



GLOBAL JOURNAL OF ADVANCED RESEARCH  
(Scholarly Peer Review Publishing System)

# EVALUATION OF EFFICACY OF BIO-ACTIVE GLASS GEL IN THE TREATMENT OF DENTINAL HYPERSENSITIVITY.

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## ABSTRACT

The aim of the present study is to evaluate the efficacy of Bio-active glass gel when in the treatment of dentinal hypersensitivity. 30 patients with dentinal hypersensitivity symptoms (positive to airblast stimuli, cold stimuli and tactile stimuli and having a VAS score of 3 and above) were recruited from the private dental clinic, Hyderabad. Study is split mouth, double blinded, parallel arm in design. At baseline, response to all stimuli in both the groups was non-significant and immediate after application and post 1 week, Bioactive glass group showed statistically significant reduction in VAS scores. The study concluded that the Bioactive gel is safe and efficacious in treatment of dentinal hypersensitivity symptom without producing any adverse effects.

**Keys words:** dentinal hypersensitivity, bioactive glass, VAS

## 1. INTRODUCTION

Dentinal hypersensitivity is a common clinical entity characterized by sharp pain of short duration due to exposed dentinal tubules in response to thermal, tactile, osmotic, chemical or electrical stimuli and which cannot be classified into any other dental disease.

Although several hypotheses have been proposed to explain how external stimuli may influence the nerve fibers, the most widely accepted hypothesis is the hydrodynamic theory, where movement of the fluid within dentin transduces surface stimuli by deformation of pulpal mechanoreceptors which in turn causes pain and hypersensitivity. In context to hydrodynamic theory of dentinal hypersensitivity sealing of the dentinal tubules with a bonding resin has also been suggested to create a long-lasting blockage of dentinal tubules.<sup>1</sup> One such product is an aqueous solution of hydroxy-ethyl-methacrylate and glutaraldehyde (GLUMA) (Fig 1) and a strong desensitizing effect of this system on dentin hypersensitivity has been reported. It blocks the dentinal tubules by coagulation of dentinal fluid proteins within the dentinal tubules, thereby

counteracting the hydrodynamic mechanism of dentinal hypersensitivity.



**Figure 1 :** Gluma gel

Bioactive Glass (inorganic amorphous calcium sodium phosphosilicate) application for the relief of pain related to dentinal hypersensitivity has been previously described by Greenspan. <sup>2</sup> It consists of elements that are naturally available in the human body and hence is highly biocompatible. In the present study Bio enamel gel (Prevest DenPro) (Fig 2) is used as topical application on non-carious cervical lesions. The aim of the present study is to evaluate the efficacy of Bio-active glass gel in the treatment of dentinal hypersensitivity



**Figure 2:** Bioactive gel

## 2. MATERIALS AND METHODS

30 patients with dentinal hypersensitivity symptoms (positive to airblast stimuli, cold stimuli and tactile stimuli and having a VAS score of 3 and above) were recruited from the private dental clinic, Hyderabad. Study is split mouth, double blinded, parallel arm in design. The quadrants in all the subjects were randomly assigned into 2 groups and treated with GLUMA gel and Bio-active glass gel respectively.

The response is evaluated by visual analog scale (VAS) ranging from 1 to 10 before the application, immediately after application and 1 week post application. The patient and the examiner who recorded the scores were unaware of the agents used, ensuring double blindness of the study.

Inclusion criteria: A history of tooth hypersensitivity to thermal, mechanical, sweet, or sour stimuli on at least two teeth with a VAS score of at least 3; hypersensitive area on facial surfaces of the teeth; good physical health; and a willingness to participate in the study.

Exclusion criteria: chipped teeth, defective restorations, cracked tooth syndrome, fractured undisplaced cusps, deep periodontal pockets, or a tender tooth in the same quadrant as the hypersensitive teeth; orthodontic appliances, dentures, or bridgework that would interfere with the evaluation of hypersensitivity; taking antibiotics and/or anti-inflammatory drugs; already undergoing treatment for tooth hypersensitivity; deep dental caries or large restorations showing pulpal response; pregnant or lactating females; periodontal surgery within the previous 6 months; chronic systemic disease; or a pacemaker.

The teeth were isolated with cotton rolls and dried with cotton pledgets. A drop of desensitizer was then applied applied using cotton applicator and left for 2-3 minutes. For all the stimuli tests (Fig 3,4,5), patient response was recorded immediately after application and 1 week post application. The minimum gap of 5 minutes was given between each stimuli. The patients were instructed not to use any other desensitizing agent during the study.



**Figure 3:** Tactile test



**Figure 4:** Airblast test



**Figure 5:** Cold test

### **3. STATISTICAL ANALYSIS**

All the analysis was performed using SPSS version 18. A p-value of  $<0.05$  was considered statistically significant. Inter-group Comparisons were done using student t test.

#### 4. RESULTS

This study was conducted to compare the efficacy of 2-Hydroxyethylmethacrylate gel and Bio-active glass gel in the treatment of dentinal hypersensitivity in 30 volunteers.

The response for tactile stimuli before trial was  $4.50 \pm 0.53$  and  $4.40 \pm 0.63$  in Bio-active glass (BG) and Hydroxyethylmethacrylate Gel (HEMA) group respectively. The response airblast before trial was  $4.20 \pm 0.79$  and  $3.95 \pm 0.74$  in BG and HEMA group respectively. Similarly response for cold stimulus was  $4.30 \pm 0.48$  and  $4.30 \pm 0.67$  in each group, with no significance.

The response for tactile stimuli after initial introduction was  $1.00 \pm 0.67$  and  $1.40 \pm 0.70$  in BG and HEMA group respectively with significance of  $p < 0.006$ . The response airblast after initial introduction was  $1.00 \pm 0.47$  and  $1.90 \pm 0.57$  in BG and HEMA group respectively with significance of  $p < 0.001$ . Similarly response for cold stimulus was  $1.30 \pm 0.48$  and  $1.90 \pm 0.57$  in each group, with significance of  $p < 0.001$ .

The response touch after 1 week was  $0.70 \pm 0.42$  and  $1.00 \pm 0.47$  in BG and HEMA group respectively with significance of  $p < 0.001$ . The response airblast after 1 week was  $0.65 \pm 0.42$  and  $1.30 \pm 0.48$  in BG and HEMA group respectively with significance of  $p < 0.001$ . Similarly response for cold stimulus was  $0.80 \pm 0.32$  and  $1.10 \pm 0.32$  in each group, with significance of  $p < 0.001$  (Table 1)

**Table 1: Evaluation of Hydroxyethylmethacrylate Gel (HEMA) and Bio-Active Glass Gel (BG) in Dentinal Hypersensitivity**

		Group (n=30)		p-value
		BG	HEMA	
Before	Touch	$4.50 \pm 0.53$	$4.40 \pm 0.67$	NS
	Air	$4.20 \pm 0.79$	$3.95 \pm 0.74$	NS
	Cold	$4.30 \pm 0.48$	$4.30 \pm 0.67$	NS
After	Touch	$1.00 \pm 0.67$	$1.40 \pm 0.70$	0.006
	Air	$1.00 \pm 0.47$	$1.90 \pm 0.57$	$<0.001$
	Cold	$1.30 \pm 0.48$	$1.90 \pm 0.57$	$<0.001$
1 week	Touch	$0.70 \pm 0.42$	$1.00 \pm 0.47$	$<0.001$
	Air	$0.65 \pm 0.42$	$1.30 \pm 0.48$	$<0.001$
	Cold	$0.80 \pm 0.32$	$1.10 \pm 0.32$	$<0.001$

#### 5. DISCUSSION

Dentinal Hypersensitivity studies are subject based. Hence, several factors can influence the pain intensity. Till date no standard procedures have been developed to test products which have been designed for the relief of this condition, hence comparison of these products was difficult. Hydroxyethylmethacrylate has a property of intrinsically blocking the dentinal tubules, counteracting the hydrodynamic mechanism.<sup>3</sup>

In this study, it was shown that the efficacy of BG was comparatively higher than that of other groups. The reason for this could be explained, in part, by mechanistic factors that lead to surface deposition and tubule occlusion by BG. These materials are reactive when exposed to body fluids and deposit hydroxycarbonate apatite, a mineral that is chemically similar to the mineral in enamel and dentin.<sup>4,5</sup> The BG group was found to be significantly better in reducing the VAS score compared to the other group at any time point for both the controlled air group and cold water stimulus. Other studies<sup>6,7,8,9</sup> concluded that BG containing dentifrice showed reduced sensitivity compared to other group.

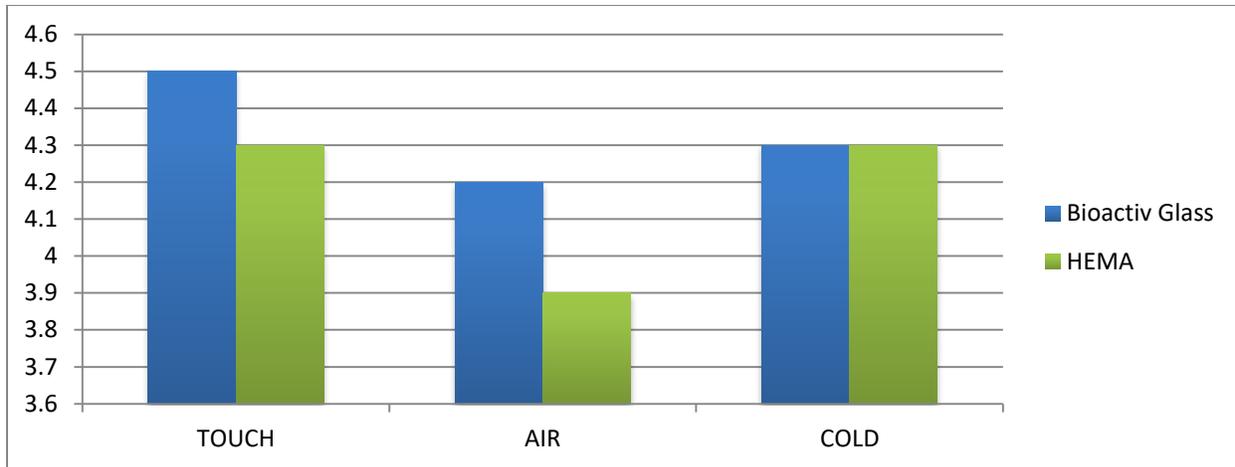


Figure 6: Graph showing mean VAS scores at baseline

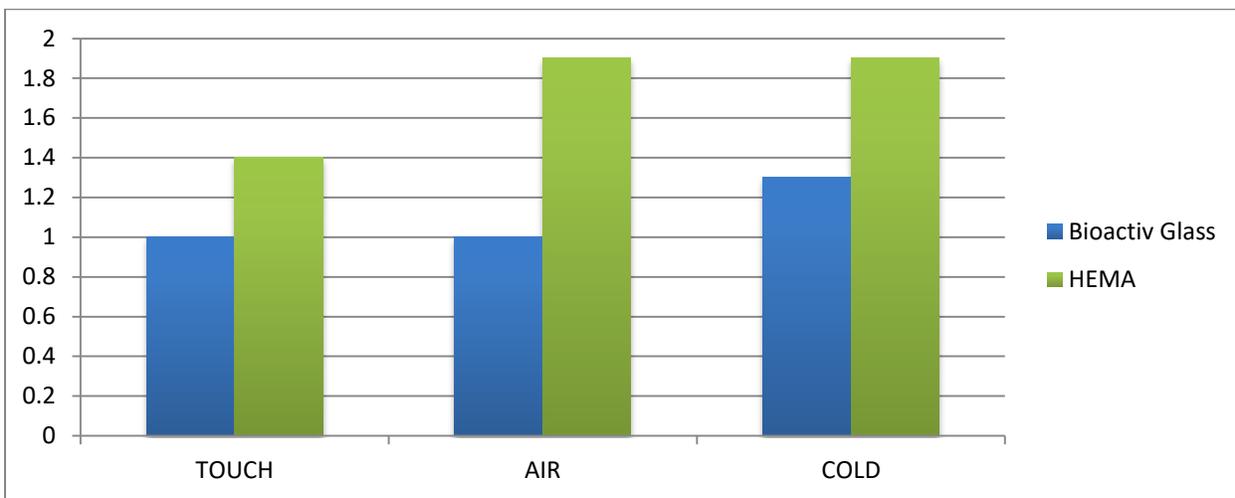


Figure 7: Graph showing mean VAS scores immediately after application

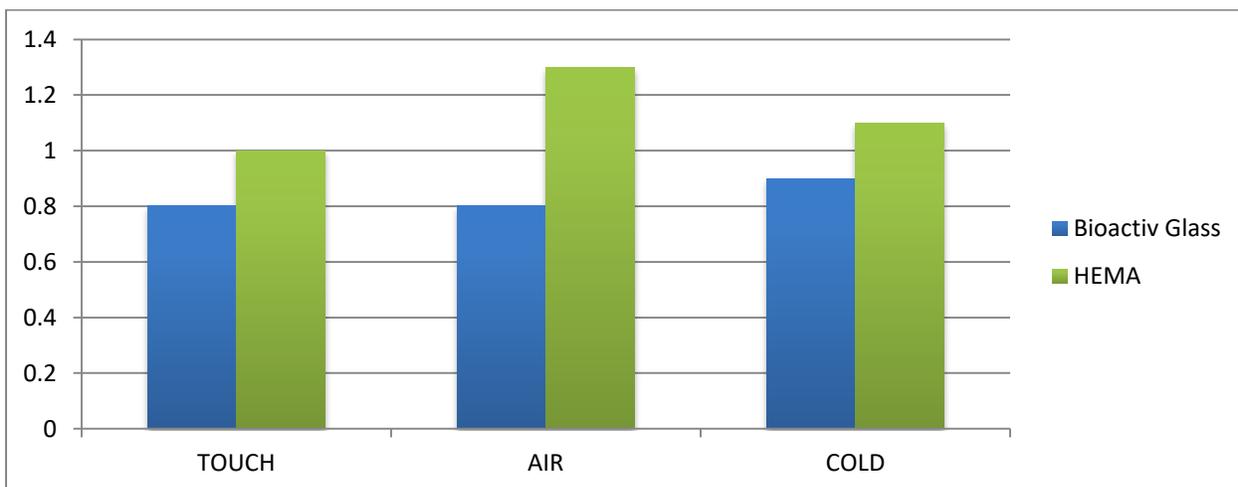


Figure 8: Graph showing mean VAS scores 1 week post application

## 6. CONCLUSION

The study concluded that the Bioactive gel is safe and efficacious. It is helpful in treatment of dentinal hypersensitivity symptoms like sensitivity to air blast stimuli, cold stimuli and tactile stimuli without producing any adverse effect. Well-designed studies, long term follow up and larger sample size will lead to obtain more reliable results.

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