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ORIGINAL ARTICLE

Awareness on Age Estimation in Adults in Forensic Odontology among Dental Students

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ABSTRACT

Human identity relies heavily on determining a person's age. Age may be accurately estimated by using teeth that have characteristics such as hardness and resistance to external causes including chemicals, putrefaction, and fire explosions. In addition to dental operations, they exhibit peculiar and analogous characteristics of age-associated regressive changes, making them a mirror reflection of an individual's aging process from cradle to grave. Adult age assessment is a mystery to forensic dentists since the dentition is affected by several exogenous and endogenous factors that may lead to disparities between dental age and chronological age as age advances. Dental students in forensic odontology will be quizzed on their knowledge of how to estimate an adult's age. This survey had a successful completion rate of 100 dentistry students. Among the 10 questions in the survey are those about the age estimation method participants are most familiar with, the age estimation method calculated using formula 11.43+4.56(x), the method that used pulp size measurement to estimate the age, the key to optimal dental age estimation and the numerous factors that influence adult age estimation. SPSS version 23.0 was used to collect and analyze the data, and tables and pie charts illustrated the findings. Most participants were aware of gustafson's approach (58 percent), followed by the incremental line of cementum (24 percent), followed by amino acid racemization (90 percent), followed by dentin hypersensitivity (8 percent), and followed by the radiographic method of kvaal (1 percent). There is no statistical significance to the difference between p and 0.05. Due to its widespread use and high degree of accuracy, the gustafson method was chosen for this study. There was a fair amount of knowledge about age estimation procedures in forensic odontology among the adults. This survey aims to assess dental practitioners' understanding of adult age estimation methodologies and to raise awareness among them about the need of avoiding age estimation errors.

KEY WORDS: age estimation, adult dentitions, dentin translucency, and cementum annulations

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INTRODUCTION

Early attempts to use teeth as an indicator of a person's age were made in England. Until recently, height was employed to determine one's age [1]. For the first time, in 1837, the male monarch Saunders, who examined the teeth and heights of 1049 youngsters, presented evidence in parliament that teeth are a more trustworthy gauge of age than height [2].

The skeletal system and dentition, for example, undergo a sequence of changes as a child grows and matures [3]. Growth is a complex and dynamic process. The teeth are a reflection of these alterations. Unlike fingerprints, human dentition is a hard tissue analog that is unique to each individual. Typically, in order to determine the age of the deceased or the living, forensic odontologists are consulted. Estimating a person's age is critical when trying to identify the remains of people who died in accidents, crimes, or natural disasters. Age estimation is becoming more difficult due to the recent surge in migration around the world. Reconstruction and comparative identification relies on teeth because they are one of the most durable structures in the human body. Asylum, criminal, civil, and retirement benefit proceedings become relevant for living people who lack valid identifying documents (exiles and adoption cases) [4, 5].The

International and Interdisciplinary “Study Group on Forensic Age Diagnostics” was constituted in Berlin on March 10, 2000, with the aim to develop a consensus among scientists about the most appropriate methods to be used in specific situations, drawing up recommendations for age estimation and institutionalizing quality control in this area [6]. The aim of this survey is to find the Awareness on age estimation in adults in forensic odontology among dental students

MATERIAL AND METHODS

A survey of 122 students was conducted online to see how well they grasped the accuracy of age estimation in forensic odontology. A random sample of participants received the questionnaire via an internet platform. We administered a 10-question online questionnaire to our study participants using Google Forms. Questions about effectiveness were included in the questionnaire. The questionnaire's validity and reliability were confirmed by experts in the field. A pilot study with a lower sample size found the same results. One of the most important questions in the questionnaire was how participants estimate their own ages, as well as which age estimation method they are most familiar with, how age estimation is calculated using the formula 11.43+4.56(x), and what factors are considered when using gustafson's method to estimate a person's age. To assure the survey's credibility, standard processes were followed. To assess whether or not there was a substantial difference between variables, percentages and frequencies were analyzed. A p-value was assigned to the chi-square test. 05 is regarded as statistically significant.

Data Analytics Data was entered into a spreadsheet using Excel version 16.37 (Microsoft Corp, Redmond, Wash). The data tabulation in Excel was according to S.no and effectiveness based questions in age estimation of adults in forensic odontology. The data which was collected was analyzed using Statistical Package for Social sciences (SPSS) software, version 1.0.0.1347 64 bit (IBM Corp., NY, USA). The data were assessed by being subjected to descriptive analysis with the help of frequencies, percentages, means. The data was represented by the means of bar graphs. A Chi-square test was used and results were correlated and associated.

INCLUSION CRITERIA: Gustafsons method, Incremental line of cementum, amino acid racemization, dentin hypersensitivity, demirjian's method.

EXCLUSION CRITERIA: Non dental professionals, Incomplete data

RESULT

The findings of a poll of dental school students are as follows:. Gustafson's approach (58 percent), followed by the incremental line of cementum (24 percent), followed by amino acid racemization (90 percent), followed by dentin hypersensitivity (8 percent), and followed by the radiographic method of kvaal (1%). Gustafson's technique was selected by 58.9% of participants, followed by Demirjian's method (35.3%) and then maples and race method (6.06 percent). Kvaal and companions (58.5% of participants) is the most popular choice, followed by kagerer and grupe (25.2%) and bang and kamm (also a popular choice) (16.1 percent).

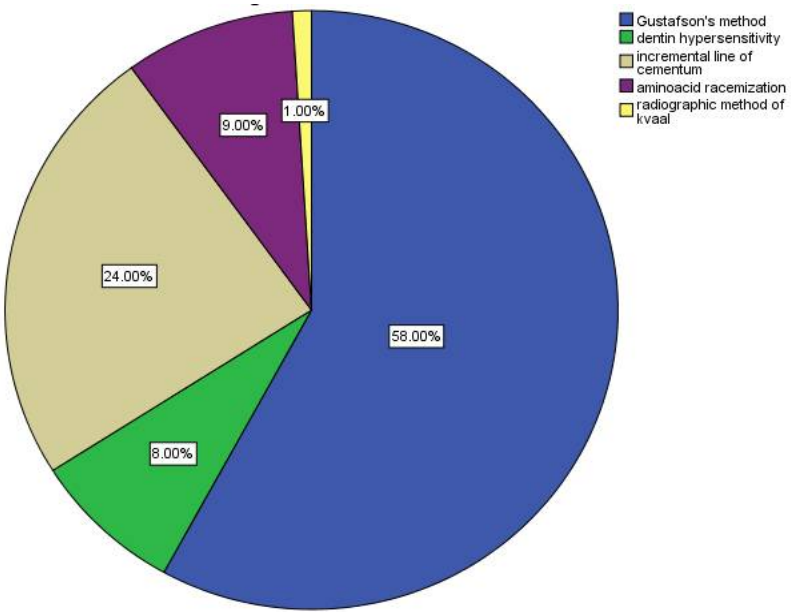

FIGURE 1- This pie chart shows the percentage of participants who are most familiar with each medium of communication. Gustafson's approach is represented by blue, dentin hypersensitivity by green, incremental cementum lines are represented by peach, amino acid racemization is represented by violet, and kvaal radiography method is represented by yellow. 58 percent of those polled were familiar with the gustafson method, whereas 24 percent were familiar with the incremental cementum line, 9 percent with amino acid racemization, 8 percent with dentin hypersensitivity, and 1 percent with the radiographic Kvaal method.

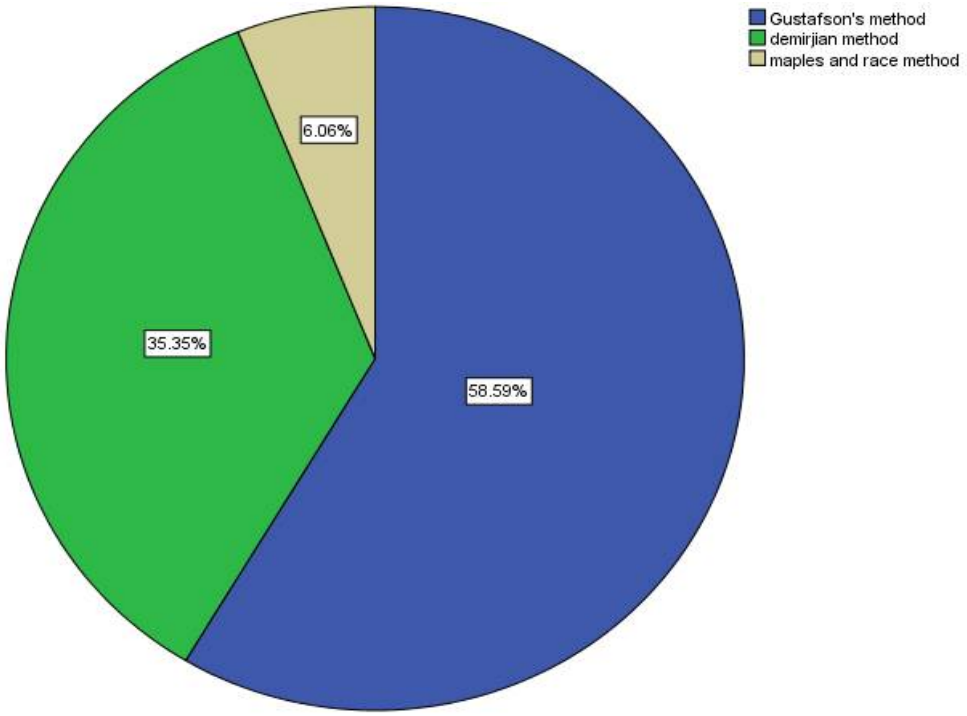

FIGURE 2:The above graph represents the participants awareness on age estimation method done using the formula 11.43+4.56(x).Blue colour represents Gustafson's method, green colour represents demirjian method and peach colour represents maples and race method. Majority of the participants said it was gustafson's method(58.9%),followed by demirjian's method (35.3%) and followed by maples and race method(6.06%)

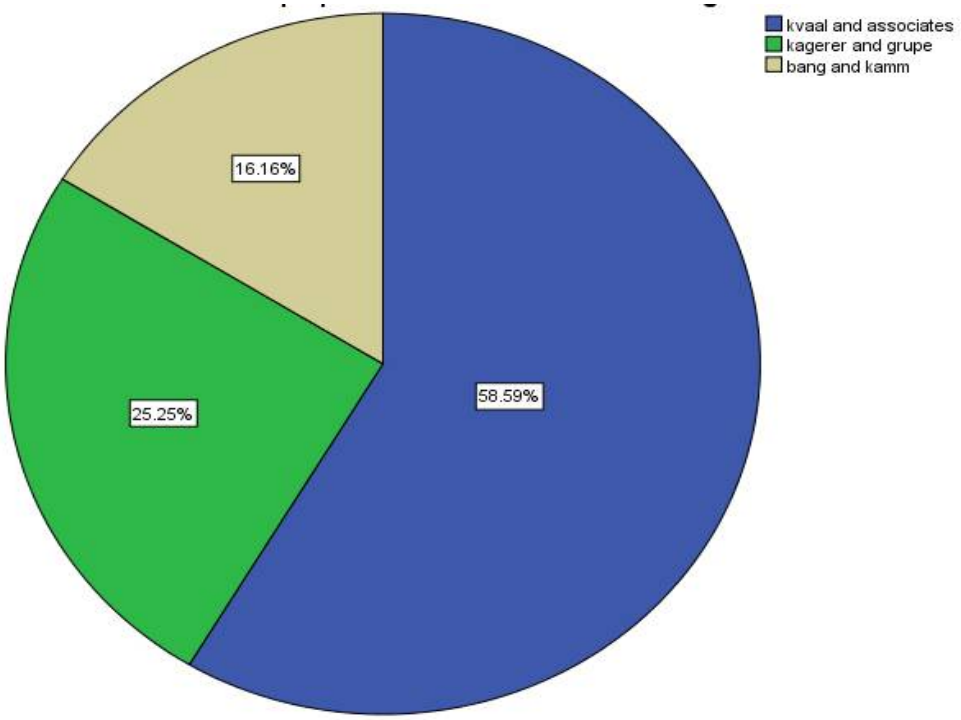

FIGURE 3: Using this graph, you can see the relationship between pulp size and age. kvaal and companions are represented by the color blue; kagerer and grupe are represented by the color green; bang and kamm are represented by the color peach. Most participants chose kvaal and colleagues (58.5%), followed by kagerer and group (25.2%), and then bang and kamm (10.1%). (16.1 percent)

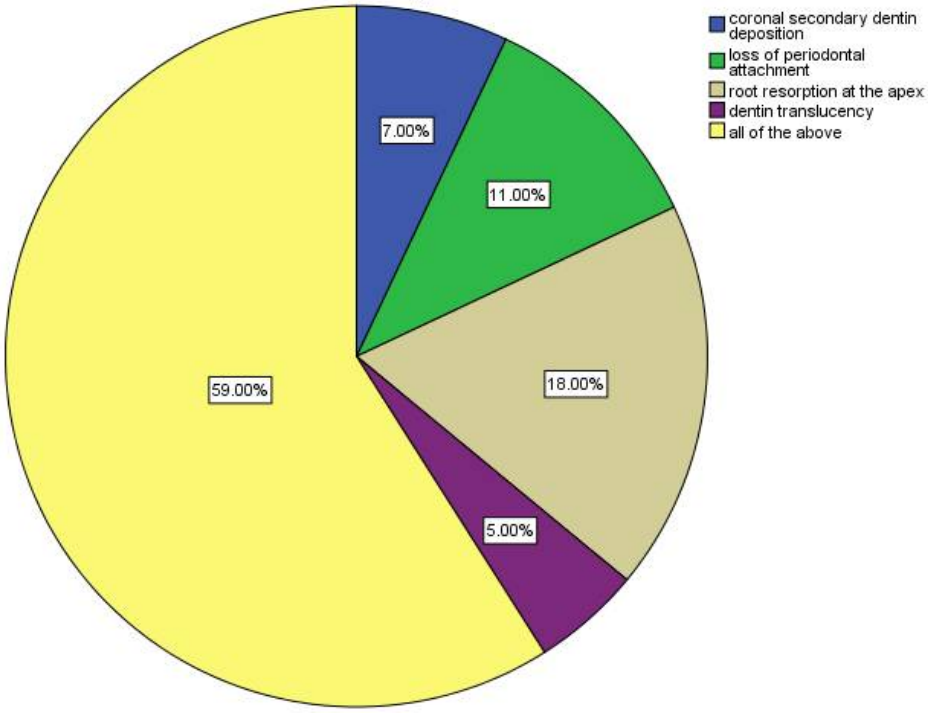

FIGURE 4:This graph represents factors that influence gustafson's method. Blue colour represents coronal secondary dentin deposition, green colour represents loss of periodonatal attachment, peachcolour represents root resorption of the apex ,violet colour represents dentin translucency and yellow represents all of the above .most of the participants choose all of the above(59%),followed by root resorption at the apex(18%),followed by loss of periodontal attachment(11%),followed by coronal secondary dentin deposition(7%) and followed by dentin translucency(5%).

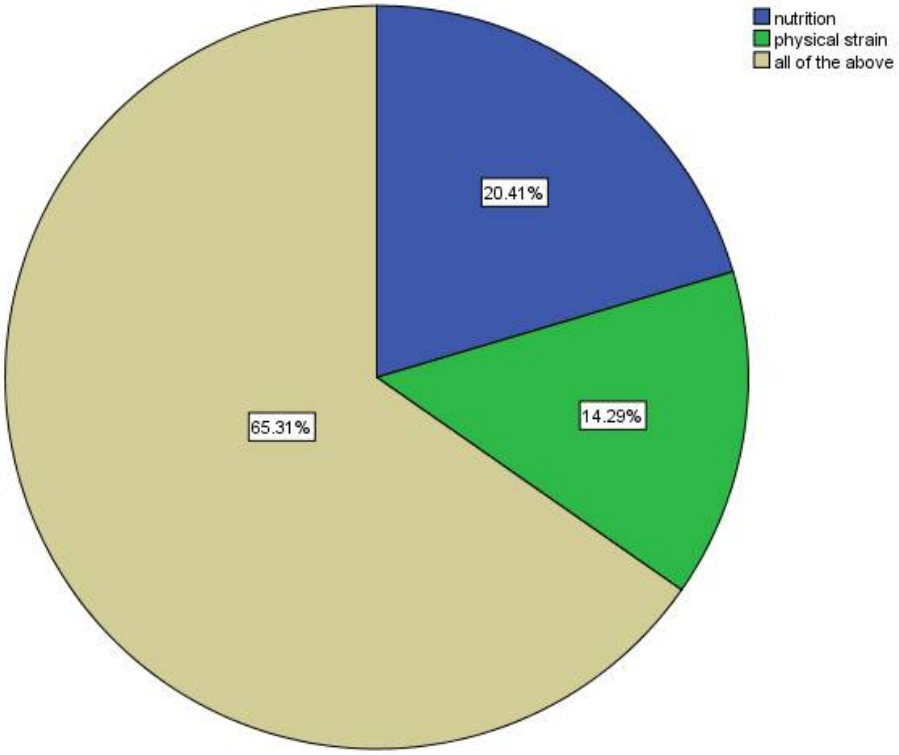

FIGURE 5:This graph represents factors influencing adult age estimation. Peach colour represents all of the above, Blue colour represents nutrition, green colour represents physical strain. Most of the participants choose all of the above(65.31%),followed by nutrition(20.41%) and followed by physical activity (14.2%).

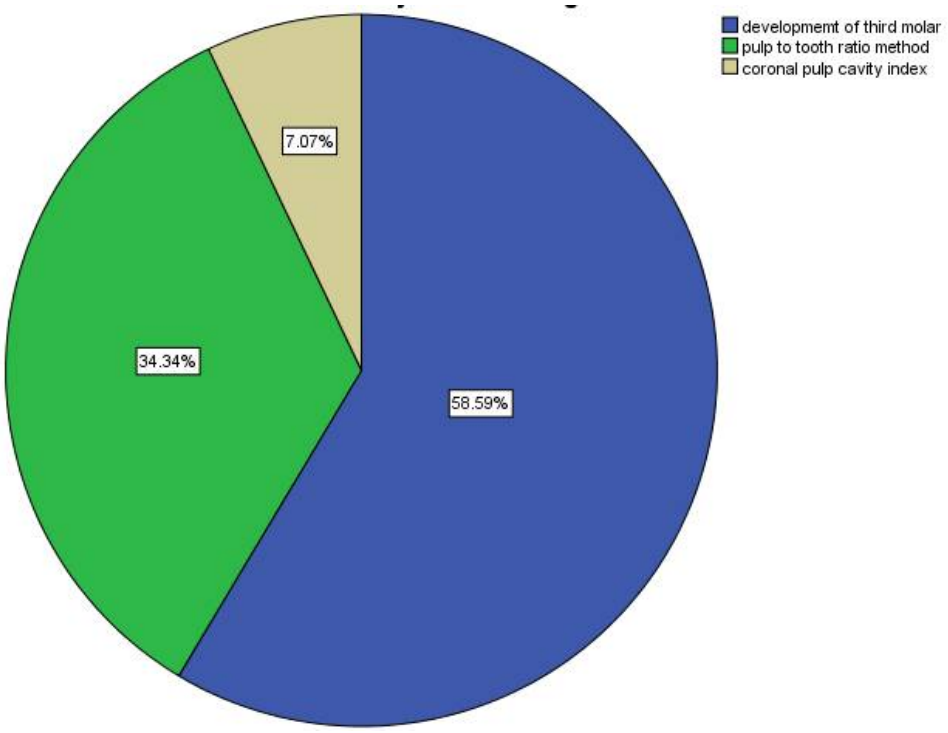

FIGURE 6:This above graph represents vanheerden system of adult age estimation's reason. Blue colour represents development of third molar, green colour represents pulp to tooth ratio method. Most of the participants choose development of third molar(58.5%), followed by pulp to tooth ratio(34.3%) and followed by coronal pulp cavity index(7.07%)

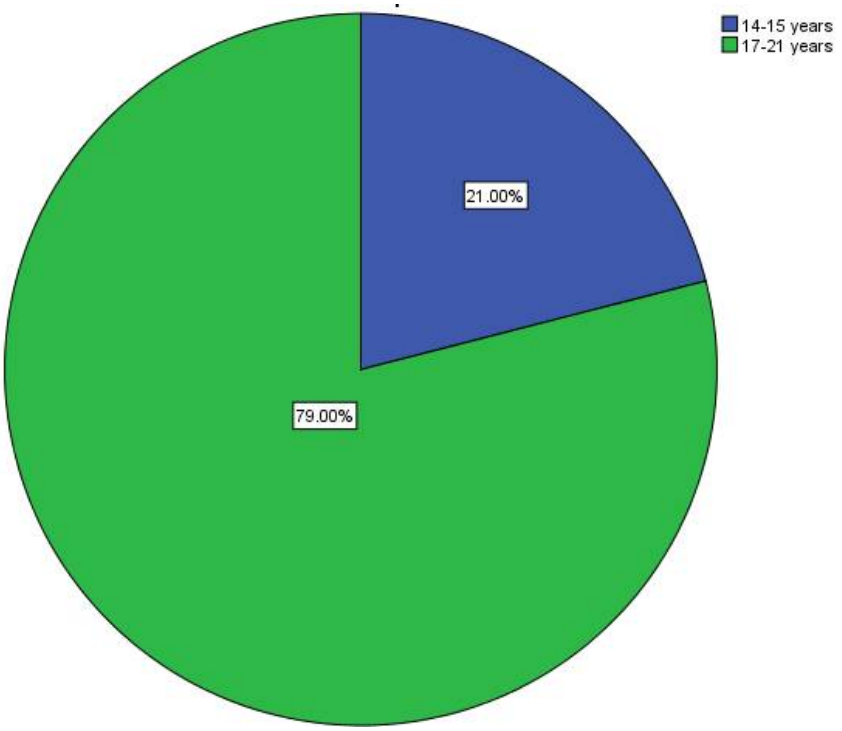

FIGURE 7:The above graph represents the eruption of the third molar tooth. Green colour represents 17-21 years and blue colour represents 14-15 years. most of the participants choose 17-21 years(79%) and followed by 14-15 years(21%)

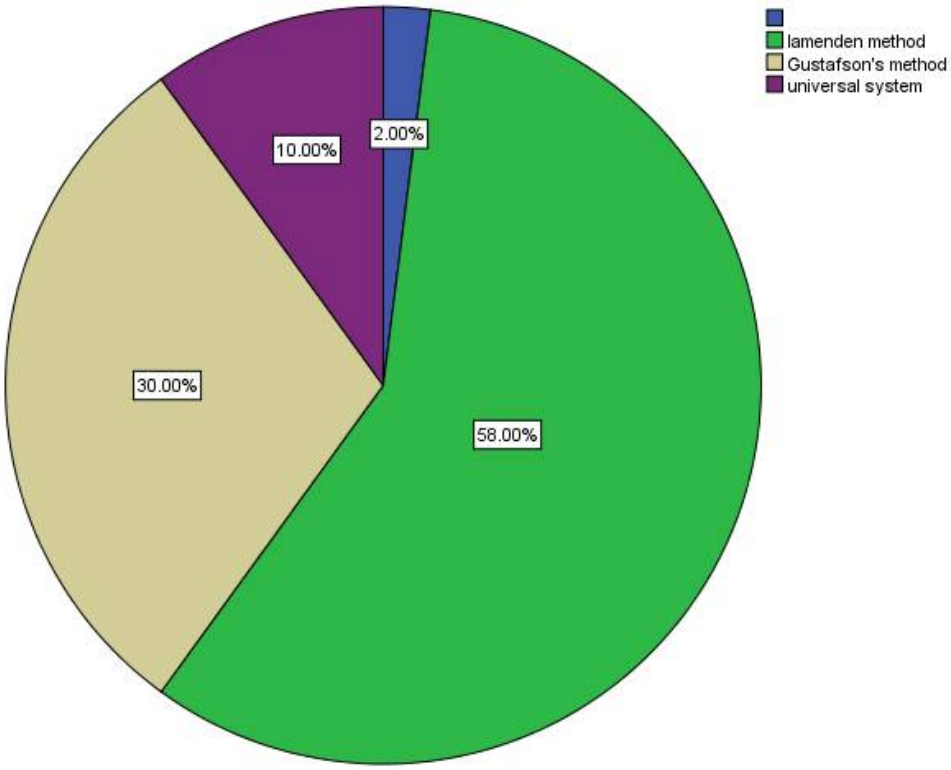

FIGURE 8:The above graph represents transparency of radicular dentin and secondary dentin deposition. Green colour represents lamenden method, Peach colour represents Gustafson's method and violet colour represents universal system. Most of the participants choose lamenden method(58%),followed by gustafson's method(30%) and followed by universal method(10%)

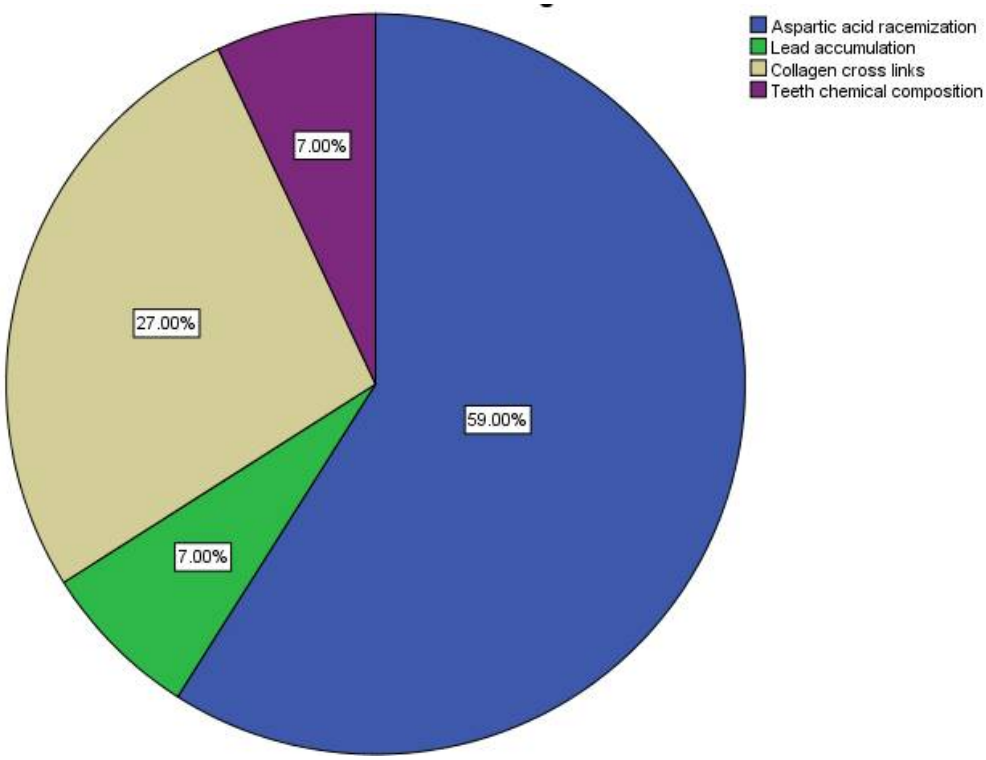

FIGURE 9: The above graph represents chemical method of age estimation. Blue colour represents aspartic acid racemization, green colour represents lead accumulation ,peach colour represents collagen cross links, violet colour represents chemical composition of teeth. Most of the participants choose aspartic acid racemization (59%),followed by peach colour represents collagen cross links(27%),followed by chemical composition of tooth(7%) and followed by teeth chemical composition(7%).

DISCUSSION

As a group of dental students, dental students were very concerned about the importance and usefulness of the adult age estimation approach. Gustafson's approach was the most commonly known, followed by the incremental line of cementum, amino acid racemization, dentin hypersensitivity, and the radiographic method of kvaal. The results of a prior study on the Gustafson method of estimating age were very comparable to those of ours. Participants were more likely to know about the procedure because gustafson's method has been frequently used [7].

Chemical age estimation is the most common method participants are familiar with, and this study sheds light on it. Aspartic acid racemization (59 percent), peach color represents collagen cross linkages (27 percent), chemical composition of tooth (7 percent) and teeth chemical composition (7 percent) were the most popular choices for participants (7 percent). A prior study used aspartic acid racemization from tooth biopsy specimens to estimate the age of Indians still living, and the results were Individuals who have reached skeletal maturity can have their ages accurately estimated using aspartic acid racemization from dentine biopsy samples. Article [8] said that this was the case. Methods to determine age are classified into chemical and biological categories based on these levels, such as racemization of aspartic acid, lead buildup, collagen cross-links, chemical composition of the teeth, and analysis of advanced glycation end products (AGEs).

This process is especially relevant in those cases in which the rest of the skeletal remains are marred, as the tooth remains intact under adverse circumstances while the rest of the skeleton is obliterated. Multiple approaches have been devised to determine an individual's dental age, though the procedure remains complex.

CONCLUSION

Forensic science's use of age calculations is vital, although the area is still developing. Numerous approaches and research, each with its unique implementation, precision and dependability have been offered so far. In order to minimize the mean error rate in the forensic workup, age estimates based on dental observations should be viewed as a measure of most likely age rather than real chronologic age, ongoing research projects using existing methods and formulae should be closely scrutinized, and new

population-specific formulae should be derived. When dealing with a case involving a questionable identity, an interdisciplinary strategy is required in order to maximize the contribution of forensic medicine and dentistry to a civil jurisdiction.

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CONFLICT OF INTEREST
Nil

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