

Knowledge and awareness on estimation of gender and age using the tooth cementum among dental students

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ABSTRACT

Introduction Cementum is a surface layer present in the teeth which is seen below the dentin in the root area. It is thin at the middle region of the tooth and thick at the apex region of the teeth. Specialized cells called cementoblasts form the cementum layer. The age estimation done by using cementum is a better method to obtain positive result value which gives estimated value that is almost equal to the actual value.

Aim: The main purpose of the study is to show that the dental students have knowledge and awareness on estimation of gender and age by using tooth cementum.

Materials and method Self administered questionnaire of close-ended questions was prepared and it was distributed among dental students from February to April 2021 through the online survey “google forms”. The collected data were checked regularly for clarity, competence, consistency, accuracy and validity. Demographic details were also included in the questionnaire.

Results 79% of dental students accepted that teeth can be used for the age estimation and only 21% of them didn't accept that teeth can be used for the age estimation. 69% of the respondents said that first use of cementum in human age estimation began with the number of incremental lines and 31% of them said that cementum in the human age estimation began with the width of the total cementum layer, 70% of respondents said that cementum can be used for estimating age and 30% of respondents said that cementum can't be used for estimating age. Chi square analysis was done between the year of study and whether age estimation would be done using the cementum, where most of the undergraduates said that cementum can be used for the estimation of age, however, it is not statistically significant (Pearson's chi square value = 2.324, df = 1, P value = 0.127 (>0.05)).

Conclusion From this survey, we can say that dental students have knowledge about various methods for the estimation of age by using the cementum. Further studies can be done by using secondary dentin with various methods for finding gender and age of an unknown individual.

Keywords: Cementum, Innovative technology, Estimation of age and gender.

INTRODUCTION

Cementum is a surface layer present in the teeth which is seen below the dentin in the root area. It is thin at the middle region of the tooth and thick at the apex region of the teeth. Specialized cells called cementoblasts form the cementum layer (1). It is found to be helpful for the attachment of the tooth to the periodontal ligament and also helps in the attachment of ligament to the alveolar bone (2). It is involved in the regeneration of a damaged tooth and has a tendency to inhibit absorption (3). It is a mineralized hard tissue found in the teeth. Age estimation using layers of the teeth is one of the reliable methods to estimate the age of an individual (4). The age estimation done by using cementum is a better method to obtain a positive result value which gives an estimated value that is almost equal to the actual value (5). Counting of the incremental lines in the cementum is another method for the age estimation which is done by using various instruments (6). Instead of using the cementum as a parameter for the age estimation, the Secondary dentin could also be used for estimating the age of an individual. In the field of forensic odontology the layers of tooth such as cementum and secondary dentin play an important role in finding the age of an unknown individual (7).

From the previous article, the researchers have said that tooth cementum annulation is done as a microscopic study which was based on the acellular fibres present within them (8). The incremental line in the teeth can be numbered by using various types of colouring stains that helps us to see the incremental lines separately under the microscope (9). Among all the Teeth in the mouth, Premolars are the most reliable for estimation of age as they have simpler root morphology

comparatively. Incremental lines vary from place to place in the teeth (10). In few researches, it was found that the interspecific variation of two closely related species can be found using incremental lines and it is also helpful in estimating the age of the closely related species (11).

There is a paucity of survey or research carried out previously on the knowledge and awareness on estimation of gender and age using the tooth cementum among medical students. The main aim of the study is to analyse the knowledge and awareness on estimation of gender and age using the tooth cementum among dental students.

MATERIALS AND METHODS

Study design

A cross sectional study was conducted through an online survey from February to April 2021 among undergraduates.

Study subjects

A simple random sampling was used to select the study participants. All the dental students who were willing to participate were included.

Ethical considerations

Returning the filled questionnaire was considered as implicit consent as a part of the survey. Ethical approval for the study was obtained from the Institutional Review Board (IRB), Saveetha Dental College.

Study methods

Self administered questionnaire of close-ended questions was prepared and it was distributed among dental students from February to April 2021 through the online survey "google forms". The collected data were checked regularly for clarity, competence, consistency, accuracy and validity. Demographic details were also included in the questionnaire.

Statistical analysis

Data was analysed with the SPSS version (22.0). Descriptive statistics as percent were calculated to summarise qualitative data. Chi square test was used to analyze. The confidence level was 95% and of statistical significance $P < 0.05$. Finally, the result was presented by using bar charts, pie charts and percentage tables.

RESULTS AND DISCUSSION:

Table 1: Depicts percentage of response on awareness related to estimation of gender and age based on tooth cementum among dental students.

| S.NO | QUESTION | CHOICE | PERCENTAGE |
|------|---|---|------------|
| 1 | Year of study | PG UG | 83% 17% |
| 2 | Do you think the teeth can be used for the estimation age of a person? | YES NO | 79% 21% |
| 3 | Do you think the teeth can be used for the prediction of gender? | YES NO | 52% 48% |
| 4 | Do you think that estimation of age can be done by using the tooth cementum? | YES NO | 70% 30% |
| 5 | Are you aware that the thickness of cementum in humans increases with age? | YES NO | 87% 13% |
| 6 | Do you think tooth cementum is useful in forensic odontology for predicting the gender? | YES NO | 61% 39% |
| 7 | Which of these two methods give the accurate results for the estimation age using the cementum? | DEMIRJIAN METHOD. TOOTH CEMENTUM ANNULATION. | 70% 30% |
| 8 | Do you think the hypercementosis can affect the results of estimation of age | YES NO | 76% 24% |

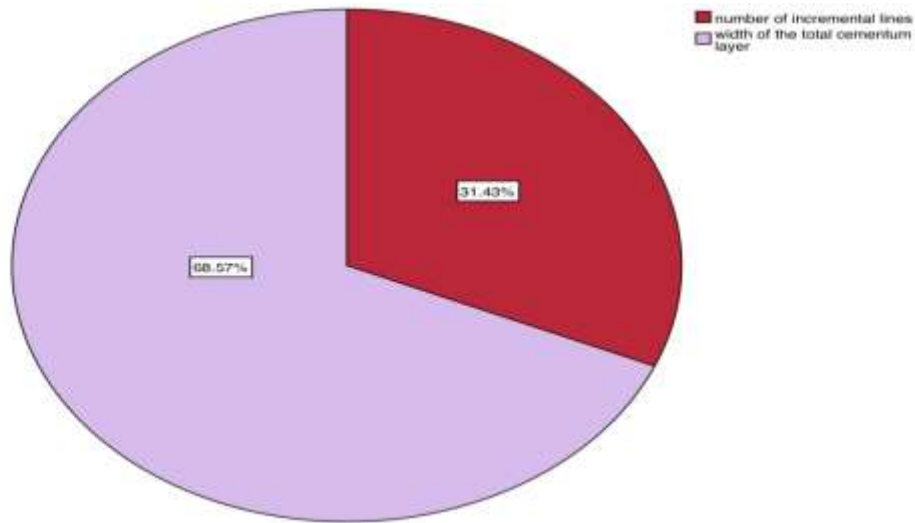


Figure 1 represents the distribution of participants based on the opinion on the method of measurement of age estimation using cementum, where 69% responded to width of the total cementum layer (purple) and 31% responded to the number of incremental lines (red).

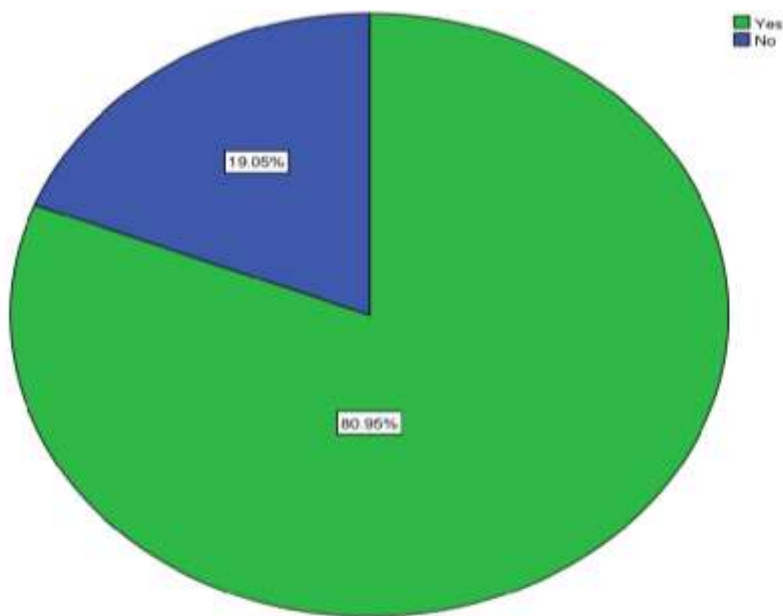


Figure 2 represents the distribution of participants based on the opinion on whether resorption of cementum is less as compared to bone, where 81% responded yes (green) and 19% responded no (blue).

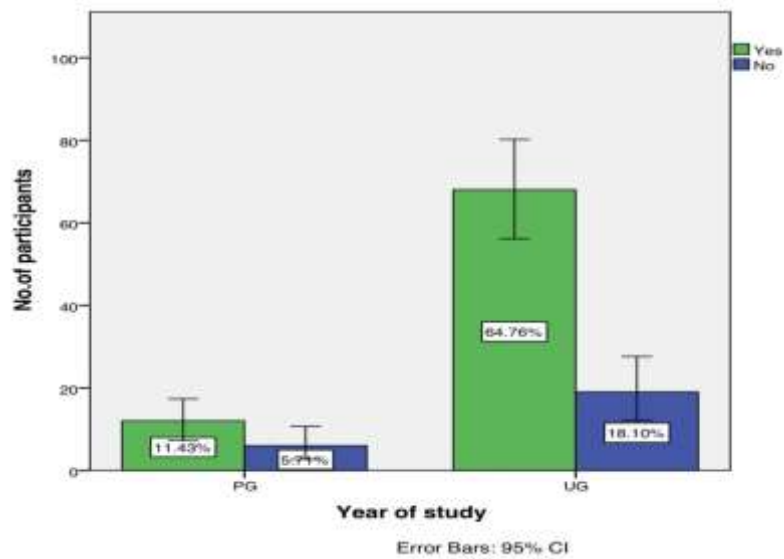


Figure 3: Bar graph showing association between year of study and opinion on whether hypercementosis could affect the result of age estimation. X axis represents year of study and Y axis represents the number of participants who responded 'yes' (green) and 'no' (blue). UG participants strongly believe that hypercementosis affects the result of age estimation more than PG participants, however, it is not statistically significant (Pearson's chi square value =1.086, df=1, P value = 0.297(>0.05)).

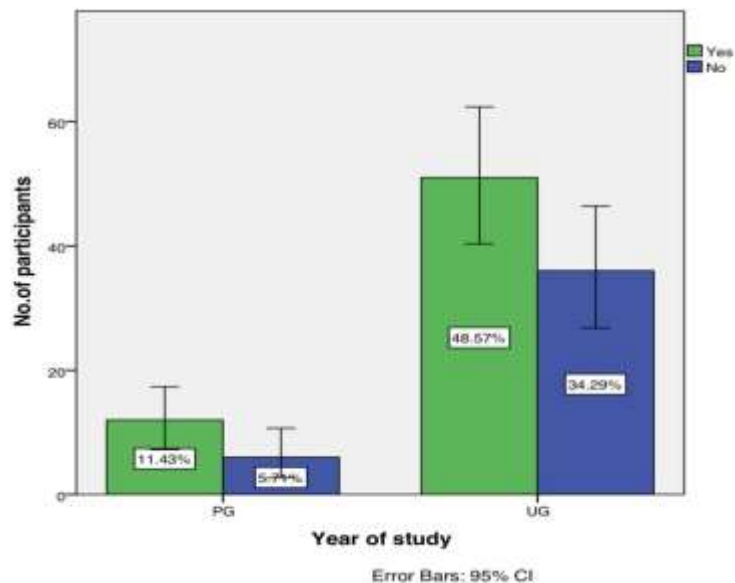


Figure 4: Bar graph showing association between year of study and opinion on whether tooth cementum is useful in forensic odontology for gender prediction. X axis represents the year of study and the Y axis represents the number of participants who responded 'yes' (green) and 'no' (blue). UG participants strongly believe that tooth cementum is useful in forensic odontology for gender prediction more than PG participants, however, it is not statistically significant (Pearson's chi square value =1.159, df =1, P value = 0.282(>0.05)).

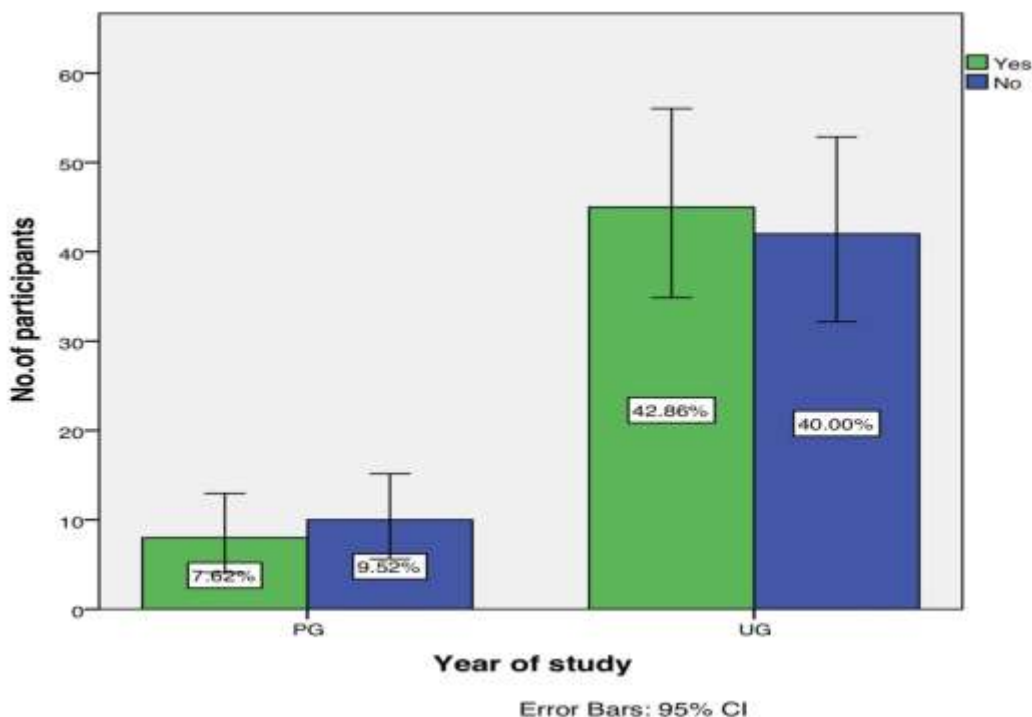


Figure 5: Bar graph showing association between year of study and opinion on whether age estimation could be done using tooth cementum. X axis represents the year of study and the Y axis represents the number of participants who responded 'yes' (green) and 'no' (blue). UG participants strongly believe that age estimation could be done using tooth cementum than PG participants, however, it is not statistically significant (Pearson's chi square value = 2.324, df =1, P value = 0.127(>0.05)).

The study population included dental undergraduates belonging to the 18-25 years of age group. The survey results were collected and statistically analyzed. 100% participants actively responded to the questions. 83% of respondents were UG and 17% of respondents were PG [Table 1]. 79% of dental students accepted that teeth can be used for the age estimation and only 21% of them didn't accept that teeth can be used for the age estimation [Table 1]. 52% of dental students accepted that teeth can be used for predicting gender and only 48% of them didn't accept that gender can't be predicted by using the teeth [Table 1]. 70% of respondents said that cementum can be used for estimating age and 30% of respondents said that cementum can't be used for estimating age [Table 1]. 87% of respondents were aware that the thickness of the cementum increases with age and only 13% of them were not aware that the thickness of the cementum increases with the age [Table 1]. 61% of respondents said that cementum is useful in forensic odontology for predicting gender and 39% of them said that cementum is not useful in forensic odontology for predicting gender [Table 1]. 70% of respondents have said that the Tooth cementum annulation method gives the accurate results for age estimation by using cementum and only 30% of them said that the demirjian method gives the accurate results for age estimation by using cementum [Table 1]. 76% of respondents said that due to hypercementosis the results for the age estimation can be affected and 24% of them said that hypercementosis doesn't affect the results of the age estimation [Table 1]. 69% of the respondents said that first use of cementum in human age estimation began with the number of incremental lines and 31% of them said that cementum in the human age estimation began with the width of the total cementum layer [Figure 1]. Chi square analysis was done between the year of study and awareness on the estimation of age and gender using tooth cementum, where the undergraduates were more aware compared to the postgraduates. Results were not statistically significant [Figure 2]. Chi square analysis was done between the year of study and opinion whether hypercementosis could affect the result of age estimation, where most of the undergraduates said hypercementosis affects the results in the age estimation [Figure 3].

Chi square analysis was done between the year of study and whether the cementum is useful in prediction of gender in forensic odontology, where most of the undergraduates said that cementum is useful in the prediction of gender, p value 0.282(>0.05), hence it is not statistically significant [Figure 4]. Chi square analysis was done between the year of study and whether age estimation would be done using the cementum, where most of the undergraduates said that cementum can be used for the estimation of age, p value 0.282(>0.05), hence it is not statistically significant [Figure 5].

From the previous study, done by Obertov Z(12) estimation of age can be done by using cementum with olzes methods gives the accurate results when we are comparing with our study most the respondents said that tooth cementum annulation is the best method for the estimation age using cementum. From previous study, done by Gocha TP(13) the results generated by using the tooth cementum annulation method can show error due to Hypermineralization of the cementum, this results was more or less similar to our study results such that most of the undergraduates said the hypercementosis causes error in the estimation of age.

Most of the results from the previous literature are more or less similar to the result of this survey. There is no proper survey or research carried out previously on Knowledge and awareness on estimation of gender and age using the tooth cementum .

Our team has extensive knowledge and research experience that has translate into high quality publications (14),(15),(16),(17),(18),(19),(20),(21),(22),(23),(24),(25),(26),(27),(28),(29),(30),(31),(32),(33)

CONCLUSION:

From this survey, we can say that dental students have knowledge about various methods for the estimation of age by using the cementum. Further studies can be done by using secondary dentin with various methods for finding gender and age of an unknown individual.

CONFLICT OF INTEREST:

All the authors declare no conflict of interest in the study.

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