February, 2010

Microstructural Characteristics of Functionally Graded Materials Designed as Dental Post

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Aim: To study the interfaces and microstructure of multilayered materials fabricated based on functionally graded concept for use as dental posts. **Method**: Three types of multilayered composite materials were produced using powders of Zirconia (ZrO_2), Alumina (Al_2O_3), Hydroxyapatite (HA) and Titanium (Ti). The powders were compacted into a cylindrical steel die in an uniaxial hydraulic press at 250 MPa producing of 12.7 mm in diameter and 8 mm in the height. The compacted specimens were then sintered in a tube furnace at 1200°C for 1 hour under flowing argon gas. Two specimens were fabricated from each of the three multilayered composite. SEM, EDX and XRD techniques were used for characterization of material interfaces and their microstructure. **Results:** The scanning electron micrographs showed that interfaces between the 1st, 2nd, 3rd and 4th layers showed continuous boundaries free of defects and graded phase distribution. Whilst the microstructure of the 1st, 2nd, 3rd and 4th layers showed a gradual change in the Ti concentration that confirms the functionally graded design of the multilayered composite material. EDX and XRD analyses from different areas of themicrostructures confirmed the presence and gradual change of Ti-HA-ZrO_2-Al_2O_3elements and phases in the all specimens. **Conclusions:** Multilayered dental post utilizing the functionally graded design approach may be able to minimize the occurrence of root fractures in endodontically treated teeth.

This study was supported by PS354/2008C, University Malaya

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Variations in Clinical Features of Premolars in Young Malaysian Adults: A Preliminary Analysis

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Objectives: The objective of the study was to determine the prevalence of clinical features of premolars in young Malaysian adults aged 15-35 years old. **Methods:** This is a cross-sectional epidemiological study. Subjects from secondary school in Klang Valley which were randomly selected and polyclinic UKM were screened. Impressions of 200 subjects who fulfilled the inclusion criteria were taken using alginate and poured into dental casts. Dental casts were then examined and data entered into SPSS programme and analysed. **Results:** All first premolars were present and 1% of second premolars were clinically missing (n=4). In first premolars, 60.9% (n=487) were in normal position, 1.1% (n=9) were impacted, 33.6% (n=269) were rotated and 4.4% (n=35) were displaced either buccally or palatally. In second premolars, 53.5% (n=426) were in normal position, 1.6% (n=13) were impacted, 40.1% (n=319) were rotated and 4.8% (n=38) were displaced. **Conclusion:** With the exception of third molars, this study found that the second premolar is the most common missing teeth compared to first premolar and less than 50% of first and second premolars showed variations of their positions.

This study was supported by FRGS, Grant no: UKM-DD-03-FRGS 0003-2009