G22 Demirjian's Dental Age Estimation Using Third Molars: A Systematic Review

Tanuj Kanchan, MD, All India Institute of Medical Sciences, Jodhpur, Jodhpur, Rajasthan 342 005, INDIA; Rutwik D. Shedge, MSc, All India Institute of Medical Sciences, Jodhpur 342005, INDIA; Arun K. Patnana, MDS, All India Institute of Medical Sciences, Jodhpur 342005, INDIA; Kewal Krishan, PhD, Panjab University, Chandigarh 160 014, INDIA*

Learning Overview: This presentation aims at educating attendees as to the way of conducting literature searches and qualitative analysis in a systematic review. Attendees will learn whether third molar maturation, which is routinely studied for the purpose of age estimation, is a valid and reliable indicator of age.

Impact on the Forensic Science Community: The presentation will impact the forensic science community by presenting substantial proof related to the accuracy and reliability of third molars as indicators of whether an individual has attained the legal age of majority and will thus aid forensic anthropologists and medicolegal professionals across the globe in deciding whether to use Demirjian's scoring method for investigating third molar maturation in routine use.

Forensic age estimation in the living has paramount medicolegal and social implications in the modern world. It is a crucial aspect of identification in both civil and criminal law and is routinely conducted in individuals seeking asylum, unaccompanied minors, and refugees without proper documentation indicative of their identity. It is conducted in individuals participating in sports events, applying for jobs, pensions, etc. It is conducted before assigning criminal responsibility and in victims of child solicitation, pornography, etc.

Most of the methods of age estimation are based on observing appearance, ossification, or fusion as an indicator of skeletal maturity. These indicators being used for age estimation usually attain complete maturity by the age of 18 years and, hence, are ill-suited to define adulthood and legal maturity. Third molars usually erupt between the late teens and early 20s and thus can be used as markers to discriminate the age of an individual as being 18 years. Multiple studies investigating the use of third molar development for age estimation have been conducted, and most of these studies have used Demirjian's eight-stage scoring method. This method divides third molar maturation into eight distinct stages that can be observed in an orthopantomogram. However, as third molar eruption is quite inconsistent and unpredictable, a systematic review was planned by this study that aimed at verifying the accuracy and reliability of third molars as indicators of the age of an individual when their development has been graded using Demirjian's scoring system.

The present systematic review was registered in the International Prospective Register of Systematic Reviews (PROSPERO) under CRD42018099603 and included a methodical search across four databases for articles that answered the review question, "Are third molars accurate and reliable indicators of the dental age estimated using Demirjian's method?" This exhaustive search resulted in acquiring 1,402 articles that were screened down to ten articles after going through the titles, abstracts, and full texts of these 1,402 articles. The ten articles acquired after this arduous searching process were then subjected to qualitative synthesis using the QUADAS 2 tool, where they were observed to be devoid of a high risk of bias. The results of these studies were compared to seek the answer to the review question. It was observed that the third molar maturation, when scored using Demirjian's rating system, were statistically significantly correlated with the chronological age of participants across all the studies. Furthermore, it was observed that Stage H of Demirjian's scoring system showed a likelihood of an individual being more than 18 years of age that ranged from 75% to 100%. It was also observed that across all the studies, the difference between estimated and chronological ages of all the individuals ranged from 0.01 years to 1.5 years. The systematic review thus concluded that third molar maturity when analyzed using Demirjian's eight-stage scoring system is an accurate and reliable indicator of dental age.

Age Estimation, Third Molar, Demirjian's Method

*Presenting Author