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ORIGINAL ARTICLE

Comparison of Efficacy of Dentifrice Containing 8% Arginine and 8% Strontium Acetate in Reducing Dentinal Hypersensitivity

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ABSTRACT

Aim: To find out the effect of dentifrice containing 8% strontium acetate and 8% arginine in reducing dentinal hypersensitivity.
Study Design: Randomized clinical trial
Place and Duration of Study: Department of Periodontology, Gandhara University Peshawar from 1st June 2014 to 31st October 2021.
Methodology: Six hundred and twenty five patients were enrolled. The study was conducted in Sardar Begum Dental Hospital, Gandhara University Peshawar. They were divided into two groups; Group A were using dentifrice that contains 1450ppm sodium monofluorophosphate and 8.0% arginine whereas patients of group B were given dentifrice which contains 1040 ppm fluoride as sodium fluoride and 8% strontium acetate.
Results: The mean difference was 0.59 of the initial less than one min Schiff values in both the groups. On the other hand, Schiff values in both the groups after 8 week application was 0.26. Likewise, difference in baseline mean values was 2.32 while 1 min post-application mean difference for strontium acetate and arginine was 7.13 and 2.88 respectively.
Conclusion: Significant decreased in hypersensitivity in patient using the arginine and strontium acetate. Therefore it was an effective dentifrices in decreasing in office hypersensitivity.
Keywords: Efficacy, Dentifrice, Dentinal hypersensitivity

INTRODUCTION

Dentine hypersensitivity is caused by exposed dentine due to the external stimuli with acute pain of short duration. The stimulus producing dentine hypersensitivity are thermal evaporative, tactile, chemical and osmotic which cannot be endorsed any other pathology and any other dental defects.[1] The prevalence of dentine hypersensitivity was 14.3% in all dental patients while 8-57% among adults population while the most prevalent age was 20 to 30 years.[2-4] In dentine hypersensitivity the outer most layer of the dentine is exposed with open dentinal tubules, these tubules are exposed to the pulp cavity[5,6] while in hydrodynamic theory suggests that7,8 external stimuli like hot, cold, osmotic pressure and tactile cause dentinal fluid to move in the exposed dentine tubules. In mechanoreceptors pain is initiated when fluid is moving in dentinal tubules while physiological parameters are satisfied. The patient with dentine hypersensitivity the size and width of an dentinal tubules are eight times larger and two time wider than normal dentinal tubules.[9,10] To manage the hypersensitivity two treatment methods can be utilized based on nerve depolarization which is physiological approach or dentinal tubules occlusion.[11] Dentifrices are twice daily used containing potassium salts for example chloride, nitrate and citrate. They are considered as nerve depolarizing agents. Clinical trials showed that potassium based dentifrices cause decreased in hypersensitivity if patient used it for two weeks regularly while if it is used fir longer time show full effect on teeth hypersensitivity.

The purpose of this trial was to compare the effectiveness of dentifrices containing 1450 ppm sodium monofluorophosphate and 8.0% arginine with dentifrices containing1040 ppm sodium fluoride and 8.0% strontium acetate against hypersensitivity. Study was also designed to assess its sustained effect for eight weeks.

MATERIALS AND METHODS

This randomize control trial was conducted in Periodontology Section, Sarddar Begum Dental College, Gandhara University, Peshawar. The study was conducted after the ethical approval taken from the ethical committee of Gandhara University Peshawar. The study included both male and female, from 18 to 70 years. Sample size was 652 patients with at least two hypersensitive teeth with abrasion, gingival recession and cervical erosion, patient met the score 2 or 3 of Schiff cold air sensitivity scale were included in the study while patient with any pathology, advanced periodontal disease or treated any periodontal disease in 12 months, chronic diseases, pregnant and lactating mother were excluded from the study. Method of Schiff cold air sensitivity scale was applied on patient atleast two hypersensitive teeth. Data was collected and analysis was done by using SPSS program. Sample was divided into two study groups that was Group A and Group B. Both the patients in groups were assessed 1min after application as well as 8 weeks of application. Patients were also given brushing instructions including: brushing their teeth at least for 1min, only using given dentifrices and twice a day. Patients of group A were given dentifrice which contains 1450ppm Sodium monofluorophosphate and 8.0% arginine whereas patients of group B were given dentifrice that contain 1040 ppm sodium fluoride and 8% strontium acetate. Two study groups that were balanced based on air blast dentine hypersensitivity baseline scores the sensitive tooth was isolated from the adjacent teeth by placing finger on the adjacent teeth. Air was delivered from the standard dental unit syringe on the buccal surface of the exposed tooth for one second at the distance of 1cm. patient was assessed according to the given; Score 0= No response to air stimulus, Score 1= Give response to air stimulus; no response to discontinuation of stimulus, Score 2= Give response to air stimulus; give response to discontinuation of stimulus and Score 3=Give response to air stimulus; also consider stimulus painful also requests discontinuation of stimulus.

Data was analyzed using SPSS-20, difference between the groups were calculated by using Independent sample t-test while Paired sample t-test was used for calculating differences within the same groups and A P-value ≤0.05 was considered statistically significant.

RESULTS

The average age of male was 36.22 and female was 34.28. There were 236 males and 223 were females. The average baseline values of the Schiff test for arginine was 0.49, minimum 2.00 and a maximum 3.00 range. The average number of (Schiff test) after the initial arginine polish with slow hand piece gives standard deviation

minimum 0.68 and 3.00 maximum, respectively. Values of standard deviation after weeks showed 0.68 and maximum of 3.00. The standard deviation results for arginine showed 12.54, min 47 and max 92. After one minute application of arginine St. dev scores showed 16.81, min=25 and max=80, respectively. Results after eight weeks of application give standard deviation 18.52, min=10 and max=75, respectively. Standard deviation results for strontium acetate showed11.80, min 50 and max 90 respectively. After one-minute application of strontium acetate standard deviation scores was 13.96, min=25 and max=80. Results after eight weeks of application give standard deviation 13.55, max=70 and min=10 (Tables 1-8).

Table 1: Mean standard deviation of 8.0% arginine after 1 min application and after 8 weeks use of arginine

Schiff test	Mean±SD
Baseline	2.55±0.49
Postoperative 1 minute	1.98±0.68
Postoperative 8 weeks	1.57±0.68

Table 2: Standard deviation of 8.0% strontium Acetate after 1 min brushing of strontium acetate and after 8 weeks of application

Schiff test	Mean±SD
Start	2.64±0.48
Postoperative 1 minute	1.91±0.60
Postoperative 8 weeks	1.30±0.67

Table 3: Mean VAS for all groups after 1 min application and after 8 weeks use

Schiff test	Mean±SD
Initial	68.93±12.11
Postoperative 1 minute	50.28±15.37
Postoperative 8 weeks	36.43±16.46

Table 4: Mean values of VAS for both groups after 1 min application and after 8 weeks use

Schiff test	Mean±SD
Baseline	69.83±13.21
Postoperative 1 minute	51.35±16.42
Postoperative 8 weeks	37.54±17.36

Table 5: After 1 min application and after 8 weeks use paired differences of Schiff test results within the 8.0% C4H6O4SR

Arginine		Paired Differences					P value
		Mean	S.d	Std. error mean	95% confidence interval difference		
					Lower	Upper	
One	Initial - Post 1 min	-.5592	.55022	.10977	-.80320	-.35064	.000
Two	Post 1 min - Post 8 weeks	-.40375	.54807	.10759	-.62521	-.18246	.001
Three	Baseline–post 8 weeks	.98067	.60796	.11913	.73520	1.22632	.000

Table 6: The differences of S.T values within the 8.0% C4H6O4SR sodium group after 1 min application and after 8 weeks use

$C_4h_6O_4Sr$		Paired Differences					P value
		Mean	S.d	Std. error mean	95% confidence interval difference		
					Lower	Upper	
One	Initial - Post 1 min	.72076	.51441	.10088	.52300	.93854	.000
Two	Post 1 min - Post 8 weeks	1.23615	.68948	.13522	1.06767	1.62464	.000
Three	Baseline–post 8 weeks	.61538	.58835	.11538	.37775	.85302	.000

Table 7: After 1 min application and after 8 weeks use, VAS with the 8.0% C_4H_6O4SR group

Strontium acetate		Paired Differences					P value
		Mean	S.d	Std. error mean	95% confidence interval difference		
					Lower	Upper	
One	Initial - Post 1 min	21.25000	12.21167	2.39491	16.31760	26.18240	.001
Two	Post 1 min - Post 8 weeks	37.23077	14.29282	2.80305	31.45778	43.00376	.001
Three	Baseline–post 8 weeks	15.98077	10.46946	2.05323	11.75206	20.20948	.001

Table 8: Paired after initial application and after 8 weeks, differences of VAS within the 8.0% Arginine group

		Paired Differences					P value
		Mean	S.d	Std. error mean	95% confidence interval difference		
					Lower	Upper	
One	Initial - post 1 min	16.03846	11.77448	2.30917	11.178264	20.79428	.001
Two	Baseline – After 8 weeks	27.76923	13.03781	2.55693	22.50214	33.03532	.001
Three	Post 1min – post 8 weeks	11.73077	10.94918	2.14731	7.30330	16.15324	.001

DISCUSSION

Retention of teeth in oral cavity cause hypersensitivity which is needs to be treated. Different eating habits like use of fizzy drinks may cause exposure of dentinal tubules as tooth loss surface due to abrasion, erosion and gum recession.[14] Management of dentine hypersensitivity involve both at home and in office. The use of dentifrices is considered first priority because it is cost efficient, reliable method for treatment of dentine hypersensitivity. Dentifrices have the property for instant relief of pain, less side effects and easy to use.[15]

The best or ideal hypersensitivity paste or varnish mostly works like the natural desensitizing mechanism, i.e. occluding the dentinal areas efficiently and rapidly. The agents containing pro-arg, with calcium carbonate base along 1450 ppm fluoride as sodium mnofluorophosphate had shown clinically good results in reducing the hypersensitivity and starting near to natural desensitizing process and is having good results than agents having 2% K^+ (potassium ions). CLSM showed Pro-arginin technology advantages in blocking the open tubules.[16]

One of the present study shows, dentifrice having less than 8% SA was effective in decreasing dentine hypersensitivity oninitial1 min., usage due to the creation of topical layer on dentine surface and can reduce the effect of dietary medium. Hughes et al showed that less than 9% $C_4H_60_4Sr$ (sensodyne rapid action) was good in decreasing DH on continuous use of two times a day for about 56 days. There was a notable decrease in DH as compared to the initial scale.[13] There was a remarkable reduction in the values of all scales which proved that both showed good efficacy against dental hypersensitivity. Remarkable reduction in dentine sensitivity was present in both groups of this study, hence supporting present study.

Efficacy of an arginine paste study on dental hypersensitivity in patients showed the efficiency of arginine in reducing DH after phase one therapy. They clinically tested DH before, after phase 1 therapy, post immediate application of arginine, then after two, four and six weeks of regular use. There was a noticeable reduce sensitivity after post opp. application of arginine which was sustained for 42 days of continuous usage.

Schiff values percentage change from the initial administration for the strontium acetate group was less than 28% for post-op one minute application and less than 51% after 8 weeks topical use while the variation for group A was less than 23% for post-op 1 min application and less than 38% after 8 weeks usage.

CONCLUSION

A significant reduction in hypersensitivity was observed in both groups; arginine and strontium acetate were effective against dental hypersensitivity.

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