SDM
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"MICROWAVE GLAZING OF PORCELAIN AND ITS EFFECT ON SURFACE ROUGHNESS, FLEXURAL STRENGTH AND COLOUR STABILITY AS COMPARED WITH CONVENTIONAL OVEN GLAZING- AN INVITRO STUDY"

By

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ABSTRACT

Introduction: The demand for increased esthetic and functional needs has resulted in the more frequent use of ceramic materials. There is a constant need to improve properties of the available ceramics in order to meet the patient's requirements. Although the superior qualities of microwave technology are common knowledge in the industry, effects of microwave glazing of dental ceramics have not been investigated.

Objective: The purpose of the study undertaken was to investigate the surface roughness, flexural strength and resistance to staining achieved by glazing two commercially available porcelains in a microwave oven. And further, to compare the qualities of microwave glazed porcelains with oven glazed porcelains and hand polished, unglazed porcelains.

Methodology: Thirty specimens of each type of porcelain (Noritake Super EX-3 and IPS Classic) were fabricated and sintered in a conventional oven. The specimens were further divided into 3 groups (n=10): unglazed (handpolished using diamond rotary ceramic polishers), microwave glazed, and conventional oven glazed. Each specimen was evaluated for surface roughness (μm) using a profilometer. The flexural strength (MPa) of each specimen was measured with a three-point bend test using a universal testing machine and the resistance to staining was measured by soaking the samples in methylene blue for 24 hrs and using a spectrophotometer to test the mean colour change (ΔE).

The data was tabulated and subjected to statistical analysis. The mean and standard deviation was calculated for each group and subjected to test for normality.

Results: The two porcelains showed comparable surface roughness and flexural strength with regards to microwave glazing of the samples. However, a statistically significant difference was noted in the colour stability between the two groups of microwave glazed porcelains. There was statistically significant difference between the unglazed, oven glazed and microwave glazed samples with respect to surface roughness, flexural strength and colour stability ($p<0.001$). Results showed that the microwave glazed samples differed significantly from the unglazed and oven glazed samples with respect to surface roughness ($p<0.001$) and colour stability ($p<0.001$). The microwave glazed samples did not differ significantly from the oven glazed samples in regard to flexural strength but both glazed samples showed statically significant difference in flexural strength as compared to unglazed samples ($p=0.002, 0.004$).

Conclusion: Within the limitations of the study and for the materials used in the study, it was concluded that the surface character and resistance to staining of microwave-glazed porcelain was superior to oven-glazed porcelain and unglazed porcelain. The flexural strength of microwave glazed porcelain was comparable to oven glazed porcelain which was superior to unglazed porcelain.

Keywords: ceramics, microwave glazing, surface roughness, flexural strength, colour stability