IN VITRO EVALUATION OF ENAMEL WEAR BY GLAZED AND POLISHED DENTAL PORCELAINS USING THE RADIOMETRIC METHOD

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Dental porcelain is one of the most widely used material in Dentistry today, mainly due to its esthetic properties. The disadvantages of dental porcelain use include low impact strength and possibility to cause tooth or dental material wear. The latter has stimulated some authors to discourage the use of porcelain on occluding surfaces, yet its surface treatment may be important to reduce the risks of opposing tooth wear. Porcelain surfaces can be polished or glazed before placed in the mouth.

To analyze the influence of the porcelain glazing and polishing procedures on its capacity to cause dental wear, this study evaluated the *in vitro* enamel wear caused by the commercial brands Ceramco II, Noritake and Finesse, by means of the radiometric method. The average roughness (Ra) of dental porcelains was measured to verify their correlation with enamel wear. These measurements were carried out with a profilometer. The specimens were also photographed with an optical microscope.

Five specimens of dental enamel and 10 specimens of each porcelain (5 glazed, 5 polished) were used. The enamels had dimensions of 5 x 8 mm, with a flat surface. The porcelains had cylindrical shape, with 6mm height and a 3.8 mm diameter. Each enamel was submitted to the artificial wear caused by 6 specimens of porcelains (3 commercial brands, glazed and polished).

For the radiometric analysis, the dental enamel was first flattened, cut and then irradiated with neutrons from the IEA-R1 nuclear reactor (IPEN/CNEN) and then submitted to the surface wear test by each porcelain group. A mechanical machine was used to provoke the wear of the material. This machine has a long stick, in which the bottom is adapted for the antagonistic material. The irradiated enamel is placed inside an acrylic plate which is then placed inside an acrylic reservoir, with 10 mL of distilled water and mounted in the machine. This machine allows a sliding motion of the antagonistic material on the surface of the irradiated enamel producing wear. Each cycle refers to a complete forward-and-backward movement. After 2,500 cycles for each porcelain specimen, the released enamel residue was evaluated, using a Geiger-Müller detector to measure beta radiation from ^{32}P of the enamel. The amount of worn enamel was calculated by comparative method of neutron activation analysis

The results from dental wear varied from 39 ± 11 to 88±104μg of dental tissue, and showed no statistical difference (Kruskall Wallis, $\alpha = 0.05$) between the enamel wear caused by glazed and polished porcelains. Moderate correlation was verified between the enamel wear capacity and Ra of dental porcelains. The qualitative analysis of the roughness before and after the wear test showed differences in the surface of porcelains, even though baseline and final Ra means did not statistically differ.

From this study we concluded that there is a correlation between roughness of the porcelain and antagonistic enamel wear. There was no statistical difference between antagonistic enamel wear caused by glazed and polished porcelains. The numerical differences of the dental wear and the qualitative analysis of the porcelain surface roughness suggest that the tribological behavior of the porcelains are not directly related to the surface treatment, but varies according to each specific porcelain.

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