RESEARCH REPORT

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Effects of Preheating Resin Composite on Flowability

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Purpose – Preheating of resin composite compules has been suggested as a means of improving flow characteristics. The purpose of this study was to quantify in vitro the effect of preheating of resin composite compules on flowability.

Methods – A screening test was devised to assess the flow of six resin composites at room temperature (24° C) and after heating to 55° C and to 60° C in a commercial heating unit (***Calset**/AdDent, Inc.*). Composite compules were placed into a steel positioning stand for heating and testing. A load was applied to the plunger of the compule by a steel rod mounted in a chuck on a servo-hydraulic testing machine (MTS 858, MTS Systems Corp.) at a crosshead speed of 1.0 mm/sec. The load (N) after displacement of 6 mm was recorded as a measure of flowability. Data were analyzed by analysis of variance and means were compared by a Fisher's PLSD test at the 0.05 level of significance.

Results – Preliminary tests indicated that 1.0 mm/sec was the approximate rate that a load would be applied a compule with a conventional injection gun. Heating in a commercial unit produced a statistically significant improvement in flow ranging from 5 to 76% for the resin composites tested.

Table 1. Load (N) at a displacement of 6 mm for each material at each temperature*.

	Esthet•X DENTSPLY Caulk	*Filtek Supreme* 3M ESPE	*Heliomolar* Ivoclar Vivadent	*Point 4* SDS/Kerr	*Simile* Pentron Clinical Technologies, LLC	*Filtek Z250* 3M ESPE
	Microhybrid	*Nanofilled*	*Microfilled*	*Microhybrid*	*Nanofilled*	*Microfine*
24° C	215 (11)	94.3 (8.5)	81.9^{b} (9.2)	98.7 (7.3)	105 (19)	191 (21)
55° C	108^{a} (13)	51.1 (5.7)	77.6^{b} (6.3)	40.4^{c} (3.3)	68.7 (6.1)	57^{d} (13)
60° C	96^{a} (14)	39.5 (4.4)	63.6 (6.3)	36.4^{c} (3.2)	47.4 (2.3)	45.0^{d} (4.3)

* Means with standard deviations in parentheses (n=5). Means with the same superscript were not significantly different (p>0.05).

Table 2. Increase in flow (%) for each resin composite from baseline at 55° and at 60° C.

	Esthet•X	*Filtek Supreme*	*Heliomolar*	*Point 4*	*Simile*	*Filtek Z250*
55° C	50	46	5	59	34	70
60° C	55	58	22	63	55	76

Conclusion – Preheating resin composite compules at 55° and 60° C provided an effective means of increasing flowability of the composites tested.

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