

Age estimation by dental developmental stages in children and adolescents in Iceland

Sigríður Rosa Víðisdóttir ¹
Svend Richter ²

¹ Faculty of Odontology, University of Iceland, Reykjavík, Iceland

Corresponding author:
sv2@hi.is

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ABSTRACT

Introduction: For centuries teeth have been used both for identification of unknown persons and for estimating age for forensic and other scientific purposes. The dental age estimation technique is considered to be highly reliable in children and adolescents. Standard deviation in the developmental stages in this age group is from a few months to 1 to 2 years. In adults, where teeth have reached full development, regression changes are used, but the accuracy is much less than in dental development. Studies have shown that it is necessary to create a database for dental maturity for every population and compare it to others. The present study is the first one for dental development in the Icelandic population; the age range being 4-24 years. It will help in forensic dental age estimation and will also help dentists, physicians, anthropologists, archaeologists and other professionals who rely on developmental age assessment in children and adolescents.

Material and methods: In the present study, which is a retrospective cross-sectional study, dental maturity was determined in 1100 Icelandic children and adolescents from orthopantomograms (OPGs). The first 100 were used for a pilot study and the remaining 1000 for the main study. A total of 23 were excluded. The sample consisted of 508 girls and 469 boys from the age of 4-24 years. Dental developmental scoring system was used as a standard for determination of dental maturity stages. A total of 200 OPGs were studied both on the left and right side and the remaining on the right side. Dental maturity was established for all teeth and both genders, when the sample permitted, from the beginning of crown formation to the root apex closure.

Results: The Cronbach's Alpha reliability test showed high reliability, $R = 0.982$. Girls in Iceland reach full dental maturity (stage 10, R_0) at 17.81 years of age for the maxillary and 18.47 years in the mandibular teeth. Boys reach full dental maturity at 18.00 years of age in the maxilla and 17.63 in the mandible. There was no significant difference between left and right side ($r = 0.95-1.00$). There was no gender difference, except in root formation in maxillary and mandibular canines where girls reached apex closure earlier than boys.

Conclusion: A reliable database has been established in Iceland for tooth development in the age range of 4-24 years, which is compatible with international studies. These results will help forensic odontologists and other professionals to estimate with high accuracy age and dental maturity in Icelandic children and adolescents.