REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 24, No. 4 (2023)
http://www.veterinaria.org
Article Received: Revised: Accepted:

Morphological Analysis Of The Lower Second Premolar For Age Estimation Of South Indian Adult Population Using Digital Orthopantomogram.

Arun kishore[1*], Dr. Dinesh Kumar[2]

[1*]Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical science, Saveetha University, Chennai- 600077.
[2]Senior lecturer Department of pedodontitcs, Saveetha Dental College and Hospitals, Saveetha Institute Of Medical And Technical Science Chennai, India

***Corresponding Author:** Dr. Dinesh Kumar
*Senior lecturer Department of pedodontitcs, Saveetha Dental College and Hospitals, Saveetha Institute Of Medical And Technical Science Chennai, India

ABSTRACT:
Introduction: A panoramic radiograph: a wide view of upper and lower jaw of the denal X-ray. This provides a dual-dimensional from one side of the ear to the other side of the ear. The scan offers various specific details on positioning of the impacted teeth, assessment and treatment planning for various periodontal treatments , orthodontic diagnosis and assessment, jaw damage and various causes of orofacial pain. The aim of the research is to morphologically analyse the lower second premolar among south indian population for age estimation using orthopantomogram.
Materials and Methods: In this research 2000 orthopantomogram of both the sexes varying from age 18 to 75 are taken . The OPG images are zoomed using adobe photoshop and is used to measure the lower second premolar area and is pulp area separately with the help of histogram the pixels of lower second premolar and pulp are obtained . Using the obtained information the statistics and results are tabulated
Result and Discussion: From the analysed digital orthopantomogram by measuring the pulp/root ration using adobe photoshop. From this method we can say the age difference in the lower second premolar.
Conclusion:From the research, it was evident that by using the pulp/root ration of the digital orthopantomogram we can find the estimated age of the tooth.

Keywords: age estimation, orthopantomogram, radiography, south indian population

INTRODUCTION:

A panoramic radiograph is a wide view of the upper and lower jaw of the denal X-ray. This provides a dual-dimensional from one side of the ear to the other side of the ear. The scan offers various specific details on positioning of the impacted teeth, assessment and treatment planning for various periodontal treatments , orthodontic diagnosis and assessment, jaw damage and various causes of orofacial pain. This technique was discovered by Neha Sharma . The main benefits of OPG is that it is painless, fast and easy and mainly there is no radiant or radiation left in the body after an OPG. The disadvantages are that if the patient is pregnant there is a small chance of injury that may develop in the developing baby and in the long run if being exposed very often to the radiation there is a chance of developing cancer in certain areas. Estimation of age,sex and other factors is one of the most significant characteristics in forensics and archaeology departments[1,2]. The previous study articles focus on estimating the age using the pulpal ratio as the age becomes greater .Finding the ratio of pulp using OPG radiographs has the potential as a useful instrument for assessing an adult population their age.

Methodologies of age estimation using tooth were built into an important tool for the detection of identities in the forensic science department[7]. Since teeth can be conserved the over a long span of time as opposed to any other tissues changes in age were used as markers used to measure human age. Using dental X-rays to estimate the age of adults, whether living or deceased, can be a helpful non-invasive tool in forensics and archaeology. However, to ensure the method is reliable, it needs to be tested on a separate sample that wasn't used during its initial development. Testing on an independent sample helps verify the method's accuracy and prevents it from being too tailored to the original dataset, which could lead to misleading results in real-life applications. In practice, researchers would collect a new set of radiographs, apply the age estimation technique, and compare the results with the actual known ages. This process helps confirm the method's effectiveness and accuracy. A few creators have applied the mash/tooth territory proportion technique to different populaces. Despite the fact that a similar technique was utilized in various populaces, it could deliver various outcomes for each, which implies that the materialism of every technique changes by population[9][10].

REDVET - Revista electrónica de Veterinaria - ISSN 1695-7504
Vol 24, No. 4 (2023)
http://www.veterinaria.org
Article Received: Revised: Accepted:

The age assessment ways are comparatively straightforward and this involves different stages of identification on photography pictures and mineralization status subsequently their comparison with the quality to find the approximate age vary.
In this current research on the age estimation using orthopantomogram we are going to use doing the ration of the pulp and root [pulpal/root ratio][16,17] .The advantage of this study is it easy interpretation and the disadvantage is that we are doing it in a homogenous population.

MATERIALS AND METHOD:
The research was done with 2000 digital orthopantomograms of both the sexs among south indian population in combined taken as a part of diagnostic procedure, showing the permanent teeth. Chronological age became recorded from the patient's birth certificate and knowledgeable consent changed into taken from the patient/ parent. Clearance from the Ethical committee was received. Radiographic assessment was finished using the program which is utilized for the assortment of productive X-ray pictures and is protected and it improves the outcomes provided alongside the framework and age estimation was finished using two procedures - Cameriere's and Drusini systems.

RESULT:

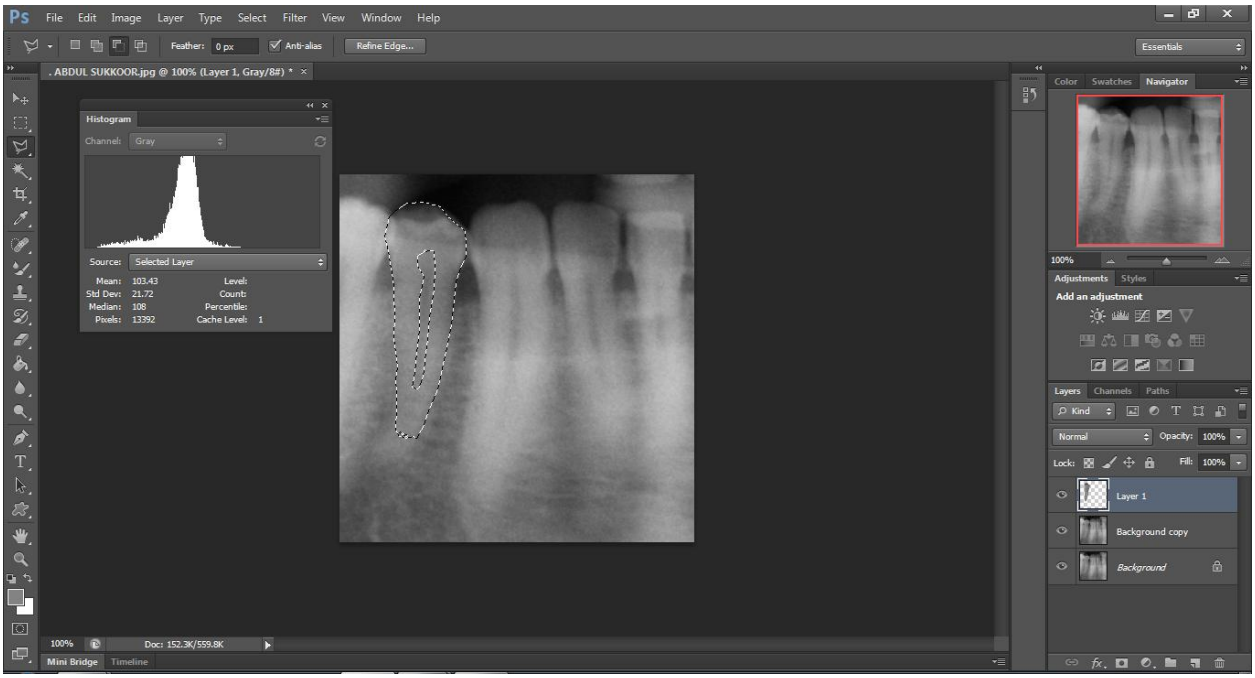

Figure 1

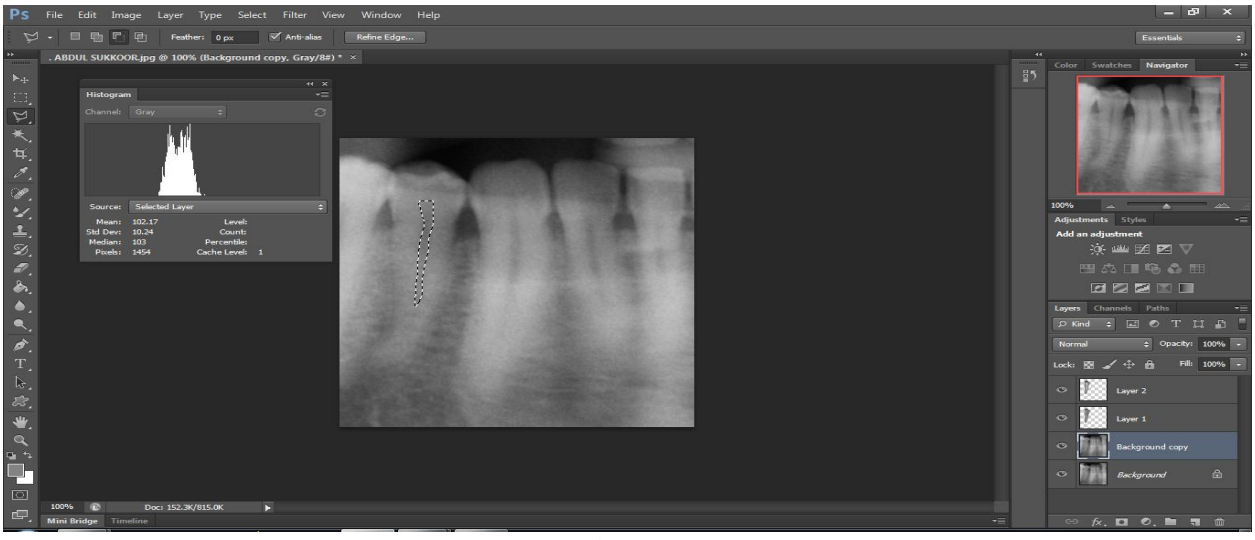

Figure 2

In Figure 1 and Figure 2 the area of the premolar is being measured by using adobe photoshop and is used to measure the lower second premolar area and its pulp area separately.

DISCUSSION:

The analytical methodology used for the measurements Process used by Cameriere et al. Following Cameriere 's process the entire tooth pulp and tooth areas were Calculated. Additionally, the crown and apical sections of the pulp of the tooth have been measured separately. The line is being marked on the medial junction of the CEJ , the top part is the crown and the bottom part is the root . The ratio of crown part and the root part of the tooth is measured in area and the age assessment was done effectively in finding the age with the Cameriere method the outcome was not specific but it is very relatable and close to the exact outcome of estimated age.

In one of the similar previous article the age was estimated using atlas approach which is a use of radiological graphs which approach the morphological distinct stages of mineralisation in teeth and it gives a more accurate outcome with the estimated age and this method is mainly used to find the estimated age of a young adolescent and would be difficult to estimate the age of a adult and using orthopantomogram the estimated age can be found accurate as that of the atlas approach so when we compare both the research work the both are similar[20,21]. Another similar study in finding the estimated age using morphological technique in adults in this method is mainly based on the degenerative changes seen in tooth due to attrition, amount of secondary formed dentin, apposition of dentine and amount of apical resorption in this mainly Demirijian's technique is used when compared our research work using digital orthopantogram is more precise than morphological technique because attrition, secondary formed dentin are same in all cases and it is not as precise as using digital orthopantomogram[22]. When compared using digital orthopantomogram with other techniques it is a good and easy technique and other technique have their own advantages.

The need for adult age estimation has grown across various fields, including forensics and archaeology, especially when it comes to identifying unidentified individuals. As a result, there's a growing need for age assessing methods that are eco friendly , reliable, and simple. Secondary dentin formation in the teeth of adults is a useful indicator for estimating age through dental radiography. Using dental radiology techniques for age estimation can fulfill this need, particularly while other methods like extracting isn't possible. Lower premolars are often used in these studies because they are single-rooted, and their pulp cavities are large enough to make analysis easier in radiographic images.
Compared to periapical radiography, panoramic radiography has remarkably low resolution. Thus, this graphic modality will also have blurred tooth or pulp contour. The key explanation why identifying ideal radiographs in the older age group seemed so difficult was that there can be at least one lower premolar present[27,28] .The mandibular premolars were selected as samples because they are single rooted in nature , and their pulp size is sufficiently broad to enable thorough analysis in radiographic images, area measurements of the crown and apical sections and tooth as a whole was studied on how they correlated with age. However, panoramic radiographs produce more consistent images than periapical radiographs, which can show magnification differences depending on the angle of the image.

CONCLUSION :

From the survey we can assess that Using panoramic radiography, the pulp/tooth area ratio showed promising efficient technique for assessing age and helps to identify morphological changes in tooth due to age estimation among the south indian population.

REFERENCE:

1. Sperber N. A simple technique for age estimation in adult corpses: the two criteria dental method. J Forensic Sci. 1993 Jul;38(4):763–4.
2. Eckert WG, Garland N. The history of the forensic applications in radiology. Am J Forensic Med Pathol. 1984 Mar;5(1):53–6.
3. Lee J-H, Lee C, Battulga B, Na JY, Hwang JJ, Kim YH, et al. Morphological analysis of the lower second premolar for age estimation of Korean adults. Forensic Sci Int. 2017 Dec;281:186.e1–186.e6.
4. Philippas GG. Influence of Occlusal Wear and Age on Formation of Dentin and Size of Pulp Chamber [Internet]. Vol. 40, Journal of Dental Research. 1961. p. 1186–98. Available from: http://dx.doi.org/10.1177/00220345610400061301
5. Panchbhai AS. Dental radiographic indicators, a key to age estimation. Dentomaxillofac Radiol. 2011 May;40(4):199–212.
6. Nik-Hussein NN, Kee KM, Gan P. Validity of Demirjian and Willems methods for dental age estimation for Malaysian children aged 5-15 years old. Forensic Sci Int. 2011 Jan 30;204(1-3):208.e1–6.
7. Bang G, Ramm E. Determination of age in humans from root dentin transparency. Acta Odontol Scand. 1970 Mar;28(1):3–35.
8. Solheim T. A new method for dental age estimation in adults [Internet]. Vol. 59, Forensic Science International. 1993. p. 137–47. Available from: http://dx.doi.org/10.1016/0379-0738(93)90152-z

9. Yang F, Jacobs R, Willems G. Dental age estimation through volume matching of teeth imaged by cone-beam CT. Forensic Sci Int. 2006 May 15;159 Suppl 1:S78–83.
10. Mohammed R, Krishnamraju PV, Prasanth PS, Sanghvi P, Reddy ML, Jyotsna S. Dental age estimation using Willems method: A digital orthopantomographic study [Internet]. Vol. 5, Contemporary Clinical Dentistry. 2014. p. 371. Available from: http://dx.doi.org/10.4103/0976-237x.137954
11. Nykänen R, Espeland L, Kvaal SI, Krogstad O. Validity of the Demirjian method for dental age estimation when applied to Norwegian children. Acta Odontol Scand. 1998 Aug;56(4):238–44.
12. Maber M, Liversidge HM, Hector MP. Accuracy of age estimation of radiographic methods using developing teeth. Forensic Sci Int. 2006 May 15;159 Suppl 1:S68–73.
13. Comparison of the Applicability of Demirjian and Willems Methods for Dental Age Estimation in Children from the Thrace Region, Turkey. 2018.
14. Murray PE, Stanley HR, Matthews JB, Sloan AJ, Smith AJ. Age-related odontometric changes of human teeth. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2002 Apr;93(4):474–82.
15. Zaher JF, Fawzy IA, Habib SR, Ali MM. Age estimation from pulp/tooth area ratio in maxillary incisors among Egyptians using dental radiographic images [Internet]. Vol. 18, Journal of Forensic and Legal Medicine. 2011. p. 62–5. Available from: http://dx.doi.org/10.1016/j.jflm.2010.12.004
16. Mahmoued T. Application of Coronal Pulp Cavity Index for Age Estimation among Adult Egyptians. GRIN Verlag; 2013. 15 p.
17. Gustafson G, Odont Malmö D. Age Determinations on Teeth [Internet]. Vol. 41, The Journal of the American Dental Association. 1950. p. 45–54. Available from: http://dx.doi.org/10.14219/jada.archive.1950.0132
18. Kumar NN, Panchaksharappa MG, Annigeri RG. Digitized morphometric analysis of dental pulp of permanent mandibular second molar for age estimation of Davangere population [Internet]. Vol. 39, Journal of Forensic and Legal Medicine. 2016. p. 85–90. Available from: http://dx.doi.org/10.1016/j.jflm.2016.01.019
19. Solheim T, Vonen A. Dental age estimation, quality assurance and age estimation of asylum seekers in Norway. Forensic Sci Int. 2006 May 15;159 Suppl 1:S56–60.
20. Kurita LM, Menezes AV, Casanova MS, Haiter-Neto F. Dental maturity as an indicator of chronological age: radiographic assessment of dental age in a brazilian population [Internet]. Vol. 15, Journal of Applied Oral Science. 2007. p. 99–104. Available from: http://dx.doi.org/10.1590/s1678-77572007000200005
21. Drusini AG. The Coronal Pulp Cavity Index: A Forensic Tool for Age Determination in Human Adults [Internet]. Cuadernos de Medicina Forense. 2008. Available from: http://dx.doi.org/10.4321/s1135-76062008000300006
22. Cruz-Landeira A, Linares-Argote J, Martínez-Rodríguez M, Rodríguez-Calvo MS, Otero XL, Concheiro L. Dental age estimation in Spanish and Venezuelan children. Comparison of Demirjian and Chaillet's scores [Internet]. Vol. 124, International Journal of Legal Medicine. 2010. p. 105–12. Available from: http://dx.doi.org/10.1007/s00414-009-0380-5
23. Mincer HH, Harris EF, Berryman HE. The A.B.F.O. Study of Third Molar Development and Its Use as an Estimator of Chronological Age [Internet]. Vol. 38, Journal of Forensic Sciences. 1993. p. 13418J. Available from: http://dx.doi.org/10.1520/jfs13418j
24. Babshet M, Acharya AB, Naikmasur VG. Age estimation from pulp/tooth area ratio (PTR) in an Indian sample: A preliminary comparison of three mandibular teeth used alone and in combination [Internet]. Vol. 18, Journal of Forensic and Legal Medicine. 2011. p. 350–4. Available from: http://dx.doi.org/10.1016/j.jflm.2011.07.003
25. Cameriere R, Cunha E, Wasterlain SN, De Luca S, Sassaroli E, Pagliara F, et al. Age estimation by pulp/tooth ratio in lateral and central incisors by peri-apical X-ray [Internet]. Vol. 20, Journal of Forensic and Legal Medicine. 2013. p. 530–6. Available from: http://dx.doi.org/10.1016/j.jflm.2013.02.012
26. Kvaal SI, Kolltveit KM, Thomsen IO, Solheim T. Age estimation of adults from dental radiographs [Internet]. Vol. 74, Forensic Science International. 1995. p. 175–85. Available from: http://dx.doi.org/10.1016/0379-0738(95)01760-g
27. Lucy D, Pollard AM, Roberts CA. A Comparison of Three Dental Techniques for Estimating Age at Death in Humans [Internet]. Vol. 22, Journal of Archaeological Science. 1995. p. 417–28. Available from: http://dx.doi.org/10.1006/jasc.1995.0041
28. Jeevan MB, Kale AD, Angadi PV, Hallikerimath S. Age estimation by pulp/tooth area ratio in canines: Cameriere's method assessed in an Indian sample using radiovisiography [Internet]. Vol. 204, Forensic Science International. 2011. p. 209.e1–209.e5. Available from: http://dx.doi.org/10.1016/j.forsciint.2010.08.017
29. Page M, Taylor J, Blenkin M. Commentary on: De Luca S, Bautista J, Alemán I, Cameriere R. Age-at-death estimation by pulp/tooth area ratio in canines: study of a 20th-century Mexican sample of prisoners to test Cameriere's method. J Forensic Sci 2011;56(5):1302-9. J Forensic Sci. 2012 Mar;57(2):556; author reply 557–9.