

AGE ESTIMATION FROM THE PHYSIOLOGICAL CHANGES OF TEETH

Dr. Amandeep Singh, Resident

Dr. R.K.Gorea, Professor and Head

Department of Forensic Medicine, Government Medical College, Patiala.

Dr. Urveshi Singla, Associate Professor

Department of Oral & Maxillary Surgery, Government Dental College, Patiala

ABSTRACT :

This study was done to evaluate physiological changes in the teeth with the advancing age. 30 cases were taken in this research and the six factors were recorded, these were attrition, periodontal disease, secondary dentine deposition, cementum apposition, root resorption. Each factor was allotted a score of 0-3 depending upon degree of changes in the tooth. Total scores were used to estimate the age using the formula and regression line was obtained. A mean difference ± 2.16 years was found between actual and calculated age

KEY WORDS : Age estimation, Gustafson method, Teeth

INTRODUCTION

Age is one of the essential factors in establishing the identity of the person. Estimation of the human age is a procedure adopted by anthropologists, archaeologists and forensic scientists. Different factors have been used for age estimation but none has withstood the test of time for adults above 25 years. Examination of teeth in many ways form a unique part of human body e.g. they are most durable and resilient part of the skeleton. The science dealing with establishing identity of a person by teeth is popularly known as Forensic Odontology or Forensic Dentistry [1].

Changes that are appreciable with increasing age are attrition, periodontal disease, and deposition of secondary dentine, root translucency, cementum apposition, root resorption, color changes and increase in root roughness [2]. By taking in consideration, these secondary changes in teeth with advancing age various studies were done to estimate the age of an individual. Such research has resulted in multi-factorial methods that help in age estimation.

Gustafson [2] in 1950 suggested the use of six retrogressive changes and ranked them on arbitrary scale, allotting 0-3 points according to degree of the change. Due to error in this morphometric method several modification were

done in subsequent studies. Johanson [3] in 1971 in his research used same six criterions but different ranking scale and then estimated the age of an individual. Solheim [4] used in situ teeth and eight variables which included two of color estimate, two for periodontosis, and two for attrition, crown length and sex. None of the changes took singly proved more accurate than when these were studied together.

MATERIAL AND METHODS

The medico legal cases received for the autopsy by the Department of Forensic Medicine, Government Medical College, Patiala, were taken for the study. 30 cases were studied (age group of 25 to 70 years). The following dental parameters were studied in each case: Attrition, Periodontal disease, Cementum apposition, Secondary dentine deposition, Root translucency and Root resorption. The apparatus used in the study are Tooth extraction forceps, Probe, Electric lathe, Carborundum stone (rough and smooth), Alcohol and Xylene, Formalin, Microscope and slide, etc.

The details of the deceased were noted from the relatives accompanying. After collecting the details, teeth to be studied were selected and this selection is made based on the study of Solheim (1980) with priority given to first premolars

then second premolars and canines and lastly incisors [4]. Degree of attrition and extent of periodontal disease were recorded before the extraction of the tooth. Then the tooth was extracted by extraction forceps and preserved in formalin until the ground section was prepared. Ground section was prepared by hand grinding which was done first with lathe and then with rough Carborundum stone until a section of 1 mm was obtained and at this thickness, the root translucency was noted. Grinding was further done using fine stone until the section of 0.25-mm thickness is left. Finally, cleaned and dried section was mounted on slide and viewed under microscope for secondary dentine, cementum apposition and root resorption.

The factors seen in the tooth before and after sectioning were recorded using 4 points allotment system [5] as follows:

Attrition (A):

- A0- No Attrition,
- A1- Attrition limited to enamel level,
- A2- Attrition limited to dentine level,
- A3- Attrition up to pulp cavity.

Periodontal disease (P):

- P0-No obvious periodontal disease,
- P1-Beginning of periodontal disease but no bone loss,
- P2-Periodontal disease more than 1/3rd of the root,
- P3-Periodontal disease more than 2/3rd of the root.

Secondary dentine (S):

- S0-No secondary dentine formation,
- S1-Secondary dentine up to upper part of pulp cavity,
- S2-Secondary dentin up to 2/3rd of the pulp cavity,
- S3-Diffuse calcification of entire pulp cavity.

Root translucency (T):

- T0- No translucency,
- T1- Beginning of translucency,
- T2- Translucency more than 1/3rd of the apical root,
- T3- Translucency more than 2/3rd of the apical root.

Cementum apposition (C):

- C0- Normal cementum,
- C1- Thickness of cementum more normal,
- C2- Abnormal thickness of cementum near the apex of the root,
- C3- Generalized abnormal thickness of cementum throughout the apex of the root.

Root resorption (R):

- R0- No resorption,
- R1- Spotted resorption,
- R2- Resorption limited to cementum,
- R3- Extensive resorption of the cementum and dentin both.

After collecting the data and calculating the total score, estimated age calculated using the formula. A graph was plotted with actual age on one side, the score calculated on the other, and regression formulae [6] is obtained.

FORMULA USED [7]

$$AGE = 11.43 + 4.56 (TOTAL SCORE)$$

OBSERVATIONS

Out of the total 30 cases taken randomly from the mortuary of Govt. Medical College. Study group consisted of 17 males and 13 females while 12 were vegetarian and 28 non-vegetarian.

AGE - WISE DISTRIBUTION

GROUPS	AGE (in yrs)	No. of Cases
Group A	25-30	8
Group B	31-35	3
Group C	36-40	4
Group D	41-45	3
Group E	46-50	6
Group F	51-55	2
Group G	56-60	4
TOTAL		30

Known Age in years

COMPARISONS OF AGES

Case No.	Actual Age	Score	Calculated Age	Difference in Ages
1	27	4	29.87	2.87
2	34	5	34.43	0.43
3	35	6	38.99	3.99
4	29	5	34.43	5.43
5	58	11	61.79	3.79
6	60	11	61.79	1.79
7	38	5	34.43	3.57
8	50	8	48.11	1.89
9	40	6	38.99	1.01
10	28	3	25.31	2.69
11	30	5	34.43	4.43
12	55	9	52.67	2.33
13	62	11	61.79	0.21
14	49	7	43.55	5.45
15	37	6	38.99	1.99
16	46	8	48.11	2.11
17	25	4	29.75	4.75
18	42	7	43.55	1.55
19	52	8	48.11	3.89
20	28	4	29.75	1.75
21	50	8	48.11	1.89
22	47	8	48.11	1.11
23	35	5	34.43	0.57
24	28	4	29.87	1.87
25	40	6	38.99	1.01
26	50	9	52.67	2.67
27	57	10	57.23	0.23
28	29	4	29.87	0.87
29	30	4	29.87	0.13
30	45	7	43.55	1.45

DISCUSSION

The mean age difference of calculated age from the actual age was ± 2.16 years, which was contrary to the finding of Gustafson who found age difference of ± 3.63 years. A regression formula $y = 4.6696x + 10.381$ was obtained where X is total points and Y is estimated age. Diet whether vegetarian or non-vegetarian did not affect the scores as our study was on premolars, which are not much in use while eating. These findings were similar to the results of the study done by Pillai and Bhaskar [6] in 1974.

CONCLUSION

In this study, Mean age difference of the calculated age from actual age was found to ± 2.16 years. Standard deviation was 1.56. The attrition factor was found to contribute more in males than in females. Vegetarian and Non-vegetarian also had similar scores. Regression line obtained can be used to estimate the age of unknown cadaver by first calculating the score and then finding the age using this regression line.

REFERENCES

1. Parikh CK: Parikh Text Book of Medical Jurisprudence and Toxicology. Identification in Mass Disasters: CBS Publishers and Distribution. Bombay: 5th edition: 1990: p. 76
2. Gustafson G: Age determination from teeth; Journal of American Dental Association: 1980: 41: 45-54.
3. Lucy D, Aykroyd RG, Pollard AM, Solheim T: A Bayesian approach to adult human age estimation from dental observations by Johanson's age changes: Journal of Forensic Science: 1996: 41 (2): 189-194.
4. Solheim T., Sundnes PK.: Dental Age Estimation of Norwegian Adults – A Comparison of Different Methods; Forensic Science International Journal: 1980: 16(1): 7-13.
5. Vij K: Textbook of Forensic Medicine and Toxicology. Identification: B.I.Churchill Livingstone: Second Edition: 2002: 4: 71-72.
6. Pillai PS, Bhaskar G: Age Estimation from the teeth using Gustafson's method – A Study in India; Journal of Forensic Science: 1974: 3: 135-141.
7. Pillay VV: Text Book of Forensic Medicine and Toxicology. Identification. Paras Publishers. Bangalore. 14th edition; 2004: p. 68
8. Singh AM, Mukerjee JB: Age Determination from teeth of Bengalee subject by following Gustafson's method ; Journal of Indian Academy of Forensic Science : 1985 : 24 (2) : 1.