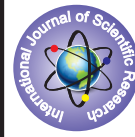


Comparison of Clinical Efficacy Of Four Dentifrices In The Management Of Dental Hypersensitivity.



Dental Science

KEYWORDS: dental hypersensitivity, sensitivity, visual analog scale, desensitizer, Calcium fluoro phosphosilicate, , herbal, potassium nitrate, strontium chloride,

Dr. Vanita Gautam

Associate professor, Department of Conservative dentistry and endodontics, UCMS college of dental surgery, Bhairahawa, Nepal.

Dr. Hemant kumar halwai

Associate professor, Department of orthodontics and Dentofacial orthopedics, UCMS college of dental surgery, Bhairahawa, Nepal.

ABSTRACT

Background: Dental hypersensitivity (DH) is a painful response of a tooth to irritants such as toothbrushing, sweet or sour foods, and thermal changes. It is a cumbersome condition both for the patient and the dental care providers as well. **Aim:** to compare the clinical efficacy of four different commercially available dentifrices in the management of dental hypersensitivity. **Materials & Methods:** A total of 160 patients clinically diagnosed with dental hypersensitivity (93 males and 67 females) participated in this study. The participants were randomly divided into four groups: Group 1 - toothpaste containing 5% potassium nitrate; Group 2 - toothpaste containing 5% fluoro calcium phosphosilicate ; Group 3 - toothpaste containing 10% strontium chloride; and Group 4 - a herbal formulation. The patients' DH scores for tactile, thermal, and evaporative stimuli were recorded on a visual analog scale at baseline, 2 weeks, 1 month, and 2 months. **Results:** Symptoms of dental hypersensitivity were reduced in all four groups. However, group 2 showed a better clinical response. **Conclusions:** The dentifrice containing fluoro calcium phosphosilicate is more efficacious in managing dental hypersensitivity.

INTRODUCTION

Dental hypersensitivity (DH) is characterized by short sharp pain arising from exposed dentine in response to stimuli typically thermal, evaporative, tactile, osmotic or chemical and which cannot be ascribed to any other form of dental defect or pathology.[1] Others terms to describe DH have been created by substituting the word dental, adding site descriptors, such as cervical or root, and combining this with either hypersensitivity or sensitivity.[2,3] DH is a painful clinical condition that affects 8 to 57% of the adult population and is associated with the dentin exposure to the oral environment.[3,4]

A slightly higher incidence of DH is reported in females than in males. While DH can affect the patient of any age, most affected patients are in the age group of 20–50 years, with a peak between 30 and 40 years of age.[5] Regarding the type of teeth involved, canines and premolars of both the arches are the most affected teeth. Buccal aspect of cervical area is the commonly affected site.[6] The most widely accepted theory is the hydrodynamic theory where DH is mediated by a hydrodynamic mechanism, in which a stimulus results in an increased fluid flow in the dentinal tubules. This, in turn, activates nerves located on the pulpal aspect of the tubules, resulting in the generation of action potentials which are interpreted as pain by the patient.[7,8]

Before considering any treatment strategy for the management of DHS, it is important to elicit through case history and perform clinical examination to exclude risk factors overenthusiastic brushers, Periodontal treated patients, Bulimics, People with xerostomia, High-acid food/drink consumers, Older people exhibiting gingival recession and Chewing 'smokeless' or 'snuff' tobacco. Many substances have been advocated for the treatment of dental hypersensitivity pain with numerous clinical trials reporting their apparent efficacy. Attempts to reduce dental hypersensitivity have been aimed at either reducing the excitability of the nerve fibers within the pulp or occluding the open dentinal tubules. In the tubular occlusion approach, the tooth is treated with an agent that occludes the dentinal tubules, thus resulting in stoppage of pulpal fluid flow. This leads to a reduction in DH. Treatment strategies such as lasers, dentin sealers, and periodontal soft-tissue grafting work on the same principle.[9] In the other approach, potassium cations of potassium nitrate dentifrice tend to concentrate in the interior of the dentinal tubules, causing a depolarization of the cellular membrane of the nerve terminal and a refractory period with decreased sensitivity.[10]

MATERIALS AND METHODS

This research was conducted in the city of Nepal with patients from the Universal college of dental sciences Bhairahawa, Nepal, after being approved by the institution's Ethics Committee . The patients signed Informed Consent and were informed of the characteristics and conditions of the research.

Inclusion criteria were individuals with hypersensitivity to hot, cold, or sour stimuli on facial surfaces of at least two posterior teeth, good periodontal health (no probing depth >4 mm), and with no other conditions that might explain their apparent DH, aged between 20 and 60 years. Exclusion criteria were chipped teeth, defective restorations, fractured teeth, deep dental caries, orthodontic appliances, dentures, or bridgework that would interfere with the evaluation of hypersensitivity; periodontal surgery within the previous 6 months; ongoing treatment with antibiotics and/or anti-inflammatory drugs; ongoing treatment for tooth hypersensitivity; pregnancy or lactation; uncontrolled metabolic diseases; major psychiatric disorders; and heavy smoking and alcohol or drug abuse. The teeth were isolated with cotton rolls, and stimuli (sharp dental explorer, air blast test and cold water spray) were applied in each tooth according to a standard methodology. Sensitivity was measured using a 10 cm VAS, with a score of zero being a pain-free response and a score of ten being excruciating pain or discomfort.

The four kinds of toothpaste studied were

- (1) Group 1 - a commercially available toothpaste containing 5% potassium nitrate (RA Thermosteal, ICPA Health Products Ltd., Ankleshwar, India)
- (2) Group 2 - a commercially available nonaqueous toothpaste containing 5% fluoro calcium sodium phosphosilicate with fused silica (Elsenz, Group Pharmaceuticals, Hyderabad, India)
- (3) Group 3-10% SC (Thermosteal", ICPA Health Products Ltd., Ankleshwar, India)
- (4) Group 4 - a herbal toothpaste (Dantkanti, Patanjali Ltd India) which has herbal extracts such as neem, babul, tomar and pudina.

The cases were randomly divided into four groups of forty subjects each. Each group was provided with one of the test dentifrices in its blind package. Each patient was advised to brush their teeth in the usual manner for 3 min, twice daily, with soft bristle toothbrush, and to apply the dentifrice in an amount equal to about half the length of the bristle head. They were also instructed not to eat or drink anything within half an hour of brushing with the dentifrices. They were recalled at 1 week, 1 month, and 2 months for the assessment of tooth sensitivity. During the study period, the use of other oral hygiene products as well as any other dental treatment for

hypersensitive teeth was not permitted. Drugs that may alter the perception of pain were not permitted within 24 h of the assessment.

RESULTS

This parallel double blind randomised control trial included 160 cases (93 males and 67 females of mean age 36.9 ± 10.8 years). No cases of drop-outs or adverse effects were noted. Mean VASs for tactile, air, and cold-water stimulus for all four groups at baseline, 2 weeks, 1 month, and 2 months are shown in Table 1. Intragroup comparison showed that all groups recorded a significant improvement from baseline to 2 months. No significant difference between groups at baseline was found for tactile, air, and cold-water stimulus [table 1].

	Toothpaste group	Baseline	2 week	1 month	2 month	P value
Tactile method	1	4.81±0.62	3.90±0.98	2.12±0.78	1.80±0.41	0.001
	2	4.70±0.54	3.86±0.65	1.80±0.65	1.20±0.83	0.001
	3	4.65±0.73	3.54±0.75	2.20±0.43	1.65±0.24	0.001
	4	4.59±0.21	3.70±0.34	3.02±0.23	2.00±0.91	0.001
Air blast spray	1	7.23±1.24	6.68±1.45	5.40±1.46	2.90±1.5	0.001
	2	7.20±1.45	6.38±1.65	2.28±1.34	0.80±0.45	0.001
	3	7.30±1.29	4.38±1.87	4.32±1.25	2.93±0.09	0.001
	4	7.09±1.47	6.26±1.65	5.00±2.03	3.58±0.76	0.001
Cold water spray	1	7.65±1.13	6.65±1.34	5.08±1.67	2.95±0.87	0.001
	2	7.27±1.09	5.34±1.16	3.45±1.35	1.45±0.97	0.001
	3	7.28±1.32	6.09±1.32	4.42±1.25	3.30±1.08	0.001
	4	7.58±1.23	6.87±1.50	5.45±1.17	3.56±1.18	0.001

Results of Intergroup comparison revealed that Group 2 resulted in more improvement at all-time intervals compared to the other groups for all stimuli. Group 1 did not show any statistical significance with Group 3 except for the tactile stimulus test. Although Group 1 showed no statistical difference with Group 4 at 2 weeks, Group 1 fared consistently better than Group 4 at 1 month and 2 months recalls. Group 3 and Group 4 exhibited significant differences at 2 weeks and 1 month, but over a 2 months recall, Group 3 and Group 4 did not show a statistical difference for tactile and cold water stimulus.

DISCUSSION

There are varieties of treatment regimens recommended over the years to cure dentinal sensitivity. Particular attention has been focused on home use dentifrices containing various active compounds, which act by either blocking the hydrodynamic mechanism or the neural response.[7] This study compared four commercially available dentifrices. Findings of the present study indicate that the efficacy of toothpaste containing fluoro calcium phosphosilicate is comparatively better than the other toothpastes. The toothpaste in group 2 offers long lasting relief and protection from dentinal hypersensitivity in following four steps:

1. Step1: Chemical Bonding: its particles chemically bind to the tooth surface
2. Step 2: Release of minerals: components slowly dissolve to release calcium, phosphate and fluoride ions into saliva.
3. Step 3: Rapid Apatite Formation: ions precipitate and crystallize to form fluorohydroxyapatite over dentin surface and within dentinal tubules. These highly acid resistant crystal provide deep occlusion within dentinal tubules
4. Step4: Enamel Remineralization: sustained release of fluoride ions rebuilds and strengthens enamel.

Limitations and Future prospects of the study

In the present study, no control group or placebo was included, thus there is possibility of biased results. More numbers of clinical trials done over a larger population are essential in future to find out best treatment strategy.

CONCLUSION

This study demonstrated that the fluoro calcium phosphosilicate

group showed significantly better results compared to either potassium nitrate, strontium chloride, or a herbal dentifrice in reducing dental hypersensitivity symptoms.

REFERENCES

1. Dowell P, Addy M. Dentine hypersensitivity – a review. Aetiology, symptoms and theories of pain production. *J Clin Periodontol* 1983; 10: 341-350.
2. Addy M. Dentine hypersensitivity: new perspectives on an old problem. *Int Dent J* 2001;52: 367-375.
3. Markowitz K, Pashley DH. Personal reflections on a sensitive subject. *J Dent Res* 2007;86: 292-295.
4. Addy M. Dentine hypersensitivity: definition, prevalence, distribution and aetiology. In: Tooth wear and sensitivity: clinical advances in restorative dentistry. Addy M, Embery G, Edgar WM, Orchardson R eds, Martin Dunitz, London, 2000: 239-248
5. Flynn J, Galloway R, Orchardson R. The incidence of hypersensitive teeth in the west of Scotland. *J Dent* 1985;13:230-6.
6. Addy M, Mostafa P, Newcombe RG. Dentine hypersensitivity: The distribution of recession, sensitivity and plaque. *J Dent* 1987;15:242-8.
7. Bartold PM. Dentinal hypersensitivity: A review. *Aust Dent J* 2006;51:212-8.
8. Gibson M, Sharif MO, Smith A, Saini P, Brunton PA. A practice-based randomised controlled trial of the efficacy of three interventions to reduce dentinal hypersensitivity. *J Dent* 2013;41:668-74.
9. Pradeep AR, Agarwal E, Naik SB, Bajaj P, Kalra N. Comparison of efficacy of three commercially available dentifrices [corrected] on dentinal hypersensitivity: A randomized clinical trial. *Aust Dent J* 2012;57:429-34.
10. Frechoso SC, Menéndez M, Guisasaola C, Arregui I, Tejerina JM, Sicilia A. Evaluation of the efficacy of two potassium nitrate bioadhesive gels (5% and 10%) in the treatment of dentine hypersensitivity. A randomised clinical trial. *J Clin Periodontol* 2003;30:315-20.