Research Article

Effectiveness of casein phosphopeptide-amorphous calcium phosphate varnish (MI Varnish) on reduction of dentin hypersensitivity following non-surgical periodontal therapy – A randomized controlled clinical trial

Kyaarthini Subramaniam[1], Vinay Sivaswamy[2], Priya Lochana Gajendran[1]*

ABSTRACT

Aim: The aim of the study was to evaluate the effectiveness of casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) varnish on reducing dentin hypersensitivity following non-surgical periodontal procedure (scaling). **Objective:** The objective of the study was to assess the reduction in patient discomfort to sensitivity following non-surgical periodontal procedure. **Materials and Methods:** Patients with gingival recession in their lower anterior teeth and who required scaling were specifically chosen for this study. A total of 10 patients in the control group were subjected to only scaling procedure. A total of 10 patients in the test group were subjected to scaling followed by application of CPP-ACP varnish (G. C. Tooth Mousse) in the areas of exposed root dentin and visual analog scale was used to evaluate the discomfort acted by sensitivity immediate after treatment and at 1 week review period. **Results:** When comparing between the pre- and post-values of Group II (TEST group-CCP-ACP), there was statistically significant decrease in dentin sensitivity 1 week after the scaling procedure ($P < 0.01$). There was statistically significant change ($P = 0.023$) when comparing the 1 week post-operative values between the control and test group using Mann–Whitney U test. **Conclusion:** CPP-ACP has immediate action on hypersensitivity. Further study is required to see its long lasting desensitizing action. It can be effectively used in prevention of sensitivity after routine periodontal therapy.

KEY WORDS: Desensitisation, Hypersensitivity, Periodontal therapy, Scaling

INTRODUCTION

Conditions such as abrasion, erosion, and attrition are types of dental wear. Dental wear results in an exaggerated response to non-noxious sensory stimulus which is termed as tooth hypersensitivity.[1] Methods to relieve discomfort due to hypersensitivity include covering the outer ends of dentinal tubules or by stimulating the formation of secondary dentin.

Dental wear is not the only condition with which patients experience sensitivity in their teeth. Patients with gingival recession also complain of sensitivity, especially following scaling procedures. This is due to exposed root dentin in the regions of receded gums.[2] This situation is mainly observed in patients with receded gums and teeth in the exposed regions covered by plaque and calculus. Scaling procedure removes the plaque and calculus layer and exposes the root surface. This results in sensitivity immediately when the patient breathes in air or drinks cold liquids. There are two courses of action for these cases with one option being root coverage procedures.

Root coverage procedures may consist of soft tissue grafts or repositioned gingival flaps. However, not all patients undergo these procedures especially if the receded teeth are present in the lower anterior region and are not visible in the esthetic zone. For such cases, desensitizing agents can be prescribed as palliative therapy for hypersensitive regions in teeth.[3] Desensitizing agents provide transient relief from sensitivity in varying degrees. The most common

Access this article online

Website: jprsolutions.info | ISSN: 0975-7619

[1]Department of Periodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India, [2]Department of Prosthodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India

***Corresponding author:** Dr. Priya Lochana Gajendran, Department of Periodontics, Saveetha Dental College, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India. Phone: +91-994141388. E-mail: priyalochana.87@gmail.com

Received on: 15-01-2019; Revised on: 22-02-2019; Accepted on: 16-03-2019

desensitizing agents are sodium fluoride, potassium nitrate, arginine complexes, and strontium chloride and they are available in paste or varnish forms. These materials need frequent applications to provide relief and do not aid in remineralizing tooth structure.

Casein phosphopeptide-amorphous calcium phosphate (CPP-ACP) is a milk protein derivative and has been proven to possess anti-cariogenic, desensitizing, and remineralization properties.[4] This product has been extensively tested in gel form and has been recently formulated into a liquid varnish for clinical application. This study aims to evaluate the effectiveness of CPP-ACP varnish in reducing hypersensitivity in patients following non-surgical periodontal therapy (scaling).

MATERIALS AND METHODS

This study was conducted among walk-in patients Win the outpatient clinics in Saveetha Dental College, Chennai, India. Patients with gingival recession in their lower anterior teeth and who required scaling were specifically chosen for this study [Figure 1]. The power calculation was done using G-Power software and the sample size was determined to be eight patients (one control group and one test group). A total of 10 patients in the control group were subjected to only scaling procedure. A total of 10 patients in the test group were subjected to scaling followed by application of CPP-ACP varnish (G. C. Tooth Mousse) in the areas of exposed root dentin [Figures 2-4]. The patients were screened for gingival recession and dry air was first blasted on all the teeth surfaces using a three way syringe and asked to provide a score on visual analog scale indicating the level of sensitivity they experienced before scaling. Later, the same procedure was done immediately following scaling and finally, the patients were recalled after 1 week and the score of visual analog scale was taken once again after blasting dry air using a three way syringe on all the teeth surfaces [Figure 5]. The scores obtained were analyzed using SPSS V20 statistical software, the results were tabulated.

RESULTS

The values showed a non-normal distribution; hence, nonparametric tests were applied for statistical analysis. The mean and standard deviation values of the control and test group have been shown in Table 1. Wilcoxon signed ranks test was used for intragroup comparison between the pre- and post-operative visual analog scale values of Groups I and II. When comparing between the pre- and post-values of Group I (control group), there was a statistically significant decrease in dentin sensitivity 1 week after the scaling procedure ($P < 0.01$) [Table 2]. When comparing between the pre- and post-values of Group II (TEST group-CCP-ACP), there was statistically significant

Figure 1: Pre-operative scaling

Figure 2: After oral prophylaxis

Figure 3: Casein phosphopeptide-amorphous calcium phosphate in varnish form

Figure 4: Applying varnish on the exposed root dentin areas after scaling

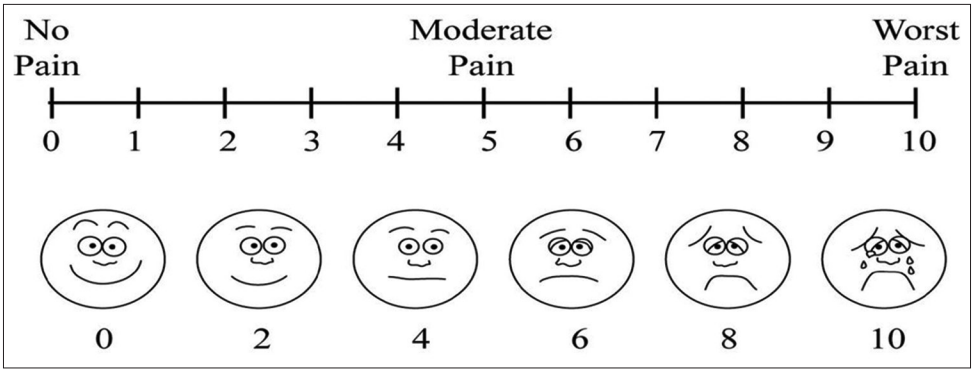

Figure 5: Visual analog scale

decrease in dentin sensitivity 1 week after the scaling procedure ($P < 0.01$). There was statistically significant change ($P = 0.023$) when comparing the 1 week post-operative values between the control and test group using Mann–Whitney U test [Table 3].

DISCUSSION

G. C. Tooth Mousse was developed by Professor Reynolds at the University of Melbourne in 1998. It contains CPP-ACP.[5] CPP acts as reservoir of ACP and provides calcium and phosphate ions which aid in remineralization. Continuous stimuli lead to protective changes in dentin. It causes collagen fibers and apatite crystals to begin appearing inside the tubules, leading to blockage of tubules.

In the current study, when comparing between the pre- and post-values of Group II (TEST group-CCP-ACP), there was a statistically significant decrease in dentin sensitivity 1 week after the scaling procedure ($P < 0.01$). There was also a statistically significant change ($P = 0.023$) when comparing the 1 week post-operative values between the control and test group using Mann–Whitney U test.

Similar results were seen in another study,[6] where Gluma desensitizer, G. C. Tooth mousse and ACP were compared at 2nd, 4th, and 6th month duration. Clinical impression suggests that dentinal hypersensitivity has a somewhat random cyclical pattern that may reflect a change in balance between the effects of etiological versus protective factors.[7] Placebo effects are commonly referred to in the dentinal hypersensitivity clinical trial literature but not studied. The placebo effect is a response to medical intervention that results from the intervention itself and not from any particular mechanism of action.[8,9]

Studies done on agents such as potassium nitrate, strontium chloride, and stannous fluoride do not show immediate relief.[10] However, in the present study, reduction sensitivity was achieved at short duration. It shows rapid, prolonged desensitizing action, and patient's satisfaction.

Table 1: Descriptive statistics

Groups	N	Mean	Standard deviation
Group I pre	10	7.5	0.84984
Group II pre	10	7.8	1.03280
Group I post	10	4.4	1.17379
Group II post	10	3.4	0.51640

Table 2: Comparing Group I pre with Group I post and comparing Group II pre with Group II post using Wilcoxon signed ranks test

Statistical analysis	Group I pre with Group I post	Group II pre with Group II post
Z	−2.280	−2.859
Asymp. Sig. (2-tailed)	0.005	0.004

P<0.001

Table 3: Comparing Group I post with Group II post using Mann–Whitney U test

Statistical analysis	Post I and post II
Mann–Whitney U test	22.000
Asymp. Sig. (2-tailed)	0.023
Exact Sig. (2*[1-tailed Sig.])	0.035

P<0.05

CONCLUSION

Thus, from the above study, it can conclude that CPP-ACP has immediate action on dentin hypersensitivity. However, further studies are required to see its long-lasting desensitizing action for it to be effectively used in prevention of sensitivity after routine periodontal therapy.

REFERENCES

1. Pashley DH. Dentin permeability: Theory and practice. In: Experimental Endodontics. Boca Raton, FL: CRC Press Inc.; 1990. p. 19-49.
2. Addy M, Embery G, Edgar M, Orchardson R. Tooth Wear and Sensitivity. London: Martin Dunitz; 2000.
3. Geiger S, Matalon S, Blasbalg J, Tung M, Eichmiller FC. The clinical effect of amorphous calcium phosphate (ACP) on root surface hypersensitivity. Oper Dent 2003;28:496-500.
4. Jacobsen PL, Bruce G. Clinical dentin hypersensitivity: Understanding the causes and prescribing a treatment. J Contemp Dent Pract 2001;2:1-2.

5. Nagata T, Ishida H, Shinohara H, Nishikawa S, Kasahara S, Wakano Y, *et al.* Clinical evaluation of a potassium nitrate dentifrice for the treatment of dentinal hypersensitivity. J Clin Periodontol 1994;21:217-21.
6. Shen P, Cai F, Nowicki A, Vincent J, Reynolds EC. Remineralization of enamel subsurface lesions by sugar-free chewing gum containing casein phosphopeptide-amorphous calcium phosphate. J Dent Res 2001;80:2066-70.
7. Reynolds EC, Cain CJ, Webber FL, Black CL, Riley PF, Johnson IH, *et al.* Anticariogenicity of calcium phosphate complexes of tryptic casein phosphopeptides in the rat. J Dent Res 1995;74:1272-9.
8. Rosaiah K, Aruna K. Clinical efficacy of amorphous calcium phosphate, G.C. tooth mousse and gluma desensitizer in treating dentin hypersensitivity. Int J Dent Clin 2011;3:1-4.
9. Yates R, Owens J, Jackson R, Newcombe RG, Addy M. A split-mouth placebo-controlled study to determine the effect of amorphous calcium phosphate in the treatment of dentine hypersensitivity. J Clin Periodontol 1998;25:687-92.
10. West NX, Addy M, Jackson RJ, Ridge DB. Dentine hypersensitivity and the placebo response. A comparison of the effect of strontium acetate, potassium nitrate and fluoride toothpastes. J Clin Periodontol 1997;24:209-15.

Source of support: Nil; Conflict of interest: None Declared