methods, namely the Tooth Coronal Index (TCI) and Pulp Chamber Tooth Height Ratio (PCTHR). Most of the studies conducted for estimating age using these methods have indicated the need for population-specific standards for more accuracy.[4,5] This study proposes estimating the age of 300 adults (aged 21 to 50 years) belonging to a North Indian population, comprised of individuals belonging to Himachal Pradesh, Punjab, Haryana, and Chandigarh. No such study has been conducted on this population, per research.

The digital panoramic radiographs of the subjects were collected after their written informed consent and ethical clearance from Institutional Ethics Committee of the Government Medical College and Hospital (GMCH), Chandigarh. Collected images were analyzed using ImageJ software. The goal of the present study is to compare the validity and precision of the above-mentioned two radiographic methods in estimating the age of North Indian individuals. The preliminary results based on 102 samples indicated the error range of the TCI and PCTHR methods in age estimation as ±5 and ±6 years, respectively. The conclusive analysis of the present study is underway and the results and their interpretations, along with the comparative efficiency of these two dental age estimation methods, will be presented.

Reference(s):

1. Shekhawat K.S., Chauhan A. Analysis of dental hard tissues exposed to high temperatures for forensic applications: An in-vitro study. *J Forensic Dent Sci* 2016; 8(2): 90-94.
2. Zhai Y., Park H., Han J., Wang H., Ji F., Tao J. Dental age assessment in a Northern Chinese population. *Journal of Forensic and Legal Medicine* 2016; 38:43-49.
3. Jain S., Nagi R., Daga M., Shandilya A., Shukla A., Parakh A., et al. Tooth coronal index and pulp/tooth ratio in dental age estimation on digital panoramic radiographs—A comparative study. *Forensic Sci. Int.* 2017; 277:115-121.
4. Kumar N.N., Panchaksharappa M.G., Annigeri R.G. Digitized morphometric analysis of dental pulp of permanent mandibular second molar for age estimation of Davangere population. *Journal of Forensic and Legal Medicine* 2016; 39:85-90.
5. Mehta S., Urala A.,. Vineetha R., Mehta A., Lodha S. Assessment of age with mandibular first molar: An orthopantogram study. *Dental and Medical Problems* 2017; 54(2):179-182.

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