

**JOURNAL of FORENSIC ODONTO-
STOMATOLOGY**
VOLUME 31 Supplement 1 October 2013
Abstract book IOFOS Conference 2013 Firenze

**WEIGHTED PROBABILITY AT THE 10 YEAR
THRESHOLD**

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The authors declare that they have no conflict of interest.

Introduction: *In the United Kingdom, there are specific age thresholds of legal importance. One of these is the 10 year threshold. Below this age, children who have committed a criminal offence cannot be charged in the criminal law system. The conventional approach is to carry out an age estimation using a Panoramic radiograph of the subject. A difficulty with this approach is that lawyers enquire as to the way that the age is estimated and fail to understand the Normal distribution theory. Clinical Practice has shown that the use of probabilities is better understood by lawyers especially when converted to a percentage value. This paper explores the application of simple probability theory and calculations to the 10 year threshold where multiple Tooth Development Stages (TDS) are used to determine the probability that a subject is below the 10 year threshold ($p < 10$).*

Material and Methods: *The 'study sample' radiographs and data from Yadava et 2011 were re-analysed for this study. The DARLInG Reference Data Set (Roberts GJ and Petrie A. 2012) was used to provide the summary data.*

Results: *A sample of 50 females randomly selected from case records from re-use of radiographs all approximately within 2 years of the 10 year threshold 9.2 years to 11.05 years. The calculated Chronological Age and Associated Probabilities was used to create a table as follows*

CA < 10 years ; CA > 10 years

DA-Probability < 10 years Correct: a. 18 [36%] - b. 25 [50%]

DA Probability < 10 years Incorrect: c. 4 [8%] - d. 3 [6%]

This is interpreted as follows:

- a. 18 of the 50 study subjects [36%] were correctly identified as being under 10 years of age.*
- b. 25 of the 50 subjects [50%] were correctly identified as being over 10 years of age*
- c. 4 of the 50 subjects who were over 10 years were incorrectly identified as being under 10 years of age. This helps the subjects, but does not serve the interests of justice.*

d. 3 of the subjects who were under 10 years were incorrectly identified as over 10 years of age.

This is a poor outcome for the subject who is inappropriately deemed to be criminally liable for any offence that has been committed. The interests of Justice are not served.

Discussion: *This approach provides a new method of helping social workers, solicitors, barristers, judges and care-workers understand dental age assessment with a reliable method of determining whether a child is above or below the 10 year threshold with a high degree of accuracy.*

KEYWORDS: Forensic Odontology, Age estimation, Age Threshold.

JFOS. October 2013, Vol. 31, Sup. No.1, Pag 89-90.
ISSN :2219-6749