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Toxicity of resin-matrix composites in dentistry

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Abstract

Background: Resin-matrix composites (RMC) are widely used as restorative materials due to their mechanical, optical, and aesthetic properties. However, some concerns have emerged due to polymerization shrinkage, material degradation, and the release of monomers from the organic matrix, such as the derivatives of bisphenol A (BPA), which are potentially toxic [1-3]. Therefore, it is important to understand the factors that contribute to the incomplete monomer conversion of RMC [1,4]. **Objective:** This systematic review aims to comprehensively explore the factors contributing to the toxicity associated with RMC and to establish clinical criteria that reduce the release of residual monomers. **Methods:** A systematic review was performed according to the PRISMA criteria. A PICO question was established and three databases, PubMed, Cochrane Central, and Web of Science were selected to run this research. Filters were established to retrieve articles in the last 20 years, in English. The inclusion criteria were *in vivo* studies/humans, Randomized Controlled Trial (RCT) and toxicity studies. The study characteristics of the included articles were extracted using a predefined Excel file. **Results:** A total of 1,261 articles were retrieved from the three electronic databases. Following the elimination of duplicates, a total of 1,227 articles remained for further selection by title and abstract, after which 20 articles were subjected to comprehensive reading; 13 articles were included and 7 excluded. The analysis of the selected articles indicated that low levels of monomers were detected in the participants´ saliva and urine, suggesting relatively low local and systemic toxicity. Dental operator-dependent factors were identified. Adherence to RMC placement protocols is essential. **Conclusions:** This systematic review suggests that low levels of free monomers were detected in participants with RMC and adherence to manufacturer's instructions is important. Further studies are needed to stablish causality, considering the exposure to non-dental BPA source materials.

Keywords: toxicity; resin monomers; BPA; resin-matrix composite; dentistry

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