G17 Third Molar Maturity Index (I_{3M}) for Assessing Age of Majority in a Black African Population in Botswana

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After attending this presentation, attendees will better understand that I_{3M} may, with high accuracy, discriminate individuals of Black African origin who are approximately the legal adult age of 18 years in Botswana.

This presentation will impact the forensic science community by illustrating that I_{3M} may be a useful alternative method in legal and forensic practice.

Assessment of legal age, also known as the age of majority, is a controversial issue because of a lack of biomarkers or physiological evidence during late adolescence that can be used to differentiate a subject as a minor or adult. The third molar has been recognized as a suitable site for age examination in late adolescence.

This study analyzed the development of the left mandibular third molar using I_{3M} and a specific cut-off value of I_{3M}=0.08, which was established by Cameriere et al. and was used to discriminate between minors and adults.[1] A final sample of panoramic radiographs (Orthopantomograms (OPTs)) of 1,294 living Black Africans from Gaborone, Botswana, obtained from 582 males and 712 females aged between 13 years and 23 years, was evaluated. The real chronological age declined as I_{3M} gradually increased. There was no statistically significant difference in third molar development between males and females (p >0.05) across different I_{3M} classes. Results of a 2×2 contingency table indicated that I_{3M}=0.08 was a useful cut-off value for discriminating between minors and adults. The accuracy or overall fraction of correctly classified participants was 0.91 with a 95% Confidence Interval (CI) of 0.89-0.93. The test sensitivity, or the proportion of participants assessed as 18 years and older, was 0.88 (95% CI 0.87-0.89), whereas test specificity, or the proportion of individuals assessed as younger than 18 years (I_{3M} <0.08) was 0.95 (95% CI 0.93-0.96). The positive predictive value of the test, or the prediction that the participants whose I_{3M} <0.08 were adults, was 0.95 (95% CI 0.94-0.97). The negative predictive value of the test, or the prediction that the participants whose I_{3M} was ≥0.08 were minors, was 0.88 (95% CI 0.86-0.89). The Likelihood Ratio of the positive test (LR+) was 17.69 (95% CI 12.91-24.79). The Likelihood Ratio of the negative test (LR-) was 0.12 (95% CI 0.11-0.14). The estimated post-test probability p was 0.95 (95% CI 0.92-0.97).

These results indicate with high accuracy that calculating I_{3M} may be a useful alternative method in legal and forensic practice to discriminate individuals who are approximately the legal adult age of 18 years in a Black African population in Botswana. Further studies should address the usefulness of this method and specific cut-off values for different adolescent populations.

Reference(s):

1. Cameriere R., Ferrante L., De Angelis D., et al. The comparison between measurement of open apices of third molars and Demirjian stages to test chronological age of over 18 year olds in living subjects. *Int J Legal Med*. 2008;122(6):493-497.

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