**ORIGINAL ARTICLE**

# Management of Dentinal Hypersensitivity Using Fluoride Application and Dentine Bonding Agent: a Clinical Study to Explore the Best Outcome in Getting Relief from Pain Associated with Hypersensitivity

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## ABSTRACT

**Aim:** To evaluate the effects of fluoride gel and dentine bonding agents in dentinal sensitivity.
**Methods:** This descriptive study was carried out at Nishtar Institute of Dentistry Multan from 15th January 2016 to 14th April, 2016. A total number 21 patients were selected and examined randomly after fulfilling the selection criteria. Patients were divided in three groups. Group I received the placebo gel. Group II received the 2% sodium fluoride gel and Group III got the application of dentine bonding agent.
**Results**: The results rejected the null hypothesis that the treatments would respond equally and there is difference among all the treatments.
**Conclusion:** The dentinal hypersensitivity can be relieved by the fluoride gel and with the application of dentine bonding agent. The results have a significant positive slue towards the bonding agent.
**Keywords:** Hypersensitivity, Odontoblast, Dentine bonding agent, Fluoride gel

## INTRODUCTION

Dental diseases are major public problems including the carious teeth and the sensitivity. According to Webster dictionary, the word sensitivity means the capacity of an organism or sense organ to respond to stimulation. When we talk about the teeth sensitivity, it means the response of vital tooth tissue versus any stimulation whether it is hot, cold or any noxious stimulation. Tooth sensitivity is common clinical finding that is usually associated with the exposed dentin surface. There are a number of causes that may give rise to the dentinal hypersensitivity making situation kittle. These include the worn tooth surface exposing the dentine, broken teeth, traumatic teeth, gum recession, periodontal pockets, and sub gingival plaque. There is different treatment management of every scenario. Most commonly the tooth hypersensitivity is due to the dental plaque or exposed dentin surface. The pulpal inflammation may also present the features like dentinal hypersensitivity and giving features like that of irreversible pulpitis. This type of pain is sharp as compared to pain of dentine hypersensitivity (DH).[1]

Tooth is the hardest tissue in the human body. It is covered by the enamel. The enamel is a protecting covering over the dentin which is comparatively less hard and having nerve endings from the tooth pulp.[2] Some theories suggest that odontoblasts are responsible for the transmission of pain due to stimuli. But recent studies report that there is no synaptic connection found between the odontoblasts.[3] Whenever there is an exposed dentine surface in the teeth due to any etiology like gingival recession, periodontal pockets and tooth abrasion, this gives access of the orally taken fluids and food to the dentine when someone snarfs. This causes the stimulation of nerve fibers and thus might result in painful sensation termed as hypersensitivity. As like all the diseases and problems, this is also a manageable condition if diagnosed properly. The Holy Prophet Muhammad (ﷺ) said, “Every disease has a cure. If a cure is applied to the disease, then it is relieved by the permission the Almighty Allah” (Sahi Al-Muslim). So it is our faith that every disease is curable. Teeth hypersensitivity, although being very common in community, yet it is curable if treated properly according to the diagnosis. A lot of remedies have been proposed including the application of desensitizing agents or tooth pastes, fluorides, gum graft, bonding agents and endodontics to get relief from pain associated with the dentinal hypersensitivity. Most recently there have been introduction of lasers fast becoming a key instrument in dentistry for various treatments including the dentine hypersensitivity. These lasers occlude the dentinal tubules and thus reduce the dentine sensitivity.

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## PATIENTS AND METHODS

This study was conducted at Nishtar Institute of Dentistry Multan from 15th January 2016 to 14th April 2016. Establishing the desirability of research, in this study we investigated the relief in the teeth hypersensitivity due to application of resin bonding agent and fluoride gel. Our aim is to see the level of cure and its durability. We want to explore the efficacy of cure and thus we selected the patients having gingival recession. All the selected patients were having Miller's class 1 gingival recession in which the marginal tissue recession does not extend to the mucogingival junction. A total number of 21 patients were selected randomly between the ages of 35 to 45 years and divided into three groups.11 patients were male and 10 were females. The patients were given a brief detail about the visual analogue scale before the calculation was made. All the patients had permanent teeth with highly sensitive teeth. Group I was treated with the application of placebo gel, Group II with the application of 2% sodium fluoride gel and Group III was treated with the application of resin bonding agent for dentine. In group II patients, the fluoride gel was applied in the dentine exposed surfaces with the help of syringe after the isolation of area with cotton rolls. Patient was informed not to eat or drink for 20 minutes. Same method was applied to group I patients receiving the placebo gel. This application was repeated after two weeks for each patient. The sensitivity level was measured after three months. For group III, the dentine bonding agent was applied after the isolation of teeth according to manufacturer's instruction.

## RESULTS

q is determined from the Tukey chart. The Df 18 (within group) with 3 groups of treatments intersects at 3.61 in the chart. By putting the value we get the value of 1.03.It connotes that any two means that are more than 1.03 are significantly different. F statistic we got is greater than 3.5546. It suggests that one or more treatments are significantly different. Tukey HSD test denotes the difference between the three pairs of treatments (Table 1).

**Table 1:** Descriptive statistics for treatments

| Treatment | Placebo gel | Fluoride gel | Dentine bonding agent | Total |
|---|---|---|---|---|
| Observations N | 7 | 7 | 7 | 21 |
| Sum ∑xi | 57.0000 | 47.0000 | 21.0000 | 125.0000 |
| Mean | 8.1429 | 6.7143 | 3.0000 | 5.9524 |
| Sum of squares $\sum x^2 i$ | 467.0000 | 319.0000 | 67.0000 | 853.0000 |
| Sample variance $S^2$ | 0.4762 | 0.5714 | 0.6667 | 5.4476 |
| Sample std. dev. S | 0.6901 | 0.7559 | 0.8165 | 2.3340 |
| Std. dev. of mean sex | 0.2608 | 0.2857 | 0.3086 | 0.5093 |

**Analysis of Variance (ANOVA)**

| Groups | Sum of squares | Degrees of freedom | Mean square | F statistic | p-value |
|---|---|---|---|---|---|
| Between | 98.6667 | 2 | 49.3333 | 86.3333 | <0.001 |
| Within | 10.2857 | 18 | 0.5714 | | |
| Total | 108.9524 | 20 | | | |

**Tukey's HSD:** HSD=q MS within/n 3.61 0.57/7 = 1.03 x□ Placebo - x□ Fluoride = 8.1429-6.7143 = 1.4286 x□ Placebo – x□ Dentine bonding = 8.1429-3.0000 = 5.1429 x□ Fluoride – x□ Dentine bonding =6.7143-3.0000 = 3.7143

## DISCUSSION

Dentin hypersensitivity (DH) is usually due to the exposed dentine surface. This exposed surface is when in contact with the orally intake foods or beverages, gives a sharp pain. There are a lot of theories and explanations have been proposed for this mechanism. Unfortunately none of them is considered as absolute. Pantagruelian researches have made to understand the problem. The diagnosis plays a vital role in the treatment of dentinal hypersensitivity. The patient gets relief when the cause is removed. There are a number of treatment options are present that are used to get relief from the dentine hypersensitivity. The prevalence of DH is about 4% to 74%.[2,5] Fluorides have been used exclusively as remineralization of both enamel and dentine.[6] A number of researchers have reported the role of fluorides in minimizing the sensitivity with a good efficacy. Still a number of studies have attempted to explain their role and investigators' hidebound. The dentinal tubules are blocked by the calcium fluoride crystallites and thus the dentinal permeability is reducsd.[7] Sodium fluoride is used as desensitizing agent in the dentifrices. It is used in the concentration of 2%. The precipitates which are formed by the sodium fluoride are removed by the mechanical means and saliva. Therefore acidulated form of sodium fluoride is used which form a

precipitate within the dentinal tubules. Stannous fluoride can also be used in the same way used to reduce the dentinal permeability. This reduces the DH. According to the work of Thrash 0.4 % staneous fluoride when used along with 0.717% of fluoride provides immediate effect after five minutes of application.[8] Ammonium hexafluorosilicate can also be used as desensitizing agent. A combination of calcium fluoride and fluoridated appetite is able to block the dentinal tubule.[9,10] Dentine adhesive is another way to minimize the DH. There is a hybrid layer which is formed in the dentine. This hybrid layer is responsible for decreasing the permeability of dentine and reducing the sensitivity.[7] The application of acid etching removes the smear layer and then dentine bonding agent is applied on the surface. This dentine bonding agent forms resin tags that are impregnated in the dentinal tubules. Thus the dentinal permeability and the sensitivity is reduced due to the sealing of the tubvules.[12] The recent innovation has added the special dentine bonding agents that are meant for the DH. These materials have hydroxyethy methacrylate (HEMA), benzalkonium chloride, gluteraldehyde and fluoride. Guteraldehyde acts as protein coagulant within the dentinal tubules.[13] In our study it is also concluded that dentine bonding agents have a good role in relieving the DH. It has an edge over the application of fluoride gel. Previous studies have not dealt with the dentine bonding due to lack of certain innovative dental materials. Although some research has been carried out on the other desensitizing agents, there have been a few empirical investigations available. Recently the literature has emerged in proving the beneficial effects of fluoride as well as dentine bonding agents. According to work of Patil et al[14] among dentine bonding agents, gluma desensitizer and gluma comfort bond and desensitizer have a greater value of reduction in DH than single bond universal. This validates our study. Other investigators also proved that the degree of reduction in DH is greater with the use of dentine bonding agents than other non desensitizing tooth pastes.[15] Similar findings have been observed by Gibson and Sharif which denotes that the relief from the dentine sensitivity show greater improvement between 2 weeks to 6 months as compared to desensitizing tooth pastes.[16] fluoride gel has also an equal and effective way of controlling DH when using in high concentration, not only DH but also reduce the root caries[11]

## CONCLUSION

The application of fluoride gel and dentine bonding agents have a significant role in reducing the dentine hypersensitivity, the desideratum. Both reduce the DH. Our research focus claims the beneficial effects and relieving effects of the applied material making patient insouciant. There is also a concupiscible difference in the sensitivity reduction between these two materials. However long term effects regarding the efficacy of these materials still needed to be probed.

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