DOI: https://doi.org/10.53350/pjmhs22169823

ORIGINAL ARTICLE

Accuracy of age Estimation Method Following the Length of Mandibular Body: A Cross-Sectional Study

MARVI SHAIKH[1], ABDUL JABBAR[2], SANA SHAH[3], SYEDA SADIA HASSAN[4], ALVINA ALI SHAIKH[5], HASSAN SHAHID[6]
[1]*Senior lecturer, Oral biology, Isra University Hyderabad*
[2]*Associate professor, Orthodontics, Liaquat university of medical and health sciences Jamshoro*
[3]*Liaquat university of medical and health sciences Jamshoro*
[4]*Associate professor and head of department Oral biology, Isra university Hyderabad*
[5]*Assistant Professor Oral Medicine, Isra University Hyderabad*
[6]*Professor Community Dentistry, Isra University Hyderabad*
Correspondence to: Marvi Shaikh, Email: marviishaikh@gmail.com

ABSTRACT

Objective: The aim is to identify the accuracy of age estimation following the mandibular body length by lateral cephalograms
Methodology: Mandibular body length was calculated using lateral cephalograms. 60 participants' lateral cephalograms were traced using the same view box. LMB was obtained by marking reference points on the most anteroinferior part of the mandible, specifically the gonion (Go), which is the constructed point at the intersection of the ramus plane and the mandibular plane, and the gnathion (Gn), which is the constructed point between the menton and the pogonion. With a ruler, the line drawn from Go to Gn was measured, and the results were recorded in millimeters. The results of the acquired values were statistically analyzed
Result: With all these parameters (P >0.9516 mandibular body length the findings obtained are of no important distinction between estimated age and real age. The duration of the mandibular body indicates less normal error test (i.e. 0.188) among these. Practical implication
Conclusion: mandibular body length was not statistically significant with the chronological age of the patient. The mandibular body length, however, is the highest parameter with the least standard error. Little difference was seen with LMB in this study, with a P value of 0.0490. The mean and standard deviation of the mean length of the mandibular body in males and females from lateral cephalogram showed insignificant results with the p-value.
Keywords: lateral cephalogram, Mandibular measurements, and Orthopantomograms.

INTRODUCTION

Human chronological or biological age does not indicate the actual phase of maturation of the body. The inherited, functional, environmental, dietary, metabolic, social, mental, and cultural factors influence growth. Dental age is a significant variable that should be considered while treating malocclusion or inappropriate facial development. Adopted children who have committed legal offences or are being treated under forensic circumstances can benefit from having their dental age determined as a means of determining their chronological age. However, chronological age alone is not sufficient to judge an expanding child's phase of growth. (1)

Early orthodontic therapy aims to rectify skeletal, dentoalveolar, and muscular imbalances that are present or developing to enhance the orofacial environment. When a myofunctional or orthopaedic appliance is required for therapy, determining the child's development status becomes even more crucial. The diagnosis, treatment planning, and assessment of the results of orthodontic treatment can all benefit from a prediction of remaining growth potential and the degree of craniofacial growth.

However, it is not a simple evaluation to estimate chronological age through the dental mineralization stage, and validity testing is essential. As genes play a more significant role in controlling dental calcification and development relative to environmental variables. Techniques based on tooth formation phases have disclosed that they are more suitable for age evaluation than those based on skeletal growth. Dental radiography is an easy and non-destructive method that is regularly used in age estimation techniques. In estimating the chronological age of sub-adults, maturation phases of growing third molars can be used. The development of both the mandibular body and the ramus is accompanied by notable remodeling processes, and both structures exhibit sexual dimorphism. (2) There are numerous radiographic methods available for dental calcification phases that can be assessed from periapical and orthopantomograms radiographs, while periapical and orthopantomograms, caries, and pathologies are more efficient than lateral cephalograms in dental clinics. This is a practical reason to try to evaluate tooth calcification skeletal maturity. (3, 4) During development, each bone undergoes a sequence of modifications that can be seen radiologically. The prediction of mandibular growth has been the subject of several publications. A formula was used to forecast the potential for mandibular development in Japanese girls based on the age of their cervical vertebrae. To forecast incremental mandibular length based on cervical vertebrae. The purpose of the study is to identify the accuracy of age estimation following the mandibular body length.

MATERIAL AND METHODS

Study design: We employed a cross-sectional study and the Non-probability Convenience sampling technique. The research was carried out in the Orthodontic Department's Outpatient Department, Institute of Dentistry LUMHS Jamshoro
Sample Size: The online epitols sample size calculator was used to calculate the sample size. According to the software the assumed population standard deviation is 1.51. 2 at a 95% confidence interval using 0.4 desired precision. The sample size calculated was 55. To make it round off, a total of 60 sample sizes will be considered.
Sample Selection Inclusion Criteria: Patients between the ages of 14-30 years, without any developmental anomalies, were included.
Data Collection Procedure: This research was approved by the hospital's ethical assessment commission. All respondents described the goals and methodology. All patients reporting orthodontic treatment meeting inclusion criteria were given informed and written permission. A total of 60 subjects—30 men and 30 women—who attended the orthodontics division of the dental department made up the sample for this study. Out of 30 subjects, 15 were under the age of 20 and 15 were above the age of 20 for each gender.

Lateral cephalograms were performed to determine the length of the mandibular body Using the same view box, the lateral cephalograms of sixty distinct patients were traced. The most anteroinferior portion of the mandible was marked with reference points to obtain LMB. These points were designated as the gonion (Go), which is the constructed point at the intersection of the ramus plane and the mandibular plane, and the gnathion (Gn), which is the constructed point between the menton and the pogonion. The length of the line that was drawn from Go to Gn was determined by using a ruler, and the results were expressed in millimeters. Statistics were applied to the findings to come up with the values.

Each parameter's age estimation algorithm was created using straightforward linear regression analysis. The generated equation was used to estimate age, which was then compared to chronological age determined by decoding the radiographs.

Data Analysis Procedure: The software SPSS 22 was used to analyze data collection. Quantitative factors like age and gender were given averages and standard deviations. Frequency and percentage calculations were made for qualitative variables such as the plaque index and gingival index. Age, gender, and periodontal characteristics, which have an influence modifier, were governed by stratification using Anova and an independent t-test to confirm the statistical distinction. Mandibular body length P > 0.9516. Mandibular body length exhibits the lowest normal error test among these (i.e., 0.188).

RESULTS

The chronological age of each individual was compared to the estimated age using these measurements of the various participants using a Students "t" test. The descriptive mean age of the patients was 19.06 4.76 years, with a minimum age of 12 years and a maximum age of 30 years (Table 1).

Table 1:

Mean	19.06
Standard deviation	4.7
Range	18
Minimum	12
Maximum	30

The mean and standard deviation of the mean length of the mandibular body in males and females from lateral cephalogram showed insignificant results with a p-value of 18.19 ± 0.0692 (Table 2).

Table 2: Gender-wise mean length of the mandibular body

Gender	Mean	N	Standard deviation
Male	18.5	30	1.2
Female	17.7	30	1.4
Total	18.1	60	0.06

Results for the mean and standard deviation of the Score DMJ Method in males and females from OPG were not statistically significant (p=11.82 ±2.99).

Table 3:

	n	Minimum	Maximum	Mean	Standard deviation
Length of the mandibular body	60 60	15.2	21.50	18.1	1.45

However, there was a small but significant difference in LMB (P = 0.0491).

Table 5:

Variables	Gender	Mean	Standard deviation	t	p
length of the mandibular body	Male Female	17.53 16.52	1.24	2.00	0.04

Table 6: Using the t-test, compare the overall length of the mandibular body in the male and female samples to the actual age and anticipated age.

Variable	Gender	N	Mean	SD	t	p
Total	Actual age Estimated age	60 60	18.1 18.1	3.98 1.64	0.0000	1.0000
Male	Actual age Estimated age	30 30	18.17 18.67	4.37 1.63	0.54	0.58
Female	Actual age Estimated age	30 30	18.20 17.72	3.61 1.62	0.64	0.518

There was no statistically significant difference between actual and estimated age as determined by LBM

DISCUSSION

A key element of any method of identification is age estimation, a branch of forensic science. Age estimation is important to distinguish between children and adults in criminal law cases, social benefits, employment, and marriage. In people between the ages of 15 and 23, it is still difficult to determine their chronological age. Indicators of skeletal development such as diaphysis-epiphysis fusion, handwriting analysis, cervical vertebrae maturation, amino acid racemization, pubic symphysis alterations, cranial bone fusion, or secondary sexual character changes are most often utilized in this age range. In a dentistry setting, dental radiography provides a simple and non-destructive way to determine the age. It is possible to positively identify a body by comparing radiographs taken before and after death. Identification of human remains may be greatly aided by antemortem orthopantomograms. For so many years, Nolla's method has been the technique of selection that describes the growth of the teeth in 10 stages. It has extra mineralization stages that prove to be more precise and reliable, making it the most suitable method. Growth and development are evaluated in various aspects. Because genetic and environmental variability is present, those based on the skeleton are not as accurate. (5)

When distinguishing between a child and an adult, dental growth is more accurate. Continued age overestimation may suggest that genetic and environmental factors can influence the growth of the tooth. At different parts in various parts of the world, tooth formation and particular developmental stages can be reached. Physiological age is based on different tissue systems being matured. To assess an individual's degree of physiological maturity, the development of morphological, skeletal, and secondary sexual character and dental formation can be evaluated together or separately. Biological sex is another cause of variation. In tooth formation, females are more advanced than males. Since 1982, radiography has been the simplest, quickest, and most affordable diagnostic tool used in routine dental checkups to view these stages. (6) Age lengthens the mandibular body, according to research. These factors can be used to estimate age in lateral cephalograms. Teeth, being nearly indestructible, are the best tool for determining age. In this study, the LMB was used to estimate age. Raghda(7) estimated age and used three mandibular parameters to determine sex, namely gonial angle, ramus height, and bigonial width. Age raises bigonial width and ramus height in the 2nd and 3rd decades, then decreases. The current investigation found no statistically significant gender difference. Annamalai's study on mandibular ramus measures to determine sex found a substantial difference between males and females. (8) By examining the radiological appearance of seven teeth on the left side of the jaw, Tanner's method of skeletal maturity was used to determine the maturity score. (3) Indicators of pubertal growth phase maturity can be found in the stages of tooth calcification from OPG, according to a study conducted by Krailassiri on Thai people between the ages of 7 and 19. (9) (10) (11) The development of the third molars occurs later than in other groups and has a linear age relationship in both sexes, with statistical analysis revealing a stronger link for males than females. Using a sample of children and young people from northern India, Rai investigated how the development of the third molar in the mandible correlated with chronological age and sexual orientation. (12) (13) In the current research, The descriptive mean age of the patients was 19.06 4.76 years, with a minimum age of 12 years and a maximum age of 30 years. The mean and standard deviation of mean length of mandibular body in male and female from lateral cephalogram showed the insignificant results with p-value 18.19 ± 0.0692. In this research little difference was observed with LMB with a P value of 0.0490.

CONCLUSION

Mandibular body length was not statistically significant with the chronological age of the patient. The mean and standard deviation of the mean length of the mandibular body in males and females from lateral cephalogram showed insignificant results with p-value The mandibular body length, however, is the highest parameter with the least standard error.

REFERENCES

1. Sachan K, Sharma VP, Tandon P. A correlative study of dental age and skeletal maturation. Indian Journal of Dental Research. 2011;22(6):882.
2. Kedarisetty SG, Rao GV, Rayapudi N, Korlepara R. Evaluation of skeletal and dental age using third molar calcification, condylar height, and length of the mandibular body. Journal of forensic dental sciences. 2015;7(2):121.
3. Demirjian A, Goldstein H, Tanner JM. A new system of dental age assessment. Human biology. 1973:211-27.
4. Priyadharshini KI, Idiculla JJ, Sivapathasundaram B, Mohanbabu V, Augustine D, Patil S. Age estimation using development of third molars in South Indian population: A radiological study. Journal of International Society of Preventive & Community Dentistry. 2015;5(Suppl 1):S32.
5. Kats O. Comparing Two Classification Methods of Third Molar Developmentt: University of Minnesota; 2018.
6. Patnana AK, Vabbalareddy RS, Vanga NRV. Evaluating the reliability of three different dental age estimation methods in Visakhapatnam children. International journal of clinical pediatric dentistry. 2014;7(3):186.
7. Al-Shamout R, Ammoush M, Alrbata R, Al-Habahbah A. Age and gender differences in gonial angle, ramus height and bigonial width in dentate subjects. Pakistan Oral & Dental Journal. 2012;32(1).
8. Indira AP, Markande A, David MP. Mandibular ramus: An indicator for sex determination-A digital radiographic study. Journal of forensic dental sciences. 2012;4(2):58.
9. Krailassiri S, Anuwongnukroh N, Dechkunakorn S. Relationships between dental calcification stages and skeletal maturity indicators in Thai individuals. The Angle Orthodontist. 2002;72(2):155-66.
10. Willems G, Van Olmen A, Spiessens B, Carels C. Dental age estimation in Belgian children: Demirjian's technique revisited. Journal of forensic science. 2001;46(4):893-5.
11. Sisman Y, Uysal T, Yagmur F, Ramoglu SI. Third-molar development in relation to chronologic age in Turkish children and young adults. The Angle Orthodontist. 2007;77(6):1040-5.
12. Rai B, Kaur J, Anand S. Mandibular third molar development staging to chronologic age and sex in north Indian children and young adults. J Forensic Odontostomatol. 2009;27(2):45-9.
13. Acharya AB. Age estimation in Indians using Demirjian's 8-teeth method. Journal of forensic sciences. 2011;56(1):124-7.