

## Assumption of Age From Dental Observations in Adult Bangladeshis

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### Abstract

Age is a medicolegally vital factor in establishing the identity of a person. Teeth are one of the most long-lasting and tough parts of skeleton. Gustafson (1950) recommended the use of six retrogressive dental changes that are seen with increasing age. The aim of the study was to evaluate the results and to check the reliability of modified Gustafson's method for determining the age of an individual. 30 cases were taken in this research. 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  $\pm 2.16$  years was found between actual and calculated age.

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**Key words :** Age estimation, Gustafson method, Teeth

### Introduction

Estimation of age at death and determination of sex of the victim or remains are important factors in the identification of an individual in forensic odontology. Teeth are the most durable parts of our body and among the most reliable tools in the process of identification of age. Dayal reported that was particularly useful in the detection of bodies in mass disasters and natural calamities.<sup>1</sup>

It is more important in the present day world to identify missing, dead, murdered, or killed persons in accidents. The identification of the corpses, mutilated bodies, is of importance

from social, emotional, and medicolegal aspects. Dental age estimation can be divided into two periods in life. The first period is when the teeth are developing in jaws up to 20 years. Later, when all teeth are fully formed, regressive age-related changes might be used as a scientific method. Age can be estimated in children and in adolescents by means of development and eruption of deciduous and permanent teeth up to 14 years. After the age of 14 years, the third molar is the only remaining tooth which is still developing; and consequently, dental age estimation methods have to rely on the

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development of this tooth until the age of 20. After this period, age determination is mainly done by visual examination, radiographic methods and structural changes in teeth. Changes that are appreciable with increasing age are attrition, periodontal diseases, and deposition of secondary dentine, root translucency, cementum apposition, root resorption, color changes and increase in roughness.<sup>2</sup> 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 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.<sup>2</sup> Lucy stated that due to error in this morphometric method several modifications were done in subsequent studies<sup>3</sup> in 1971 in his research used same six criteria but different ranking scale and then estimated the age of an individual. Solheim used in situ teeth and eight variables which included two of color estimate, two for periodontosis, and two for attrition, crown length and sex.<sup>4</sup> None of the changes taken singly proved more accurate than when these were studied together.

### Methods

The present work was undertaken in the Oral & Maxillofacial Surgery Department, Shaheed Suhrawardy Medical College Hospital. The sample group comprised of extracted teeth from individuals in the age group of 20-65 years. The teeth were obtained after pre-extraction examination of the patient by the researcher in the Department. However, some teeth extracted from individuals of selected age group in private dental clinics in the absence of the researcher were also included in the study. In such cases, the pre-extraction assessment of the patient

was not possible, and hence was not done. Teeth with caries excluded from the study. According to Vij the following dental parameters were<sup>5</sup> studied in each case:

#### **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

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#### **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.

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.<sup>4</sup> 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 Carborundumstone 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. 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.

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<sup>6</sup> is obtained.

#### Formula Used<sup>7</sup>

$Y = 4.5X + 11.43$  (X – total score, Y – estimated age)

X – Total score =  $A_n + S_n + P_n + C_n + R_n + T_n$

#### Results

Out of the total 30 cases taken randomly from the outdoor patient of the Oral & Maxillofacial Surgery Department of Shaheed Suhrawardy Medical College Hospital. Study group consisted of 14 males and 16 females.

Table I: The case distribution in different age groups

GROUPS	AGE ( in years )	No. of Cases
Group A	25-30	7
Group B	31-35	4
Group C	36-40	4
Group D	41-45	3
Group E	46-50	6
Group F	51-55	3
Group G	56-60	3
TOTAL		30

Table II: Comparisons of age

Case no	Actual age	Score	Calculated age	Difference in ages
1	34	5	34.87	0.43
2	29	5	34.43	5.43
3	27	4	29.87	2.87
4	58	11	61.79	3.79
5	38	5	34.43	3.57
6	35	6	38.99	3.99
7	60	11	61.79	1.79
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	49	7	43.55	5.45
14	62	11	61.79	0.21
15	40	6	38.99	1.01
16	50	9	52.67	2.67
17	55	10	55.23	0.23
18	29	4	29.87	0.87
19	32	4	31.87	0.13
20	45	7	43.55	1.45
21	50	8	48.11	1.89
22	47	8	48.12	1.12
23	35	5	34.43	0.57
24	28	4	29.87	1.87
25	28	4	29.75	1.75
26	52	8	48.11	3.89
27	42	7	43.55	1.55
28	25	4	29.75	4.75
29	46	8	48.11	2.11
30	37	6	38.99	1.99

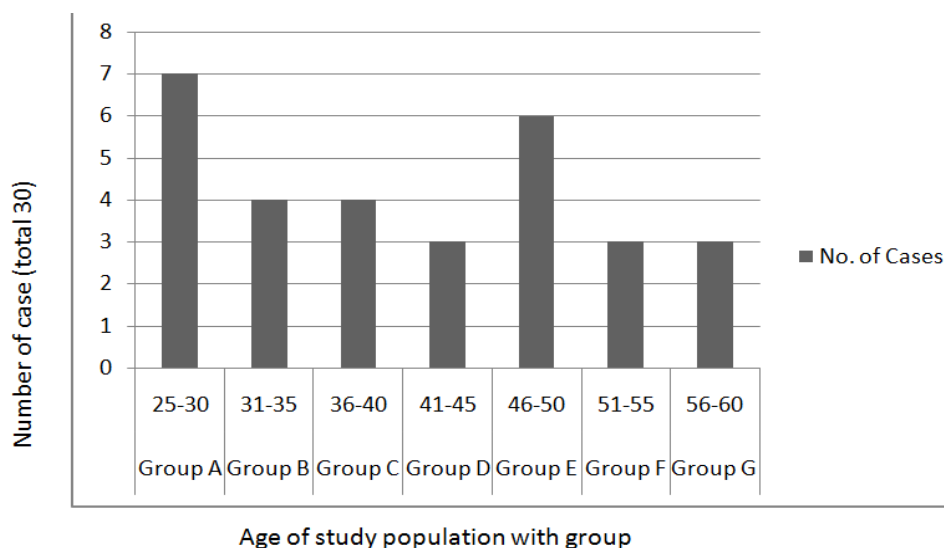


Figure1. Distribution of age of study population with group

### Dicussion

Age is one of the essential factors in establishing the identity of a person. Age estimation from teeth is a field in forensic odontology which is of great interest in the identification of a person. It has been shown that the state of the teeth has closer correlation with age than any other hard tissue of the body. Age can be estimated in children and in adolescent by means of development and eruption of deciduous and permanent teeth up to 14 years. After the age of 14 years, the third molar is the only remaining tooth which is still developing and consequently dental age estimation methods have to rely on the development of this tooth until 20 years of age. After this period, age determination is mainly done by visual examination, radiographic methods, and structural changes in teeth; and by means of biochemical methods. The Gustafson's method is the most popular age estimation method being used since 1950. He used six retrogressive changes in teeth, namely attrition, secondary dentin deposition, periodontal status, root transparency, cementum apposition, and root resorption. This technique was modified in many ways by several investigators to get

optimum results. The sample group comprised of extracted teeth from individuals in the age group of 20-60 years. The extracted teeth were prepared for examination and the extent of secondary dentine deposition, cementum apposition, and root resorption were recorded under low power microscope and ranked them on an arbitrary scale, allotted 0-3 points according to the degree of secondary changes.

Since the study group comprised of those teeth that were already extracted at various private dental clinics, the radiographic evaluation of these samples could not be carried out. Hence, the parameter involving periodontal status was not considered for the study. The mean age difference between actual and calculated age of total 30 cases studied was  $\pm 2.16$  years. The mean age difference between actual and calculated age was less as compared to the Gustafson's original work which was  $\pm 3.63$  years. A regression formula  $y = 4.6696x + 10.381$  was obtained where X is total points and Y is estimated age. These findings were similar to the results of the study done by Pillai and Bhaskar in 1974.<sup>6</sup> Score points of observation are found to vary tooth wise even

in the same sample and in some cases total points are found to be identical in two or in rare cases in three teeth. This variation in score points is not only limited to attrition and paradontosis but also to other age changes. Our study also states that the age changes are comparatively more advanced in the anterior teeth and also they are more uniform for which when considered alone, anterior tooth gives better results than the posterior one. Same individual even having uniform mastication (chewing habits). Central Incisor is the first permanent tooth replacing the deciduous tooth. It is the most frequently used teeth in biting and cutting habit, thus more prone to secondary changes. However the transparency of root is found better in higher age groups (above 25 years). This finding in our study somehow contradicts with the opinion of Gustafson.

#### *Conclusion*

The present study concludes that regressive alterations of teeth can be used for estimation of age which helps in identification of the corpses; mutilated bodies; and is of importance for social, emotional, and medicolegal aspects. We also conclude that Gustafson's method is a reliable method for age estimation from teeth .

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