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Editorial

Investigators should not limit their research to only commercially-available bulk-fill resin dental composites.

Naresh Kumar[1] & Shahid Ali.[2]

Affiliations: [1]Department Science of Dental Materials, Dow International Dental College, Dow University of Health Sciences, Karachi, Pakistan. [2]Department Science of Dental Materials, Bibi Aseefa Dental College, Shaheed Mohtarma Benazir Bhutto Medical University, Larkana, Pakistan.

Corresponding author: Naresh Kumar. Department of Science of Dental Materials Dow International Dental College Dow University of Health Sciences Karachi, Pakistan. Phone: (92-333) 2818500. E-mail: kumar.naresh@duhs.edu.pk

Since the introduction of resin-based composites (RBCs) in dentistry, several modifications in their composition have been made by different manufacturers in order to improve the mechanical, physical, rheological and optical properties of these materials. As a result, RBCs have been significantly improved and are being increasingly used as direct as well as indirect restorative materials worldwide.[1] Moreover, a comparable survival rate of RBCs with their amalgam counterparts has been reported.[2]

Despite the clinical success, their limited depth of cure and polymerization shrinkage stress still remains major problems. Therefore, clinicians utilize RBCs in incremental layers in order to address the aforementioned problems. Although this approach provides good clinical results it is time consuming. Consequently, attempts were made to develop a RBC which could be filled in a single bout so as to shorten procedure times. In 2009, DENTSPLY introduced a "Bulk-fill" RBC named smart dentin replacement (SDR) with bold claims that the material can be cured up to 4mm depth and with minimum shrinkage stress. The manufacturer stated that the modified resin chemistry and polymerization modulators are responsible for such reduction in shrinkage stress.[3] Subsequently, many manufacturers marketed bulk-fill RBCs with similar claims.

The clinical data on the bulk-fill RBCs are very scant[4] however; *in vitro* investigations are being conducted to fill this void so as to predict the clinical performance of materials.[5,6] The cuspal deflection of a bulk-fill RBC and a conventional RBC was compared and a significant reduction in the cuspal deflection of the former RBC was reported.[7] In terms of marginal adaptation, the bulk-fill RBC has exhibited comparable results with a conventional RBC.[8] The mechanical properties, namely, creep resistance, modulus of elasticity, hardness and strength of the bulk-fill RBCs have been investigated by different researchers. In general, most of the studies reveal either equivalent or inferior parameters regarding the above-mentioned properties of the bulk-fill compared with the conventional RBCs.[6,9]

Undoubtedly, laboratory based experiments related to commercially-available bulk-fill RBCs highlight promising results in terms of depth of cure and shrinkage stress,[10-12] but it is difficult to uncover any exact factor responsible for such findings, as most of the manufacturers are

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generally reluctant to reveal the detailed composition of their RBCs. Hence, it is difficult to understand the fundamental concepts. Leprince *et al.*,[6] suggested that higher translucency of RBCs is mainly responsible for the increased depth of cure while variations in the filler content and/or the polymeric resins are likely to cause lower shrinkage stress. Until now, most of the studies are based on commercially available bulk-fill RBCs, whereas experimental bulk-fill RBCs have rarely been investigated,[13] thus we propose further research work on experimental bulk-fill RBCs with precise formulations in order to understand the basic behavior of materials, which would ultimately assist the development of materials with superior properties and greater clinical success.

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