# Human dental age estimation based on third molar development: comparing an Indonesian population with multiple other country specific populations

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**ABSTRACT**

There are numerous methods for forensic dental age estimation as; human dentition contains multiple age related parameters. In sub-adults, third molar(s) development observed on panoramic radiographs is considered as dental age predictor [1] [2]. It is still needs to be proven in a standardized comparison that environmental factors and ethnicity are influential components in the dental bud development [3] [4]. Moreover, additional investigations must be done to check the influence of possible differences in tooth development on the age prediction results. Therefore an ongoing study was performed to detect possible ethnical differences in third molar development and the related age predictions on country specific populations [5] [6]. The ongoing study model had not integrated an Indonesian sample. As Indonesia is an isolated population scattered in small chain of islands. So, it was interesting to incorporate them in the ongoing study. The aim of the current study was to collect retrospective panoramic Indonesian radiographs on which the staging of permanent teeth [7] and third molar(s) [8] [9] development was done. The obtained degree of third molars(s) development was compared with earlier collected populations, and their influence on the age prediction outcomes was disclosed.

Retrospectively orthopantomogram of Indonesian subjects in the age range between 16-25 years were collected. All included subjects lived a whole lifetime in Indonesia and were from the same biological group. The developmental stages of the left mandibular permanent teeth were registered according to Demirjian et al [7] (excluding third molars) and all available third molars were staged according to Köhler et al [8]. The degree of third molar(s) development was denoted as developmental score (DS). Therefore a generalized linear mixed model for multivariate ordinal data was used. The Bayes estimate of the random effect was interpreted as its score on a latent factor underlying and summarizing the developmental stages of the four third molars. A linear regression model with the DS as dependent variable and age and countries as predictors were used to evaluate differences in DTMD between countries. The subject from the collected sample were divided at random but stratified on age in a training and a test dataset. The test dataset was used to evaluate the performance of the Bayesian model developed on the subjects in a training dataset. The difference between observed and predicted age was calculated and mean absolute difference (MAD) as well as

mean squared error (MSE) were used to quantify the age prediction performance.
The study hypothesis is that, as was detected with the earlier performed country specific comparisons, the magnitude of possible difference in the DS and age prediction performance turns out to be small [5-6].

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