

## ·基础与临床研究·

## 酸蚀对人磨牙抗压强度影响的体外研究

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**【摘要】目的** 研究饮食引起的酸性口腔环境对人磨牙抗压强度的影响, 评估咬合坚硬食物应力下的脆性折断风险, 结合体外压缩强度试验和数值计算进行定量评估。**方法** 采用乙酸水溶液对尺寸差异较小的人磨牙进行体外等效酸蚀处理, 分无酸蚀、轻度、中度和重度酸蚀组。对全部牙体进行压缩强度试验, 建立有限元模型分析断裂破坏过程和规律。**结果** 4组牙体破坏形式相似, 均为无屈服阶段的脆性断裂。在无酸蚀组出现最大破坏载荷为 2.79 kN, 在重度酸蚀组出现最小破坏载荷为 1.30 kN。有限元分析结果表明: 牙体破坏时最大与最小应力分别为 289 MPa 和 141 MPa。本研究等效重度酸蚀体外实验表明磨牙强度下降 53.4%。数值模拟结果预测, 当垂直牙体咬合受力时, 符合几何突变处出现最大应力集中的规律。**结论** 酸蚀对牙体抗压强度有显著影响, 长期酸蚀在咬合坚硬食物条件下, 存在局部应力集中导致的脆断风险。

**【关键词】** 人磨牙 酸蚀 抗压强度 数值模拟

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*In vitro* study of the effect of acid etching on compressive strength of human molarsLi Pingping<sup>1</sup> Wu Qi<sup>2</sup>

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**【Abstract】Objective** The aim of this study was to investigate the diet-mediated acid oral environment on the mechanical properties of human teeth, to evaluate the risk of brittle fracture under stress caused by biting hard food, and quantitatively determine the impact of acid corrosion on the damage degree of human teeth based on compressive strength numerical calculation. **Methods** Human molars with small difference in sizes were divided into four groups with different ratios of acetic acid solution. Compression tests were carried out on all of the teeth. A finite element model was established to analyze the fracture process. **Results** Failure modes of the four groups were similar, all of them were brittle fracture without yield stage. The maximum damage load 2.79 kN was found in the non-acid group and the minimum damage load 1.3 kN was found in the severe acid group. The results of finite element simulation showed that the maximum and minimum stresses were 289 MPa and 141 MPa respectively, the strength decreased 53.4%. **Conclusion** Acid etching has a significant effect on the compressive strength of teeth. Under the acid condition of hard food biting for a long time, there is a risk of local stress concentration and brittle fracture.

**【Key words】** Molar Acid etching Compressive strength Numerical simulation

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