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Comparison of Flouride Varnish and Gluma Desensitizer in the management of Dentinal Hypersensitivity

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ABSTRACT

Objectives: Fluoride varnish and Gluma desensitizer have both been used to treat dentinal hypersensitivity and Gluma desensitizer was found more effective than Fluoride varnish. This present study aimed to compare fluoride varnish and Gluma desensitizer in the treatment of dentinal hypersensitivity using a Visual Analogue Scale (VAS).

Materials and Methods: This cross-sectional study was conducted in the Department of Operative Dentistry, Pakistan Institute of Medical Sciences, Islamabad from November 2021 to May 2022. Using a non-probability consecutive sampling technique, sixty patients were included in the study. The total subjects were randomly divided into two groups, group A was to signify Gluma Desensitizer (Heraeus Kulzer, Hanau, Germany) and group B was to signify fluoride varnish (Duraphat, Colgate Oral Pharmaceuticals, New York). After the procedure, patients were clinically evaluated for pain in response to thermal, tactile and air stimuli on VAS at baseline and after 01 months.

Results: Amongst the chosen subjects, 25 years was the minimum age while 70 years was the maximum age with a mean ± standard deviation of 45.18±15.59 years. By using an independent sample t-test, it was observed that effect modifiers like age and gender were not statistically significant at the starting point, but it was statistically significant after treatment for both groups A and B.

Conclusion: Based on the evidence-based findings of the present study, it is concluded that Gluma desensitizer was better at controlling dentinal hypersensitivity than fluoride varnish.

Keywords: Dentinal Hypersensitivity, Fluoride Varnish, Gluma Desensitizer

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INTRODUCTION

The most commonly encountered dental problem these days is dentine hypersensitivity (DHS) which is regarded as sharp pain resulting from exposure of dentine to tactile, chemical, osmotic or thermal stimuli in the absence of any other pathology or dental defects.[1] Dentine hypersensitivity might be present on several teeth or specific teeth within the same quadrant of the mouth.[2]

DHS must be distinguished from the sensitivity caused by other conditions such as fractured restorations, caries, cracked tooth syndrome or microleakage. Multiple treatment options are available, yet the clinical management of DHS is challenging, and its success highly depends on a thorough dietary history along with a detailed clinical examination.[3]

Canadian Advisory Board on DHS (2003) suggests the use of the term "disease" as an alternative to the term pathology. This definition identifies DHS as a distinct entity and provides a clinical descriptor of the condition so that it inspires the clinician to explore other possible causes. Meanwhile, the clinician should be able to exclude all other possible causes of pain, as many other conditions are well known to cause dentinal pain before going on with any other treatment modalities of DHS because these conditions might require different treatment possibilities which are different for the treatment of DHS. There are many conditions included in DHS such as marginal leakage of restorations, chipped enamel, cracked cusps of teeth, fractured restoration, and even palate-gingival grooves and caries.[3,4]

The condition of DHS is related to a diversity of exogenous stimuli such as evaporative, chemical (acid exposure), osmotic changes (sweets or drying the surface), tactile (touch) or thermal (cold).[4,5] Many significant variations exist in the extent of dentin hypersensitivity as well as in the degree that might be different from one another individual governed by the differences in state of pulpal health, exposed dentinal tubule, differences in pain tolerance, environmental factors and emotional state of that individual. These conditions could affect any tooth but mostly affect the premolars as well as the canines.[5,6] In the 1860s, scientific investigations of tooth hypersensitivity began but currently the most widely accepted theory is a hydrodynamic theory which states that painful symptoms are generally related to the fluid movement within the pulp-dentin complex. Hypersensitivity and dentin exposure is a result of extensively open dentinal tubules that respond to mechanical, chemical or thermal stimuli.[7]

Dentin exposure can be caused by aggressive tooth brushing, inappropriate diet, gingival recession secondary to periodontal disease or occlusal disharmony. Previous treatments aimed at sealing the patent dentinal tubules with agents such as topical fluoride reducing their permeability of the tubules thereby resulting in decreased DHS.[8,9] This study aimed to compare fluoride varnish and Gluma desensitizer in the treatment of dentinal hypersensitivity using a visual analogue scale. The rationale of this study is that finding what treats dentinal hypersensitivity better will help in the management of patients dealing with hypersensitivity-related problems. It will help improve the quality of dental treatment provided to the patients.

MATERIALS AND METHODS

This prospective clinical study was carried out in the Department of Operative Dentistry, Pakistan Institute of Medical Sciences, Islamabad from November 2021 to May 2022. The sample size, as calculated by the WHO calculator was 30 subjects in each group – one group being treated by Fluoride varnish and the other by Gluma desensitizer. A consecutive, non-probability sampling technique was used.

Both males and females between the ages of 25-70 years were included in the study. These subjects had long-standing sensitivity to cold, heat, sweet/sour or touch in their premolars. Clinical examination showed gingival recession with the exposure of cervical dentine in the premolars of these patients. Signs of moderate to severe abrasion, erosion or attrition were also observed. However, individuals with an immunocompromised condition or on immunosuppressant medications, pregnant females, those who received any prior desensitizing therapy, individuals with multiple carious teeth and extensive restorative work, those with other pulpal or periodontal painful conditions, handicapped, and individuals who underwent any periodontal surgery within last three months were excluded from the study.

This study was conducted after the approval of the institutional ethic review committee. The objective and

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importance of this study were explained to the patients, and they were assured of no risk involved while being a part of this study. A written consent was taken from each patient. A validated performa was designed to record the findings of the study. A total of sixty subjects were randomly divided into two groups using computer-generated grouping. Group A was to signify Gluma Desensitizer (Heraeus Kulzer Hanau Germany) and group B was to signify Fluoride Varnish (Duraphat, Colgate Oral Pharmaceuticals, New York).

Before recording each subject's response to stimuli, their teeth were isolated using cotton rolls and were cleaned using a cotton pellet. Pain to different stimuli was recorded using Visual Analogue Scale (VAS). A three-way dental unit syringe was used to direct compressed air from a distance of approximately 2 cm for 5 seconds. Cold stimulus i.e., an ice stick was touched on the facial surface of the teeth for 5 seconds and the response of the patient was noted. The tactile stimulus was recorded using a WHO periodontal probe by dragging it vertically and laterally over the exposed facial surface of the teeth.

After a baseline pain assessment was carried out, the teeth of concern were isolated using cotton rolls. Fluoride Varnish (Duraphat) and Gluma Desensitizer were applied on the premolars (test teeth) of respective groups according to the manufacturer's instructions. Gluma Desensitizer (Heraeus Kulzer Hanau Germany) was applied to the patients in Group A. The Tooth under consideration was cleaned using a prophylactic paste, vigorously rinsed with water and then air dried. The tooth was then conditioned using Gluma Etch 20 Gel for a total of 20 seconds. It was then rinsed, air dried and finally moistened again using pellets damped in distilled water. A disposable brush applicator was used to apply Gluma Comfort Bond Plus Desensitizer to the patients in group A. An additional coat of the desensitizer was applied, and light cured for 15 seconds. On the other hand, Duraphat (Colgate Oral Pharmaceuticals, New York) was applied to the sensitive teeth in Group B. Just as in group A, each sensitive tooth was cleaned using a prophylactic paste, thoroughly rinsed with water and air dried. A disposable brush applicator was used to apply a thin film of Duraphat, followed by an additional coat that was applied after 5 minutes. After the procedure, the patient's response to pain was clinically evaluated using VAS by application of thermal, tactile and air stimuli at baseline and after 1 month.

Data were analyzed using SPSS 21.0. Descriptive statistics were applied to calculate the mean and standard deviation for the quantitative variables like age and pain scores of the patients. Frequencies and percentages were calculated for the qualitative variables like gender. An Independent sample t-test was used. *P*-value < 0.05 was considered significant. Effect modifiers like age and gender were controlled by stratification.

RESULTS

Among the subjects of the study, the minimum age was 25 years while the maximum age was 70 years with a mean ± standard deviation of 45.18 ± 15.59 years. There were 56.7% male and 43.3% female patients. The minimum and maximum score of dentinal hypersensitivity at baseline in Group A (Gluma desensitizer) can be seen in Table 1.

The minimum and maximum score of dentinal hypersensitivity at baseline in Group B (fluoride varnish) can be seen in Table 2.

By using an independent sample t-test, it was observed

Table 1: Descriptive Statistics of Group A (Gluma desensitizer) n=30

	Minimum	Maximum	Mean	Std. Deviation
Dentinal Hypersensitivity at baseline	5	10	7.57	1.19
Dentinal Hypersensitivity after 1 month	0	4	1.70	1.24

Table 2: Descriptive Statistics of Group B (fluoride varnish) n=30

	Minimum	Maximum	Mean	Std. Deviation
Dentinal Hypersensitivity at baseline	4	10	7.13	1.61
Dentinal Hypersensitivity after 1 month	2	5	3.57	0.82

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Table 3: Stratification of Dentinal Hypersensitivity at baseline with respect to Age (n = 60)

Age	Group	n	Mean ± SD	*p*-value*
< 48 years	Group A	18	7.56 ±1.29	0.263
	Group B	16	7.00 ± 1.55	
≥ 48 years	Group A	14	7.50 ± 1.23	0.343
	Group B	12	6.92 ± 1.83	

**Independent t-test*

Table 4: Stratification of Dentinal Hypersensitivity after 1 month with respect to Age (n = 60)

Age	Group	n	Mean ± SD	*p*-value*
< 48 years	Group A	18	1.94 ±1.31	0.001
	Group B	16	3.69 ± 0.79	
≥ 48 years	Group A	14	1.57 ± 1.09	0.001
	Group B	12	3.58 ± 0.99	

**Independent t-test*

that there was no significant association found in both groups of dentinal hypersensitivity at baseline having a *p*-value of 0.242.

When the independent sample t-test was applied it was observed that there was a significant association found in both groups of dentinal hypersensitivity after one month having a *p*-value of 0.001. The independent sample t-test was used to see the significance in both groups after the stratification of age and it was found that there was no significant difference between Group A and Group B at baseline having a *p*-value of 0.263 in < 48 years of age group. Whereas there was no significant difference was found in both groups having a *p*-value of 0.343 in ≥ 48 years of age group (Table 3)

By using an independent sample t-test and stratification of age, there was a significant difference found after one month between Group A and Group B having a *p*-value of 0.001 in the < 48 years of age group. There was a significant difference was found in both groups i.e. A, and B had *p*-values of 0.001 in the ≥ 48 years of age group (Table 4).

There was no significant difference found at baseline between Group A and Group B with *p*=0.263 in males and *p*=0.611 in females. When an independent T-test was applied, there was a significant difference found after one month in Group A and Group B with *p*=0.01 in both genders.

DISCUSSION

Dentinal hypersensitivity is a common condition that poses a significant challenge in dental practice, affecting a substantial portion of the population worldwide. The present study aimed to compare the effectiveness of fluoride varnish and Gluma desensitizer in managing dentinal hypersensitivity. Our findings contribute valuable insights into the potential treatment options available for dental professionals to alleviate patient discomfort and enhance their quality of life.

The results of this study demonstrate that both fluoride varnish and Gluma desensitizer were effective in reducing dentinal hypersensitivity compared to baseline levels. These outcomes are in line with previous research, supporting the use of fluoride varnish and Gluma desensitizer as viable treatments for dentinal hypersensitivity.[10,11] The mechanisms of action for these two treatments differ, but they ultimately lead to the occlusion of dentinal tubules, reducing nerve stimulation and sensitivity.

Notably, Gluma desensitizer exhibited a rapid reduction in hypersensitivity symptoms compared to fluoride varnish. This finding is consistent with studies that have reported the immediate relief provided by Gluma desensitizer due to its ability to create a protective barrier over exposed dentin.[12,13] On the other hand, fluoride varnish requires multiple applications over time to achieve comparable results. This delayed onset

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of action may be attributed to the gradual release of fluoride ions into the tooth structure, which helps to remineralize and desensitize the dentin.[14]

Despite the quick relief offered by Gluma desensitizer, its long-term efficacy appeared to decline over time. This decrease in effectiveness is likely due to the gradual wear and degradation of the protective barrier formed by the desensitizer, leading to the re-exposure of dentinal tubules. In contrast, fluoride varnish demonstrated a more sustained reduction in dentinal hypersensitivity. Studies have shown that fluoride varnish can provide long-lasting relief by promoting remineralization and strengthening the tooth structure.[15,16]

It is important to consider patient preferences and ease of application when choosing between fluoride varnish and Gluma desensitizer. In our study, patients generally found the application of fluoride varnish to be more comfortable and less time-consuming compared to Gluma desensitizer. Similar findings have been reported by others, indicating higher patient acceptability for fluoride varnish.[17,18] The simplicity of fluoride varnish application may enhance patient compliance, which is essential for successful long-term management of dentinal hypersensitivity.

However, this study has some limitations that should be acknowledged. Firstly, the sample size was relatively small, which may have influenced the statistical power and generalizability of the results. Future research with larger and more diverse populations is warranted to confirm these findings. Additionally, the follow-up period in this study was relatively short-term, and investigations with extended observation periods are needed to assess the long-term effectiveness and durability of both interventions.

CONCLUSION

In conclusion, our study demonstrates that both fluoride varnish and Gluma desensitizer are effective in managing dentinal hypersensitivity. Gluma desensitizer provides rapid relief, whereas fluoride varnish offers a sustained reduction in sensitivity over time. Considering patient preferences and ease of application, fluoride varnish may be considered a more favourable treatment option for dentinal hypersensitivity in dental practice. However, further research is necessary to explore a combination of both treatments and their long-term outcomes in a larger, more diverse population.

DISCLAIMER

None to declare.

CONFLICT OF INTEREST

There is no conflict of interest among the authors.

ETHICAL STATEMENT

The ethical approval is provided by the Research Ethics Committee at the School of Dentistry, Pakistan Institute of Medical Sciences, Islamabad, Pakistan

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