The ball mill as a means of investigating the mechanical failure of dental materials

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Abstract

Objective: The main purpose of this paper is to present a new method of predicting clinical performance using mechanical loading in a ball mill.

Methods: A series of four experiments (two involving a hybrid composite and one each on orthodontic brackets and bands) is described in which the ball mill was used to subject specimens to mechanical fatigue.

Results: A reproducibility study using composite beam specimens showed no significant difference between the Mean Survival Time (MST) in all the three experimental runs (P = 0.42). When subjected to thermal cycling, the MST of the cycled group was 155.0 min compared to 247.0 min for the control group (P < 0.01). The MST of untreated and sandblasted brackets was 7.9 h and 14 h respectively (P < 0.01). There is also a significant difference (P < 0.001) in the MST of sandblasted bands when compared to the untreated bands.

Conclusions: The ball mill proved to be a convenient and reproducible means of producing mechanical fatigue and may be useful in predicting the clinical performance of dental materials.

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Keyword

ball mill; fatigue; composites; orthodontics composite

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