# Chronological Age Estimation by Radiological Measurements on Digital Panoramic Image Among Iraqi Sample ( Forensic Odontological Study )

## A THESIS
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# Abstract

**Introduction :**

Age estimation has become increasingly important in forensic sciences , From the earliest times of human history teeth were considered to be an indicator of age .

**Aim of the study :**

The aim of the current study was to estimate the chronological age for Iraqi sample by the application of Kvaal's technique on digital panoramic image and Comparing between the real age and the estimated age .

**Materials and methods :**

A sample consisted of one hundred Iraqi dental patients of both gender ( 66 male and 31 female ) and of different age groups ranging from 20 to 59 years old , The total samples were collected from the first of December 2007 till thirty of May 2008 , these patients were divided according to age range into four groups :

20-29 years old ,

30-39 years old ,

40-49 years old ,

50-59 years old .

For each patient, digital panoramic image was taken , consequently ( 100 ) digital panoramic image were obtained for those patients .

On each single panoramic image , six teeth selected from any side of the image , these teeth are :

Maxillary central incisor , Maxillary lateral incisor ,Maxillary second bicuspid , Mandibular lateral incisor , Mandibular canine , Mandibular first bicuspid , with certain excluded criteria had been taken into consideration .

The following measurements were taken on the panoramic image for all six types of teeth with the aid of computer programmes " Adobe acrobat ( version - 8 ) professional " :

The maximum tooth length ,

The root length on the mesial surface from the C.E.J. to the root apex , The pulp length on the mesial surface ,

Root width at C.E. J,

Root width at mid point between (C.E.J) & ( midroot length ) ,

Root width at midroot length ,

Pulp width at C.E.J ,

Pulp width at mid point between (C.E.J) & ( midroot length ) ,

Pulp width at midroot length .

All these measurements recorded in a specially designed measurements chart for each single image , All the previous measurements were calculated by millimeter unit to get the maximum accuracy . Ratios between the length and the width measurements of the same tooth were calculated in order to avoid measurements errors due to differences in magnification on the digital panoramic image .

The obtained measurements processed by multiple regression formulas " SPSS and Automatic age calculation soft ware " to estimate the

chronological age for each single image which subsequently reflect the chronological age for each patient .

Regression formulas were calculated for chronological age estimation based on the analysis of :

All six teeth together ( maxilla and mandible ) ,

The three maxillary teeth only ,

The three mandibular teeth only ,

Each individual tooth alone .

All measurements together with known real ages and estimated chronological ages were statistically analyzed, Differences between the real age and the estimated chronological age were analyzed using the Student's t-test and the standard of error of the estimated age was calculated , Pearson' s correlation coefficients and Concordance correlation coefficients between the estimated chronological age and the obtained ratios were calculated .

**The results :**

The results of the current study showed that the estimated age did come very near to the chronological age , Especially in those conditions where either all six teeth or all three mandibular teeth participated in age estimation .

Also the results showed that the most nearest tooth from age estimation point of view is the maxillary central incisor and the distant tooth is the mandibular canine .

Also the results showed that the nearest age group from age estimation point of view was happened in thirtieth group ( 30-39 years old ) ,

While the farrest results between the real age and the estimated age was happened in fiftieth group ( 50-59 years old ) .

In the present study there is a certain relationship between the teeth wear and the age estimation , since teeth wear proceed with age processing .

**Conclusions :**

No significant differences were found between the real age of the individuals and the estimated age based on the panoramic image .

From the results of the current study it was shown that chronological age could be estimated from certain measurements for certain teeth obtained from panoramic image and without any tooth extraction or any damage. The most promising results obtained when we using in this method the six teeth all together or at least the three mandibular teeth or the maxillary central incisor alone .

This give an indication for further researches about the effect of tooth wear and hard food on chronological age estimation and a new methods for chronological age estimation in old adults .