



DEPTH OF CURE OF BULK-FILL LIGHT CURED COMPOSITE RESINS WITH DIFFERENT INITIATORS

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INTRODUCTION AND OBJECTIVES

Bulk-fill composites' manufacturers claim that these materials can be completely cured on a single layer up to 5mm (1), reducing the risk of bacterial and salivary contamination or air bubbles incorporation between layers (2).

The aim of this study was to evaluate the depth of cure of bulk-fill composites with different times of curing, according to the photo initiator and the resin shade.

MATERIALS AND METHODS

Specimens were prepared incorporating an increment of composite (Tetric EvoCeram Bulk-Fill [TECBF] IVA and IVB - Ivoclar Vivadent or Filtek One Bulk-Fill [FOBF] A3 and B1 - 3M ESPE – fig. 1) in standardized metal molds with 4 mm of diameter and height, using the buccal surface of a superior central incisor as a reflection substrate (fig. 2 and 3). Twelve groups (n=10) were defined according to curing time (10, 20 or 40 seconds), shade (lowest/highest value) and photo initiator (Lucirin/camphoroquinone). Vickers microhardness (VMH) was measured at the top and bottom of each specimen by 5 indentations with a force of 29,42 N for 5 s (fig. 4 and 5). The depth of cure (DC) was obtained by the ratio of the bottom/top VHM (3). Results above 80% were used to consider the sample well cured (4). Comparative inferential statistical analysis was performed through IBM SPSS Statistics v.24 software using a three-way ANOVA at a significance level of 5%.



Fig. 1 A - Composite TECBF; B—FOBF

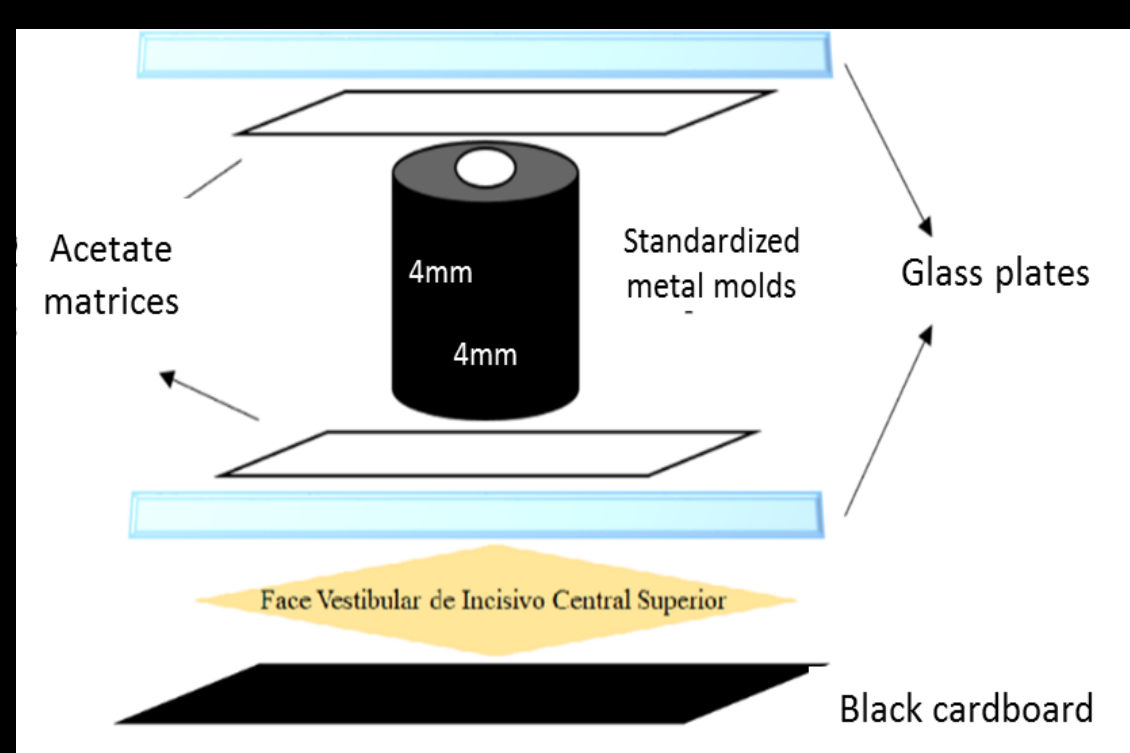


Fig. 2—Diagram of specimens preparation

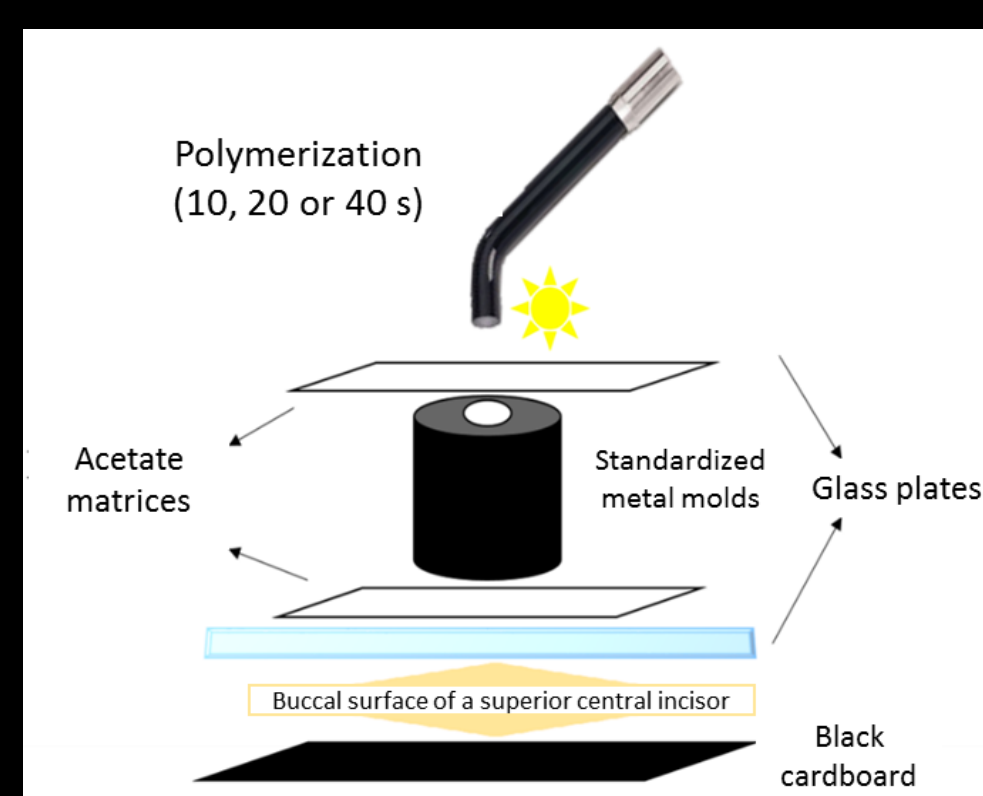


Fig. 3—Diagram of specimens polymerization



Fig. 4—Vickers Hardness Tester

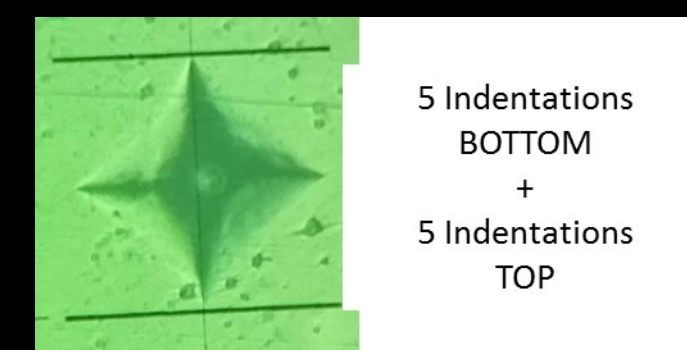


Fig. 5—Indentation

RESULTS

Regardless the shade, DC of the composite resins studied showed an improvement tendency with an increased polymerization time. In both of resins, time was the main factor in obtaining a suitable depth of cure ($p < 0.001$ and partial eta squared = 0.771), being 10 s of polymerization insufficient to reach the minimum of 80% of polymerization ($p < 0.001$). So, 20 s is the time needed to ensure an adequate polymerization, since there is no statistically significant differences between 20 and 40 s of polymerization (fig 6). Colour was not found to be a significant factor in the DC of bulk-fill composites ($p = 0.916$). FOFB showed a similar depth of cure but higher superficial hardness when compared to TECBF.

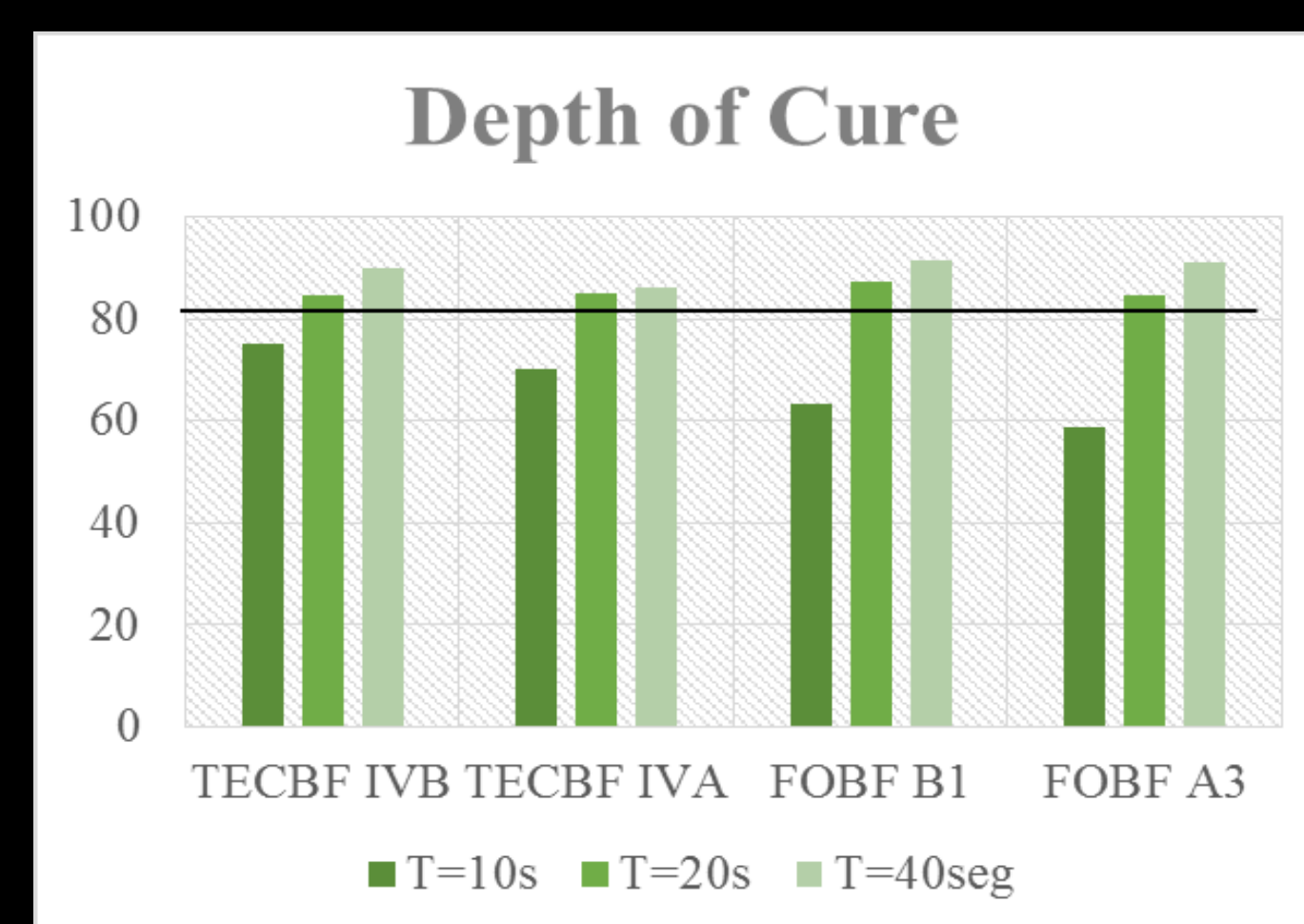


Fig. 6—Depth of cure of TECBF and FOFB according to their shade and curing time (%)

DISCUSSION AND CONCLUSIONS

Curing time is the crucial factor in obtaining a proper depth of cure. Colour, on the other hand, does not appear to be a significant factor in the depth of cure of the bulk-fill resin composites studied. The presence of different photo initiators may justify the differences found between the two resin composites.

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