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Initiative of the Research Unit of College of Dentistry, Imam AbdulRahman Bin Faisal University
Evaluation of dental light curing units

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Light cured resin based composites are considered as one of the preferred option to restore both anterior and posterior teeth (1). The polymerization of light cured composites can be initiated by the dentist and is regarded as one of the major advantage over other filling materials (2). In order to polymerize light cured resin based composite and change it to a solid restorative material so that it can withstand the challenges of oral cavity, adequate light energy in the correct wavelength must be delivered from the light curing unit (3). The quality of the energy directed to resin based composite restorations can be affected by multiple factors such as intensity of light source, the duration of light from light curing unit to resin, the distance between the surface of resin and curing tip and the range of the wavelength (4). Commercially, a photo-initiating system for dental applications is based on camphorquinone and different amines. The light absorbed in the UV-region by camphorquinone is in the range of 200-300nm, while at 467nm, light will be absorbed in the visible light region (5). There are four main types of polymerization sources: Halogen bulbs (QTH), plasma arc lamps, argon ion lasers and light emitting diodes (LED) (2). QTH and LED are the most famous types of light curing units used in dental clinics (6). QTH curing lights have a disadvantage of short lifespan of 40-100 hours due to the bulb, reflector and filter degradation over time as a result of heat produced during cycles, while LED lights are currently more widely used as they have the advantage of being cordless, lighter weight and their life expenditure can be around 10,000 hours (7).

The LED and QTH curing lights produce a narrow spectrum of blue light in the 400-500nm region, while the intensity ranges between 400-600mW/cm². Intensity of curing lights is one of the important factor to achieve adequate polymerization to accomplish the desired properties of resin composite such as mechanical properties, solubility, dimensional stability, change in color and biocompatibility (8). According to the literature, the intensity of these curing units should be more than 300-600 mw/cm² (9). Therefore, 300mW/cm² must be considered as the minimum intensity value to polymerize resin-based composite of 2mm thickness increment for 30-40 seconds (10). Also, the American National Standard Institute and American Dental Association (ANSI/ADA) recommends that “The light radiance existent in the 400 to 515nm wavelength region should be no less than 300mW/cm²”. Dental radiometers are inexpensive and simplified version of sophisticated laboratory based equipment, which can provide a general benchmark in evaluating the intensity output of curing lights. It is a handheld device consisting of a small round sensor with a diameter between 7-13mm and is large enough to accommodate the tips of currently available curing lights. Once the light is irradiated, the intensity output is shown in the form of digital or analog reading.
Recently, data was collected from private dental clinics of Dammam during college of dentistry interns’ research program which evaluated the distribution of light curing units and their intensity output using a commercially available dental radiometer. A total of 200 curing units were examined out of which 177 were LED units and 23 were QTH units. 13% of all light curing units had intensity less than 300mW/cm². Among LED units, 12.4% had light intensity less than 600mW/cm², while for halogen units, 17.3% units had light intensity less than 300mW/cm² and therefore were considered clinically unacceptable. Similar studies have been carried in different parts of the world which shows that significant proportion of curing lights perform unsatisfactorily (11-13).

Therefore, it is vital that the assessment of light curing units should be done regularly during in vitro and in vivo studies, to assure adequate output.

References:


**Abstract**

**Objectives:** The aim of the present study was to test cutting efficiency of different materials against conventional alumina in an air abrasion system. **Methods:** The powder samples were divided into three groups: Group 1 - alumina (control), Group 2 - 45S5 bioactive glass, and Group 3 - hydroxyapatite. 30 microscope glass slides of 0.5 mm thickness were used as an alternative of human enamel and were also divided randomly into these three groups. The time taken by the abrasive particles to cut a hole through the microscope glass slide was recorded with a stopwatch. In addition, morphology of the particles was observed through scanning electron microscopy (SEM). At-test was used to compare the times taken to cut a hole through the microscope glass slides, and the level of significance was set at P < 0.05. **Results:** The mean time taken to cut a hole through the microscope glass slide was 2.96 s and 23.01 s for Groups 1 and 2, respectively, whereas powder of Group 3 did not cut after 120 s. The differences between cutting times of Groups 1 and 2 were statistically significant (P < 0.05). The SEM micrographs revealed coarse angular shape for particles of Groups 1 and 2 but Group 3 particles were with round ends and presence of smaller particles was also observed in Groups 2 and 3. **Conclusion:** The alumina particles demonstrated excellent cutting efficiency followed by 45S5 particles. The use of bioactive glass particles should be encouraged for cutting purposes whenever a shortage of time for practitioners is not a concern.


**Abstract**

The percentage of completely and partially edentulous patients and their prosthetic treatment at the Department of Substitutive Dental Sciences (SDS), College of Dentistry, University of Dammam, were investigated. Panoramic radiographs and medical records of adult patients (n = 479, mean age 45.9 years, and range 25-96 years) treated in 2011-2014 were examined. 6% of the patients were completely edentulous, 8% had single jaw edentulousness, and 74% were partially edentulous. Edentulousness was significantly correlated with age and the number of missing teeth was significantly higher among males (p < 0.026). Diabetes was significantly associated with complete edentulousness, single edentulous jaw (p value 0.015), and partial edentulousness (p value 0.023). Kennedy class III was the most frequent class of partial edentulousness in single and/or both jaws (p = 0.000). Patients having class I and/or class II were treated most often with removable partial dentures (RPD) (p = 0.000), while patients having class III were treated with fixed partial dentures (FPD). It was found that complete edentulousness increases in older age and the number of missing teeth was significantly higher among males. Kennedy class III was most common in both upper and lower jaw and was treated more often with FPD than with RPD.


**Abstract**

Book chapter. No abstract available.

**Indexing Status:** Scopus: ☀ Web of Science: ☀ PubMed: ☀

**Abstract**

The process of tooth eruption consists of two phases, active and passive. While the distinction is unequivocal, the mechanism is ambiguous. This article compares and contrasts altered passive eruption (APE) and active secondary eruption (ASE). Although these phases present with similar clinical manifestations, each has its own etiology, physiogenesis, and pathogenesis. Furthermore, the differential diagnosis between the two, and that between other mirroring conditions, is essential for arriving at a definite diagnosis and correct treatment strategies, which may be similar but have different consequences. This article concludes with two case studies that show the management of APE and ASE, highlighting the treatment similarities and differences that are dependent on the specific etiology.


**Indexing Status:** Scopus: ☀ Web of Science: ☀ PubMed: ☀

**Abstract**

**OBJECTIVES:** To describe peer-assisted learning (PAL) groups formed by dental undergraduate students in a biomedical course and to investigate the association of individual and group characteristics with academic performance. **SUBJECTS AND METHODS:** In 2015, 92 fourth-year students (43 males and 49 females) in the College of Dentistry, University of Dammam, Saudi Arabia, were invited to form PAL groups to study a unit of a biomedical course. An examination was used to assess their knowledge after 2 weeks. In addition, a questionnaire and social network analysis were used to investigate (1) individual student attributes: gender, role, subject matter knowledge, grade in previous year, teaming with friends, previous communication with teammates, and content discussion, and (2) group attributes: group teacher’s previous grade, number of colleagues with whom a student connected, teaming with friends, similarity of teammates’ previous grades, and teacher having higher previous grades than other teammates. Regression analysis was used to assess the association of examination scores with individual and group attributes. **RESULTS:** The response rate was 80.4% (74 students: 36 males and 38 females). Students who previously scored grades A and B had higher examination scores than students with grades C/less (regression coefficient = 18.50 and 13.39) within the groups. Higher scores were not associated with working in groups including friends only (regression coefficient = 1.17) or when all students had similar previous grades (regression coefficient = 0.85). **CONCLUSIONS:** Students with previous high grades benefited to a greater extent from working in PAL groups. Similarity of teammates in PAL groups was not associated with better scores.


**Indexing Status:** Scopus: ☀ Web of Science: ☀ PubMed: ☀

**Abstract**

**OBJECTIVES:** To determine the combined effect of fatigue cyclic loading and thermocycling (CLTC) on the shear bond strength (SBS) of a resin cement to zirconia surfaces that were previously air-abraded with aluminum oxide (Al2O3) particles at different pressures. **MATERIALS AND METHODS:** Seventy-two cuboid zirconia specimens were prepared and randomly assigned to 3 groups according to the air-abrasion pressures (1, 2, and 2.8 bar), and each group was further divided into 2 groups depending on aging parameters (n = 12). Panavia F 2.0 was placed on pre-conditioned zirconia surfaces, and SBS testing was performed either after 24 hours or 10,000 fatigue cycles (cyclic loading) and 5,000 thermocycles. Non-contact profilometry was used to measure surface roughness. Failure modes were evaluated under optical and scanning electron microscopy. The data were analyzed using 2-way
RESULTS: The 2.8 bar group showed significantly higher surface roughness compared to the 1 bar group ($p < 0.05$). The interaction between pressure and time/cycling was not significant on SBS, and pressure did not have a significant effect either. SBS was significantly higher ($p = 0.006$) for 24 hours storage compared to CLTC. The 2 bar-CLTC group presented significantly higher percentage of pre-test failure during fatigue compared to the other groups. Mixed-failure mode was more frequent than adhesive failure. CONCLUSIONS: CLTC significantly decreased the SBS values regardless of the air-abrasion pressure used.

Abstract

OBJECTIVE: To evaluate the periodontal abscess as a possible oral clinical diagnostic criteria for the diagnosis of diabetes mellitus in the elderly. METHODS: In this clinical outpatient department, cross-sectional study of 84 months, 143 212 subjects between the ages of 40 and 84 years were screened for the presence of periodontal abscess. Relevant medical and dental histories were recorded using a questionnaire. The subjects who fulfilled the inclusion criteria of undiagnosed diabetes mellitus, presence of periodontal abscess, and absence of other systemic disease were referred for laboratory diagnosis of diabetes mellitus (HbA1c). The subjects tested positive for the diabetes were noted, statistical evaluation was undertaken to correlate between undiagnosed diabetes mellitus and periodontal abscess. RESULTS: It was found out that 0.05% undiagnosed diabetes was noted among the 143 212 patients. Among the 143 212 subjects, 1352 met the inclusion criteria having periodontal abscess. Mean age of the participants was 57 ± 14.2 years. Among the 1352 subjects with periodontal abscess: 793 (58.65%) subject subjects had increased HbA1c ($\geq 6.5\%$ or $47.5 \text{ mmol/mol or } 7.8 \text{ mmol/L}$); 559 (41.35%) individuals reported to have normal HbA1c ($\leq 6.5\%$ or $47.5 \text{ mmol/mol or } 7.8 \text{ mmol/L}$). The difference was found to be statistically significant. CONCLUSION: Periodontal abscess can be considered as possible oral clinical diagnostic criteria for the diagnosis of diabetes mellitus. Elderly individuals visiting dental clinics need to be given due attention to find out the possibility of having this systemic condition. Medical fraternities are advised to consider oral health parameters in the evaluation of the medical status of elderly individuals.

Abstract

OBJECTIVE: To assess intended refusal of recent graduates from three Arab dental schools to treat HIV + patients and factors associated with this intention. MATERIALS AND METHODS: In 2015, convenience samples of recent dental graduates were included from Libya, Egypt and the United Arab Emirates. Participants responded to a questionnaire assessing personal background, knowledge of oral manifestations and fluids transmitting HIV, perceived adequacy of training and self-efficacy to manage blood exposures, attitude to risk of infection, moral beliefs and willingness to treat HIV + patients. Logistic regression assessed factors associated with intended refusal to treat HIV + patients. RESULTS: The overall response rate was 552/710 (77.8%), mean age = 23.7 years with 41.8% males. The mean (SD) scores for knowledge of oral manifestations and fluids transmitting HIV were 5.5 (1.3)/8 and 4.2 (1.7)/7. The mean (SD) scores for attitude to risk of infection and moral beliefs were 2.9 (1.0)/4 and 2 (0.9)/3, respectively. One-third of respondents indicated intention to refuse treating HIV + patients. Knowledge of body fluids transmitting HIV and moral beliefs were associated with lower odds of refusing to treat HIV + patients (OR = 0.86 and 0.38) whereas attitude indicating greater concern for risk of infection was associated with higher odds (OR = 1.54). CONCLUSIONS: One third of dentists from three Arab dental schools indicated they would refuse to treat HIV + patients. Adequate knowledge and moral beliefs reflecting professional ethics were
associated with lower odds of refusal counterbalancing the association with attitude indicating increased concern for risk of infection with implications for dentist education and training.


Abstract
PURPOSE: To evaluate the effect of cyclic mechanical loading, thermal cycling, and storage in water on a resin nanoceramic chairside computer-aided designed/computer-aided manufactured (CAD/CAM) material compared to a control leucite-reinforced glass-ceramic material. MATERIALS AND METHODS: One hundred twenty specimens (18 × 4 × 3 mm) were milled from two chairside CAD/CAM materials' blocks (Lava Ultimate: LU; Vitablock Mark II: VM). Each group included four subgroups (A: n = 20 control; B: n = 20 cyclic loading [105 cycles, 80 N]; C: n = 20 thermal cycling [5 to 55°C]; D: n = 60 water storage [20: 3 months; 20: 6 months; 20: 9 months at 37°C]). Each subgroup included 10 specimens tested for flexure strength using three-point bending in a universal testing machine. The other 10 specimens were tested for surface roughness using an automated profiler followed by testing for surface hardness using a microhardness tester. RESULTS: LU displayed higher flexure strength than VM before and after all the aging conditions. The surface roughness for VM was lower than LU for the control, but both materials showed comparable values and significant increases after 9 months storage in water. After cyclic loading, only VM displayed a significant increase in the surface roughness value (p < 0.05). The surface hardness of VM was higher than LU for the control. VM did not show significant changes in hardness after any aging condition. LU showed significant reduction in surface hardness value only after storage in water (p < 0.05). CONCLUSION: The resin nanoceramic Lava Ultimate can be used as a durable substitute for glass-ceramic chairside CAD/CAM material.


Abstract
The renin angiotensin system (RAS) regulates numerous systemic functions and is expressed locally in skeletal tissues. Angiotensin1-7 (Ang1-7) is a beneficial member of the RAS, and the therapeutic effects of a large number of angiotensin receptors blockers (ARBs) are mediated by an Ang1-7-dependent cascade. This study examines whether the reported osteo-preservative effects of losartan are mediated through the angiotensin converting enzyme2 (ACE-2)/Ang1-7/Mas pathway in ovariectomized (OVX) rats. Sham and OVX animals received losartan (10mg/kg/d p.o.) for 6 weeks. A specific Mas receptor blocker (A-779) was delivered via mini-osmotic pumps during the losartan treatment period. Serum and urine bone metabolism biomarker levels were measured. Bone trabecular and cortical morphometry were quantified in distal femurs, whereas mineral contents were estimated in ashed bones, serum and urine. Finally, the expression of RAS components, the receptor activator of NF-κB ligand (RANKL) and osteoprotegerin (OPG) was determined. Losartan significantly improved the elevated bone metabolism marker levels and altered trabecular and cortical structures in OVX animals, and restored normal urinary and skeletal mineral levels. Mas receptor inhibition significantly abolished all osteo-protective effects of losartan and enhanced the deleterious effects of OXV. Losartan enhanced OXV-induced up-regulation of ACE-1, AngII, angiotensin type 1 (AT1) receptor and RANKL expression, and increased ACE-2, Ang1-7, Mas and OPG expression in OVX animals. However, A-779 significantly eradicated the effects of losartan on RAS components and RANKL/OPG expression. Thus, Ang1-7 are involved in the osteo-preservative effects of losartan via Mas receptor, which may add therapeutic value to this well-known antihypertensive agent.
OBJECTIVES: To assess the association between carious lesions in first and second permanent molars in adolescents and their parents' and peers' oral health practices.

Methods: This cross-sectional study of 12-15 year-old male adolescents was conducted in Dammam, Kingdom of Saudi Arabia, on February 2016. Data collection included dental examination to measure carious lesions and plaque. There was a questionnaire to assess oral health practices such as brushing with fluoridated toothpaste, current daily tobacco use, and daily consumption of sugary food and drinks. Logistic regression models assessed the association between first and second molars carious lesions with adolescents', parents', and peers' oral health practices.

Results: Of 302 students, 294 participated. The mother's brushing was significantly associated with a lower odds of carious lesions in the first molar (odds ratio [OR] = 0.17, 95% confidence interval [CI]: 0.04 - 0.77). The mothers' sugary food intake and students' own brushing were significantly associated with carious lesions in the second molar (OR = 1.95 and 0.36, 95% CI: 1.01-9.89 and 0.12-0.89). Friends' intake of sugary drinks had a strong, but non-significant, association with second molar's carious lesions (OR=3.61, 95% CI: 0.35-7.44).

Conclusion: In Saudi society, mothers have a major influence on their adolescent sons' carious lesions. Adolescents' oral health strategies should involve parents to reduce their risk of caries.

PURPOSE: The present study examined the possible involvement of the lipoxygenase (LOX) pathway in cisplatin (CPT)-induced nephrotoxicity.

METHODS: Wistar albino rats were challenged with CPT IP injection (7.5 mg/kg) and were sacrificed after one week. Signs of renal dysfunction, including urea and creatinine clearance levels and renal histological structure, were investigated. Gene and protein expression levels of different LOX pathway enzymes and products, including 5-LOX, 12-LOX, 15-LOX, 5-LOX activating protein (FLAP), leukotriene A4 hydrolase (LTA4 hydrolase), leukotriene C4 synthase (LTC4 synthase), LTB4 receptor, and cysteiny1 (cys) LT receptor types 1 and 2, were also determined in the kidneys using real-time PCR and western blotting, respectively. The serum and kidney levels of LTB4 and inflammatory markers were also estimated.

RESULTS: CPT renal toxicity was established as the creatinine and urea clearance levels were significantly reduced, while the serum levels of creatinine and urea were markedly increased. We reported a considerable up-regulation in the mRNA and protein expression levels of 5-LOX, FLAP, 12-LOX, LTA4 hydrolase, LTC4 synthase, LTB4 receptor, and Cys LT receptor types 1 and 2, while 15-LOX expression did not significantly change in the CPT group. Additionally, LTB4 and inflammatory indicators in serum and renal levels were elevated significantly in the CPT group. Histopathological examination clearly showed the nephrotoxic changes in the renal tissues of CPT-challenged animals.

CONCLUSIONS: Our findings suggested, for the first time, the participation of LOX enzymes and products in the signaling pathway leading to CPT-associated nephrotoxicity, which could be the foundation stone for combining LOX pathway attenuators with CPT therapy to decrease CPT-associated renal toxicity.
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We wish you all the best for the
“NEW ACADEMIC YEAR”