

# Age estimation using cervical vertebral maturation

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## ABSTRACT

**Aim:** the aims of this study were to 1) assess the reproducibility of Cervical Vertebral Maturation (CVM) method as described by Baccetti et al., 2) evaluate the relationship between chronological age and CVM stages 3) investigate the potential for age estimation of this method.

**Materials and Method:** the sample consisted of 474 lateral cephalometric radiographs, from patients aged 6.4-22.4 years (217 males and 257 females), following specific inclusion criteria. Six raters of various educational backgrounds were trained to CVM method. All images were assessed twice under the same conditions. Intra- and inter-rater agreement was assessed by Cohen's weighted kappa and intraclass correlation coefficient, respectively. Analysis of variance was fitted to investigate the correlation between chronological age and cervical maturation stages. The potential for age prediction was tested by general linear model regression analysis.

**Results:** intra-rater reliability ranged from 0.857 to 0.931. Intra-rater absolute agreement ranged from 77% to 87.3%. Inter-rater reliability was >0.9, whereas inter-rater absolute agreement was <50%. The lowest reproducibility was found for the 3rd Cervical Maturation Stage (CS3). Mean age differences among the 6 CS stages were statistically significant and increased as the CS increased. Linear model regression analysis showed that although gender and CS could explain roughly 60% (adjusted  $R^2=0.61$ ) of the age variance of the sample.

**Conclusions:** CVM method presented high intra- and inter-rater agreement. However, CVM cannot predict accurately the pubertal growth spurt. A direct and expected correlation was found between chronological age and cervical stages. CVM method provides a broad estimation about chronological