# Indian Journal of Forensic Odontology





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*Contents*

# Modification of Kvaal Method for Age Estimation

***Rajnish Jain, **Balwant Rai**

*M.D.S., Endodontics, **Founder Of BR Formula

**Abstract**

Age calculation has become increasingly important in forensic dentistry. The method for dental age calculation is based only on radiological measurements in periapical dental radiographs. The purpose of the present study was application of Kvaal technique for age estimation from orthopantograms. On calculating age based on measurements of all six teeth or three maxillary teeth, no significant differences were found between the chronological age and calculated age.

Kvaal's technique may be applied for age estimation from orthopantograms while keeping suitable an criteria and good quality radiographs.

**Keywords**

Forensic dentistry, orthopantograms, kvaal technique, age estimation.

**Introduction**

Age estimations of living individuals are increasingly important in criminal matters. If doubts arise regarding the age of a person suspected of a criminal offence, forensic age estimation is prompted by the need to ascertain whether the person concerned has reached the age of criminal responsibility and whether general criminal law in force for children or adults is to be applied. The main criteria for forensic age determination in the relevant age group based on odontological examination are tooth eruption and tooth mineralization, both developmental biological features. Tooth mineralization is evaluated based on what is known as an orthopantomogram, a radiograph of the complete dentition. For the evaluation of tooth mineralization, various stage classifications have been put forward[1-3].

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Kvaal et al.[4] reported a method for age estimation from radiological measurements. They investigated periapical radiographs by examining the relationship between chronological age and the two-dimensional dental pulp size in individuals older than 20 years of age. Length and width measurements of tooth and dental pulp were analyzed stereomicroscopically on apical radiographs of six teeth. Ratio between the length and width measurements of the same tooth were calculated in order to avoid measurement errors due to differences in magnification of image on the radiograph. Regression formulas were calculated for dental age estimation based on the analysis of either all six teeth, or any three teeth of maxillary or mandibular, or each individual tooth only.

The aim of the present study was to apply Kvaal's technique[4] (Manual)on digital orthopantograms of adults and accuracy of this method.

**Materials and methods**

Three hundred and nine orthopantograms of digital origin were collected from Deptt. of Orthodontics, Govt. Dental College associated with Pt. B.D. Sharma PGIMS, Rohtak (Haryana). The radiographs were from 30 individuals with age ranging from 19 to 25 years. While studying the radiographs the observer had no idea about the chronological age of the individuals. On each of the orthopantograms the original six teeth were selected as previous study[4]. Best side of orthopantogram was selected for the measurements using same criteria exclusion criteria used by Kvaal et al.[4]and all parameters were studied manual

The following measurements were carried out on orthopantograms for all six types of teeth with maunal: maximum tooth length, the pulp length, the root length on the mesial surface from enamel cementum junction to the root apex ; the root and pulp width at the enamel cementum

junction, at the mid root length and at mid point between the enamel cementum junction and mid root level. The data were analyzed by SPSS and differences between chronological and observed ages were analyzed using student t-test. Pearson correlation (r) between chronological age and calculated from measurements ratio were also calculated.

**Results**

**Table I**

**Mean (M) and Standard Deviation (SD) of all teeth between chronological age and observed age (in years)**

| Number of Teeth | Age difference (in years) (M±SD) |
|---|---|
| Three maxillary teeth | 6.32 ± 3.2* |
| Three mandibular teeth | 6.39 ± 1.72* |
| Three maxillary and three mandibular teeth | 5.37 ± 0.42 |
| Mandibular lateral incisors | 8.25 ± 2.52* |
| Mandibular canines | 7.32 ± 6.28* |
| Mandibular first biscuspids | 8.62 ± 2.63* |
| Maxillary control incisors | 7.83 ± 3.42* |
| Maxillary lateral incisors | 7.96 ± 3.34* |
| Maxillary bicuspids | 8.65 ± 2.52* |

No significant differences were found between chronological age and calculated age for the results obtained based on the original regression formulas including all six teeth or including the three maxillary teeth only.

**Discussion**

In Salheim (1993)[6] reported on morphological technique which until today seems to be the most elaborate and statistically sound for dental age estimation. Kvaal et al. (1995)[4] reported a method which combines radiological and morphological measurements, and therefore extraction was still required, while present method required only radiograph. Kvaal's original technique[4] requires that standard apical radiographs are taken of the selected teeth. This study reports a non significant correlation for most of teeth examined between the chronological age and ratio of length of pulp to

**Table II**

Pearson Correlation Coefficient between chronological age and calculated age from ratio's (length of the pulp / length of the root, length of pulp / length of tooth, width of the pulp / width of the root at enamel cementum (A) junction, width of the pulp / width of the root at mid root level (B) and width of pulp / width of the root at mid point between (A and B) of maxillary teeth (central incisor, lateral incisor, bicupids), mandibular teeth (central and lateral incisor, first biocuspids), three maxillary, three mandibular and maxillary and mandibular teeth.

| Parameters (Ratios) | Maxillary and mandibular teeth | Maxillary central incisor | Maxillary lateral incisor | Maxillary bicuspid | Mandibular lateral | Mandibular canines | Mandibular canines | Mandibular first bicuspids | Three maxillary | Three mandibular |
|---|---|---|---|---|---|---|---|---|---|---|
| Length of the pulp/ length of root | -0.51 | -0.43 | -0.45 | -0.52 | -0.32 | -0.42 | -0.42 | -0.72 | -0.44 | -0.45 |
| Length of pulp/ length of tooth | NS | NS | NS | NS | NS | NS | NS | NS | NS | NS |
| Length of pulp/ length of root | -0.54 | -0.54 | -0.42 | -0.43 | -0.45 | -0.56 | -0.56 | -0.52 | -0.57 | -0.32 |
| Width of pulp/ width of root at enamel – cementum (A) junction | -0.57 | -0.68 | -0.48 | -0.47 | -0.43 | -0.47 | -0.47 | -0.54 | -0.53 | -0.35 |
| Width of pulp/ width of root at mid (B) root level | -0.56 | -0.53 | -0.46 | -0.56 | -0.42 | -0.46 | -0.46 | -0.48 | -0.52 | -0.54 |
| Width of pulp / width of root at midpoint between A and B | 0.54 | -0.72 | -0.48 | -0.54 | -0.62 | -0.63 | -0.63 | -0.64 | -0.62 | -0.56 |

length of tooth. And significant correlation between the chronological age and ratio of length of the pulp to length of root, width of the pulp to width of the root at enamel cementum (A), width of the pulp to width of the root at midroot level (B), and width of pulp to width root at midpoint between A and B. [$p < 0.05$] (Table 2) was observed accuracy of proving this method. No significant differences were found between chronological age and calculated age for the results obtained based on the original regression formulas including all six teeth or including in three maxillary teeth.

**Conclusion**

From this study it can be concluded that Kvaal's method may be used for age estimation from the orthopantogram if at least selection criteria are suitable and good quality radiographs without requirement of apical radiographs.

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# Nicodemo et al Method Evaluation of teeth development in North Indian Children and Young people

***S. C .Anand, **Balwant Rai, ***Jasdeep Kaur, ****Rajnish K.Jain, *****O.P .Jasuja, ******Kewal Krishan Ph.D, *******B.K. Behera, ********Simmi Kharb, *********Jaipaul Singh**

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**Abstract**

The aim of the present study is to evaluate the applicability of the methods proposed by Nicodemo et al method for estimation of dental age and compared with chronological age. Orthopantograms of 413 patients, aged 70-195 months were selected to estimate the correlation between dental and chronological age. When the Nolla method was applied, the estimated age was less as compared to chronological age. There were significant correlation between chronological age and estimated dental age in both the genders.

**Keywords**

Orthopantograms, Nicodemo et al Method, dental age.

**Introduction**

Teeth represent useful material for age estimation. In childhood, the observation of the dentition status results in highly accurate age assessment. However, this accuracy decreases simultaneously with the completion of a person's dental development.[1] The development of each individual can be affected by genetic, facial, nutritional, climate, hormonal and environmental actors.[2-3] It has been reported that dental mineralization is less affected by external factors as compared to bone mineralization.[4] In addition to its clinical importance, the radiographic diagnosis may have possible medicologal implications, because it is one of the parameters proposed for helping to determine the age of undocumented youths.[5-6] Numerous studies have been developed to estimate dental age. [3,7-8] Although this variability may mostly relate to population differences, other factors, such as gender, age, and degree of dental maturation of the individual in different samples, may also play a major role. Hence, the present study was to determine the dental age of children in North Indian. In addition, the use of correction factors will assessed for allowing the clinical application of the study results.

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**Material and Methods**

We examined 413 orthopantomographs corresponding to same number of patients from the Bhagwan dental clinic, Jind and Jain Diagnostic Centre, New Delhi (India), 207 males and 206 females between 6 to 16 years of age. The criteria for inclusion in the sample were the availability in their clinical records of an orthopantomography of adequate quality, and no history of medical or surgical disease that could affect the presence and development of permanent teeth, including third molars. The children were assigned to 21,in a groups (at least n=24, 12M : 12 F) according to the chronological age. At time of radiograph examination, the chronological age of each child was calculated on the basis of the child is reported date of birth. The statistical analysis was applied when the result of the intra examiner test was considered as adequate (by Dalberg's formula error was 0.50 months). Dental age was assessed by orthopantomographs according to the methods proposed [9]. Data were tabulated and submitted

to statistical analysis using SPSS version 11.0 and student 't' test was performed.

**Results**

Table 1 shows that the mean chronological age for boys was 143.20 months and for girls was 141.80 months. In both genders the mean dental age was less as compared to chronological age in method (Table I, P<0.01) and due differences were quite marked for the older groups.

Table 2 shows the difference between chronological age and dental age for both methods and for male and female subgroups using student 't' tests and pearson correlation coefficient, which revealed high and the statistically significant (P <0.01) values. Thus a high correlation between dental age and chronological age can be estimated.

**Discussion**

Age estimation for medicological purposes (age at death, criminal cases etc) and clinically represents a fundamental problem, and various methods have been established for age determination. It has been shown that dental development relates more closely to chronological age than skeletal, somatic or sexual maturity indicators[2]. Tooth formation has been more widely used than tooth eruption for assessing dental maturation because it is a continuous and progressive process that can be followed radiographically, and most teeth can be evaluated at each examination. There are several methods for estimating dental age, among them, the method proposed by Nicodemo et al[9] which has been developed taking into consideration because it is easily to use, accurate, almost used by every pedodontist etc. It has been reported that development of each individual can be affected by genetic, racial, nutritional, climate, hormonal and environmental factors [2,6,7]. Hence, considering the regional difference in country region like India, establishing specific parameters for each would be very significant. In the present study, the applicability of method was applied for age estimation for North Indian population. The 70-195 month age range was chosen because most maturity occur during this period. In present study, in boys, the mean dental ages were underestimated in both methods and differences were significant for older groups (P <0.01, table 1) which is in agreement with a previous study[10].

In girls, the mean dental age was also less in Nicodemo et al method while more in Nolla (Table 1, P <0.01) which is contrary with previous study.[10] This may be due to difference in geographical factor and other factors. It has been reported that overestimation in younger children and an underestimation in older age children of southeast Brazil using Nolla method.[11] While in another study showed the dental age was significantly higher than chronological age among Chinese children.[12] Some authors observed that the methods of conversion to dental ages depend on the population at issue [10,12] Hence, correlation factors must be established to make the method (Nicodemo et al) applicable to Indian population.

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**Table 1 :** ***Mean (in months) and standard deviation (SD) of chronological age and estimated dental age using the method proposed by Nicodemo, et al for North Indian (Boys & Girls)***

| Groups | Age ranges **(in months)** | Boys (mean±SD) | | Girls (mean ± SD) | |
|---|---|---|---|---|---|
| | | **Chronological age** | **Nicodemo et al** | **Chronological age** | **Nicodemo et al** |
| 1. | 70 – 75 | 73.40±02.11 | 71.20±06.30 | 74.30±02.10 | 81.30±08.34 |
| 2. | 76 – 81 | 79.20 ± 01.93 | 78.10±06.82 | 78.90±02.93 | 83.40±10.89 |
| | 82 – 87 | 84.50 ± 01.73 | 83.50±08.83 | 85.60±01.69 | 92.80±08.87 |
| | 88 – 93 | 91.10 ± 02.21 | 89.30±08.85 | 90.20±01.87 | 87.81±09.53 |
| | 94 – 99 | 95.50 ± 01.70 | 93.10±09.32 | 96.60±02.70 | 91.30±07.69 |
| | 100 – 105 | 103.10±01.85 | 101.20±11.30 | 102.80±2.85 | 112.40±8.90 |
| | 106 – 111 | 107.90±01.83 | 103.80±12.40 | 106.70±2.87 | 109.30±12.35 |
| | 112 – 117 | 114.00±02.13 | 107.40±12.80 | 113.80±2.63 | 109.40±11.62 |
| | 118 – 123 | 121.51±01.70 | 116.80±09.62 | 122.61±1.55 | 103.70±11.53 |
| | 124 – 129 | 127.80±01.69 | 120.40±09.69 | 128.20±1.53 | 110.89±11.63 |
| | 130 – 135 | 131.91±01.12 | 127.30±10.30 | 132.92±1.32 | 119.91±20.13 |
| | 136 – 141 | 138.10±01.83 | 133.90±09.80 | 139.20±2.34 | 121.54±11.93 |
| | 142 – 147 | 143.90±01.86 | 140.80±14.60 | 142.80±2.87 | 134.70±11.89 |
| | 148 – 153 | 150.50±01.10 | 145.80±15.50 | 149.40±1.89 | 137.50±12.87 |
| | 154 – 159 | 156.20±01.85 | 150.60±14.70 | 157.10±1.86 | 139.60±13.89 |
| | 160 – 165 | 163.20±01.87 | 160.20±13.80 | 162.30±1.88 | 142.50±14.39 |
| | 166 – 171 | 169.20±01.83 | 162.80±09.82 | 170.30±1.87 | 150.40±13.49 |
| | 172 – 177 | 175.30±01.69 | 171.90±10.80 | 176.40±1.70 | 164.32±09.77 |
| | 178 – 183 | 178.30±01.65 | 173.80±16.83 | 179.40±1.66 | 170.41±08.32 |
| | 184 – 189 | 187.40±01.70 | 182.82±09.92 | 188.50±1.75 | 176.62±14.32 |
| | 190 – 195 | 192.30±02.80 | 190.30±12.30 | 191.21±2.81 | 184.61±13.31 |
| | **TOTAL** | **143.20±01.89** | **138.40±21.41** | **139.89±29.62** | **141.80±3.29** |

**Table 2 :** ***Statistical correlation between chrondogical and estimated dental age for both genders***

| | Male | | Female | |
|---|---|---|---|---|
| | **Chronological Age** | **Nicodemo Age (a)** | **Chronological Age (a)** | **Nicodemo et al (a)** |
| Chronological age | 1.000 | | 1.000 | |
| Nicodemo et al | 0.739 | | 0.623 | 0.923 |
| Nolla | 0.832 | 0.821 | 0.673 | 0.632 |

P < 0.01 at all level

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# Estimation of Stature from Maxillo-Facial Measurements among Brahmins of Himachal Pradesh

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**Abstract**

An attempt has been made in the present study to reconstruct stature using maxillofacial measurements among male and female Brahmins of Himachal Pradesh. Sample size comprises of 164 Brahmins (93 males and 71 females) who were measured for Facial Height (FH) and Nasal Height (NH) besides Stature (S) following the standard measurement techniques. All the subjects ranged in age from18 to 40 years. Result of the present study highlight that the stature could be reconstructed with relatively greater reliability using FH among Brahmin males and females .The results further reveal that males exhibit greater correlation with stature than the females while the error of estimate is lower among females as compared to the males. It may be mentioned here that both these maxillofacial dimensions could be used for reconstructing stature under the circumstances when only cranium is recovered from the scene of crime.

**Introduction**

Identification of skeletal remains recovered from crime scenes requires apposite examination in order to fix the distinctiveness of the deceased.

According to forensic experts the dead persons and human skeletal remains contain a wealth of information. But the postmortem injuries and corrosion of the body may alter the general appearance and also the significant features of deceased to such an extent that the visual identification even by close relations may not be possible. According to Mant (1984) the problem of identification may be grouped in to following categories:

Recently dead persons,

Decomposed and mutilated bodies,

Skeletal remains, and

Fragmentary remains.

Identification in case of recently dead bodies can be performed by examining bodily features and fingerprints, but in case of decomposed and mutilated bodies one may require a vigilant examination as the morphological features are smashed. In such situations blood and tissue culture examinations may facilitate in recognition. The analysis of skeletal and fragmentary remains is an imperative aspect and the expert is required to have sufficient comprehension of human and comparative anatomy to answer the following key question that may arise during the examination:

Whether the bones are of human or of non human?

Whether they belong to one or more individual?

What would be the sex?

What is the age?

What is the ethnic group of the individual?

How tall the person would be?

What are the other distinguishing characteristics in the skeletal remains that may lead to Personal identification?

In the beginning of the past century the researchers around the globe used long bone lengths for reconstruction of stature by constructing regression formulae as they had access to the documented skeletons of known origin and ancestry (Stevenson, 1928; Telkka, 1950; Trotter and Gleser 1958; Allbrook, 1961) But due to genetic diversity these formulae were

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population specific as well as exhibited sex differences.

However in a country like India the researchers initially used the formulae constructed by the western scholars but soon they realized the error and started working on the Indian skeletal material. There was a serious problem in locating documented skeletons and thus an attempt was made to use the dissecting room population. The length of the deceased and the long bones were measured and the data were subjected to the formulation of M.Fs (Pan, 1924; Nat, 1931).Subsequently other researchers involved themselves in formulating the regression formulae by measuring percutaneous length of the long bones as per the method suggested by Allbrook (1961)

Most of the studies pertaining to this aspect have used conventional measurements of the long limb bones to formulate prediction equations or Multiplication factors (MF) on different Indian living populations (Nath and Chandra, 1986; Nath et al, .1990; Nath, 1997, 2005; Bhavna and Nath, 2007). Toward the close of the last century researchers diverted from the use of conventional measurements and took other body measurements like hand length, foot length, mid-finger length. They observed these measurements to be quite reliable for prediction of stature. This was followed by yet another phase where researchers used cranio-facial measurements for this purpose and revealed that there exists a significant correlation between these measurements and stature

In the present study an attempt has been made to reconstruct stature among Brahmins of Himachal Pradesh using two maxillo-facial measurements.

**Material and Methods**

The present study was conducted on male and female Brahmins of Tehsil Kasauli, district Solan, Himachal Pradesh. The area was predominantly inhabited by Rajputs and Brahmins besides certain other backward castes.

With a view to accomplish the objectives of the present study a total of 164 unrelated Brahmins (93 males and 71 females) in the age range of 18 to 40 years were measured for Facial height (FH) and Nasal Height (NH) besides Stature (S) using standard measurement techniques Martin and Saller(1959).

**Stature (S):**

It is obtained as a projective distance from the standing surface to the highest point on the head (Vertex) when the subject is standing in standard arm hanging position, using anthropometer rod.

**Facial Height (FH):**

It is obtained as a direct distance between Nasion and Gnathion, using sliding caliper.

**Nasal Height (NH)**:

It is obtained as a direct distance between Nasion and Sub-nasion, using sliding caliper.

Data were subjected to statistical analysis using standard SPSS program to obtain mean, standard error of mean, test of significance, calculation of M.Fs besides correlation and regression analysis to formulate prediction equations for estimation of stature.

**Results and Discussion**

Table-1 presents basic statistical constants of all the three measurements among male and female Brahmins along with the value of test of significance. It is evident from the table that the male Brahmins are not only taller than the female ones but also possess longer face and nose. These apparent differences, when subjected to t-test, reveal highly significant sex differences in all the three body dimensions among Brahmins.

Owing to the highly significant sex differences the data were treated separately for computation of multiplication factors and correlation regression analysis.

**TABLE 1; SEX DIFFERENCES IN MAXILLO-FACIAL MEASUREMENTS AND STATURE AMONG BRAHMINS OF HIMACHAL PRADESH.**

| S.No | Measurement | Males N=93 | | Females N=71 | | Value of t- test |
|---|---|---|---|---|---|---|
| | | Mean | error | Mean | error | |
| 1 | Stature | 166.86 | 0.75 | 155.24 | 0.62 | 11.72* |
| 2 | FH | 17.97 | 0.48 | 16.79 | 0.09 | 8.70* |
| 3 | NH | 5.01 | 0.04 | 4.68 | 0.04 | 5.66* |

· Significant at 1 percent level of significance.

Tanle-2 lists the value of Multiplication factors formulated for male and female Brahmins of Himachal Pradesh. It is apparent that the value of MF is greater for males than that of the one observed for females for both the measurements.

**TABLE 2: MULTIPLICATION FACTORS FOR ESTIMATION OF STATURE FROM MAXILLO-FACIAL MEASUREMENTS AMONG BRAHMINS OF HIMACHAL PRADESH**

| S.No | Measurement | Males | females |
|---|---|---|---|
| 1 | FH | 9.29 | 9.26 |
| 2 | NH | 33.44 | 33.35 |

Table -3 lists the regression equations formulated for prediction of stature using Facial Height and Nasal Height for male and female Brahmins along with their respective values of Standard Error of Estimate (SEE) and correlation(r). It is evident from the table that the value of correlation is greater for FH than NH for either sex .The overall highest correlation is observed between FH and Stature for Male Brahmins indicating that it could provide a better estimate of stature in comparison to NH .The nasal height exhibits a sufficiently greater value of r for males suggesting that it would provide a better estimate for males in comparison to females. However the error of estimate is lower for both the measurements among females on comparison that the one observed for males.

**TABLE 3: REGRESSION EQUATIONS FOR ESTIMATION OF STATURE FROM MAXILLO- FACIAL MEASUREMENTS AMONG BRAHMINS OF HIMACHAL PRADESH**

| S.No | Regression Equations | SEE | 'r' |
|---|---|---|---|
| MALES | | | |
| 1 | S=100.44+8.99(FH) | ±6.65 | .395 |
| 2 | S=137.29+1.76(NH) | ±6.83 | .336 |
| FEMALES | | | |
| 3 | S=118.30+0.707(FH) | ±4.96 | .351 |
| 4 | S=139.97+1.72(NH) | ±5.16 | .222 |

To conclude it may be suggested that both facial height and nasal height could be used for having an estimate of stature using regression equations or M.Fs, under the circumstances when only a skull is recovered from the crime scene and one could take both these measurements after ascertaining the sex of the skull.

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# Age estimation from Permanent Maxillary Molar's Attrition of Haryana Population

**Balwant Rai**

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**Abstract**

Teeth are an excellent material in living and non-living populations for anthropological, genetic, odontologic and forensic investigations. The aim of the present study was to estimate the age using molar's attrition grading. A total of 135 Maxillary molar's were selected. The attrition conditions of the molar's crown were analyzed. Linear equations for age estimation were derived by mean of regression analysis. There were highly statistically significant correlation between molar's attrition and chronological age. When the age of individual remained completely unknown, the best estimates were provided by first maxillary molar.

**Key words**

attrition, age, molar, regression equation.

**Introduction**

Age determination plays a great role in forensic medicine pediatric endocrinology and is of particular interest in forensic odontology and treatment planning. The study of teeth to estimate the age of adult human beings, whether alive, as corpses or as skeletal remains, is widely accepted in forensic odontology. Teeth can easily be inspected in living people, and may be preserved for a long time after death. In children, age determination from the teeth is relatively simple and accurate; it is based on the stage of development and eruption of teeth. In adults, estimating age is more problematic. Out of many stomatological criteria the most common ones for estimation of age at death of adult individuals involve changes in the hard tissues[1-4]. Use of the attrition condition of the permanent tooth crown to estimate age is very convenient and accurate method using not only incisors, bicuspids and molars but also all 28 teeth excluding third molars [5-6]. No such study has been carried out in Haryana subjects. The present study endeavors to establish the effectiveness of attrition in predicting age in Haryana population and preparing regression equation for Haryana population.

**Materials and methods**

The sample used in this study consists of the first and second molars derived from 200 subjects which is provided by Dr. Sahib Singh Dental clinic (Jhajjar), Jain Diagnostic Centre and Bhagwan Dental Clinic (Jind). Restored crown, Dental caries, fractured and false teeth were not involved. The sex, age, reason of extraction, position on the jaw and address were recorded. The age range is 20-80 years , but the average age is 41.8 years. The grading of attrition estimated as previous study[7]. The data were analysis by SPSS version 11.0 and student 't' test were applied.

**Results**

Six regression equations for age estimation using attrition stages were obtained by means of linear regression (Table I).

**Table-I : Regression equations for age estimation from Haryana population**

| Jaw | Equation | (r) | SD |
|---|---|---|---|
| Maxilla | $B = 12.82+5.46\ M_1$ | 0.94 | 4.32 |
| | $B = 13.84 + 6.82\ M_2$ | 0.93 | 9.64 |
| | $B = 13.36 + 3.82\ M_1 + 1.86\ M_2$ | 0.96 | 3.85 |

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For testing these regression equations, a blind fold test was carried out. The sample was derived from forensic case (from forensic medicine, PGIMS, Rohtak). The results were showed in Table-2.

**Table - 2.** ***The results of blind fold test using so forensic cases.***

| *No* | *Sex* | *Actual age (x)* | *Estimated age (y)* | *x – y* |
|---|---|---|---|---|
| 1. | Male | 40 | 38.21 | 1.79 |
| 2. | Male | 38 | 36.41 | 1.59 |
| 3. | Male | 70 | 68.82 | 1.18 |
| 4. | Male | 68 | 71.83 | - 3.83 |
| 5. | Male | 46 | 56.43 | - 0.43 |
| 6. | Male | 21 | 23.43 | - 2.43 |
| 7. | Male | 27 | 32.65 | - 5.65 |
| 8. | Male | 56 | 52.82 | 3.18 |
| 9. | Male | 42 | 43.82 | - 1.82 |
| 10. | Male | 37 | 32.82 | 4.18 |
| 11. | Female | 43 | 41.82 | 2.18 |
| 12. | Female | 63 | 61.85 | 1.15 |
| 13. | Female | 59 | 57.67 | 1.33 |
| 14. | Female | 42 | 40.83 | 1.17 |
| 15. | Female | 56 | 54.91 | 1.09 |
| 16. | Female | 33 | 29.43 | 3.57 |
| 17. | Female | 24 | 29.34 | - 5.34 |
| 18. | Female | 46 | 48.43 | - 2.43 |
| 19. | Female | 22 | 73.24 | - 1.24 |
| 20. | Female | 28 | 32.43 | - 5.43 |

**Discussion**

Methods for determination of age from teeth are of great value form both the dental and medical points of view. Although various methods for age determinations do exist, a universal system has not been achieved due to the varying differences in different ethnic population groups. This study was done with the main objective of trying to determine the dental age of Haryana population using an attrition marker. It has been showed that diet and manner of food preparation have a important role in dental attrition. So we were selected a population, whose takes approximately same types of food i.e vegetarians the present study showed a

statistically significant in previous study by authors molar were not taken because their eruption times are variable and there are many impacted molars [7-8] the results of the blind fold test in table-III is fluctuate around the actual ages in a small range but higher than previous study [7]. It may be due to small sample size, environmental factor and genetic factors. The SDS of the equations using the first molar is less than those of second molar. Hence by using the first molar to estimate the age of death is more reliable which support the previous study[7] while contrary with other study [9]. Ethnic differences between populations dictate that new scores and grading criteria are needed for individual populations as it is observed further studies are needed with extensive and large numbers of samples in order to improve and apply in medico-legal purpose.

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**The ENFSI Annual Meeting 2008** will be held at the Hotel "Villa Maria Regina" from Tuesday afternoon, May 13, 2008 (Get together in the evening) till Friday, May 16 (in the lunch time), 2008 in Rome - Italy. Contact: http://www.enfsimembers.eu/help_login.php

**The Seventh International Conference on Forensic Inference and Statistics (ICFIS 08)** will be held on the Lausanne University Campus. Taking advantage of the forensic science facilities, there will be three introductory workshops on the 20th of August, on respectively forensic DNA analysis, fingerprint identification and Bayesian networks in forensic science. Contact: http://www.unil.ch/icfis.

**Forensic IT Working Group meeting will be organized in Madrid, from 1-3 October 2008**. The meeting will range from workshops in digital evidence, media analysis, skimming, car electronics, mobile phone analysis, to proficiency testing and collaboration proposals in European projects. Contact: z.geradts@nfi.minjus.nl or crim-dei@guardiacivil.es.

**The "1st International Eurasian Congress of Forensic Sciences" will be held October 8th, 2008** through October 11th, 2008 at the Harbiye Military Museum in Istanbul. Istanbul is a metropole connecting two continents, Asia and Europe, which are divided by the Bosphorus, by two bridges. Contact: http://www.adlitip2008.com/eng/index.asp