



# Er:YAG laser therapy in combination with GLUMA desensitizer reduces dentin hypersensitivity in children with molar-incisor hypomineralization: a randomized clinical trial

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## Abstract

This study aimed to investigate the effectiveness of erbium-doped yttrium garnet (Er:YAG) laser and GLUMA desensitizer for dentin hypersensitivity in teeth affected by Molar-Incisor Hypomineralization (MIH). One hundred twenty children were randomly allocated to four groups: the control (Co) group, the desensitizer (De) group, the laser (La) group, and the laser + desensitizer (La + De) group. Outcome measures included Visual Analogue Scale (VAS) and 14-item Oral Health Impact Profile (OHIP-14) evaluation. For mean VAS scores, a significant reduction was found over time in all groups. Co and De groups, Co and La groups, Co and La + De groups, De and La + De groups, and La and La + De groups differed significantly ( $p < 0.05$ ). For mean scores in all dimensions of OHIP-14 after treatment 6 months, the La + De group was significantly lower ( $p < 0.001$ ). The La + De groups and the La groups as well as the La + De groups and the De groups differed significantly in total OHIP, functional limitation, physical disability, and psychological disability ( $p < 0.05$ ). Physical pain between the La + De groups and the La groups and handicap between the La + De groups and De groups differed significantly ( $p < 0.05$ ). The mean values of each dimension differed significantly between the group Co and the La + De group ( $p < 0.0001$ ). Combination therapy of Er:YAG laser and GLUMA desensitizer had greater desensitizing effects and oral health-related quality improvement of life, which might be an effective alternative treatment in dentin hypersensitivity in MIH children.

**Keywords** Molar-incisor Hypomineralization · Hypersensitivity · Er:YAG laser · Desensitizer · GLUMA · Children

## Introduction

Molar-Incisor Hypomineralization (MIH) is a type of enamel hypomineralization that describes a developmental qualitative enamel defect of one or more permanent first molars, with or without accompanying affected permanent incisors. A meta-analysis confirmed that the global average prevalence of MIH was approximately 14.2% [1]. The patients with MIH commonly have a clinical symptom—dentin hypersensitivity (DH). DH is defined as a short, sharp, and intense pain in teeth arising from exposed dentin in response to external stimuli such as certain thermal,

chemical, mechanical, and osmotic stimuli, but it cannot be attributed to any other form of dental defect or disease [2]. DH-induced pain may result in difficulties in food intake, poor oral hygiene, and even impact the mental health of children [3]. DH is related to exposed dentinal tubules, but not only because of dentin exposure. The pathogenesis of DH is still unclear. At present, the hydrodynamic theory is the most widely accepted mechanism for the transmission of stimulation through dentin [4]. So the recommended approaches for treating DH mainly focus on reducing dentinal tubule openings, decreasing fluid flow, or inhibiting nerve excitability.

In children with MIH, the affected enamel is characterized by reduced quantity and quality of mineralization and increased porosity, which may result in decreased thermal insulation and altered thermal conductivity [5]. Compared to normal enamel, the hardness and elastic modulus of MIH-affected enamel are decreased, while the concentration of carbon and carbonate ions is increased, and the protein content is higher, which leads to post-eruptive enamel breakdown and

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