



Åldersbedömning –
röntgenundersökning av visdomständer i
underkäken / Age estimation by
examination with panoramic radiography
of lower third molar, rapport 333 (2021)

Bilaga 2 /Appendix 2 Studies with high risk of bias and excluded studies

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Excluded studies

This part consists of articles considered relevant in terms of abstract, but the full-text articles were irrelevant to the research question and other inclusion criteria, after assessment.

Studies with high risk of bias

This part consists of articles that were relevant in terms of abstract and full text, but after quality assessment considered to be studies with high risk of bias.

Studier med hög risk för bias/ Studies with high risk of bias

Acharya AB. Accuracy of predicting 18 years of age from mandibular third molar development in an Indian sample using Demirjian's ten-stage criteria. *International journal of legal medicine* 2011;125:227-233.

Ajmal M, Assiri KI, Al-Ameer KY, Assiri AM, Luqman M. Age estimation using third molar teeth: A study on southern Saudi population. *Journal of forensic dental sciences* 2012;4:63-65.

Al-Balbeesi HO, Al-Nahas NW, Baidas LF, Bin Huraib SM, Alhaidari Ra, Alwadai G. Correlation between skeletal maturation and developmental stages of canines and third molars among Saudi subjects. *The Saudi dental journal* 2018;30:74-84.

Alshihri AM, Kruger E, Tennant M. Western Saudi adolescent age estimation utilising third molar development. *European journal of dentistry* 2014;8:296-301.

Altalie S, Thevissen P, Fieuws S, Willems G. Optimal dental age estimation practice in United Arab Emirates' children. *Journal of forensic sciences* 2014;59:383-385.

Amanullah A, Ullah U, Yunus S, Munim A. Development stages of third-molar tooth for estimation of chronological age in children and young adult. *Pakistan Journal of Medical and Health Sciences* 2016;10:750-754.

Ashifa N, Parakh MK, Ulaganambi S. Estimation of Age Using Third Molar Development: A Radiological Cross-Sectional Study. *The American journal of forensic medicine and pathology* 2020;41:115-118.

Babburi S, Nelakurthi H, Aparna V, Soujanya P, Kotti AB, Ganipineni K. Radiographic Estimation of Chronological Age using Mineralization of Third Molars in Coastal Andhra, India. *Journal of international oral health : JIOH* 2015;7:49-52.

Berkvens ME, Fairgrieve SI, Keenan S. A comparison of techniques in age estimation using the third molar. *Journal of the Canadian Society of Forensic Science* 2017;50:74-83.

Cameriere R, Ferrante L, De Angelis D, Scarpino F, Galli F. 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. *International journal of legal medicine* 2008;122:493-497.

Cavric J, Vodanovic M, Marusic A, Galic I. Time of mineralization of permanent teeth in children and adolescents in Gaborone, Botswana. *Annals of anatomy = Anatomischer Anzeiger : official organ of the Anatomische Gesellschaft* 2016;203:24-32.

Costa J, Montero J, Serrano S, Albaladejo A, Lopez-Valverde A, Bica I. Accuracy in the legal age estimation according to the third molars mineralization among Mexicans and Columbians. *Atencion primaria* 2014;46:165-175.

De Salvia A, Calzetta C, Orrico M, De Leo D. Third mandibular molar radiological development as an indicator of chronological age in a European population. *Forensic science international* 2004;146:S9-S12.

Filipović G, Djordjević NS, Stojanović NM, Brkić Z, Igić M, Marjanović D, et al. Evaluation of chronological age based on third-molar development in the Serbian population. *Vojnosanitetski Pregled* 2020;77:1054-1059.

Friedrich RE, Schmidt K, Treszl A, Kersten JF. Predictive values derived from lower wisdom teeth developmental stages on orthopantomograms to calculate the chronological age in adolescence and young adults as a prerequisite to obtain age-adjusted informed patient consent prior to elective surgical procedures in young patients with incomplete or mismatched personal data. *GMS Interdisciplinary plastic and reconstructive surgery DGPW* 2016;5:Doc23.

Gaeta-Araujo H, Oliveira-Santos N, Nascimento EHL, Nogueira-Reis F, Oenning AC, Groppo FC, et al. A new model of classification of third molars development and its correlation with chronological age in a Brazilian subpopulation. *International journal of legal medicine* 2021;135:639-648.

Garamendi PM, Landa MI, Ballesteros J, Solano MA. Reliability of the methods applied to assess age minority in living subjects around 18 years old. A survey on a Moroccan origin population. *Forensic science international* 2005;154:3-12.

Ismail M, Venkata Naga Mohan Rao B, Mohinuddin K. A study of age estimation using third molar teeth in and around Warangal area. *Medico-Legal Update* 2016;16:12-15.

Johan NA, Khamis MF, Abdul Jamal NS, Ahmad B, Mahanani ES. The variability of lower third molar development in Northeast Malaysian population with application to age estimation. *The Journal of forensic odonto-stomatology* 2012;30:45-54.

Jung YH, Cho BH. Radiographic evaluation of third molar development in 6- to 24-year-olds. *Imaging science in dentistry* 2014;44:185-191.

Karadayi B, Kaya A, Afsin H, Ozaslan A, Çetin G. The usage of third molars to determine legally relevant age thresholds in Turkey. *Australian Journal of Forensic Sciences* 2015;47:275-282.

Khosronejad A, Navabi M, Sakhdari S, Rakhshan V. Correlation between chronological age and third molar developmental stages in an Iranian population (Demirjian method). *Dental research journal* 2017;14:143-149.

Knell B, Ruhstaller P, Prieels F, Schmeling A. Dental age diagnostics by means of radiographical evaluation of the growth stages of lower wisdom teeth. *International journal of legal medicine* 2009;123:465-469.

Lee SH, Lee J Y, Park H K, Kim Y K. Development of third molars in Korean juveniles and adolescents. *Forensic science international*- 2009; 188: 107-111.

Lewis AJ, Boaz K, Nagesh KR, Srikant N, Gupta N, Nandita KP, et al. Demirjian's method in the estimation of age: A study on human third molars. *Journal of forensic dental sciences* 2015;7:153-157.

Lucas VS, Andiappan M, McDonald F, Roberts G. Dental Age Estimation: A Test of the Reliability of Correctly Identifying a Subject Over 18 Years of Age Using the Gold Standard of Chronological Age as the Comparator. *Journal of forensic sciences* 2016;61:1238-1243.

Maled V, Vishwanath SB. The chronology of third molar mineralization by digital orthopantomography. *Journal of forensic and legal medicine* 2016;43:70-75.

Mehta N, Patel D, Mehta F, Gupta B, Zaveri G, Shah U. Evaluation of skeletal maturation using mandibular third molar development in Indian adolescents. *Journal of forensic dental sciences* 2016;8:112.

Mincer HH, Harris EF, Berryman HE. The A.B.F.O. study of third molar development and its use as an estimator of chronological age. *Journal of forensic sciences* 1993;38:379-390.

Mohd Yusof MYP, Cauwels R, Martens L. Stages in third molar development and eruption to estimate the 18-year threshold Malay juvenile. *Archives of oral biology* 2015;60:1571-1576.

Naik SB, Patil SN, Kamble SD, Mowade T, Motghare P. Reliability of Third Molar Development for Age Estimation by Radiographic Examination (Demirjian's Method). *Journal of clinical and diagnostic research : JCDR* 2014;8:ZC25-28.

Nur BG, Altunsoy M, Akkemik O, Ok E, Evcil MS. Third-molar mineralization and eruption correlated to chronologic age in Turkish children and adolescents. *Australian Journal of Forensic Sciences* 2015;47:313-321.

Nystrom ME, Ranta HM, Peltola JS, Kataja JM. Timing of developmental stages in permanent mandibular teeth of Finns from birth to age 25. *Acta odontologica Scandinavica* 2007;65:36-43.

Olze A, Taniguchi M, Schmeling A, Zhu BL, Yamada Y, Maeda H, et al. Comparative study on the chronology of third molar mineralization in a Japanese and a German population. *Legal medicine (Tokyo, Japan)* 2003;5:S256-260.

Olze A, Taniguchi M, Schmeling A, Zhu BL, Yamada Y, Maeda H, et al. Studies on the chronology of third molar mineralization in a Japanese population. *Legal medicine (Tokyo, Japan)* 2004;6:73-79.

Olze A, Pynn BR, Kraul V, Schulz R, Heinecke A, Pfeiffer H, Schmeling, A. Studies on the chronology of third molar mineralization in First Nations people of Canada. *International journal of legal medicine* 2010; 124: 433-437.

Orhan K, Ozer L, Orhan AI, Dogan S, Paksoy CS. Radiographic evaluation of third molar development in relation to chronological age among Turkish children and youth. *Forensic science international* 2007;165:46-51.

Padubidri JR, Kongara S, Rao SJ, Udupa R, Kotian MS. Radiological development of mandibular third molar as an indicator of chronological age in South Indian population. *Medico-Legal Update* 2018;18:52-58.

Panainte I, Pop SI, Martha K. Correlation Among Chronological Age, Dental Age and Cervical Vertebrae Maturity in Romanian Subjects. *Revista medico-chirurgicala a Societatii de Medici si Naturalisti din Iasi* 2016; 120:700-710.

Pinares Toledo J, Retamal Yermani R, Ortega Pinto A, Villanueva Conejeros R. Development of the third molar in Chileans: A radiographic study on chronological age. *Forensic Science International: Reports* 2021;3.

Prieto JL, Barberia E, Ortega R, Magana C. Evaluation of chronological age based on third molar development in the Spanish population. *International journal of legal medicine* 2005;119:349-354.

Priyadharshini KI, Idiculla JJ, Sivapathasundaram B, Mohanbabu V, Augustine D, Patil S. Age estimation using development of third molars in South Indian population: A radiological study. *Journal of International Society of Preventive & Community Dentistry* 2015;5:S32-38.

Rai B, Kaur J, Jafarzadeh H. Dental age estimation from the developmental stage of the third molars in Iranian population. *Journal of forensic and legal medicine* 2010;17:309-311.

Ramaswami TB, Rosa GCD, Fernandes MM, Oliveira RND, Tinoco RLR. Third molar development by Demirjian's stages and age estimation among Brazilians. *Forensic Imaging* 2020;20.

Solari AC, Abramovitch K. The accuracy and precision of third molar development as an indicator of chronological age in Hispanics. *Journal of forensic sciences* 2002;47:531-535.

Streckbein P, Reichert I, Verhoff MA, Bodeker RH, Kahling C, Wilbrand JF, et al. Estimation of legal age using calcification stages of third molars in living individuals. *Science & justice : journal of the Forensic Science Society* 2014;54:447-450.

Upalananda W, Wantanajittikul K, Na Lampang S, Janhom A. Semi-automated technique to assess the developmental stage of mandibular third molars for age estimation. *Australian Journal of Forensic Sciences* 2021.

Wong HM, Wen YF, Jayaraman J, Li J, Sun L, King NM, et al. Northern Chinese dental ages estimated from southern Chinese reference datasets closely correlate with chronological age. *Heliyon* 2016;2:e00216.

Zandi M, Shokri A, Malekzadeh H, Amini P, Shafiey P. Evaluation of third molar development and its relation to chronological age: a panoramic radiographic study. *Oral and maxillofacial surgery* 2015;19:183-189.

Exkluderade studier/Excluded studies

Abesi F, Haghanifar S, Sajadi P, Valizadeh A, Khafri S. Association between body mass index and dental development in 7-15-year-old children and adolescents in the city of Babol-Iran (2011). *Journal of Babol University of Medical Sciences* 2013;15:52-58.

Abu Asab S, Noor SNFM, Khamis MF. The accuracy of demirjian method in dental age estimation of malay children. *Singapore dental journal* 2011;32:19-27.

Acharya AB. Age estimation in Indians using Demirjian's 8-teeth method. *Journal of forensic sciences* 2011;56:124-127.

Acharya AB, Bhowmik B, Naikmasur VG. Accuracy of identifying juvenile/adult status from third molar development using prediction probabilities derived from logistic regression analysis. *Journal of forensic sciences* 2014;59:665-670.

Agrawal NK, Hackman L, Dahal S. Dental Age Assessment using Demirjian's Eight Teeth Method and Willems Method in a Tertiary Hospital. *JNMA; journal of the Nepal Medical Association* 2018;56:912-916.

Aissaoui A, Salem NH, Mougou M, Maatouk F, Chadly A. Dental age assessment among Tunisian children using the Demirjian method. *Journal of forensic dental sciences* 2016;8:47-51.

Akhil S, Joseph TI, Girish KL, Sathyan P. Accuracy of Demirjian's and Indian-specific formulae in age estimation using eight-teeth method in Kanyakumari population. *Indian journal of dental research : official publication of Indian Society for Dental Research* 2019;30:352-357.

Akkaya N, Yilanci HO, Boyacioglu H, Goksuluk D, Ozkan G. Accuracy of the use of radiographic visibility of root pulp in the mandibular third molar as a maturity marker at age thresholds of 18 and 21. *International journal of legal medicine* 2019;133:1507-1515.

Akkaya N, Yilanci HO, Goksuluk D. Applicability of Demirjian's four methods and Willems method for age estimation in a sample of Turkish children. *Legal medicine (Tokyo, Japan)* 2015;17:355-359.

Akkaya N, Yilanci HÖ. Assessment of third molar maturity index for legal age threshold of 18 in a sample of Turkish individuals. *Australian Journal of Forensic Sciences* 2020.

Al Balushi S, Thomson WM, Al-Harhi L. Dental age estimation of Omani children using Demirjian's method. *The Saudi dental journal* 2018;30:208-213.

Al Qattan F, Alzoubi EE, Lucas V, Roberts G, McDonald F, Camilleri S. Root Pulp Visibility as a mandibular maturity marker at the 18-year threshold in the Maltese population. *International journal of legal medicine* 2020;134:363-368.

Al-Emran S. Dental age assessment of 8.5 to 17-Year-old Saudi children using Demirjian's method. *The journal of contemporary dental practice* 2008;9:64-71.

Alassiry A, Alshomrani K, Al Hasi S, Albasri A, Alkathami SS, Althobaiti MA. Dental age assessment of 3-15-year-old Saudi children and adolescents using Demirjian's method-A radiographic study. *Clinical and experimental dental research* 2019;5:336-342.

Albernaz Neves J, Antunes-Ferreira N, Machado V, Botelho J, Proenca L, Quintas A, et al. Validation of the Third Molar Maturation Index (I3M) to assess the legal adult age in the Portuguese population. *Scientific reports* 2020;10:18466.

AlQahtani S, Kawthar A, AlAraik A, AlShalan A. Third molar cut-off value in assessing the legal age 18 in Saudi population. *Forensic science international* 2017;272:64-67.

Alsaffar H, Elshehawi W, Roberts G, Lucas V, McDonald F, Camilleri S. Dental age estimation of children and adolescents: Validation of the Maltese Reference Data Set. *Journal of forensic and legal medicine* 2017;45:29-31.

Altan H, Altan A, Sozer OA. Dental age estimation in southern Turkish children: Comparison of Demirjian and Willems methods. *Iranian Journal of Pediatrics* 2017;27.

Altunsoy M, Nur BG, Akkemik O, Ok E, Evcil MS. Applicability of the Demirjian method for dental age estimation in western Turkish children. *Acta odontologica Scandinavica* 2015;73:121-125.

Ambarkova V, Galic I, Vodanovic M, Biocina-Lukenda D, Brkic H. Dental age estimation using Demirjian and Willems methods: cross sectional study on children from the Former Yugoslav Republic of Macedonia. *Forensic science international* 2014;234:187.e181-187.

Angelakopoulos N, De Luca S, Velandia Palacio LA, Coccia E, Ferrante L, Cameriere R. Third molar maturity index (I3M) for assessing age of majority: study of a black South African sample. *International journal of legal medicine* 2018;132:1457-1464.

Antunovic M, Galic I, Zelic K, Nedeljkovic N, Lazic E, Djuric M, et al. The third molars for indicating legal adult age in Montenegro. *Legal medicine (Tokyo, Japan)* 2018;33:55-61.

Antunovic M, Mihajlovic KZ, Nedeljkovic N, Lazic E, Galic I. Third molars in assessing legal adulthood on montenegrin population. *Acta Stomatologica Croatica* 2016;50:188.

Apaydin BK, Yasar F. Accuracy of the demirjian, willems and cameriere methods of estimating dental age on turkish children. *Nigerian journal of clinical practice* 2018;21:257-263.

Arge S, Boldsen JL, Wenzel A, Holmstrup P, Jensen ND, Lynnerup N. Third molar development in a contemporary Danish 13-25year old population. *Forensic science international* 2018;289:12-17.

Arge S, Wenzel A, Holmstrup P, Jensen ND, Lynnerup N, Boldsen JL. Transition analysis applied to third molar development in a Danish population. *Forensic science international* 2020;308:110145.

Arthanari A, Doggalli N, Vidhya A, Rudraswamy S. Age estimation from second & third molar by modified gleiser and hunt method: A retrospective study. *Indian Journal of Forensic Medicine and Toxicology* 2020;14:1-8.

Artis O, Coudane H, Artis JP. Estimation of the age from the stage of development of wisdom teeth, in a caucasian population of the north-east of France. *Journal de Medecine Legale Droit Medical* 2007;50:399-407.

Asif MK, Ibrahim N, Al-Amery SM, John J, Nambiar P. Juvenile versus adult: A new approach for age estimation from 3-dimensional analyses of the mandibular third molar apices. *Journal of Forensic Radiology and Imaging* 2019;19.

Asif MK, Nambiar P, Ibrahim N, Al-Amery SM, Khan IM. Three-dimensional image analysis of developing mandibular third molars apices for age estimation: A study using CBCT data enhanced with Mimics & 3-Matics software. *Legal medicine (Tokyo, Japan)* 2019;39:9-14.

Baghdadi ZD. Dental maturity of Saudi children: Role of ethnicity in age determination. *Imaging science in dentistry* 2013;43:267-272.

Baghdadi ZD. Dental maturity in saudi children using the demirjian method: a comparative study and new prediction models. *ISRN dentistry* 2013;2013:390314.

Baghdadi ZD. Testing international dental maturation scoring system and population-specific Demirjian versions on Saudi sub-population. *Journal of clinical and experimental dentistry* 2014;6:e138-144.

Baghdadi ZD, Pani SC. Accuracy of population-specific Demirjian curves in the estimation of dental age of Saudi children. *International journal of paediatric dentistry* 2012;22:125-131.

Bagherpour A, Anbiaee N, Partovi P, Golestani S, Afzalinassab S. Dental age assessment of young Iranian adults using third molars: A multivariate regression study. *Journal of forensic and legal medicine* 2012;19:407-412.

Balla SB, Ankiseti SA, Bushra A, Bolloju VB, Mir Mujahed A, Kanaparthi A, et al. Preliminary analysis testing the accuracy of radiographic visibility of root pulp in the mandibular first molars as a maturity marker at age threshold of 18 years. *International journal of legal medicine* 2020;134:769-774.

Balla SB, Banda TR, Galic I, N NM, Naishadham PP. Validation of Cameriere's third molar maturity index alone and in combination with apical maturity of permanent mandibular second molar for indicating legal age of 14 years in a sample of South Indian children. *Forensic science international* 2019;297:243-248.

Balla SB, Chinni SS, Galic I, Alwala AM, Machani P, Cameriere R. A cut-off value of third molar maturity index for indicating a minimum age of criminal responsibility: Older or younger than 16 years? *Journal of forensic and legal medicine* 2019;65:108-112.

Balla SB, Galic I, P K, Vanin S, De Luca S, Cameriere R. Validation of third molar maturity index (I3M) for discrimination of juvenile/adult status in South Indian population. *Journal of forensic and legal medicine* 2017;49:2-7.

Balla SB, Lingam S, Kotra A, P HR, P K, N NM, et al. New regression models for dental age estimation in children using third molar maturity index: A preliminary analysis testing its usefulness as reliable age marker. *Legal medicine (Tokyo, Japan)* 2019;39:35-40.

Bassed RB, Briggs C, Drummer OH. Age estimation using CT imaging of the third molar tooth, the medial clavicular epiphysis, and the spheno-occipital synchondrosis: a multifactorial approach. *Forensic science international* 2011;212:273.e271-275.

Bassed RB, Briggs C, Drummer OH. Age estimation and the developing third molar tooth: an analysis of an Australian population using computed tomography. *Journal of forensic sciences* 2011;56:1185-1191.

Baumann P, Widek T, Merckens H, Boldt J, Petrovic A, Urschler M, et al. Dental age estimation of living persons: Comparison of MRI with OPG. *Forensic science international* 2015;253:76-80.

Bhat VJ, Kamath G. Age estimation from the root development of mandibular third molars. *Medico-Legal Update* 2004;4:127-130.

Bhowmik B, Acharya AB, Naikmasur VG. The usefulness of Belgian formulae in third molar-based age assessment of Indians. *Forensic science international* 2013;226:300.e301-305.

Bijjaragi SC, Sangle VA, Saraswathi FK, Patil VS, Ashwini Rani SR, Bapure SK. Age estimation by modified Demirjian's method (2004) and its applicability in Tibetan young adults: A digital panoramic study. *Journal of oral and maxillofacial pathology : JOMFP* 2015;19:100-105.

Birchler FA, Kiliaridis S, Combescure C, Julku J, Pirttiniemi PM, Vazquez L. Dental age assessment on panoramic radiographs: Comparison between two generations of young Finnish subjects. *The Journal of international medical research* 2019;47:311-324.

Birchler FA, Kiliaridis S, Combescure C, Vazquez L. Dental age assessment on panoramic radiographs in a Swiss population: a validation study of two prediction models. *Dento maxillo facial radiology* 2016;45:20150137.

Bittencourt MV, Cericato G, Franco A, Girao R, Lima APB, Paranhos L. Accuracy of dental development for estimating the pubertal growth spurt in comparison to skeletal development: a systematic review and meta-analysis. *Dento maxillo facial radiology* 2018;47:20170362.

Blankenship JA, Mincer HH, Anderson KM, Woods MA, Burton EL. Third molar development in the estimation of chronologic age in american blacks as compared with whites. *Journal of forensic sciences* 2007;52:428-433.

Boonpitaksathit T, Hunt N, Roberts GJ, Petrie A, Lucas VS. Dental age assessment of adolescents and emerging adults in United Kingdom Caucasians using censored data for stage H of third molar roots. *European journal of orthodontics* 2011;33:503-508.

Boyacioglu Dogru H, Gulsahi A, Cehreli SB, Galic I, van der Stelt P, Cameriere R. Age of majority assessment in Dutch individuals based on Cameriere's third molar maturity index. *Forensic science international* 2018;282:231.e231-231.e236.

Cameriere R, Brkic H, Ermenc B, Ferrante L, Ovsenik M, Cingolani M. The measurement of open apices of teeth to test chronological age of over 14-year olds in living subjects. *Forensic science international* 2008;174:217-221.

Cameriere R, Ferrante L, Liversidge HM, Prieto JL, Brkic H. Accuracy of age estimation in children using radiograph of developing teeth. *Forensic science international* 2008;176:173-177.

Cameriere R, Pacifici A, Viva S, Carbone D, Pacifici L, Polimeni A. Adult or not? Accuracy of Cameriere's cut-off value for third molar in assessing 18 years of age for legal purposes. *Minerva stomatologica* 2014;63:283-294.

Cameriere R, Santoro V, Roca R, Lozito P, Introna F, Cingolani M, et al. Assessment of legal adult age of 18 by measurement of open apices of the third molars: Study on the Albanian sample. *Forensic science international* 2014;245:205.e201-205.

Cameriere R, Velandia Palacio LA, Marchetti M, Baralla F, Cingolani M, Ferrante L. Child brides: the age estimation problem in young girls. *The Journal of forensic odonto-stomatology* 2020;3:2-7.

Cameriere R, Velandia Palacio LA, Pinares J, Bestetti F, Paba R, Coccia E, et al. Assessment of second (I2M) and third (I3M) molar indices for establishing 14 and 16 legal ages and validation of the Cameriere's I3M cut-off for 18 years old in Chilean population. *Forensic science international* 2018;285:205.e201-205.e205.

Cantekin K, Ercan Sekerci A, Peduk K, Delikan E, Ozakar Ilday N, Demirbuga S, et al. Dental age assessment for different climatic regions. *The American journal of forensic medicine and pathology* 2014;35:197-200.

Cantekin K, Sekerci AE, Buyuk SK. Dental computed tomographic imaging as age estimation: morphological analysis of the third molar of a group of Turkish population. *The American journal of forensic medicine and pathology* 2013;34:357-362.

Cardoso HFV, Caldas IM, Andrade M. Dental and skeletal maturation as simultaneous and separate predictors of chronological age in post-pubertal individuals: a preliminary study in assessing the probability of having attained 16 years of age in the living. *Australian Journal of Forensic Sciences* 2018;50:371-384.

Carneiro JL, Caldas IM, Afonso A, Cardoso HFV. Is Demirjian's original method really useful for age estimation in a forensic context? *Forensic science, medicine, and pathology* 2015;11:216-221.

Cavric J, Galic I, Vodanovic M, Brkic H, Gregov J, Viva S, et al. Third molar maturity index (I3M) for assessing age of majority in a black African population in Botswana. *International journal of legal medicine* 2016;130:1109-1120.

Celik S, Zeren C, Celikel A, Yengil E, Altan A. Applicability of the Demirjian method for dental assessment of southern Turkish children. *Journal of forensic and legal medicine* 2014;25:1-5.

Celikoglu M, Cantekin K, Ceylan I. Dental age assessment: the applicability of Demirjian method in eastern Turkish children. *Journal of forensic sciences* 2011;56:S220-222.

Chaudhary MA, Liversidge HM. A radiographic study estimating age of mandibular third molars by periodontal ligament visibility. *The Journal of forensic odonto-stomatology* 2017;35:79-89.

Chen JW, Guo J, Zhou J, Liu RK, Chen TT, Zou SJ. Assessment of dental maturity of western Chinese children using Demirjian's method. *Forensic science international* 2010;197:119.e111-114.

Choudhury BK, Bhuyan SK, Pati A, Misra SR, Panigrahi R, Priyadarshini SR, et al. Estimation of CA using orocervical radiographic indices: A prospective observational study. *Indian Journal of Forensic Medicine and Toxicology* 2019;13:1846-1851.

Chu G, Han MQ, Chen T, Zhou H, Guo YC. Construction of Age Estimation Model of 18-Year-Olds in the Northern Chinese Population Based on the Development of Mandibular Second and Third Molars. *Fa yi xue za zhi* 2019;35:289-294.

Chu G, Wang YH, Li MJ, Han MQ, Zhang ZY, Chen T, et al. Third molar maturity index (I3M) for assessing age of majority in northern Chinese population. *International journal of legal medicine* 2018;132:1759-1768.

Corradi F, Pinchi V, Barsanti I, Manca R, Garatti S. Optimal age classification of young individuals based on dental evidence in civil and criminal proceedings. *International journal of legal medicine* 2013;127:1157-1164.

Corral C, García F, García J, León P, Herrera A, Martínez C, et al. Chronological versus dental age in subjects from 5 to 19 years: A comparative study with forensic implications. *Colombia Medica* 2010;41:215-223.

Correia AdM, Barbosa DdS, Alcantara JAdS, Oliveira PMdC, Silva PGdB, Franco A, et al. Performance and comparison of the London Atlas technique and Cameriere's third molar maturity index (I3M) for allocating individuals below or above the threshold of 18 years. *Forensic science international* 2020;317:110512.

Cruz-Landeira A, Linares-Argote J, Martinez-Rodriguez M, Rodriguez-Calvo MS, Otero XL, Concheiro L. Dental age estimation in Spanish and Venezuelan children. Comparison of Demirjian and Chaillet's scores. *International journal of legal medicine* 2010;124:105-112.

Dardouri AAK, Cameriere R, De Luca S, Vanin S. Third molar maturity index by measurements of open apices in a Libyan sample of living subjects. *Forensic science international* 2016;267:230.e231-230.e236.

Davidson CL, Nel C, Bernitz H, van Staden PJ, Uys A. Validation of Roberts' method using root canal width patterns as a mandibular maturity marker in determining the 18-year threshold. *International journal of legal medicine* 2021.

De Angelis D, Gibelli D, Merelli V, Botto M, Ventura F, Cattaneo C. Application of age estimation methods based on teeth eruption: how easy is Olze method to use? *International journal of legal medicine* 2014;128:841-844.

De Donno A, Angrisani C, Mele F, Introna F, Santoro V. Dental age estimation: Demirjian's versus the other methods in different populations. A literature review. *Medicine, science, and the law* 2021;61:125-129.

De Luca S, Aguilar L, Rivera M, Palacio LAV, Riccomi G, Bestetti F, et al. Accuracy of cut-off value by measurement of third molar index: Study of a Colombian sample. *Forensic science international* 2016;261:160.e161-165.

De Luca S, Biagi R, Begnoni G, Farronato G, Cingolani M, Merelli V, et al. Accuracy of Cameriere's cut-off value for third molar in assessing 18 years of age. *Forensic science international* 2014;235:102.e101-106.

De Luca S, Pacifici A, Pacifici L, Polimeni A, Fischetto SG, Velandia Palacio LA, et al. Third molar development by measurements of open apices in an Italian sample of living subjects. *Journal of forensic and legal medicine* 2016;38:36-42.

De Micco F, Martino F, Velandia Palacio LA, Cingolani M, Campobasso CP. Third molar maturity index and legal age in different ethnic populations: Accuracy of Cameriere's method. *Medicine, science, and the law* 2021;61:105-112.

Deitos AR, Costa C, Michel-Crosato E, Galic I, Cameriere R, Biazevic MGH. Age estimation among Brazilians: Younger or older than 18? *Journal of forensic and legal medicine* 2015;33:111-115.

Demirturk Kocasarac H, Sinanoglu A, Noujeim M, Helvacioğlu Yigit D, Baydemir C. Radiologic assessment of third molar tooth and spheno-occipital synchondrosis for age estimation: a multiple regression analysis study. *International journal of legal medicine* 2016;130:799-808.

Duangto P, Janhom A, Prasitwattanaseree S, Mahakkanukrauh P, Iamaroon A. New prediction models for dental age estimation in Thai children and adolescents. *Forensic science international* 2016;266:583.e581-583.e585.

Esan TA, Schepartz LA. Accuracy of the Demirjian and Willems methods of age estimation in a Black Southern African population. *Legal medicine (Tokyo, Japan)* 2018;31:82-89.

Esan TA, Schepartz LA. The timing of permanent tooth development in a Black Southern African population using the Demirjian method. *International journal of legal medicine* 2019;133:257-268.

Esan TA, Yengopal V, Schepartz LA. The Demirjian versus the Willems method for dental age estimation in different populations: A meta-analysis of published studies. *PLoS one* 2017;12:e0186682.

Fan F, Dai Xh, Wang L, Li Y, Zhang K, Deng Zh. Establish Assessment Model of 18 Years of Age in Chinese Han Population by Mandibular Third Molar. *Fa yi xue za zhi* 2016;32:31-44.

Fan JI, Zhou WI. Validity and reliability of the Demirjian distinguish software on estimating dental age. *Zhongguo yi xue ke xue yuan xue bao. Acta Academiae Medicinae Sinicae* 2005;27:363-366.

Fei Y, Wang J. Study on development time of mandibular permanent teeth with Demirjian method in 928 children. *Shanghai kou qiang yi xue = Shanghai journal of stomatology* 2017;26:565-568.

Franco A, de Oliveira MN, Campos Vidigal MT, Blumenberg C, Pinheiro AA, Paranhos LR. Assessment of dental age estimation methods applied to Brazilian children: a systematic review and meta-analysis. *Dento maxillo facial radiology* 2021;50:20200128.

Franco RPAV, Franco A, Turkina A, Arakelyan M, Arzukanyan A, Velenko P, et al. Radiographic assessment of third molar development in a Russian population to determine the age of majority. *Archives of oral biology* 2021;125:105102.

Franco RPAV, Franco A, Turkina A, Arakelyan M, Arzukanyan A, Velenko P, et al. Third molar classification using Gleiser and Hunt system modified by Khöler in Russian adolescents – Age threshold of 14 and 16. *Forensic Imaging* 2021;25.

Franklin D, Karkhanis S, Flavel A, Collini F, DeLuca S, Cameriere R. Accuracy of a cut-off value based on the third molar index: Validation in an Australian population. *Forensic science international* 2016;266:575.e571-575.e576.

Friedrich RE, Ulbricht C, Von Maydell LA, Scheuer HA. The impact of the topography of wisdom teeth on the chronology of root formation - Consequences for the forensic-odontologic age estimation of adolescents and young adults: Radiographic investigations of orthopantomograms. *Archiv fur Kriminologie* 2005;216:15-35.

Galibourg A, Cussat-Blanc S, Dumoncel J, Telmon N, Monsarrat P, Maret D. Comparison of different machine learning approaches to predict dental age using Demirjian's staging approach. *International journal of legal medicine* 2021;135:665-675.

Galic I, Lauc T, Brkic H, Vodanovic M, Galic E, Biazevic MGH, et al. Cameriere's third molar maturity index in assessing age of majority. *Forensic science international* 2015;252:191.e191-195.

Gandhi N, Jain S, Kumar M, Rupakar P, Choyal K, Prajapati S. Reliability of third molar development for age estimation in Gujarati population: A comparative study. *Journal of forensic dental sciences* 2015;7:107-113.

Garg N, Kathuria A, Srikant N, Nandita KP, Yellapurkar S, Jose NP, et al. Validity of Willems age estimation method in children's & adolescents' of Dakshina Kannada Region, India. *Journal of the Canadian Society of Forensic Science* 2021;54:27-33.

Gelbrich B, Frerking C, Weiss S, Schwerdt S, Stellzig-Eisenhauer A, Tausche E, et al. Combining wrist age and third molars in forensic age estimation: how to calculate the joint age estimate and its error rate in age diagnostics. *Annals of human biology* 2015;42:389-396.

Gilbert C, Fairgrieve SI, Keenan SC. A Test of the Demirjian method of dental ageing using a mixed population sample from Northern Ontario. *Journal of the Canadian Society of Forensic Science* 2014;47:1-19.

Ginzalova K, Dostalova T, Eliasova H, Vinsu A, Bucek A, Buckova M. Using Dental Age to Estimate Chronological Age in Czech Children Aged 3-18 Years. *Prague medical report* 2015;116:139-154.

Gomez Jimenez L, Velandia Palacio LA, De Luca S, Ramirez Vasquez Y, Corominas Capellan M, Cameriere R. Validation of the third molar maturity index (I3M): study of a Dominican Republic sample. *The Journal of forensic odonto-stomatology* 2019;3:27-33.

Gulsahi A, De Luca S, Cehreli SB, Tirali RE, Cameriere R. Accuracy of the third molar index for assessing the legal majority of 18 years in Turkish population. *Forensic science international* 2016;266:584.e581-584.e586.

Gulsahi A, Tirali RE, Cehreli SB, De Luca S, Ferrante L, Cameriere R. The reliability of Cameriere's method in Turkish children: a preliminary report. *Forensic science international* 2015;249:319.e311-315.

Gungor OE, Kale B, Celikoglu M, Gungor AY, Sari Z. Validity of the Demirjian method for dental age estimation for Southern Turkish children. *Nigerian journal of clinical practice* 2015;18:616-619.

Gunst K, Mesotten K, Carbonez A, Willems G. Third molar root development in relation to chronological age: a large sample sized retrospective study. *Forensic science international* 2003;136:52-57.

Guo Y, Olze A, Ottow C, Schmidt S, Schulz R, Heindel W, et al. Dental age estimation in living individuals using 3.0 T MRI of lower third molars. *International journal of legal medicine* 2015;129:1265-1270.

Guo YC, Chu G, Olze A, Schmidt S, Schulz R, Ottow C, et al. Application of age assessment based on the radiographic visibility of the root pulp of lower third molars in a northern Chinese population. *International journal of legal medicine* 2018;132:825-829.

Guo YC, Wang YH, Olze A, Schmidt S, Schulz R, Pfeiffer H, et al. Dental age estimation based on the radiographic visibility of the periodontal ligament in the lower third molars: application of a new stage classification. *International journal of legal medicine* 2020;134:369-374.

Guo Yc, Yan Cx, Lin Xw, Zhou H, Pan F, Wei L, et al. Studies of the chronological course of third molars eruption in a northern Chinese population. *Archives of oral biology* 2014;59:906-911.

Gupta S, Mehendiratta M, Rehani S, Kumra M, Nagpal R, Gupta R. Age estimation in Indian children and adolescents in the NCR region of Haryana: A comparative study. *Journal of forensic dental sciences* 2015;7:253-258.

Haglund M, Mornstad H. A systematic review and meta-analysis of the fully formed wisdom tooth as a radiological marker of adulthood. *International journal of legal medicine* 2019;133:231-239.

Hegde RJ, Khare SS, Saraf TA, Trivedi S, Naidu S. Evaluation of the accuracy of Demirjian method for estimation of dental age among 6-12 years of children in Navi Mumbai: A radiographic study. *Journal of the Indian Society of Pedodontics and Preventive Dentistry* 2015;33:319-323.

Hegde S, Patodia A, Dixit U. Staging of third molar development in relation to chronological age of 5-16-year-old Indian children. *Forensic science international* 2016;269:63-69.

Hegde S, Patodia A, Dixit U. A comparison of the validity of the Demirjian, Willems, Nolla and Haavikko methods in determination of chronological age of 5-15-year-old Indian children. *Journal of forensic and legal medicine* 2017;50:49-57.

Hegde S, Patodia A, Shah K, Dixit U. The applicability of the Demirjian, Willems and Chaillet standards to age estimation of 5-15-year-old Indian children. *The Journal of forensic odonto-stomatology* 2019;37:40-50.

Hofmann E, Robold M, Proff P, Kirschneck C. Age assessment based on third molar mineralisation : An epidemiological-radiological study on a Central-European population. *Altersbestimmung anhand der Weisheitszahnmineralisation : Eine epidemiologisch-radiologische Studie an einem mitteleuropäischen Probandengut.* 2017;78:97-111.

Ifesanya JU, Adeyemi AT. Accuracy of age estimation using Demirjian method among Nigerian children. *African journal of medicine and medical sciences* 2012;41:297-300.

Jafari A, Mohebbi S, Khami M, Shahabi MS, Naseh M, Elhami F, et al. Radiographic evaluation of third molar development in 5- to 25-year olds in tehran, iran. *Journal of dentistry (Tehran, Iran)* 2012;9:107-115.

Javadinejad S, Sekhavati H, Ghafari R. A Comparison of the Accuracy of Four Age Estimation Methods Based on Panoramic Radiography of Developing Teeth. *Journal of dental research, dental clinics, dental prospects* 2015;9:72-78.

Jayaraman J, Roberts G. Demirjian's method is unsuitable for dental age estimation. *Forensic science, medicine, and pathology* 2016;12:532-533.

Jayaraman J, Roberts GJ. Comparison of dental maturation in Hong Kong Chinese and United Kingdom Caucasian populations. *Forensic science international* 2018;292:61-70.

Jayaraman J, Roberts GJ, King NM, Wong HM. Dental age assessment of southern Chinese using the United Kingdom Caucasian reference dataset. *Forensic science international* 2012;216:68-72.

Jayaraman J, Wong HM, King NM, Roberts GJ. The French-Canadian data set of Demirjian for dental age estimation: a systematic review and meta-analysis. *Journal of forensic and legal medicine* 2013;20:373-381.

Jin H, Cheng M, Liu H, Chen Y, Ou G, Zhao H. Dental age assessment of the third molar using demirjian's method in 344 teenagers of guangdong han population and the application of forensic science. *Chinese Journal of Forensic Medicine* 2014;29:194-197.

Kar May L, Mei Shian AY, Durward C, Jayaraman J. A method of estimating age of undocumented children and young adults of different socioeconomic status in Cambodia. *Heliyon* 2020;6:e03476.

Karadayi B, Afsin H, Ozaslan A, Karadayi S. Development of dental charts according to tooth development and eruption for Turkish children and young adults. *Imaging science in dentistry* 2014;44:103-113.

Karadayi B, Kaya A, Kolusayin MO, Karadayi S, Afsin H, Ozaslan A. Radiological age estimation: based on third molar mineralization and eruption in Turkish children and young adults. *International journal of legal medicine* 2012;126:933-942.

Karatas OH, Ozturk F, Dedeoglu N, Colak C, Altun O. Radiographic evaluation of third-molar development in relation to the chronological age of Turkish children in the southwest Eastern Anatolia region. *Forensic science international* 2013;232:238.e231-235.

Kasper KA, Austin D, Kvanli AH, Rios TR, Senn DR. Reliability of third molar development for age estimation in a Texas Hispanic population: a comparison study. *Journal of forensic sciences* 2009;54:651-657.

Kedarisetty SG, Rao GV, Rayapudi N, Korlepara R. Evaluation of skeletal and dental age using third molar calcification, condylar height and length of the mandibular body. *Journal of forensic dental sciences* 2015;7:121-125.

Kelmendi J, Cameriere R, Kocani F, Galic I, Mehmeti B, Vodanovic M. The third molar maturity index in indicating the legal adult age in Kosovar population. *International journal of legal medicine* 2018;132:1151-1159.

Kermani M, Tabatabaei Yazdi F, Abed Haghighi M. Evaluation of the accuracy of Demirjian's method for estimating chronological age from dental age in Shiraz, Iran: Using geometric morphometrics method. *Clinical and experimental dental research* 2019;5:191-198.

Khare P, Li J, Velandia Palacio LA, Galic I, Ferrante L, Cameriere R. Validation of the third molar maturity index cut-off value of 0.08 for indicating legal age of 18 years in Eastern Chinese region. *Legal medicine (Tokyo, Japan)* 2020;42:101645.

Khdairi N, Halilah T, Khandakji MN, Jost-Brinkmann PG, Bartzela T. The adaptation of Demirjian's dental age estimation method on North German children. *Forensic science international* 2019;303:109927.

Khoja A, Fida M, Shaikh A. Validity of different dental age estimation methods in Pakistani orthodontic patients. *Australian Journal of Forensic Sciences* 2015;47:283-292.

Khorate MM, Dinkar AD, Ahmed J. Accuracy of age estimation methods from orthopantomograph in forensic odontology: a comparative study. *Forensic science international* 2014;234:184.e181-188.

Kiran CS, Reddy RS, Ramesh T, Madhavi NS, Ramya K. Radiographic evaluation of dental age using Demirjian's eight-teeth method and its comparison with Indian formulas in South Indian population. *Journal of forensic dental sciences* 2015;7:44-48.

Konigsberg LW, Frankenberg SR, Liversidge HM. Status of Mandibular Third Molar Development as Evidence in Legal Age Threshold Cases. *Journal of forensic sciences* 2019;64:680-697.

Kullman L. Accuracy of two dental and one skeletal age estimation method in Swedish adolescents. *Forensic science international* 1995;75:225-236.

Kumagai A, Takahashi N, Palacio LAV, Giampieri A, Ferrante L, Cameriere R. Accuracy of the third molar index cut-off value for estimating 18years of age: Validation in a Japanese samples. *Legal medicine (Tokyo, Japan)* 2019;38:5-9.

Kumagai A, Willems G, Franco A, Thevissen P. Age estimation combining radiographic information of two dental and four skeletal predictors in children and subadults. *International journal of legal medicine* 2018;132:1769-1777.

Kumar GK, Kumar DRS, Kulkarni G, Balla SB, Shyam NDVN, Naishadham Y. Olze et al. stages of radiographic visibility of root pulp and cameriere's third molar maturity index to estimate legal adult age in Hyderabad population. *Journal of forensic dental sciences* 2019;11:84-89.

Kumar VJ, Gopal KS. Reliability of age estimation using Demirjian's 8 teeth method and India specific formula. *Journal of forensic dental sciences* 2011;3:19-22.

Kumaresan R, Cugati N, Chandrasekaran B, Karthikeyan P. Reliability and validity of five radiographic dental-age estimation methods in a population of Malaysian children. *Journal of investigative and clinical dentistry* 2016;7:102-109.

Kutesa AM, Rwenyonyi CM, Mwesigwa CL, Muhammad M, Nabaggala GS, Kalyango J. Dental age estimation using radiographic assessment of third molar eruption among 10-20-year-old Ugandan population. *Journal of forensic dental sciences* 2019;11:16-21.

Lan LM, Yang ZD, Sun SL, Wen D, Kureshi A, Zeye MMJ, et al. Application of Demirjian's and Cameriere's Method in Dental Age Estimation of 8-16-Year-Old Adolescents from Hunan Han Nationality. *Fa yi xue za zhi* 2019;35:406-410.

Lee SS, Kim D, Lee S, Lee UY, Seo JS, Ahn YW, et al. Validity of Demirjian's and modified Demirjian's methods in age estimation for Korean juveniles and adolescents. *Forensic science international* 2011;211:41-46.

Lee Yin ET, Sim KP, Putera Mohd Yusof MY. Adaptation of Demirjian's method for age estimation via third molar development among adolescents and young adults of Malay ethnicity: A preliminary assessment. *Malaysian Journal of Medicine and Health Sciences* 2020;16:14-18.

Litsas G, Athanasiou AE, Papadopoulos MA, Ioannidou-Marathiotou I, Karagiannis V. Dental calcification stages as determinants of the peak growth period. *Phasen in der dentalen Kalzifikation als Determinanten der Hauptwachstumsperiode*. 2016;77:341-349.

Liversidge HM. Interpreting group differences using Demirjian's dental maturity method. *Forensic science international* 2010;201:95-101.

Liversidge HM, Konigsberg LW. Recent analytical developments yield new insights into the timing of tooth formation and standards for age estimation. *American Journal of Physical Anthropology* 2016;159:210-211.

Liversidge HM, Marsden PH. Estimating age and the likelihood of having attained 18 years of age using mandibular third molars. *British dental journal* 2010;209:E13.

Liversidge HM, Peariasamy K, Folayan MO, Adeniyi AO, Ngom PI, Mikami Y, et al. A radiographic study of the mandibular third molar root development in different ethnic groups. *The Journal of forensic odonto-stomatology* 2017;35:97-108.

Liversidge HM, Smith H. Nolla's longitudinal dental study revisited. *American Journal of Physical Anthropology* 2014;153:171.

Lu M, Lai X, Tan Q, Ding Z, Deng M, Liang C, et al. Dental calcification of 15-22 years old male in Dongguan city and its forensic significance. *Chinese Journal of Forensic Medicine* 2013;28:310-313.

Maled V, Manjunatha B, Patil K, Balaraj BM. The chronology of third molar root mineralization in south Indian population. *Medicine, science, and the law* 2014;54:28-34.

Marquez-Ruiz AB, Trevino-Tijerina MC, Gonzalez-Herrera L, Sanchez B, Gonzalez-Ramirez AR, Valenzuela A. Three-dimensional analysis of third molar development to estimate age of majority. *Science & justice : journal of the Forensic Science Society* 2017;57:376-383.

Marrero-Ramos MD, Lopez-Urquia L, Suarez-Soto A, Sanchez-Villegas A, Vicente-Barrero M. Estimation of the age of majority through radiographic evaluation of the third molar maturation degree. *Medicina oral, patologia oral y cirugia bucal* 2020;25:e359-e363.

Mauricio-Vilchez C, Mauricio F, Vilchez L, Cadenillas A, Medina J, Mayta-Tovalino F. Radiographic Correlation of Skeletal Maturation Using the Stages of Dental Calcification in a Peruvian Population. *Scientifica* 2020;2020:4052619.

McLelland E, Keenan S, Fairgrieve SI. A cross-sectional study of three dental age estimation techniques applied to permanent mandibular teeth in a Northern Ontario population and their reproducibility in forensic investigations. *Journal of the Canadian Society of Forensic Science* 2019;52:18-19.

Medina AC, Blanco L. Accuracy of dental age estimation in Venezuelan children: comparison of Demirjian and Willems methods. *Acta odontologica latinoamericana : AOL* 2014;27:34-41.

Melo M, Ata-Ali J. Accuracy of the estimation of dental age in comparison with chronological age in a Spanish sample of 2641 living subjects using the Demirjian and Nolla methods. *Forensic science international* 2017;270:276.e271-276.e277.

Meshram AH, Dode CR, Lanjewar DN. Estimation of age of Indian adolescents by radiographic study of mandibular third molar. *Indian Journal of Forensic Medicine and Toxicology* 2013;7:246-250.

Mesotten K, Gunst K, Carbonez A, Willems G. Dental age estimation and third molars: a preliminary study. *Forensic science international* 2002;129:110-115.

Metsaniitty M, Waltimo-Siren J, Ranta H, Fieuws S, Thevissen P. Dental age estimation in Somali children using the Willems et al. model. *International journal of legal medicine* 2018;132:1779-1786.

Metsaniitty M, Waltimo-Siren J, Ranta H, Fieuws S, Thevissen P. Dental age estimation in Somali children and sub-adults combining permanent teeth and third molar development. *International journal of legal medicine* 2019;133:1207-1215.

Mishra SS, Parakh A. Accuracy of Chaillet and Demirjian's 8-teeth method in dental age estimation of Central Indian population using India specific regression formulae. *Forensic Science International: Reports* 2020;2.

Mitchell JC, Roberts GJ, Donaldson ANA, Lucas VS. Dental age assessment (DAA): reference data for British caucasians at the 16-year threshold. *Forensic science international* 2009;189:19-23.

Mohammed RB, Sanghvi P, Perumalla KK, Srinivasaraju D, Srinivas J, Kalyan US, et al. Accuracy of four dental age estimation methods in southern Indian children. *Journal of clinical and diagnostic research : JCDR* 2015;9:HC01-08.

Mohammed RB, Srinivas B, Sanghvi P, Satyanarayana G, Gopalakrishnan M, Pavani BV. Accuracy of Demirjian's 8 teeth method for age prediction in South Indian children: A comparative study. *Contemporary clinical dentistry* 2015;6:5-11.

Mohan R, Jain RK, Balakrishnan N. Assessment of growth status by correlating the maturation stages of middle phalanx of the third finger and calcification stages of mandibular third molar in an institutional set up. *International Journal of Research in Pharmaceutical Sciences* 2020;11:1965-1969.

Mohanty I, Panda S, Dalai RP, Mohanty N. Predictive accuracy of Demirjian's, Modified Demirjian's and India specific dental age estimation methods in Odisha (Eastern Indian) population. *The Journal of forensic odonto-stomatology* 2019;37:32-39.

Mohd Yusof MYP, Cauwels R, Deschepper E, Martens L. Application of third molar development and eruption models in estimating dental age in Malay sub-adults. *Journal of forensic and legal medicine* 2015;34:40-44.

Mohd Yusof MYP, Wan Mokhtar I, Rajasekharan S, Overholser R, Martens L. Performance of Willem's dental age estimation method in children: A systematic review and meta-analysis. *Forensic science international* 2017;280:245.e241-245.e210.

Monirifard M, Yaraghi N, Vali A, Vali A, Vali A. Radiographic assessment of third molars development and it's relation to dental and chronological age in an Iranian population. *Dental research journal* 2015;12:64-70.

Moode PK, Kumar LA, Mittapelly R. Accuracy of Demerjian age estimation method in south India KADAPA [A.P] population-a cross sectional study. *Medico-Legal Update* 2020;20:175-179.

Moukarzel M, Angelakopoulos N, De Luca S, Velandia Palacio LA, Aquilanti L, Coccia E, et al. Validity assessment of the third molar maturity index (I3M) in a Lebanese sample of adolescents and young adults. *Australian Journal of Forensic Sciences* 2020.

Ndiaye ML, Soumboundou S, Douch H, Lecor PA, Ly-Ba A, Toure B. Demirjian's stages and Camérière's third molar maturity index to estimate legal adult age in Senegalese population. *Revue de Medecine Legale* 2020;11:150-157.

Nik-Hussein NN, Kee KM, Gan P. Validity of Demirjian and Willems methods for dental age estimation for Malaysian children aged 5-15 years old. *Forensic science international* 2011;204:208.e201-206.

Nobrega JBMD, Protasio APL, Ribeiro ILA, Valenca AMG, Santiago BM, Cameriere R. Validation of the Third Molar Maturation Index to estimate the age of criminal responsibility in Northeastern Brazil. *Forensic science international* 2019;304:109917.

Nour El Deen REH, Alduaiji HM, Alajlan GM, Aljabr AA. Development of the Permanent Dentition and Validity of Demirjian and Goldstein Method for Dental Age Estimation in Sample of Saudi Arabian Children (Qassim Region). *International journal of health sciences* 2016;10:21-28.

Olze A, Bilang D, Schmidt S, Wernecke KD, Geserick G, Schmeling A. Validation of common classification systems for assessing the mineralization of third molars. *International journal of legal medicine* 2005;119:22-26.

Olze A, Hertel J, Schulz R, Wierer T, Schmeling A. Radiographic evaluation of Gustafson's criteria for the purpose of forensic age diagnostics. *International journal of legal medicine* 2012;126:615-621.

Olze A, Schmeling A, Rieger K, Kalb G, Geserick G. Studies on the chronology of third molar mineralization in a German population. *Rechtsmedizin* 2003;13:5-10.

Ottow C, Krämer JA, Olze A, Schmidt S, Schulz R, Wittschieber D, et al. Magnetic resonance tomography studies on age estimation of unaccompanied minor refugees. *Rechtsmedizin* 2015;25:12-20.

Ozveren N, Serindere G. Comparison of the applicability of Demirjian and Willems methods for dental age estimation in children from the Thrace region, Turkey. *Forensic science international* 018;285:38-43.

Palanisamy V, Rao A, Shenoy R, Baranya SS. Correlation of dental age, skeletal age, and chronological age among children aged 9-14 years: A retrospective study. *Journal of the Indian Society of Pedodontics and Preventive Dentistry* 2016;34:310-314.

Palmela Pereira C, Rodrigues A, Santos A, Salvado F, Santos R, Cameriere R. Cut-off for the legal ages in the Portuguese Population by Third Maturity Index: Measures of Accuracy. *Archives of oral biology* 2021;125:105089.

Pan J, Shen C, Yang Z, Fan L, Wang M, Shen S, et al. A modified dental age assessment method for 5- to 16-year-old eastern Chinese children. *Clinical oral investigations* 2021.

Panainte I, Pop SI, Martha K. Correlation Among Chronological Age, Dental Age and Cervical Vertebrae Maturity in Romanian Subjects. *Revista medico-chirurgicala a Societatii de Medici si Naturalisti din Iasi* 2016; 120:700-710.

Pandey H, Tripathi V, Pathak H, Choudhary SK, Parchake MB. Age estimation and comparison by dental and skeletal maturity in the age range of 9-18 years in the Mumbai region. *Journal of forensic dental sciences* 2019;11:142-146.

Patel PS, Chaudhary AR, Dudhia BB, Bhatia PV, Soni NC, Jani YV. Accuracy of two dental and one skeletal age estimation methods in 6-16-year-old Gujarati children. *Journal of forensic dental sciences* 2015;7:18-27.

Patnana AK, Vabbalareddy RS, V Vanga NR. Evaluating the reliability of three different dental age estimation methods in visakhapatnam children. *International journal of clinical pediatric dentistry* 2014;7:186-191.

Patnana AK, Vanga NRV, Chandrabhatla SK, Vabbalareddy R. Dental age estimation using percentile curves and regression analysis methods - A test of accuracy and reliability. *Journal of Clinical and Diagnostic Research* 2018;12:ZC01-ZC04.

Pavlovic S, Palmela Pereira C, Vargas de Sousa Santos RF. Age estimation in Portuguese population: The application of the London atlas of tooth development and eruption. *Forensic science international* 2017;272:97-103.

Peiris TS, Roberts GJ, Prabhu N. Dental Age Assessment: a comparison of 4- to 24-year-olds in the United Kingdom and an Australian population. *International journal of paediatric dentistry* 2009;19:367-376.

Periyakaruppan S, Meundi MA, David CM. Accuracy of age estimation in 6-21-year-old South Indian population - A comparative analysis of clinical and radiographic methods. *The Journal of forensic odonto-stomatology* 2018;36:10-19.

Phillips VM, van Wyk Kotze TJ. Testing standard methods of dental age estimation by Moorrees, Fanning and Hunt and Demirjian, Goldstein and Tanner on three South African children samples. *The Journal of forensic odonto-stomatology* 2009;27:20-28.

Pinchi V, De Luca F, Focardi M, Pradella F, Vitale G, Ricciardi F, et al. Combining dental and skeletal evidence in age classification: Pilot study in a sample of Italian sub-adults. *Legal medicine (Tokyo, Japan)* 2016;20:75-79.

Pinchi V, Pradella F, Vitale G, Rugo D, Nieri M, Norelli GA. Comparison of the diagnostic accuracy, sensitivity and specificity of four odontological methods for age evaluation in Italian children at the age threshold of 14 years using ROC curves. *Medicine, science, and the law* 2016;56:13-18.

Pourtaji B, Nasiri A. *Journal of Zanzan University of Medical Sciences and Health Services* 2017;25:104-114.

Prabhakar AR, Panda AK, Raju OS. Applicability of Demirjian's method of age assessment in children of Davangere. *Journal of the Indian Society of Pedodontics and Preventive Dentistry* 2002;20:54-62.

Prasad H, Kala N. Accuracy of two dental age estimation methods in the Indian population - A meta-analysis of published studies. *The Journal of forensic odonto-stomatology* 2019;3:2-11.

Rai V, Saha S, Yadav G, Tripathi AM, Grover K. Dental and skeletal maturity- a biological indicator of chronologic age. *Journal of clinical and diagnostic research : JCDR* 2014;8:ZC60-64.

Ranasinghe S, Perera J, Taylor JA, Tennakoon A, Pallewatte A, Jayasinghe R. Dental age estimation using radiographs: Towards the best method for Sri Lankan children. *Forensic science international* 2019;298:64-70.

Rath H, Rath R, Mahapatra S, Debta T. Assessment of Demirjian's 8-teeth technique of age estimation and Indian-specific formulas in an East Indian population: A cross-sectional study. *Journal of forensic dental sciences* 2017;9:45.

Ribier L, Saint-Martin P, Seignier M, Pare A, Brunereau L, Rerolle C. Cameriere's third molar maturity index in assessing age of majority: a study of a French sample. *International journal of legal medicine* 2020;134:783-792.

Roberts GJ, Lucas VS, Andiappan M, McDonald F. Dental Age Estimation: Pattern Recognition of Root Canal Widths of Mandibular Molars. A Novel Mandibular Maturity Marker at the 18-Year Threshold. *Journal of forensic sciences* 2017;62:351-354.

Roberts GJ, McDonald F, Andiappan M, Lucas VS. Dental Age Estimation (DAE): Data management for tooth development stages including the third molar. Appropriate censoring of Stage H, the final stage of tooth development. *Journal of forensic and legal medicine* 2015;36:177-184.

Rodríguez A, Verdugo V, Loarte G, Villavicencio E, Torracchi E. Estimation of the chronological age based on the mineralization of the third lower molar in the andean population. *Revista Estomatologica Herediana* 2020;30:272-277.

Rolseth V, Mosdol A, Dahlberg PS, Ding Y, Bleka O, Skjerven-Martinsen M, et al. Age assessment by Demirjian's development stages of the third molar: a systematic review. *European radiology* 2019;29:2311-2321.

Rolseth V, Mosdol A, Dalberg PS, Ding KY, Bleka O, Skjerven-Martinsen M, et al. 2017.

Rolseth V, Mosdøl A, Dalberg PS, Ding KY, Bleka Ø, Skjerven-Martinsen M, et al. Demirjian's Development Stages on Wisdom Teeth for Estimation of Chronological Age: A Systematic Review; 2017.

Rozkovicova E, Dostalova T, Markova M, Broukal Z. The third molar as an age marker in adolescents: new approach to age evaluation. *Journal of forensic sciences* 2012;57:1323-1328.

Rozylo-Kalinowska I, Kalinowski P, Kozek M, Galic I, Cameriere R. Validity of the third molar maturity index I3M for indicating the adult age in the Polish population. *Forensic science international* 2018;290:352.e351-352.e356.

Saade A, Baron P, Noujeim Z, Azar D. Dental and Skeletal Age Estimations in Lebanese Children: A Retrospective Cross-sectional Study. *Journal of International Society of Preventive & Community Dentistry* 2017;7:90-97.

Santiago BM, Almeida L, Cavalcanti YW, Magno MB, Maia LC. Accuracy of the third molar maturity index in assessing the legal age of 18 years: a systematic review and meta-analysis. *International journal of legal medicine* 2018;132:1167-1184.

Sarkar S, Kailasam S, Mahesh Kumar P. Accuracy of estimation of dental age in comparison with chronological age in Indian population--a comparative analysis of two formulas. *Journal of forensic and legal medicine* 2013;20:230-233.

Sasso A, Legovic M, Mady Maricic B, Pavlic A, Spalj S. Secular trend of earlier onset and decelerated development of third molars: evidence from Croatia. *Forensic science international* 2015;249:202-206.

Sasso A, Spalj S, Mady Maricic B, Sasso A, Cabov T, Legovic M. Secular trend in the development of permanent teeth in a population of Istria and the littoral region of Croatia. *Journal of forensic sciences* 2013;58:673-677.

Scendoni R, Zolotenkova GV, Vanin S, Pigolkin YI, Cameriere R. Forensic Validity of the Third Molar Maturity Index (I 3M) for Age Estimation in a Russian Population. *BioMed research international* 2020;2020:6670590.

Scheurer E, Sunitsch S, Stollberger R, Petrovic A. Dental age estimation: Evaluation of MR sequences for the imaging of tooth development. *Rechtsmedizin* 2011;21:364.

Shrawat JS, Singh M. Willems method of dental age estimation in children: A systematic review and meta-analysis. *Journal of forensic and legal medicine* 2017;52:122-129.

Selmanagic A, Ajanovic M, Kamber-Cesir A, Redzepagic-Vrazalica L, Jeleskovic A, Nakas E. Radiological Evaluation of Dental Age Assessment Based on the Development of Third Molars in Population of Bosnia and Herzegovina. *Acta stomatologica Croatica* 2020;54:161-167.

Shah R, Angadi PV. Radiographic assessment of periodontal ligament visibility in mandibular third molars as a tool for defining the 18-year threshold among Indians. *Australian Journal of Forensic Sciences* 2020.

Sharma P, Wadhwan V, Ravi Prakash SM, Aggarwal P, Sharma N. Assessment of age of majority by measurement of open apices of the third molars using Cameriere's third molar maturity index. *Journal of forensic dental sciences* 2017;9:96-101.

Sharma P, Wadhwan V, Sharma N. Reliability of determining the age of majority: a comparison between measurement of open apices of third molars and Demirjian stages. *The Journal of forensic odonto-stomatology* 2018;36:2-9.

Sharma R, Srivastava A. Radiographic evaluation of dental age of adults using Kvaal's method. *Journal of forensic dental sciences* 2010;2:22-26.

Shen C, Pan J, Yang Z, Mou H, Tao J, Ji F. Applicability of 2 Dental Age Estimation Methods to Taiwanese Population. *The American journal of forensic medicine and pathology* 2020;41:269-275.

Shi GF, Lie RJ, Tao J, Fan LH, Zhu GY. Application of Demirjian's method for chronological age estimation in teenagers of Shanghai Han population. *Fa yi xue za zhi* 2009;25:168-171.

Shilpa PH, Sunil RS, Sapna K, Kumar NC. Estimation and comparison of dental, skeletal and chronologic age in Bangalore south school going children. *Journal of the Indian Society of Pedodontics and Preventive Dentistry* 2013;31:63-68.

Soares CBRB, Figueiroa JN, Dantas RMX, Kurita LM, Pontual AdA, Ramos-Perez FMdM, et al. Evaluation of third molar development in the estimation of chronological age. *Forensic science international* 2015;254:13-17.

Sobieska E, Fester A, Nieborak M, Zadurska M. Assessment of the Dental Age of Children in the Polish Population with Comparison of the Demirjian and the Willems Methods. *Medical science monitor : international medical journal of experimental and clinical research* 2018;24:8315-8321.

Sousa AMdS, Jacometti V, AlQahtani S, Silva RHAd. Age estimation of Brazilian individuals using the London Atlas. *Archives of oral biology* 2020;113:104705.

Spinas E, De Luca S, Lampis L, Velandia Palacio LA, Cameriere R. Is the third molar maturity index (I3M) useful for a genetic isolate population? Study of a Sardinian sample of children and young adults. *International journal of legal medicine* 2018;132:1787-1794.

Srkoc T, Mestrovic S, Anic-Milosevic S, Slaj M. Association between Dental and Skeletal Maturation Stages in Croatian Subjects. *Acta clinica Croatica* 2015;54:445-452.

Subedi N, Parajuli U, Paudel IS, Mallik M. Demirjian's Eight Teeth Method for Dental age Estimation in Nepalese Population. *Journal of Nepal Health Research Council* 2021;18:686-691.

Sudha R, Balla SB. Usefulness of Demirjian's stages in determining the age of majority: A study on South Indian population. *Journal of Indian Academy of Forensic Medicine* 2017;39:123-130.

Sujir N, Chauhan NP, Pai KM, Ahmed J, Denny C, Shenoy N. Radiographic evaluation of third molar development in relation to chronological age among South Indian population. *Indian Journal of Forensic Medicine and Toxicology* 2020;14:252-256.

Sukhia RH, Fida M. Correlation among chronologic age, skeletal maturity, and dental age. *World journal of orthodontics* 2010;11:e78-84.

Tafrount C, Galic I, Franchi A, Fanton L, Cameriere R. Third molar maturity index for indicating the legal adult age in southeastern France. *Forensic science international* 2019;294:218.e211-218.e216.

Tan Y, Wang J, Ba K, Zhang S, Chen J, Luo Z, et al. Relationship between dental calcification stages of the third molar and ages among teenagers in Chengdu. *Hua xi kou qiang yi xue za zhi = Huaxi kouqiang yixue zazhi = West China journal of stomatology* 2013;31:272-278.

Tangmose S, Thevissen P, Lynnerup N, Willems G, Boldsen J. Age estimation in the living: Transition analysis on developing third molars. *Forensic science international* 2015;257:512.e511-512.e517.

Tao J, Wang Y, Liu Rj, Xu X, Li Xp. Accuracy of age estimation from orthopantomograph using Demirjian's method. *Fa yi xue za zhi* 2007;23:258-260.

Thevissen PW, Fieuws S, Willems G. Human dental age estimation using third molar developmental stages: does a Bayesian approach outperform regression models to discriminate between juveniles and adults? *International journal of legal medicine* 2010;124:35-42.

Thevissen PW, Fieuws S, Willems G. Third molar development: evaluation of nine tooth development registration techniques for age estimations. *Journal of forensic sciences* 2013;58:393-397.

Thevissen PW, Galiti D, Willems G. Human dental age estimation combining third molar(s) development and tooth morphological age predictors. *International journal of legal medicine* 2012;126:883-887.

Thorson J, Hagg U. The accuracy and precision of the third mandibular molar as an indicator of chronological age. *Swedish dental journal* 1991;15:15-22.

Toth ZO, Udvar O, Angyal J. Chronological age estimation based on dental panoramic radiography. *Kormeghatározás panoráma röntgenfelvételek alapján.* 2014;107:93-98.

Trakiniene G, Smailiene D, Kuciauskiene A. Evaluation of skeletal maturity using maxillary canine, mandibular second and third molar calcification stages. *European journal of orthodontics* 2016;38:398-403.

Trevino-Tijerina MC, Valenzuela-Garach A, Elizondo-Pereo RA, Cerda-Flores RM, Vargas-Villarreal J, González-Salazar F. Age estimation of teenagers from Monterrey (Mexico) by the evaluation of dental mineralization after multi-slice helical computed tomography. *Australian Journal of Forensic Sciences* 2016;48:138-149.

Tuteja M, Bahirwani S, Balaji P. An evaluation of third molar eruption for assessment of chronologic age: A panoramic study. *Journal of forensic dental sciences* 2012;4:13-18.

Uys A, Fabris-Rotelli I, Bernitz H. Estimating age in black South African children. *SADJ : journal of the South African Dental Association = tydskrif van die Suid-Afrikaanse Tandheelkundige Vereniging* 2014;69:54-51.

Uzuner FD, Kaygisiz E, Yeniay A, Darendeliler N, Zor ZF. Radiographic evaluation of third molar development in relation to chronological age, gender and jaws. *Journal of Oral and Maxillofacial Surgery* 2014;72:e80-e81.

Van Vlierberghe M, Boltacz-Rzepakowska E, Van Langenhove L, Laszkiewicz J, Wyns B, Devlaminck D, et al. A comparative study of two different regression methods for radiographs in Polish youngsters estimating chronological age on third molars. *Forensic science international* 2010;201:86-94.

Verochana K, Prapayasatok S, Janhom A, Mahasantipiya PM, Korwanich N. Accuracy of an equation for estimating age from mandibular third molar development in a Thai population. *Imaging science in dentistry* 2016;46:1-7.

Wang J, Bai X, Wang M, Zhou Z, Bian X, Qiu C, et al. Applicability and accuracy of Demirjian and Willems methods in a population of Eastern Chinese subadults. *Forensic science international* 2018;292:90-96.

Wang J, Ji F, Zhai Y, Park H, Tao J. Is Willems method universal for age estimation: a systematic review and meta-analysis. *J Forensic Leg Med* 2017; 52:130-6.

Wang J, Wang M, Shen S, Guo Y, Fan L, Ji F, et al. Testing the nonlinear equations for dental age evaluation in a population of eastern China. *Legal medicine (Tokyo, Japan)* 2021;48:101793.

Wang M, Fan L, Shen S, Bai X, Wang J, Ji F, et al. Applicability of the third molar maturity index for assessment of age of majority in Eastern China. *Legal medicine (Tokyo, Japan)* 2019;41:101639.

Wang M, Wang J, Pan Y, Fan L, Shen Z, Ji F, et al. Applicability of newly derived second and third molar maturity indices for indicating the legal age of 16 years in the Southern Chinese population. *Legal medicine (Tokyo, Japan)* 2020;46:101725.

Wang MTA, Huang B, Chiu AHY, Lam WM, Takahashi K, Bessho K, et al. Discrepancy between chronological age and evaluated dental age using the Demirjian system in Western Australian children. *Australian Journal of Forensic Sciences* 2015;47:469-474.

Witek T, Genet P, Merkens H, Boldt J, Petrovic A, Vallis J, et al. Dental age estimation: The chronology of mineralization and eruption of male third molars with 3T MRI. *Forensic science international* 2019;297:228-235.

Willems G, Thevissen PW, Belmans A, Liversidge HM. Willems II. Non-gender-specific dental maturity scores. *Forensic science international* 2010;201:84-85.

Willems G, Van Olmen A, Spiessens B, Carels C. Dental age estimation in Belgian children: Demirjian's technique revisited. *Journal of forensic sciences* 2001;46:893-895.

Wolf TG, Briseno-Marroquin B, Callaway A, Patyna M, Muller VT, Willershausen I, et al. Dental age assessment in 6- to 14-year old German children: comparison of Cameriere and Demirjian methods. *BMC oral health* 2016;16:120.

Yan J, Lou X, Xie L, Yu D, Shen G, Wang Y. Assessment of dental age of children aged 3.5 to 16.9 years using Demirjian's method: a meta-analysis based on 26 studies. *PloS one* 2013;8:e84672.

Yang Z, Geng K, Liu Y, Sun S, Wen D, Xiao J, et al. Accuracy of the Demirjian and Willems methods of dental age estimation for children from central southern China. *International journal of legal medicine* 2019;133:593-601.

Yusof MYPM, Thevissen PW, Fieuws S, Willems G. Dental age estimation in Malay children based on all permanent teeth types. *International journal of legal medicine* 2014;128:329-333.

Zatylna N, Rogowska K, Kozanecka A. Comparison of 6-12-year-old girls' and boys' dental age using Demirijan's method. *Dental and Medical Problems* 2013;50:64-70.

Zelic K, Galic I, Nedeljkovic N, Jakovljevic A, Milosevic O, Djuric M, et al. Accuracy of Cameriere's third molar maturity index in assessing legal adulthood on Serbian population. *Forensic science international* 2016;259:127-132.

Zeng DL, Wu ZL, Cui MY. Chronological age estimation of third molar mineralization of Han in southern China. *International journal of legal medicine* 2010;124:119-123.

Zhai Y, Park H, Han J, Wang H, Ji F, Tao J. Dental age assessment in a northern Chinese population. *Journal of forensic and legal medicine* 2016;38:43-49.