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Commentary on: Tardivo D, Sastre J, Ruquet M, Thollon L, Adalian P, Leonetti G, et al. Three-dimensional modeling of the various volumes of canines to determine age and sex: a preliminary study. J Forensic Sci 2011;56(3):766-70.

Sir,

The reason for the present letter to the Editor lies in the recent publication of the article by Delphine Tardivo et al. (1), which presented an interesting method of sex and age estimation based on the pulp and total tooth volumes. Their method is valuable in that it allows creation of a three-dimensional image of each tooth. However, we would like to emphasize that the choice of the statistical methods used in the data analysis is not always suitable, and some pitfalls in the statistical analysis might affect the accuracy of the results.

- To evaluate measurements reliability, the authors used the *t*-test. But, paired *t*-test may only reveal if the difference between the measurements of a feature of a tooth, repeated twice on the same statistical unit, have a mean value of zero. This is a necessary condition for the reliability, but it is not sufficient one. To assess the reliability of total volume (TV) and pulp volume (PV) measurements, we suggest to evaluate the concordance correlation coefficient or the intraclass correlation coefficient (2).
- To obtain an estimate age as function of pulp/tooth ratio, the authors developed simple linear regression equations for all individuals, men, and women. But it is not discussed why the intercept was forced to be zero, and above all, how is possible that the slope of the three equations are positive. In fact, PV/TV values are negatively correlated with age and consequently, the slopes must be negative. Finally, R^2 is not sufficient to evaluate the accuracy of the proposed models. For example, if the standard deviation of the sample age was 18 years, a value of $R^2 = 0.38$ yields a standard error of the error term equal to 14.2 years! This means that at least the standard deviation of the error term and the mean error of the regression must be reported.

Other considerations could be done on the representativeness of the sample used in the regression, but it is not our intention to take referees place. Taking into account that the authors proposed in their study to expand their data set and to refine their method, this letter simply seeks to highlight how, particularly in the forensic sciences, important scientific results need a proper statistical intake.

References

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2. Ferrante L, Cameriere R. Statistical methods to assess the reliability of measurements in the procedures for forensic age estimation. Int J Legal Med 2009;123(4):277–3.

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