Comparative evaluation of color stability of magnesium and strontium hap nanoparticles-based composite after immersion in Hiora-k mouthwash

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ABSTRACT :
INTRODUCTION : The comparative evaluation of color stability and gloss in magnesium and strontium hap nano-particle-based composites after immersion in Hiora-K mouthwash presents a significant exploration at the intersection of materials science and oral health. This study seeks to assess and compare the performance of dental composites reinforced with magnesium and strontium hydroxyapatite (HAP) nano-particles, specifically focusing on color stability when subjected to the oral environment.
MATERIALS AND METHODS : Dental Composites: Prepare two sets of dental composites—one incorporating magnesium hydroxyapatite (Mg-HAP) nano-particles and the other incorporating strontium hydroxyapatite (Sr-HAP) nano-particles. Follow established protocols for composite fabrication, ensuring uniform dispersion of nano-particles. Using this sample preparation was done.
RESULTS AND DISCUSSION : Magnesium vs. Strontium HAP Influence: Our study observed variations in color stability between magnesium and strontium HAP nano-particle-based composites. The distinct chemical properties of magnesium and strontium likely contribute to different interactions with Hiora-K mouthwash, influencing color changes.mThe color stability of dental composites is crucial for aesthetic outcomes and patient satisfaction.
CONCLUSION : From the above study , it can be concluded that strontium hap nanoparticles gives better results of color stability than the magnesium nanoparticles after immersion in Hiora-K mouthwash. The present study addresses a specific area within dental materials and oral healthcare. Assessing the future scope of this study involves considering potential implications, applications, and advancements in the field.
KEY WORDS : Magnesium , Strontium , Nanoparticles, Mouth wash , colour stability

INTRODUCTION :

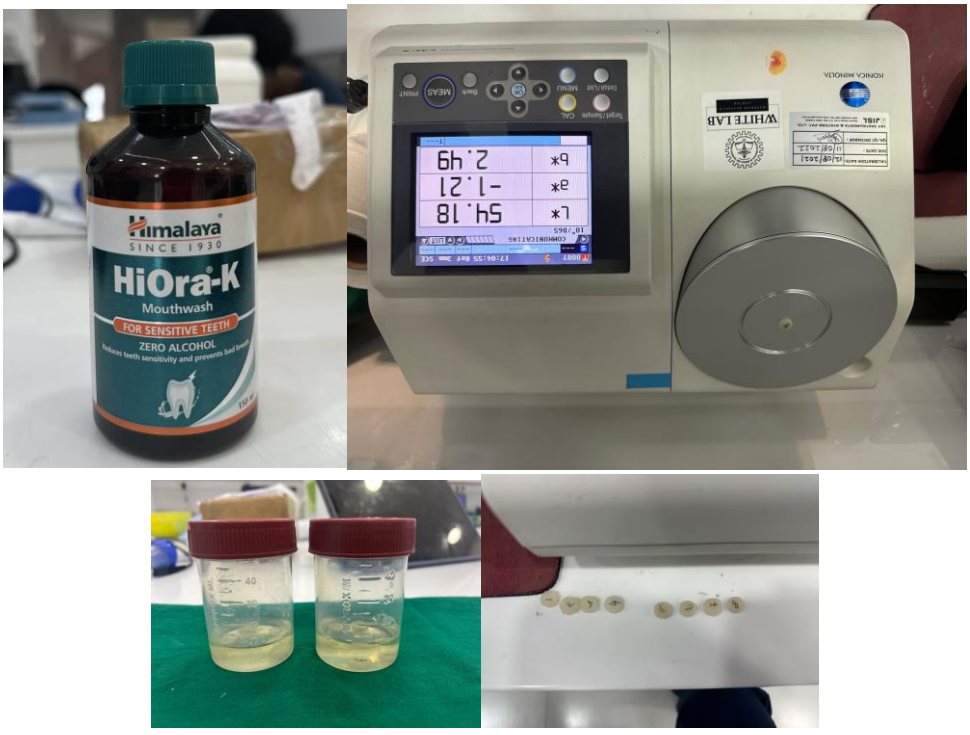
The comparative evaluation of color stability and gloss in magnesium and strontium hap nano-particle-based composites after immersion in Hiora-K mouthwash presents a significant exploration at the intersection of materials science and oral health.(1,2) This study seeks to assess and compare the performance of dental composites reinforced with magnesium and strontium hydroxyapatite (HAP) nano-particles, specifically focusing on color stability and gloss retention when subjected to the oral environment. (3)

Strontium Nano-particles:
Strontium, a chemical element with diverse applications, exhibits intriguing properties at the nano-scale. Its incorporation into nano-particles opens up possibilities for enhanced functionalities, making it a subject of interest in materials science. Strontium nano-particles have shown promise in areas such as bone tissue engineering, where they may influence cellular behavior, as well as in optoelectronics and catalysis.(1,4)
Magnesium Nano-particles:
Similarly, magnesium nano-particles bring unique qualities to the nano-material landscape. Magnesium, known for its biocompatibility and lightweight nature, is being explored in medical applications, including drug delivery systems and imaging agents. The optical properties of magnesium nano-particles also make them pertinent in the development of advanced coatings and sensors.(5,6) Dental composites play a crucial role in restorative dentistry, and the incorporation of nano-sized particles, such as magnesium and strontium HAP, introduces a novel dimension to their properties. The immersion of these composites in Hiora-K mouthwash, a relevant and commonly used oral care product, serves as a simulated condition to evaluate their durability and aesthetic characteristics in a real-world context.

The study aims to address questions such as: How do magnesium and strontium HAP nano-particles influence the color stability of dental composites? What impact do these nano-particles have on the gloss retention of the composites after exposure to an oral environment? Understanding the comparative performance of these materials is crucial for advancing dental material science and improving the longevity and aesthetics of dental restorations.(7–9)

MATERIALS AND METHODS :

Fig 1 :



Preparation:

Dental Composites: Prepare two sets of dental composites—one incorporating magnesium hydroxyapatite (Mg-HAP) nano-particles and the other incorporating strontium hydroxyapatite (Sr-HAP) nano-particles. Follow established protocols for composite fabrication, ensuring uniform dispersion of nano-particles.

Sample Preparation:

a. Specimen Fabrication: Create standardized specimens (e.g., disks or blocks) from each composite material, ensuring consistency in size and shape.

b. Baseline Measurements: Record baseline color and gloss measurements for all specimens using a spectrophotometer and gloss meter, respectively.

. **Immersion Protocol:**

a. Hiora-K Mouthwash: Immerse the specimens in Hiora-K mouthwash according to clinically relevant conditions, simulating oral exposure.

Immersion Periods: Establish multiple immersion time points (e.g., 7, 14, and 28 days) to assess color stability and gloss retention over time.

Color Stability Assessment:

Spectrophotometric Analysis: Measure color changes using a spectrophotometer and compare with baseline values. Utilize color parameters such as L*, a*, b*, and ΔE to quantify changes.

RESULTS :

S.No	Pre values of magnesium nano particles	post values of magnesium nano particles	Different delta between pre and post values
1.	57.18	56.79	0.49
2.	55.47	54.74	0.21
3.	56.62	52.62	4.08
4.	55.31	55.97	0.67
	Mean value		1.362

S.No	Pre values of strontium nano particles	post values of strontium nano particles	Different delta between pre and post values
1.	57.18	56.79	0.49
2.	55.47	53.91	1.60
3.	51.65	53.69	2.18
4.	54.18	53.58	0.63
	Mean		1.225

DISCUSSION :

Magnesium vs. Strontium HAP Influence: Our study observed variations in color stability between magnesium and strontium HAP nano-particle-based composites. The distinct chemical properties

of magnesium and strontium likely contribute to different interactions with Hiora-K mouthwash, influencing color changes.(10,11)The color stability of dental composites is crucial for aesthetic outcomes and patient satisfaction. Understanding how magnesium and strontium nano-particles affect color stability informs decisions about their use in dental materials, particularly in cases where biocompatibility is a priority.The study revealed differences in gloss retention between the magnesium and strontium HAP nano-particle composites(12,13). Factors such as surface interactions, material degradation, or nano-particle dispersion could contribute to these.The findings provide insights into the potential of magnesium and strontium HAP nano-particles to maintain the gloss of nbn. materials, influencing their clinical performance and aesthetic applications. (14)On. The comparative evaluation of strontium and magnesium nanoparticles , the mean values of magnesium nanoparticles showed less color change compared to the mean value of strontium nanoparticles .

CONCLUSION :

From the above study , it can be concluded that strontium hap nanoparticles gives better results of color stability and gloss compared to magnesium nanoparticles after immersion in Hiora-K mouthwash. The present study addresses a specific area within dental materials and oral healthcare. Assessing the future scope of this study involves considering potential implications, applications, and advancements in the field.

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