ORIGINAL ARTICLE

Evaluation and Characterization of some Properties of Glass Ionomer Cement Reinforced by Novel Boron Nitride Nanoplatelets

Hasanein A. AlNamel [1*], Rafid M. AlBadr [2], Farah Abdul Razzaq [3]

[1] *Department of Prosthetic Dentistry, College of Dentistry, University of Basrah, Basrah, Iraq*

[2] *Department of Basic Sciences, College of Dentistry, University of Basrah, Basrah, Iraq*

[3] *Department of Conservative and Aesthetic Dentistry, College of Dentistry, University of Basrah, Basrah, Iraq*

*Corresponding Author: Hasanein A. AlNamel
Email: Hasanen.muhsen@uobasrah.edu.iq

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Abstract

Purpose: This study characterized and incorporated a novel Boron Nitride Nanoplatelet (BNNP) into conventional cement known as Glass Ionomer Cement (GIC) with changed ratios (range from 1%, 3%, 5%, and 7%wt) Subsequently.

Materials and Methods: The study examined the impact of adding BNNP on the mechanical characteristics of GIC, including its Flexural Strength (FS), Diametral Tensile Strength (DTS), water sorption/solubility, and setting times. The BNNP was characterized using Physio-Chemical Characterization, and Brunauer-Emmett-Teller (BET) testing, and density was also measured. In addition to showing considerably greater DTS (16.34± 1.26MPa) and FS (24.037 ± 0.816 MPa), the results showed that 3% wt. BNNP-modified GIC specimens decreased in water sorption/solubility 19.358±2.40 and 2.979±0.65 µg/mm^3, respectively, compared with traditional GIC.

Results: In this work, a novel BNNP containing GIC was created, resulting in a 15% reduction in water sorption. When compared to commercial GIC, the demonstrated GIC can quadruple the DTS and FS.

Conclusion: For water-based cement types, the glass-ionomer formulations including BNNP exhibit equivalent and acceptable working qualities.

Keywords: Boron Nitride Nanoplatelets; Glass Ionomer Cement; Flexural Strength; Diametral Tensile Strength; Physical Properties; Water Sorption.

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