

APPLICATION OF FLUORIDE VARNISH AS NON INVASIVE TREATMENT MODALITY FOR DENTINAL HYPERSENSITIVITY

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ABSTRACT

The objective of the study was to determine an improvement in cervical dentin hypersensitivity at 4 weeks of application of fluoride varnish from baseline observation. This descriptive observational study was carried out in department of Operative Dentistry, Rawal Institute of Health Sciences, Islamabad, from 1st July 2017 to 31st December 2017. After approval by ethical committee of the college, patients consent was also obtained. Seventy patients with hypersensitivity complain in permanent teeth with age group 20-80 years were selected. Patients data was collected through consecutive sampling consisted of 29 (41.4%) males and 41 (58.6%) females with a mean age of 39.13 ±12.19. Baseline hypersensitivity scores were recorded according to Schiff scale and tooth with highest sensitivity score was selected for fluoride application testing. Improvement in scores was recorded after 4 weeks according to patient responses. Data were analyzed by SPSS version 20. Frequency and percentages were calculated for gender, type of tooth, arch involved. Mean ± Standard deviation was calculated for age (20-80 years). The mean and median scores at baseline and 4-weeks-follow-up for participants in response to air stimuli with Schiff 4- point scale were calculated. Paired sample T test was applied to evaluate if statistically significant difference exist between hypersensitivity value before varnish application and 4 weeks after its application. A significant difference in sensitivity was found at 4-weeks follow-up and base line levels.

Keywords: Dentin sensitivity, Dentin desensitizing agent, sodium fluoride varnish, Tooth Sensitivities

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INTRODUCTION

There is an array of dental conditions effecting the overall well being and daily life activities of a person among which dentinal hypersensitivity is a common one, it is the clinical condition of short, sharp pain arising primarily due to external stimuli (osmotic, thermal, evaporative, tactile, chemical) and commonly affecting buccal aspects of teeth.¹

Several hypothesis regarding dentin hypersensitivity mechanism were mentioned in the past. Most accepted hypothesis is hydrodynamic theory, according to which stimuli causing fluid flow in tubules excites

baroreceptors leading to neural discharges. Cervical dentin exposed due to tooth surface loss, recession or wear, cementum loss cause sensitivity.²Diagnosis of the condition is totally patient based. Dentinal hypersensitivity may be triggered by multiple factors. Symptoms are unmatched to clinical signs.³A number of diagnostic tools have been developed to measure cervical dentin hypersensitivity like cold test, hot test, water jet, electrical devices and explorer instruments, occlusal and bite examination, but we used the test that is common one and easily available in clinical settings in our present study which is air jet by triple syringe. It has been reported in a study that 15-17 % of population between age of 18-65 years suffer from dentin hypersensitivity.³Ritters and colleagues carried out the study for treating dentinal hypersensitivity with fluoride varnish and they reported mean visual analogue score, which decreases from 34.9 baseline to 26.3 score, two weeks after varnish application.^{1,4}

Various treatment modalities have been used in the treatment of this condition including various desensitizing agents based on desensitization of the nerves or some formulations based on tubules occlusion or sealing ability either applied professionally or used at home as non invasive and operative procedures. Other

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modalities are lasers, iontophoresis, prosthesis like gingival veneers, periodontal graft procedures.⁵ Common non-operative procedures includes the use of topical preparations with desensitizing agents promoting deposition or barriers like material covering the affected area of tooth.

Fluoride is commonly used along with oxalates and potassium combinations producing effective results. These combinations are supplied as fluoride containing gels, solutions and varnishes. In present study we used fluoride varnish. The United states food and drug administration formally recognizes cavity varnishes for treatment of sensitive teeth. Fluoride varnish were developed for use in Europe since 1960 in terms of increasing contact time of varnish with the teeth and their use has since expanded throughout world. A thick viscous material containing high fluoride content and licensed for use is painted on tooth surface forming a quick setting base. Currently there are many 5% Sodium fluoride(NAF) varnishes system available with additional mineralizing content.^{6,7,8}

Previous studies lack the use of non operative approaches for treatment of dentin hypersensitivity and are more technique sensitive, less cost effective with minimal use of varnishes as compared to other modalities. Fluoride varnishes being less technique sensitive, cost effective, simple to use involve just drying of teeth and varnish to be painted on tooth to see the worth of non operative techniques.

This study aimed to determine an improvement in cervical dentin hypersensitivity from baseline up to 4 weeks by fluoride varnish application.

METHODOLOGY

After approval of this descriptive observational study by ethical committee of Rawal Institute of Health Sciences, seventy patients were enrolled in it; with hypersensitivity complain with any anterior and posterior permanent teeth. Sample size was calculated using World Health Organization sample size calculator with confidence interval of 95%. The study duration was from 1st July 2017 to 31st December 2017. Seventy patients fulfilling the inclusion criteria were observed. Patients from both genders aged 20-80years, having preoperative sensitivity complain due to tooth brushing, hot or cold beverages, sweet and sour food who presented to outpatient department of Rawal Institute Of Health Sciences were included in the study whereas any patients having carious teeth, cracked teeth, extensively restored teeth (cervical fillings), teeth with pulpitis, teeth under active orthodontics treatment and teeth in direct contact with any prostheses were excluded from this study.

Patient's general health was interviewed and those with systemic problems, material allergic problems were also excluded from the study. Trainee researcher herself carried out all the procedures. Written informed consent and aims and objectives of the study were ex-

plained to patient. Cotton was used to isolate and wipe the concerned tooth and tested with common clinical diagnostic procedure (triple syringe/air jet). Triple syringe was used to apply compressed air at a distance of approximately 2 cm for 5 seconds. Patient responses were gained and marked according to the Four-point Schiff Air Sensitivity Scale⁷ which is defined as follows: 0 =Subject does not respond to air stimulus, 1= Subject responds to air stimulus, but does not request discontinuation of stimulus, 2= Subject responds to air stimulus and requests discontinuation or moves from stimulus. 3 =Subject responds to air stimulus, considers stimulus to be painful, and requests discontinuation of the stimulus. Multiple sensitive teeth might be involved in the arch, tooth with highest sensitivity Schiff score was selected and this baseline score was recorded. The trainee researcher then applied the clinical product to the most sensitive tooth cervical area according to the score, following manufacturer's instructions which was ACCLEAN 5% sodium fluoride varnish (By Henry Schein Inc). Patients were acknowledged regarding temporary feel of thin layer material on tooth that is to left undisturbed in order to provide maximum effect of product. When the materials set, second Schiff scale reading was taken. Patient were instructed to take soft diet and avoid any liquors and brushing so that, material stay on tooth for almost 4 to 6 hours, if possible to wait until next day to resume oral hygiene. Any improvement in sensitivity condition was observed and recorded after 4 weeks.

Statistical Package for Social Sciences v 20 (IBM Statistics, Chicago, Ill) was used to analyze the data after its entry. Frequency and percentages were illustrated for gender, tooth number and arch. Mean±Standard deviation was calculated for age (20-80 years). The mean and median scores at baseline and 4-weeks-follow-up for participants in response to air stimuli with Schiff 4- point scale was calculated and effect modifiers were controlled. Paired sample T test was applied to evaluate if statistically significant difference exist between hypersensitivity value before varnish application and 4 weeks after its application. Level of significance of < 0.05 was considered to be statistically significant. Overall hypersensitivity improvement in form of dichotomous variables was observed. Tables, charts and graphs were used to show data.

RESULTS

Seventy patients with dentin hypersensitivity complained teeth were included in study. Single operator did all the varnish application procedures and rating sensitivities. All patients were evaluated for sensitivity improvement after 4 weeks. Distribution among male and female gender is shown in Fig 1. Frequency of most reported tooth and arch is illustrated in bar chart with maxillary right first premolar being the most frequently reported tooth as shown in Fig 2. Mean and standard deviation calculated for age was 39.13 ±12.19. For all comparisons, there was statistically significant difference in sensitivity between 4 weeks follow-up and base

line as analyzed by paired sample t-test with p-value < 0.05 (Table 1). Overall improvement was noticed in almost 68 cases (Table 2)

DISCUSSION

On large scale, people are effected with a clinical condition known as Dentinal hypersensitivity. In present study after fluoride varnish use, patients exhibited less dentinal sensitivity at the 4-weeks follow-up compared to the baseline. The overall reduction in dentinal hypersensitivity measured in terms of the Schiff Scale for all participants in the present study was highly significant statistically using paired sample T-test. Results indicated that all patients demonstrated significant reduction in sensitivity which is consistent with few previous studies. Past studies reported immediate decrease in sensitivity after initiation of the therapy hence we used the same approach in our study too with

positive outcome of results.^{1,9,10}

Several modalities were experimented by the clinicians to address dentinal hypersensitivity. Among those fluoride topical formulations are one, which have been used for at least 60 years for its treatment. Present study made use of fluoride varnish with obvious decrease in sensitivity which is consistent with some previous studies. Lack of a placebo-control group in present study limits the interpretation of the results. Despite the fact that we did not use a placebo in this study, a similar effect could be expected.^{1,4,11,12,13}

In the present study, more females were recruited than males. The decrease in sensitivity levels almost remained the same between males and females. The study conducted by Hefti and Stone documented subtle gender associated differences in the awareness of dentin hypersensitivity. The results, however, showed no

TABLE 1: PAIRED SAMPLES STATISTICS AND SIGNIFICANCE

Hypersensitivity categories	Mean	SD	Mean difference(Pre-post)	T-value	P-value
Hypersensitivity before varnish application	2.75	0.530	2.200	24.420	0.000
Hypersensitivity after varnish application	0.54	0.755			

TABLE 2: OVERALL HYPERSENSITIVITY IMPROVEMENT

	Frequency	Percentage (%)
Yes	68	97.1
No	2	2.9

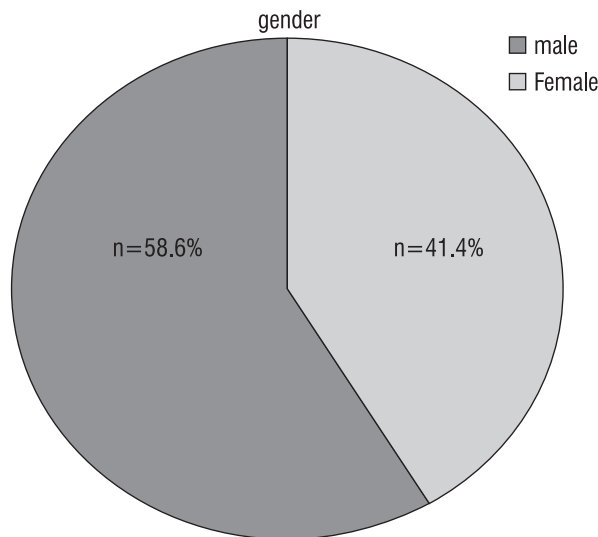


Fig 1: Gender Distribution

significant difference in dentin sensitivity perception between males and females.^{1,14} Similar numbers of men and women as subjects have to be included in future studies.

Because of variable sensitivity perception all teeth of the patients were checked to rule out the most sensitive

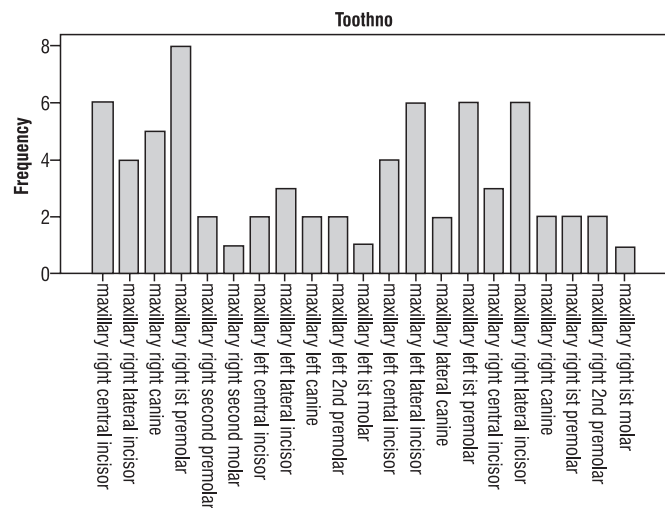


Fig 2: Frequency distribution of various teeth

tooth. Present study reported most common tooth with hypersensitivity as maxillary right first premolar which is consistent with Cruz et.al study and most reported arch as maxillary arch.^{15,16} However few past studies reported mandibular arch having more hypersensitive teeth.¹⁷ Majority of the patient with hypersensitivity were in 4th decade age group in present study which is consistent with Andreson and colleagues results.^{4,16} This is in line with the reports from various authors who inform that sensitivity is noted between 20 to 50 years of age.^{18,19}

Air jet test which we used in this study though simple and reliable have variable results for concerned hypersensitive teeth because of air temperature affected by external room temperature, air pressure its distance

from source of application and time of stimulation and this variation may or may not exceed individual threshold resulting in giving different intensities of stimulus and patient responses.^{17,18,20}

Success of 41% at one year was reported by Haneson with five percent sodium fluoride varnish.¹ Our study results indicate treatment success after 4 weeks, if success is defined as a statistically significant reduction in mean sensitivity scores from baseline.^{1,4,20}

Present study just checked fluoride varnish modality, recent advancements in non operative therapies with lasers hydroxyapatite nanoparticles technology, biosphere technology, chitosan particles may also be used in future for better results. Fluoride varnish under fair hygiene and diet conditions and prolonging the observation time, may be studied further as they are the exclusive test for a material and/or technique in the treatment of an oral condition.^{21,22,23,24}

CONCLUSION

A significant difference in sensitivity was found at 4-weeks follow-up and base line levels with application of sodium fluoride varnish.

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Overall reviewing and helped with the study concept.

4 Nouman Anayat:

Introduction, discussion, Keywords.