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Original Research

Comparison of effectiveness of three different desensitizing agents against hypersensitivity: A clinical study

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***ABSTRACT*:**
Aim: To compare the effectiveness of three different desensitizing agents containing potassium salt, natural ingredients, and 8% arginine in reducing dentin hypersensitivity (DH). **Materials and Methods**: A study was conducted on 90 adult patients for 4 weeks and 8 weeks suffering from hypersensitivity associated with cervical abrasion of two or more teeth anterior to the molars. Patients were divided into three toothpaste groups as follows: Group I: Potassium nitrate containing toothpaste, Group II: herbal desensitizing mouthwash containing natural ingredients, and Group III: 8% arginine containing toothpaste. Using air stimulus, the sensitivity scores were recorded using Schiff Sensitivity Scale (SSS) at baseline, immediately after application and after 8weeks. **Statistical Analysis:** One-way ANOVA test significant. **Results**: Group III showed significantly better reduction in DH at all time intervals when compared with Group I. **Conclusion**: Desensitizing toothpaste containing 8% arginine was found to be the most effective in the reduction of DH after a single application up to a period of 8 weeks followed by herbal desensitizing mouthwash and potassium salt-containing toothpaste.
Key words: Arginine; dentin hypersensitivity; desensitizing toothpastes; herbal; potassium salt.

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INTRODUCTION

Dentinal hypersensitivity is an increasing problem in clinical dentistry. Dentine hypersensitivity (DH) is characterized by short, sharp pain arising from the exposed dentine in response to stimuli, typically thermal, evaporative, tactile, osmotic, or chemical, which cannot be ascribed to any other form of dental defect or pathology.[1] Diagnosis of dental hypersensitivity is challenging and differential diagnosis diagnosis can be challenging, and the dental professional must perform differential diagnosis such as cracked tooth, dental caries, or periodontal disease must be ruled out.[2,3]Incidence of DH ranges from 4% to 74%. A slightly higher incidence has been reported in females. than in males. Canines and premolars are the most commonly affected teeth. Buccal aspect of the cervical area is the commonly affected site.[4] Various treatment modalities are available for the management of DH such as desensitizing toothpastes, varnishes, fluoride iontophoresis, lasers, and remineralizing agents.[5] Maximum desensitizing toothpastes available in market contains potassium salt which works by

penetrating the length of the dentin tubule, depolarizing the nerve hence interrupting the neural response to pain stimuli.[6] Recent treatment for dentinal hypersensitivity includes use of Pro-arginine ,consisting of 8% arginine, an aminoacid found in saliva which in combination with calcium carbonate, is now available as a desensitizing paste for in-office application. This desensitizing technology mimics saliva's natural process of plugging and sealing open dentinal tubules.[7] Desensitizing mouthwash are said to have better penetration n proximal surfaces. A growing interest in natural products, and studies have suggested that herbal desensitizing mouthwash may be effective as the conventionally formulated dentifrice in the management of dentinal of hypersensitivity.[8] HiOra-K (Himalaya Drug Company, Bengaluru, Karnataka, India) is a recently marketed herbal desensitizing mouthwash which claimed to give adequate relief of pain due to DH. It is also safer to use with less adverse effects.[9,10] However the "Gold standard" treatment for Dentinal hypersensitivity still lacks.

MATERIALS AND METHODS:

This clinical trial was carried out at a single center. The sensitivity scores were recorded at baseline,4 weeks, and 8 weeks. A total of 90 individuals were selected from the outpatient of the clinic.

Inclusion criteria

All healthy male and female subjects were20-70 years of age with atleast two sensitive permanent tooth surfaces (buccal/facial aspects of incisors, canines, or pre-molars)

Exclusion criteria

- Patients who have undergone active periodontal treatment within last 6 months
- Pregnant or lactating females
- Deleterious habits such as smoking and/or alcohol consumption
- Use of antibiotics within 6 months before the study
- Systemic disease.
- Patients with deep carious teeth, defective restoration, any pathological lesion, mobile teeth, cracked enamel, orthodontic appliances

Tactile sensitivity assessment:

Tactile sensitivity was assessed by using a blunt probe used under slight manual pressure in the mesiodistal direction on the hypersensitive areas of the tooth.

Air blast sensitivity assessment:

Air blast sensitivity was assessed by directing a 1–2 s blast of air perpendicular to the exposed dentin onto the buccal surface of sensitive tooth from a distance of 1 cm using air component of an air–water syringe. Adjacent proximal teeth were shielded from air blast through the placement of two fingers. Sensitivity was assessed by airblast sensitivity, using SSS described as follows:

0= Subject does not respond to air stimulus

1= Subject responds to air stimulus but doesnot request discontinuation of stimulus

2= Subject responds to air stimulus and request discontinuation or moves from stimulus

3= Subject responds to air stimulus, considers stimulus to be painful, and requests discontinuation of the stimulus.

Patients who qualified the tactile as well as the air blast sensitivity assessment were selected and randomly assigned to the three study groups, 30 patients in each group with two teeth per patient to be considered in the study.

Group I: Desensitizing paste containing potassium salt (Senquel-F toothpaste) (n = 30 teeth)

Group II: Herbal desensitizing mouthwash containing suryakshara, palakya, lavanga, and triphala (HiOra-K, Himalaya Herbal Healthcare) (n = 30 teeth)

Group III: Desensitizing paste containing 8% arginine(Colgate Sensitive Pro-Relief™, Colgate-Palmolive [India] Ltd., Mumbai, India) (n = 30 teeth)

Method of application:

Using a disposable applicator tip, pea-sized amount of the toothpaste was applied over the isolated hypersensitive area of the tooth for 5 s, and a rotary polishing cup at moderate-to-high speed was used to polish the paste over this surface for 1 min. For the mouth rinse group then rinsed with 10 ml mouth rinse for 1 minute and expectorated.

All participants of the study were instructed to report after four weeks and eight weeks for the first follow up. SSS was evaluated at each visit. Statistical analysis was done by One way Anova.

RESULTS:

There was a significant difference in mean for Group I which was 1.1667±1.0532 ,in comparison to mean of Group II which was 0.6667±1.0283,and mean of Group III, which was 0.4±0.8137(Table 1,2)

TABLE1: Schiff Sensitivity Score

SSCORE	GROUP I	GROUP II	GROUP III
0	10	19	23
1	9	5	3
2	7	3	3
3	4	3	1

TABLE 2: Comparison of Schiff sensitivity scale score

Source	SS	df	MS	F
Between treatment	9.0889	2	4.5444	4.81959
Within treatment	82.0333	87	0.9429	
Total	91.1222	89		

DISCUSSION

Dentinal hypersensitivity mainly results due to exposure of dentinal tubules by either removal of the enamel from the crown of the tooth or denudation of the root surface by the loss of cementum and overlying periodontal tissues, which can be treated by two major suppressive mechanisms: sealing (blocking) of the dentinal tubule opening or dampening neural impulses.[11] The ideal material for the treatment of DH should be mild on pulp, painless, easy to apply, rapidly acting, long-term effective, and consistent.[12] Desensitizing toothpastes widely available in market, but most adequate material to be used is not known well.

In this study, the stimuli used was evaporative, as recommended by Holland *et al*.[13].Group III; toothpaste containing 8% arginine (was found to be most effective in the reduction of DH followed by herbal mouthwash; Group II and potassium salt (Group I) toothpastes at all time intervals. The result of this study is similar to the study done by Elias Boneta *et al*. which showed significant desensitizing efficacy of 8% arginine toothpaste over potassium salt-containing toothpaste.[14] The explanation to this finding may be due to the presence of arginine and calcium carbonate which interact at physiological pH and bind to negatively charged dentin surface to form a calcium-rich layer that naturally plugs and seals patent dentinal tubules. This plug is resistant to normal pulpal pressure and acid challenge, thereby reducing dentin flow and DH.[15]

In this study, herbal desensitizing mouthwash (Group II) was more effective in reducing DH than potassium nitrate-containing toothpaste (Group I). This finding may be attributed to the presence of natural ingredients such as suryakshara, palakya, lavanga, and triphala. Suryakshara is a naturally derived potassium nitrate which desensitizes dental nerves. Palakya (spinach) contains natural oxalates which help in the formation of phyto complexes and occlude the exposed dentinal tubules. Lavanga (clove) and triphala control pain due to the obtundant action of eugenol. These herbs altogether could be exhibiting a synergistic effect in reducing pain due to DH. Various treatment modalities such as laser therapy and iontophoresis are also used for the treatment of dentinal hypersensitivity but have many disadvantages such as being expensive, complex, and questionable long-term effectiveness.

CONCLUSION

Under the limitations of the study, 8% arginine-containing toothpaste was found to be most effective followed by herbal mouthwash and potassium salt-containing toothpastes.

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