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EFFECTIVENESS OF AIR ABRASION BIOACTIVE GLASS TECHNOLOGY, LIGHT CURED RESIN-BASED DESENSITIZER AND FLUORIDE VARNISH APPLICATION IN MANAGEMENT OF HYPERSENSITIVITY OF NON-CARIOUS CERVICAL LESIONS: A RANDOMIZED CLINICAL TRIAL

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Dentin hypersensitivity, VAS, fluoride varnish, light- cured desensitizer, bioactive glass.

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ABSTRACT

Introduction: Dentin hypersensitivity (DH) can be defined as a short, sharp pain arising from exposed dentin in response to thermal, tactile, osmotic, or chemical stimuli, which cannot be attributed to any other dental defect or pathology. The hydrodynamic theory, the most accepted explanation, suggests that pain results from fluid movement within tubules, which activates pulpal nerves. Management strategies aim to either reduce nerve sensitivity or block the tubules. **Aim:** This study was conducted to compare the clinical effectiveness of light-cured resin-based desensitizer and bioactive glass powder versus fluoride varnish in treating dentin hypersensitivity (DH) in adults with cervical non-carious lesions over a six-month follow-up period using Visual Analogue Scale (VAS scale). **Materials and Methods:** A total of 75 participants fulfilling the criteria were divided into 3 groups (n=25); group1: NCCL were treated using fluoride varnish, group 2: NCCL was treated using "Sylc®" air abrasion and group 3 was treated using light cured desensitizer agent; SHIELD FORCE PLUS. Hypersensitivity was assessed immediately, 3 and 6 months after treatment. Median and range values were used to represent the ordinal data of the VAS. Intergroup and intragroup comparisons were done using Mann Whitney U test and Friedman test of repeated measures, respectively. For every test, $P \leq 0.05$ was used as the significance threshold. **Results:** The overall Effect of the 3 interventions showed a statistical significant difference in the VAS score ($P<0.001$); whereas the Fluoride varnish produced the significantly highest VAS, followed by Sylc air polishing, then light-cured desensitizer. However, within each follow-up interval, no statistical significant difference in the VAS scores was found in baseline records among the three interventions despite a remarkable statistical significant difference within the 3 follow-up intervals. **Conclusions:** Light-cured desensitizing agent is an immediate and long-lasting effective method in treating hypersensitivity of NCCL. On the other hand, fluoride varnish is still an efficient treatment for dentin hypersensitivity but not reliable if applied in single application.

INTRODUCTION

One of the frequent, chronic and challenging conditions in diagnosis and treatment is the dentin hypersensitivity [(1)]. Many theories have attempted to describe the exact mechanism of dentin hypersensitivity whereas; the most extensively validated one nowadays is the "hydrodynamic theory" which was firstly suggested in the nineteenth

century and supported by several studies done over 20 years [2]. This theory states that when an appropriate stimulus is applied on the exposed dentin surface, this causes outward movement of fluid through the dentinal tubules, which in turn triggers the pulpal nerves [3]. Consequently, for the dentin hypersensitivity to occur, many biological or pathological etiologies should take place for the lesion localization (dentin exposure), whereas for the lesion initiation, the patent dentinal tubules of the exposed dentin could be attacked by any tactile, osmotic, thermal or electrical stimuli [4].

In accordance to the hydrodynamic theory, the management of dentin hypersensitivity can follow one of two strategies, either chemically by blocking of the nerve endings sensory response or physically by blockage of the patent dentinal tubules to avoid the dentinal fluid movement [5].

Many remineralizing agents were introduced in an attempt to physically block the patent dentinal tubules, among which, the fluorides which are the most widely used products according to the Canadian Advisory Board on dentin hypersensitivity (DH) recommendations [6]. However, the reversible action of fluoride due to its physical attachment to the dentin and absence of chemical bond made its long term success questionable [7]. This led to the introduction of another promising treatment modality which is the bioactive glass owing to its high capability of human hard tissue repair and replacement by the formation of hydroxycarbonate apatite. Novamin, the first introduced bioactive glass in 2003, composed of inorganic, melt-derived amorphous glass that contained silica, phosphate, sodium and calcium. In an attempt to re-innovate the novamin, Sylc was introduced as an air flow-based prophylactic powder with the same active ingredient "novamin". However, the mode of action of Sylc provided it with the ability of forming a highly resilient, stable acid-resistant mineral layer that provided the dentinal tubules with a prolonged protection [8].

Therefore, this comparative study was carried out to investigate the clinical efficacy of Bioactive glass powder and light cured resin-based desensitizer in comparison to a fluoride varnish in treating Dentin hypersensitivity (DH) in adult population with cervical non-carious lesions over a six months period of investigation using Visual Analog Scale (VAS).

MATERIALS AND METHODS

Study setting

This research design was approved by the Research Ethics Committee (REC) of the Faculty of Dentistry, Suez Canal University (approval number: 394/2021). Participants were recruited from the outpatient clinic of the Faculty of Dentistry at Suez Canal University, specifically from the Conservative Dentistry department. The benefits, risks, and potential outcomes of the treatment were explained to each participant. Informed consent was obtained in writing from all participants. All procedures followed the ethical guidelines outlined in the Declaration of Helsinki.

Trial design

The study was a randomized controlled clinical trial, with three parallel groups design, 1:1:1 allocation ratio and equivalence framework.

Sample size calculation

The predicted difference in VAS scores, based on **Ritter *et al.*** [9], was 7 ± 5. With a power of 80% and a significance level of 5%, it was determined that 17 subjects per group were required. To account for potential dropouts during follow-up, the sample size was increased to 20 participants per group. An

additional increase to 25 subjects per group was made to address potential non-parametric errors. Sample size calculations were performed using the PS: Power and Sample Size Calculation Software, Version 3.1.2 (Vanderbilt University, Nashville, Tennessee, USA).

Eligibility criteria

Inclusion criteria

Patients included in the study were medically fit males and females (Category: American Society of Anesthesiologists class 1) aged 18-40 presenting with adequate oral hygiene, clinically healthy periodontium that haven't received any periodontal surgeries within the previous 6 months, complaining of spontaneous hypersensitivity in at least 1 Non carious cervical lesions with VAS >5.

Exclusion criteria

Patients meeting any of the following conditions were excluded from the study: systemic disease (ASA 2–6), pregnancy or breastfeeding, carious or chipped teeth, teeth with mobility grades 2 or 3, or teeth with a probing depth greater than 4 mm.

Randomization and blinding

Simple randomization was performed by generating numbers from 1 to 75 using the Random Sequence Generator (Randomness and Integrity Services Ltd, 2017; https://www.random.org/). Due to the nature of the study, the operator could not be blinded, as they were responsible for applying both the intervention and control treatments. Nevertheless, hypersensitivity testing was conducted by a blinded assistant, independent of the treatment allocation. Treatment outcomes were also assessed in a blinded manner by an independent statistician. Each treatment protocol was concealed and remained unrevealed to the assessor nor to the patient (allocation concealment). This was done by instructing each patient to pick up an envelope randomly from a box containing a series of opaque sealed envelopes. Each envelope holds a numbered paper that corresponds to a specific treatment option based on the predetermined allocation sequence.

Intervention

For every patient, the operator documented the medical and dental histories, along with the examination findings. The report ensured anonymity by registering patients with serial numbers composed of the initials of their first and last names, along with their date of birth. Detailed personal data, including name, gender, occupation, age, and phone number, were collected and recorded. Medical and dental histories were recorded on separate sheets, with each sheet bearing the patient's serial number for follow-up contact. Only patients complaining from spontaneous hypersensitivity were inspected to be enrolled into the study. Controlled air stimulus using triple airway syringe 40-65 psi at distance 1cm were used and applied perpendicular to the exposed surface. To ensure standardized distance and angulation, a premeasured piece of plastic micro-brush (1cm) was fixed to the nozzle tip by duct tape. VAS scale which is a graduated plastic card (0-10) with facial expressions was used to facilitate communication with the patient to express the degree of the pain. Only patients that express degree of pain equals to or more than five were enrolled.

Treatment procedures

The materials used in the study are presented in table (1). For all groups, Cheek retractors were used to retract soft tissue and keep an isolated field. The assigned tooth was thoroughly cleaned with polishing brush without any paste and the surface was air-dried.

Table (1) *Materials' specifications, compositions, and manufacturers*

Materials	Specifications	Composition	Manufacturers
BiFluorid 10	Fluoride Varnish	**1g Bifluorid 10 contains:** 50 mg sodium fluoride (equals 23 mg fluoride) and 50 mg calcium fluoride (equals 24 mg fluoride)	(Voco, Cuxhaven, Germany)
Sylc® original SR	Bioactive glass powder	Calcium Sodium Phosphosilicate	(Denfotex Research Ltd., London, UK)
Shield force plus®	Light-Cured Desensitizer	10–30% 2-hydroxyethyl methacrylate (HEMA), 10–30% bisphenol A dis (2-hydroxy propoxy) dimethacrylate, 10–30% phosphoric acid monomer, 30–60% propan-2-ol, 5–10% triethylene glycol dimethacrylate, 5–10% water	(Tokuyama, Tokyo, Japan)

Baseline preoperative data collection

Controlled air stimulus using triple airway syringe 40-65 psi at distance 1cm were used and applied perpendicular to the exposed surface. To ensure standardized distance and angulation, a premeasured piece of plastic micro-brush (1cm) was fixed to the nozzle tip by duct tape. VAS scale which is a graduated plastic card (0-10) with facial expressions was used to facilitate communication with the patient to express the degree of the pain. Only patients that express degree of pain equals to or more than five were enrolled into the study.

Baseline assessment

Before the treatment the baseline record was evaluated twice. The first method was by using sterile metal triple way syringe at standard distance of 1cm from the exposed dentin and air pressure of 0.5N/mm^2. Air blast duration varied between 1 and 5 seconds based on the patient's reaction. Once pain was reported, the stimulus was promptly discontinued, and the corresponding pain intensity was documented. The second method was by using sharp explorer No.3 *(*Hu-Friedy*,* Chicago, IL*)*. Gentle scratches in apico-coronal direction were done using the explorer tip in short strokes. The length of the strokes varied across the patients as the exposed dentinal surface varied between patients. To try and standardize the force used, a single operator completed all of the strokes.

Fluoride varnish group

The single dose form Bifluorid 10 (by VOCO) was used. The foil was pierced and widened using a micro-brush (Microbrush International, USA) in a circular motion and saturated with the varnish. Using a micro-brush, a thin layer of varnish was applied to the tooth surface, allowed to sit for 10–20 seconds, and subsequently air-dried with a dental syringe.

Bioactive glass (Sylc) group

To prevent particle ingestion and reduce the risk of soft tissue injury from the abrasive powder and water spray, a high-volume suction with a 45-degree beveled end was placed at the incisal or occlusal region of the teeth. "AquaCare™ Twin" air abrasion unit *(Velopex International, UK)* was used to deliver Sylc® dry powder (calcium sodium phosphosilicate) on the sensitive areas. Air stream was adjusted at 40-46 psi. according to manufactures instructions. The hand piece was maintained at a constant distance of 3–4 mm from the tooth surface and positioned at an angle of 60–80 degrees to the buccal surfaces.

To prevent gingival injury, the tip of the hand piece was directed incisally at the site of application. The powder was applied to each tooth for 5–10 seconds using a circular motion.

Shield Force group

After proper air dryness for 5 seconds and with the aid of a micro-brush (Microbrush International, USA), In accordance with the manufacturer's guidelines, Shield Force Plus was applied to all dentinal surfaces. A single layer was rubbed onto the surface for 20 seconds, then gently air-thinned for 5 seconds. Strong air was then used for another 5 seconds according to manufactures' instructions Following air thinning, the material was light-cured for 10 seconds using an LED curing light (Elipar™ Deep Cure-L, 3M ESPE) at an intensity of 1200 mW/cm^2. A layer of glycerin was applied to prevent the formation of an oxygen inhibition layer and cured for another 10 s; the glycerin was then removed using copious irrigation.

Post-operative instructions

All enrolled patients were instructed to delay normal oral hygiene measures for 24 hours, any excess material (fluoride varnish or light cured sealant) was removed by brushing and flossing in the next day. They were also instructed to avoid eating or drinking for at least one hour, after that patients should consume soft diet for at least 4 hours, they should also avoid any hot drinks or alcohol containing products. For the sylc group patients were assured that they may feel some sort of numbness in the soft tissue.

Hypersensitivity assessment

Sensitivity was assessed both preoperatively and postoperatively using the Visual Analog Scale (VAS), a 10-centimeter horizontal line graded from 1 to 10. The left end of the scale indicated 'no pain,' while the right end represented 'the worst possible pain.' To aid patient understanding, facial expression illustrations with corresponding color codes were placed beneath the VAS line. All participants in the three groups were evaluated for hypersensitivity at three time points: immediately after 3 minutes of treatment, 3 months post-treatment, and 6 months post-treatment, using the same assessment method as at baseline.

Statistical analysis

Ordinal data obtained from the Visual Analog Scale (VAS) were presented as median values with corresponding ranges. Intergroup comparisons were conducted using the Mann–Whitney U test, while intragroup comparisons were performed using Friedman's test for repeated measures, followed by multiple pairwise comparisons with the Wilcoxon signed-rank test. Bonferroni correction was applied to adjust for multiple comparisons. A significance level of $P \leq 0.05$ was considered statistically significant for all tests. Statistical analyses were conducted using IBM® SPSS® Statistics for Windows, Version 25.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Regarding the evaporative test, a descriptive statistics for visual analogue scale (VAS) concerning the evaporative test are presented in **Table (2).** There was a statistically significant difference in VAS between intervention groups ($p<0.001$). Fluoride varnish application produced the significantly highest VAS, followed by Sylc powder air polishing, then light-cured desensitizer application. Regarding baseline records, there was no statistically significant difference between intervention groups ($P=0.627$). After 3 minutes,

Sylc powder air polishing showed the highest VAS, followed by fluoride varnish application, then light-cured desensitizer application (P<0.001). After 3 and 6 months, there was a statistically significant difference between intervention groups (p<0.001 and p<0.001, respectively). Fluoride varnish application showed the significantly highest VAS, while powder air polishing and light-cured desensitizer application yielded statistically similar VAS. In all intervention groups, there was a significant decrease of VAS values during successive follow-up intervals (P<0.001 in fluoride varnish application, P<0.001 in Sylc powder air polishing and P<0.001 light-cured desensitizer application). Baseline records showed significantly higher VAS values, followed by 3 minutes; then 3 and 6 months which were statistically similar.

Table (2) *Descriptive statistics for visual analogue scale (VAS) for evaporative test.*

Intervention	Follow-up	Mean	Std. Deviation	Median	Range
Fluoride varnish	**Baseline**	8.04	0.78	8.00	2.00
	3 minutes	5.04	1.02	5.00	4.00
	3 months	2.00	0.71	2.00	2.00
	6 months	2.76	0.66	3.00	2.00
Sylc air polishing	**Baseline**	8.24	0.72	8.00	2.00
	3 minutes	6.44	0.96	6.00	3.00
	3 months	0.24	0.43	0.00	1.00
	6 months	0.32	0.47	0.00	1.00
Light-cured desensitizer	**Baseline**	8.12	0.66	8.00	2.00
	3 minutes	2.36	1.46	2.00	4.00
	3 months	0.20	0.41	0.00	1.00
	6 months	0.52	0.65	0.00	1.00

Regarding the tactile test, a descriptive statistics for visual analogue scale (VAS) concerning the tactile test are presented in *Table (3)*. There was a statistically significant difference in VAS between intervention groups (P<0.001). Fluoride varnish application produced statistically similar VAS to that of Sylc powder air polishing. While light-cured desensitizer application showed the significantly lowest VAS. Regarding baseline records, there was a statistically significant difference between intervention groups (p<0.001). Fluoride varnish application produced significantly lower VAS compared to Sylc powder air polishing and light-cured desensitizer application, which yielded statistically similar VAS. After 3 minutes, there was a statistically significant difference between intervention groups (p<0.001). Sylc powder air polishing showed the highest VAS, followed by

light-cured desensitizer application, then fluoride varnish application. After 3 and 6 months, there was a statistically significant difference between intervention groups (p<0.001 and p<0.001, respectively). Fluoride varnish application showed the significantly highest VAS, while powder air polishing and light-cured desensitizer application yielded statistically similar VAS. In fluoride varnish application and Sylc powder air polishing groups, there was a significant decrease of VAS values during successive follow-up intervals (P<0.001 and P<0.001, respectively). Baseline records showed significantly higher VAS values, followed by 3 minutes; then 3 and 6 months which were statistically similar. While in light-cured desensitizer application, there was a significant decrease of VAS values during successive follow-up intervals (P<0.001). Baseline records showed the significantly highest VAS values, while VAS values at 3 minutes, 3 months and 6 months were statistically similar.

Table (3) *Descriptive statistics for visual analogue scale (VAS) for tactile test*

Intervention	Follow-up	Mean	Std. Deviation	Median	Range
Fluoride varnish	**Baseline**	7.00	0.86	7.00	3.00
	3 minutes	4.08	0.70	4.00	2.00
	3 months	1.72	0.84	2.00	3.00
	6 months	2.08	1.25	2.00	4.00
Sylc air polishing	**Baseline**	7.76	0.88	8.00	3.00
	3 minutes	5.84	1.34	6.00	5.00
	3 months	0.12	0.33	0.00	1.00
	6 months	0.16	0.37	0.00	1.00
Light-cured desensitizer	**Baseline**	7.68	0.94	8.00	3.00
	3 minutes	0.36	0.56	0.00	2.00
	3 months	0.08	0.27	0.00	1.00
	6 months	0.28	0.54	0.00	2.00

DISCUSSION

Many of the criteria that Grossman established in 1935 for dentin hypersensitivity (DH) treatment are still relevant today. These criteria state that the material used should not irritate the pulp, be relatively painless to apply, simple to administrate, with rapid onset, long-lasting effects and should not have staining effect[9]. The best way to reduce stimulation of the dentinal tubules is to use a substance that prevents them from coming into contact with external stimuli[10]. The active ingredients in these substances must be able to precipitate within the tubules and keep the dentinal canals closed for an extended period of time [11].

Fluoride varnish is considered to be the gold standard in treating dentin hypersensitivity because

it is highly effective, long-lasting, safe, and easy to apply. One of the applications of fluoride varnish is Bifluoride 10, a dental varnish that contains sodium fluoride (NaF) and calcium fluoride (CaF). The NaF dissociates in the high calcium environment of saliva and dentinal fluid, releasing fluoride ions (F). These F- ions diffuse through the dentinal tubules and precipitate as CaF, blocking the tubules and reducing dentin hypersensitivity [12]. The gradual effect of *fluoride varnish* can be attributed to the formation of calcium fluoride (CaF_2) crystals at the openings of dentinal tubules, resulting from the reaction between fluoride ions (F^-) and calcium ions (Ca^{2+}) in the dentinal fluid. Due to the small size of the CaF_2 crystals (approximately 0.05 micrometers), a single application of fluoride varnish may not be sufficient to significantly reduce the diameter of the dentinal tubules. As a result, several applications are required to produce a noticeable occlusive effect. Additionally, the gradual loss of effectiveness may also be caused by the CaF2 and fluoroapatite compounds' inability to keep dentinal tubule occlusion. This may be the result of acidic challenges from erosive drinks during the follow-up periods or abrasion from brushing teeth. In conclusion, a number of factors, such as the small size of CaF2 crystals, the possibility of occlusive layer abrasion or erosion, and the requirement for multiple applications to achieve a significant occlusive effect, are likely to contribute to the gradual action and limited duration of efficacy of fluoride varnish [13].

The slow-moving process of fluorapatite formation results in the deposition of calcium fluoride on the tooth surface. Because fluoride varnish acts regularly, fluoride is released during the first two weeks of treatment. When the varnish is applied, its solvents evaporate, leaving the exposed dentinal tubules covered in a thin layer of material. This could lessen hypersensitivity; as shown in the study immediate results; by partially reducing dentin permeability. These findings are consistent with those of previous studies [14-20], which have demonstrated that topical fluoride applications are highly effective in managing dentin hypersensitivity; however, they do not provide long-lasting relief. In-office topical fluorides, such as varnishes, require reapplication after a certain period[15,21,22]. Topical fluorides can also be used in the form of toothpastes or mouthwashes for continuous application to the tooth surfaces[23-25]. Our findings are not in agreement with those of **Jalaluddin & Almalki** [26]. Nevertheless, this makes sense given that they combined sodium fluoride with a laser. By strengthening sodium fluoride's bio-modulatory effects and lowering pain and inflammatory processes, the laser may have enhanced the drug's effects. By melting the dentin at the tubules' openings, lasers can also obstruct dentinal tubules. ***Bioactive glass*** is an effective treatment for dentin hypersensitivity because it has several unique properties that make it ideal for this purpose [27]. Bioactive glass works to treat dentin hypersensitivity by different mechanisms. Bioactive glass forms a layer on the surface of the teeth that occludes the dentinal tubules. This prevents fluid from flowing through the tubules, which is a major stimulus for pain. Bioactive glass is also considered as a reservoir that releases ions, such as calcium and sodium, which can promote tissue regeneration and reduce inflammation. Sylc is a bioactive prophy-powder that is used for both air-polishing and therapeutic procedures. Calcium sodium phosphor-silicate (CSPS), a highly biocompatible substance that was first created for bone grafts, is the raw material used to make Sylc powder [28]. Sylc and saliva combine to create hydroxycarbonate apatite (HCA), a mineral that bears a striking resemblance to the mineral found naturally in teeth. It has been demonstrated that Sylc bioactive glass greatly lowers

dentin permeability when applied as a prophy-paste with a dental rubber cup and when air-polished [29]. In addition to their mechanical occlusion of dentinal tubules, bioactive glasses have been associated with the formation of a hydroxycarbonate apatite layer on their surfaces. This outcome could be attributed to bioactive glass powder, which mechanically and chemically destroys the majority of dentinal tubules[30].

Another well know approach in treatment of dentin hypersensitivity is light cured de-sensitizing agent. Shield force plus is a one-component, light-cured desensitizer. It is applied to the exposed dentin and light-cured for 20 seconds. The resin then forms a protective barrier on the dentin, which blocks the flow of fluid through the dentinal tubules and prevents sensitivity. Shield force plus is also effective at reducing abrasion and erosion of exposed cervical dentin. The result of this response is the blockage of dentinal tubules. Furthermore, it was established that the application of Shield Force blocked the tubules, resulting in a softer and smoother surface that was more in line with the tubules' original topography. Scanning electron microscopy studies treated with Shield Force made this evident [31].

These findings are consistent with those reported by **Nomura *et al.*** [32]. This effect is attributed to the sealing properties of Shield Force, which contains phosphate monomers, Bis-GMA, TEGDMA, and HEMA as its primary constituents. Upon polymerization, these monomers form resin tags within the dentinal tubules and create macromolecular polymer films on the dentin surface, effectively sealing the tubules. Shield Force Plus demonstrates enhanced sealing efficacy and long-term stability compared to conventional agents.

Our findings are in agreement with those of **Bharath *et al*.** [33] **& Gazhva *et al*** [34]. Shield Force's method of operation explains this. It is believed that Tokuyama Shield Force Plus functions via a double-block effect. The adhesive monomer (3D-SR monomer) in Shield Force Plus reacts with the tooth substance's calcium in the affected area. Both on the coated surface and in the dentinal tubules, the reaction product accumulates [35]. On the hypersensitive surface, a thin coating develops when the water and solvent component are eliminated using an air stream. Sealing of the dentinal tubules results in a noticeable therapeutic effect, characterized by pain relief. Light curing induces hardening of both the thin surface layer and the reaction products within the tubules. Hypersensitivity is reduced through a dual-block mechanism: one involves the chemical interaction between adhesive monomers and calcium in the tooth structure, and the other involves the formation of a durable cured coating on the dentin surface [36].

Our findings are not in agreement with those of **Ashari *et al*** [13]. The fact that Ashari et al. combined sodium fluoride varnish with a laser can help to explain this. Since the laser melted the dentin at the tubules' openings, it may have blocked the tubules and enhanced the effects of sodium fluoride varnish [37]. Low-level lasers influence nerve endings and promote cell proliferation and differentiation, which contribute to the reduction of dentin hypersensitivity (DH). The mechanism by which lasers alleviate DH is thought to involve the disruption of sensory information transmitted through C-fibers. When applied to sensitive teeth, sodium fluoride varnish penetrates the dentinal tubules and occludes the pores. The primary mechanism of action for this technique is the deposition of protein on the transverse walls of the dentinal tubules, which effectively reduces sensitivity [38]. So, this clinical study's findings contradicted the null hypothesis, which assumed no difference between the treatment protocols for dentin hypersensitivity.

CONCLUSIONS

Considering the limitations of the current study, the following conclusions can be drawn

- Bioactive glass is a highly efficient and considered a long-lasting treatment for dentin hypersensitivity.
- Light-cured desensitizing agent is an immediate and long-lasting effective method in treating hypersensitivity, providing rapid relief and sustained protection.
- Fluoride varnish still considered an efficient treatment for Dentin Hypersensitivity but cannot be relied on if applied in single application.
- The Visual Analog Scale (VAS) remains a dependable, uncomplicated, and rapid method for evaluating hypersensitivity that can be employed before, during, and after treatment.

RECOMMENDATIONS

- Integrating patient education on the prevention of known hypersensitivity causes into dental school curricula is imperative.
- Further investigations are required for assessing Dentin Hypersensitivity different treatment protocols in short and long-term.

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