

# Modification of age estimation techniques among children from Transcarpathian region

Yevhen Y. Kostenko <sup>1</sup>

Mishalov D. Volodymyr <sup>2</sup>

Myroslav Y. Goncharuk-Khomyn <sup>3</sup>

<sup>1</sup> Department of Prosthetic Dentistry, Uzhhorod National University, Association of Forensic Dentistry in Ukraine. Uzhhorod, Ukraine

<sup>2</sup> Department of Prosthetic Dentistry, Uzhhorod National University, Scientific and Research Centre of Forensic Odontology, Association of Forensic Dentistry in Ukraine. Uzhhorod, Ukraine

<sup>3</sup> Department of Forensic Medicine, National Medical Academy of Postgraduate Education named after P.L. Shupyk, Kyiv, Ukraine

**Corresponding author:**

**mirhom@rambler.ru**

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## ABSTRACT

Age estimation in forensic medical practice based on the analysis of the skeletal elements that develops and forms due to specific age features or progressive processes that are quite slow and goes on periodically in order, and so can be used as a reliable indicator for age identification criteria.

During the testing of radiographic dental age estimation methods on a sample of 188 panoramic x-rays of children aged from 4 to 16 years, who were treated previously at the University Dental Clinic, it was found that the proposed approaches of Haavikko and Demirjian characterized by significant levels of absolute errors in the range of 0.79 -1.56 years. This fact indicates the need for modification of the standard calculation algorithms to minimize data variation parameters and calculate the parameters for proximization of dental age due to valid passport criteria.

Given that the rate of Pearson correlation between the intermediate data of tooth-jaw apparatus formation by Demirjian and final results determined by the method of Haavikko was argued, we provided specific regression equation based on standardization statistic principle of all values calculated among children's orthopantomograms from Transcarpathian region. By use of this equation in the age group of 4,0-4,9 years the value of absolute error was reduced to 0,136 years, compared with 0.46 and 0.64 for Haavikko and Demirjian respectively, in the age group of 5,0-5,9 - to 0.219 years compared with 1.26 and 0.72 for Haavikko and Demirjian respectively, in the age group of 6,0-6,9 - up to 0.09 years compared with 1.03 at 0.71 for Haavikko and Demirjian respectively, in the age group of 7,0-7,9 years - for 0,021 years, compared with 0.85 and 0.75 for Haavikko and Demirjian respectively, in the age group 8,0-8,9 - to 0.168 years compared with 0.57 for Haavikko and Demirjian respectively, in the age group 9,0-9,9 - up to 0,074 years, compared with 1.13 and 0.8 for Haavikko and Demirjian respectively, in the age group 10,0-10,9 - to 0.205 years compared with 0.46 at 0.66 for Haavikko and Demirjian respectively, in the age group 11,0-11,9 - to 0.284 years compared with 0.46 per Haavikko and 0.8 per Demirjian, in the age group of 12,0-12,9 - for 0,075 years, compared with 0.7 and 0.6 for Haavikko and Demirjian respectively, in the age group 13,0-13,9 - to 0.189 years compared with 0.7 per Haavikko and 0.8 per Demirjian, in the age group 14,0-14,9 - to 0.306 years compared with 0.39 at 0.71 for Haavikko and Demirjian respectively, in the age group of 15,0-15,9 - to 0.12 years compared with 0.9 and 0.84 for

Haavikko and Demirjian respectively, in the age group of 16,0-16,9 - to 0.252 years compared with 0.51 and 0.69 for Haavikko and Demirjian respectively.

The complexity of mathematical calculations performed during the age evaluation of children, which includes the conversion stages of qualitative variables into subsequent quantitative data of the interim ratios argued the feasibility to develop semi-automatic form for calculating the age of the person using the computer application software. Prototype of this form have been developed for Haavikko, Demirjian, Cameriere, Willems, Kvaal, Cameriere (for adults) methods in Microsoft Excel 2016 (Microsoft Office 2016) software. The basic principle of operation of the proposed algorithm is that the operator enters into the corresponding cells of editor only the raw data, such as formation level, radiological parameters of the pulp and tooth length and width parameters depending on the protocol of the original stages for each of the technique. Then the program automatically publishes final figures of dental age range and all variances of absolute errors from the smallest to the largest.