

ORIGINAL STUDY

Effects of Elevated Temperatures on Tooth Structure During Polymerization of Composite Resin With a Variety of Light Sources

Abstract:

This study investigated the impact of high temperatures on dental tissues during the polymerization of optical fillings using a diode laser and two types of pulsed and continuous LED devices. Three distinct light source units were employed: a laser diode, an LEDition, and a LED.B. Temperature increases were measured at a distance of 1 mm from the thermocouple to the tip of the device. To create an experimental model, we fixed the operational voltage of the polymerization device and maintained a 1 mm gap between the terminal and the thermocouple wire. Temperature readings and thermal background (T₀) measurements were taken three times, with 1 h between each measurement, resulting in a total of 60 readings. The continuous mode of the LED.B produced the highest observed temperature increase of 6_ Celsius, while the diode laser recorded the lowest temperature rise of 2_ Celsius during each test period. These results underscore the importance of selecting the appropriate light-activated unit and curing time during basic restorations with light-activated resin to prevent thermal damage to dental tissues. The study concluded that the diode laser is preferable for phototherapy, as it consistently records lower temperatures, even with extended treatment times.