

Effects of Bisphenol A Released From Composite Fillings on Reproductive Hormone Levels in Men

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ABSTRACT

Objectives: Composite resins are the most preferred filling material because of their excellent aesthetic qualities. However, a filling material should also be biocompatible as well as aesthetic. The aim of this study was to determine the serum and saliva bisphenol-A (BPA) levels and to examine the effects of serum BPA on reproductive hormone levels after healthy men were treated with composite fillings.

Methods: Eighteen healthy males each received 2 composite restorations. Saliva and blood samples of subjects were collected before resin application and 1 day and 1, 3, and 5 weeks after the resin was applied. BPA amounts in samples were detected using high-performance liquid chromatography (HPLC). Serum gonadotropins, testosterone, sex hormone binding globulin, free androgen index, and oestrogen levels were measured with radioimmunoassay kits. Statistical analysis of data was made using Friedman, Wilcoxon signed ranks and Mann-Whitney U tests ($\alpha = 0.05$).

Results: The amount of BPA released from composite resins over time was not significantly elevated in either saliva or serum ($P > 0.5$). In addition, serum BPA levels were significantly higher than saliva BPA levels for both composites ($P < .05$), but saliva and serum BPA levels were not statistically different when comparing the 2 composites ($P > .05$).

Conclusions: BPA from composite resins used in this study did not significantly alter serum hormone levels.

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Introduction

Bisphenol A (BPA: 2,2-bis(-hydroxyphenyl) propane, CAS No: 80-05-7) is an industrial chemical that was synthesized in 1891 for the first time and was found in the 1930s to have oestrogenic effects. With an annual production of more than 2 million tons today, BPA is the main monomer used in the production of polycarbonate plastics and epoxy resins. Polycarbonate plastics are used in the manufacturing of dental resins, baby bottles, food storage containers, water bottles and bottle caps, glass lenses, CDs, DVDs, and electronic devices.^{1,2} Exposure to BPA is thought to have side effects on

human health, particularly during infant development, which is a considerable public health problem. However, there are few basic studies on its possible effects on human health.¹⁻³

Composite resins are the most preferred filling material today because of their excellent aesthetic qualities. The composite resins used in dentistry consist of resin matrix (organic phase) and fillers. Resin is the chemically active component of the composite. The most widely used monomers in resin matrix are urethane dimethacrylate (UDMA), bisphenol A glycidyl methacrylate (BISGMA), and triethylene glycol dimethacrylate (TEGDMA).⁴

Pure BPA is not found in dental products. BPA, BISGMA, and bisphenol A dimethacrylate (BISDMA) are the major resin monomers. If synthetic reactions cannot be completed cytochemically during the production of dental sealants containing BISGMA, BPA may be present in the product in an impure form. Composite resins are exposed to mechanical, bacterial, or thermal biodegradation in the oral cavity.⁵ BPA can also be found as a degradation product of BISDMA via

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