

INFLUENCE OF ACIDIC ENVIRONMENTS ON THE WEAR RESISTANCE OF 5Y-ZP ZIRCONIA

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ARTICLE HISTORY

Received: 1 September 2025 **Revised:** 22 September 2025 **Published:** 7 October 2025

ABSTRACT

This study aimed to investigate the wear resistance of 5 mol% yttria-stabilized zirconia (5Y-ZP) when exposed to different acidic environments. Sixty flat zirconia specimens were fabricated and randomly divided into three groups (n = 20 per group), each immersed in one of the following media: distilled water (control), Coca-Cola, or distilled vinegar. All specimens underwent wear testing using a dual-axis chewing simulator under a 49-N load for 120,000 cycles. Wear depth, volume loss, and surface roughness were measured using a 3D profilometer, while surface morphology and elemental composition were analyzed by scanning electron microscopy (SEM) coupled with energy-dispersive X-ray spectroscopy (EDX). Significant differences in wear were observed among the groups (P<.05), with specimens immersed in distilled water exhibiting the greatest wear, followed by vinegar, and Coca-Cola resulting in the least material loss. SEM revealed microcracks and changes in surface roughness in acidic environments. Additionally, EDX analysis showed reduced yttria content in the specimens immersed in acidic solutions. Acidic environments significantly influenced the wear behavior of 5Y-ZP zirconia. Although 5Y-ZP zirconia is known for its chemical stability, these findings suggest that exposure to acidic conditions can lead to surface degradation and yttria depletion, potentially compromising the material's clinical longevity.

Keywords: Dental, Zirconia, Acidic Environments, Wear Resistance

CITATION INFORMATION: Kangsanarak, B., Jia-Mahasap, W., & Rungsiyakull, P. (2025). Influence of Acidic Environments on the Wear Resistance of 5Y-ZP Zirconia. *Procedia of Multidisciplinary Research*, 3(10), 36.

Data Availability Statement: The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Conflicts of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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