

Comparative Analysis of Efficacy of Three Different Desensitizing Toothpastes in Reducing Dentinal Hypersensitivity: A 4-week Clinical Study

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Abstract

Background and Objectives: Despite a large number of published data, there is still a lack of a “gold standard” method in the management of DH. There is not enough research comparing the desensitizing efficacy of herbal desensitizing pastes to that of other commercially available desensitizing pastes. Hence, the goal of this study was to examine and collate the effectiveness of three distinct desensitizing toothpastes with non-identical active components in lessening dentinal hypersensitivity. **Materials and Methods:** Over the course of 4 weeks, 15 patients with dentinal hypersensitivity were investigated in a randomized control clinical trial. Patients were placed into three groups each with five patients, and each was given a different desensitizing paste for 4 weeks: Group I SHY NM Paste (calcium sodium phosphosilicate), GROUP II- Herbal desensitizing HiOra –K, and Group III –Sensitive pro relief (Arginine). At baseline and 4 weeks, the patients were examined using the visual analog scale. **Results:** The three desensitizing toothpastes, each of which included a different active ingredient, were all helpful in treating DH when compared to the other groups, the arginine group (Group III-Colgate sensitive pro relief) had greater clinical response at the end of 4 weeks. **Conclusion:** Colgate sensitive pro relief tooth paste, which contains arginine, performed much better in the treatment of dentinal hypersensitivity than either SHY NM paste or Herbal desensitizing HiOra-k toothpaste.

Keywords: Dentinal hypersensitivity, Toothpaste, Herbal, Colgate sensitive pro relief, Arginine.

INTRODUCTION

Dentinal hypersensitivity is a symptom complex, not an illness, and it is a long-term problem that, if not treated properly, can have a substantial influence on a sufferer's quality of life.^[1] The prevalence of dentinal hypersensitivity varies from 4% to 74%. Females have been reported to have a higher incidence compared to males. Patients between the ages of 20 and 50 are the most typically affected, with a peak between the ages of 30 and 40.^[2] The canines and premolars are the teeth that are most commonly affected and the area that has the most common impact is the buccal aspect of the cervical region.^[3]

Diagnosis of DH might be difficult; therefore, it is important to rule out any other dental problems or diseases that could cause similar symptoms, such as a split or fractured tooth, dental caries, or periodontal disease. It is crucial to get the right diagnosis before you can build and implement a treatment strategy.^[4]

The primary etiological factor for exposed dentin is gingival recession caused by abrasion or periodontal disease. Acid

erosion is also a significant element in exposing dentinal tubules.^[5] The “tactile” approach, which uses a blunt probe on exposed dentin in a mesiodistal orientation, or the “air-blast” method on hypersensitive portions of the tooth, are two clinical methods used to diagnose DH. The severity of pain can be measured using a categorical scale (i.e., mild, moderate, or severe pain) or the visual analog scale (VAS).^[6]

A novel DH therapy method (Pro Argin) is now available as a desensitizing paste for in-office use that consists of 8% arginine, an amino acid present in saliva, in combination with calcium carbonate. The natural action of saliva plugging and

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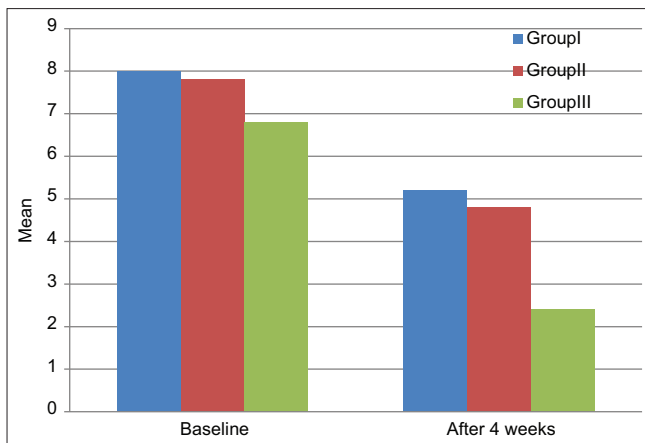


Figure 1: Mean of the three study groups at baseline and after 4 weeks.

Table 1: Descriptive statistics of the three study groups at baseline and after 4 weeks

	n	Minimum	Maximum	Mean	Std. Deviation
Group I baseline	5	7	9	8.00	0.707
Group I 4 weeks	5	4	6	5.20	0.837
Group II baseline	5	6	9	7.80	1.304
Group II 4 weeks	5	4	6	4.80	0.837
Group III baseline	5	5	8	6.80	1.304
Group III 4 weeks	5	1.00	4.00	2.4000	1.14018

*Significant $P \geq 0.05$

Table 2: Comparison of the means between the time intervals in each study group

Groups	Time interval	Mean	Standard deviation	P-value
I	Baseline	8.00	0.707	0.042*
	After 4 weeks	5.20	0.837	
II	Baseline	7.80	1.304	0.041*
	After 4 weeks	4.80	0.837	
III	Baseline	6.80	1.304	0.039*
	After 4 weeks	2.40	1.140	

*Significant $P \geq 0.05$

Table 3: Comparison of the means between the three study group at baseline and after 4 weeks

Time interval	Groups	Mean	Standard deviation	P-value
Baseline	I	8.00	0.707	0.276
	II	7.80	1.304	
	III	6.80	1.304	
After 4 weeks	I	5.20	0.837	0.011*
	II	4.80	0.837	
	III	2.40	1.140	

*Significant $P \geq 0.05$. P value in group I is found to be significant at 0.042, in Group II is 0.041 and Group III is 0.039. After 4 weeks P-value is found to be 0.011

closing open dentinal tubules is mimicked by this desensitizing technique.^[7] People are becoming increasingly interested in

herbal products that have the ability to influence dental health. HiOra (Himalaya Drug Company, Bengaluru, Karnataka, India) has launched a herbal desensitizing toothpaste that claims to relieve DH discomfort effectively. It's also easier to use and has fewer side effects.^[8]

Despite a large number of published data, there is still a lack of a “gold standard” method in the management of DH. There is not enough research comparing the desensitizing efficacy of herbal desensitizing pastes to that of other commercially available desensitizing pastes. Hence, the goal of this study was to examine the desensitizing efficacy of Group I-SHY NM Paste (calcium sodium phosphosilicate), Group II-Herbal desensitizing HiOra-k, and Group III-Colgate sensitive pro relief (Arginine) over a 4-week period in reducing dentinal hypersensitivity.

MATERIALS AND METHODS

For 4 weeks, 15 patients with dentinal hypersensitivity who reported to the department of periodontics were investigated in a randomized control clinical trial. Patients were placed into three groups, each with five patients, and each was given a different desensitizing paste for 4 weeks: Group I-SHY NM Paste (calcium sodium phosphosilicate), Group II-Herbal desensitizing HiOra-k, and Group III-Colgate sensitive pro relief (Arginine). At baseline and 4 weeks, the patients were examined using the VAS scale.

Patients between the ages of 18 and 50 who were in good health; had at least two hypersensitive teeth anterior to the molars, had cervical abrasion or gingival recession, had dentin loss defects < 1 mm in depth that did not require a restorative treatment, patients who were available for the duration of the study, and agreed to sign the informed consent form were involved in this study. Patients with severe underlying pathologies, those with a systemic medical condition, and pregnant and lactating women were all excluded from the study.

Tactile sensitivity assessment

Tactile sensitivity was measured using a blunt probe applied to the hypersensitive portions of the tooth with light manual pressure in the mesiodistal direction.

Air blast sensitivity assessment

Using the air component of an air–water syringe, a 1–2 s blast of air perpendicular to the exposed dentin (40.5 psi) was directed into the buccal surface of a sensitive tooth at a distance of 1 cm. The placement of two fingers insulated adjacent proximal teeth from the air blast. The VAS was used to record hypersensitivity; the scores were recorded on a 10-cm scale, with values ranging from 0 to 1 for no pain, 2–3 for minor discomfort, 4–6 in case of moderate pain, and 7–10 in case of severe pain. Patients having a VAS score of 4 or higher were accepted for the trial.^[9]

Method of application

Each patient was instructed to brush their teeth as usual for 3 min, twice daily, with a soft bristle toothbrush and toothpaste

equivalent to about half the length of the bristle head. They were also told not to eat or drink for at least half an hour after brushing their teeth with the dentifrices. They were called back at the end of the 4 weeks to have their tooth sensitivity assessed. The same examiner recorded scores immediately after application and 4 weeks later using the same tactile and air blast stimulation methodology.

Statistical analysis

SPSS VERSION 25.0 was used for the statistical analysis. To compare the time intervals in each study group, the Wilcoxon signed-rank test was utilized. At baseline and after 4 weeks, the Kruskal–Wallis test was employed to compare the three study groups. The statistical significance was kept at a 0.05 *P*-value.

RESULTS

None of the participants skipped the study and there were no side effects reported by any of the study's participants. At baseline and after 4 weeks, the mean and standard deviation of the Group I-SHY NM Paste was 8 ± 0.707 and 5.20 ± 0.837 , respectively (Figure 1). The mean value for Group II-Herbal desensitizing HiOra-k paste at baseline and after 4 weeks was 7.80 ± 1.304 and 4.80 ± 0.837 , respectively. The mean for Group III-Colgate sensitive pro relief (Arginine) was 6.80 ± 1.304 at baseline and 2.4000 ± 1.140 after 4 weeks (Table 1). As the baseline and 4 week VAS values were compared, all three groups showed a decrease in VAS in the 4th week when compared to the baseline, and the results were statistically significant with *P* = 0.042, 0.041, and 0.039 in Groups I, II, and III, respectively (Table 2).

At the start, there was no discernible difference between the three groups. When comparing the VAS scores of the three groups at the end of the 4th week, it is clear that Group III has a lower score than the other groups, followed by Group II and Group I.

With *P* = 0.011, the finding was likewise statistically significant. Individuals were divided into three groups based on the effectiveness of a single application of desensitizing paste over a 4-week period: Group III > Group II > Group I (Table 3).

DISCUSSION

The exposure of dentinal tubules caused by the removal of enamel from the crown of the tooth or the loss of cementum and overlying periodontal tissues causes hypersensitivity, which can be treated with one of two major suppressive mechanisms either by dampening neural impulses or by sealing (blocking) the dentinal tubule opening.^[10]

An appropriate chemical for the treatment of DH must be non-irritant to the pulp, painless to apply, simple to use, fast acting, long-term effective, and consistent.^[11] Desensitizing pastes have been frequently used to treat DH in the past due to their inexpensive cost and ease of use for home use. The in-home usage of desensitizing toothpaste has recently increased and many are inclining toward the use of herbal alternatives. These desensitizing dentifrices' comprise a

variety of active substances that obstruct the exposed dentinal tubules, reducing dentinal hypersensitivity by a neural or hydrodynamic process.

According to Holland *et al.*, the stimuli used in this study were both tactile and evaporative, because different stimuli might elicit different pain sensations of varying intensities.^[12] All dental lesions were studied with an air stimulus from a three-way syringe and a tactile stimulation from a conventional probing tip. The stimuli's reaction was measured immediately after application and again 4 weeks postoperatively.

There was a significant difference in mean change in VAS scores across all three groups when baseline values were compared to 4 week post-operative assessments. The findings of this investigation are consistent with Jena and Shashirekha's findings.^[13,14]

Colgate pro relief toothpaste with arginine (Group III) was found to be the most efficient in reducing dentinal hypersensitivity in this trial, followed by herbal (Group II) and SHY NM Paste (Group I) (calcium sodium phosphosilicate). The findings of this study are similar to those of a study published in 2019 by Kar *et al.*, who found that desensitizing toothpaste containing 8% arginine was the most efficacious in lessening dentinal hypersensitivity after a single application for up to a period of 4 weeks, followed by herbal and potassium salt containing desensitizing toothpaste.^[15]

This study's conclusion is also consistent with the findings of Elias Boneta *et al.*, who found that 8% arginine toothpaste has a higher desensitizing efficacy than potassium salt toothpaste^[16] and is also consistent with Bansal and Mahajan's study, which found that 8% arginine toothpaste had a much higher desensitizing efficacy than herbal toothpaste.^[11]

Herbal desensitizing paste HiOra-k (Group II) was found to be more effective in lowering DH than Group I-SHY NM Paste in this investigation. Natural compounds such as suryakshara, palakya, lavanga, and triphala are thought to play a role. These herbs may have a synergistic impact in lowering the discomfort associated with DH.

Limitations

This was a short-term (4-week) study to see how effective desensitizing pastes are at removing participants' acute DH problems after a single application. To determine the optimum treatment method for dentinal hypersensitivity, long-term study on the pain-relieving efficiency of desensitizing pastes should be undertaken on a wider population.

CONCLUSION

Within the limitations of this study, we can conclude that Group III-Colgate sensitive pro relief (Arginine) showed significantly better results compared with either Group I-SHY NM Paste (calcium sodium phosphosilicate), or a herbal dentifrice (Group II-Herbal desensitizing HiOra-k) in reducing DH symptoms at the end of 4 weeks.

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