Factors influencing the dynamic behavior of human teeth.

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Abstract

Modal analysis is carried out to test the natural frequencies of certain human teeth, including central incisors (CIs), canines (CAs), first premolars (FPs) and first molars (FMs). A total number of 1007 teeth are tested, taking into account tooth type, oral location, age and gender, to analyse the effects of the above-mentioned factors on the natural frequency of the sample teeth. The results reveal that no significant difference in the natural frequency is noted among teeth in the four different intra-oral quadrants. Nevertheless, tooth type and age elicit an effect upon the value of the natural frequency of teeth. On the other hand, the mean value for the natural frequency of CIs (1.27 +/- 0.15 kHz), CAs (1.30 +/- 0.15 kHz), FPs (1.27 +/- 0.15 kHz) and FMs (1.16 +/- 0.12 kHz) for males are significantly lower ($p < 0.01$) than the analogous figure for females (1.41 +/- 0.21 kHz for CIs, 1.40 +/- 0.18 kHz for CAs, 1.37 +/- 0.20 kHz for FPs, and 1.25 +/- 0.16 kHz for FMs). Moreover, the natural frequency of teeth in male subjects varies with age ($p < 0.05$). The highest mean frequency of CIs, CAs and FPs for the male subjects is found for the group aged between 40 and 49 years. On the other hand, the natural frequency for the similar set of teeth for the female subjects is shown to be in no way associated with age.