Efficacy of MI Paste® on Bleaching-Related Sensitivity

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Summary of Article

Shaista Rashid, and Mohamed ElSalhy, analyze using MI Paste® to see the difference in sensitivity and color change during vital tooth bleaching. The experiment took place at the University of New England and was published in the International Journal of Dentistry in June 2021 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8219434/#).

For this experiment, forty-five participants were randomized into two groups based upon which arch received MI Paste. Group 1, the maxillary arch, is the control group that bleached the arch with only bleach, and the mandibular arch was bleached with MI Paste®, which makes the intervention arch. Group 2 is similar to Group 1; however, the mandibular arch is the control arch, and the maxillary is the intervention arch. After two weeks, the subjects changed from the control arch to the intervention arch. The subjects were told to use MI Paste® for 5 minutes in a custom tray, wait 1 hour, and then bleach overnight in a different tray. The thermal test sensitivity levels for the arches bleached without MI Paste® were higher than those for the arches bleached with MI Paste® immediately after treatment (p=0.011). In addition, the intervention and control groups exhibited a significantly lighter shade than baseline (p 0.001), with no significant difference between them (p=0.42). Based on the study MI Paste® dramatically reduced bleaching sensitivity while remaining unaffected by shade change.

Article information

The *'Efficacy of MI Paste® on Bleaching-Related Sensitivity: Randomized Clinical Trial'* was written by Shaista Rashid, and Mohamed ElSalhy. This article was published in the International Journal of Dentistry in June 2021 (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8219434/#), (https://pubmed.ncbi.nlm.nih.gov/34221018/), DOI: (10.1155/2021/9963823). There are no conflicts of interest reported by the authors for this study.

Study Analysis

The *'Efficacy of MI Paste® on Bleaching-Related Sensitivity: Randomized Clinical Trial'* study type is randomized control clinical trial, placed at the University of New England on March 16th, 2007.

Study purpose

This study aims to see if MI paste can help with the sensitivity that comes with critical teeth bleaching. Tooth whitening is now one of the most conservative and non-invasive ways to change the color of teeth. According to studies, the prevalence of thermal sensitivity related to vital bleaching ranges from 0% to 100%. However, the length and degree of bleaching-induced sensitivity vary significantly in a systematic review. The exposure of dentinal tubules is thought to be the primary source of thermal sensitivity following bleaching. Several solutions have been developed to help people cope with the sensitivity that comes with bleaching. MI Paste® is an FDA-approved desensitizing product for treating dental hypersensitivity. MI Paste® contains the active component casein phosphopeptide-amorphous calcium phosphate obtained from milk (CPP-ACP). At neutral pH, calcium phosphate is insoluble; however, CPP keeps calcium and phosphate in an amorphous crystalline state. As a result, CPP components adhere to biofilms in the oral cavity and release calcium, phosphate, and hydroxide ions to the tooth surface, causing remineralization. CPP-ACP also has a rapid desensitizing action because it binds to proteins quickly, then precipitates and deposits calcium phosphate compound on the dentin surface, occluding the tubules. According to a randomized clinical experiment, CPP-ACP's single 10-minute professional application reduces postoperative sensitivity significantly after in-office bleaching. However, only one clinical trial has indicated CPP-ACP (MI Paste®) effectiveness in lowering at-home bleaching-related sensitivity, in contrast to the current literature on in-office bleaching-related sensitivity. The experiment found that MI Paste® provided only temporary sensitivity reduction on Day 3 of the 14-day at-home bleaching cycle. The lack of effectiveness of MI Paste® in the trial could be due to possible cross-contamination between the bleach and MI Paste®. As a result, the goal of this study was to see how effective MI Paste® was at reducing bleaching-related sensitivity in patients who were doing at-home bleaching and how it affected color change.

Experimental design

For this study, forty-six people were recruited from Oral Health Center. Participants were eligible for the study if they were between the ages of 18 and 55, had no prior bleaching experience, were not taking any desensitizing treatments, and had anterior tooth discoloration of shade A2 or darker according to the Vita ClassicalTM shade chart (Vita North America, Yorba Linda, CA, USA). In addition, participants were ruled out of the study if they were allergic to milk protein, pregnant, taking NSAIDs, had crowns or restorations on an anterior tooth, or had a gingival recession or periodontal disease or scaling or periodontal surgery in the previous six months. The sample size was 32 people, 16 individuals per group. The computation was done with an alpha of 0.05, a power of 80%, an expected difference in means of 10%, and a standard deviation of 10%. Forty-six people were targeted since a 40% dropout rate, and non-compliance with the procedure were expected.

The lead investigator used simple random allocation to divide the subjects into two groups based on the control and intervention arches. The intervention arch received bleaching and PROSPEC MI Paste®, while the control arch received only bleaching (GC American Inc, Alsip, IL USA). The maxillary arch in Group 1 was the control arch (just bleaching), whereas the mandibular arch was the intervention arch (bleaching with MI Paste®). The mandibular arch in Group 2 was used as the control arch (just bleaching), whereas the maxillary arch was used as the intervention arch (bleaching plus MI Paste®). The study utilized the GC TiONTM Tooth Whitening Take Home Kit (GC American Inc, Alsip, IL, USA). PROSPEC MI Paste® and a 15% carbamide peroxide gel were used in the TiONTM system. For both the distribution of bleaching gel and MI Paste®, custom trays with reservoirs were created. To avoid contamination, both groups were told to bleach the control arch first in specially scalloped trays with 15% carbamide peroxide.

Participants were encouraged to floss and brush their teeth before wearing the bleaching trays for two weeks at night for 6–8 hours. During the two-week bleaching phase, subjects were given a Visual Analogue Scale (VAS) daily log to keep track of their sensitivity. After two weeks, subjects stopped bleaching on their control arches and were given bleach and MI Paste® for the opposing arch. Participants were given two trays for the intervention arch and told not to bleach the control arch any longer. Participants apply MI Paste® to the non-scalloped tray, wear

it for 5 minutes, remove it, spit out the excess, and refrain from eating or drinking for one hour. After the one-hour wait period, participants were told not to rinse their mouths or brush their teeth again. For the two weeks, they were told to bleach the arch with the second scalloped tray for 6–8 hours at night, for example, Group 1 bleach/MI Paste® on the mandibular arch, Group 2 bleach/MI Paste® on the maxillary arch. During the second bleaching phase, participants were given another Visual Analogue Scale (VAS) daily log to record their sensitivity for each day. A thermal sensitivity test and a daily log of the Visual Analogue Scale (VAS) were used to assess sensitivity. The maxillary and mandibular anterior teeth (#6–11 and #22–27, respectively) were tested. The pain response was measured on a scale of 0–3, with 0 representing "no pain" and 3 indicating "intense pain" lasting more than 10 seconds. For each arch, thermal sensitivity measurements were taken at baseline, two weeks after bleaching began, and two weeks after treatment ended. The shade of the teeth was determined under-regulated settings for color corrected light using the Vita ClassicalTM shade guide (Vita North America, Yorba Linda, CA, USA). The manufacturers' recommended lightness grouping was used to arrange the Vita ClassicalTM shade scores, ranging from 1 to 16. For each arch, shade measurements were taken as sensitive measurements during the same time period and location. This experiment took SPSS 22.0 was used to handle and analyze the data (IBM Corp., Armonk, NY, USA). The t-test was used to assess the difference in mean scores within and between groups. The overall (arch-specific) VAS sensitivity ratings, daily longitudinal VAS scores, Vita shade match, and CIELAB Lab tests compared intervention and control groups (lightness).

Results

There was no significant change in heat sensitivity scores between treated and untreated arches ($p=0.063$). The thermal sensitivity scores of the arches bleached without MI Paste® were higher than those of the arches bleached with MI Paste® immediately after treatment (Time 1) ($p=0.011$). However, sensitivity scores on the longitudinal visual analogue scale showed that the arches bleached with MI Paste® had significantly lower mean overall VAS sensitivity scores than those without MI Paste® during the 14-day bleaching period ($p=0.002$). For the 14 days, the control had a mean score of 37.9, whereas the MI Paste® arches had 27.5. When daily ratings

were compared, MI Paste®-treated maxillary arches had significantly lower sensitivity levels starting on Day 9 than maxillary arches bleached without MI Paste®.

In contrast, mandibular arches had a significant difference starting on Day 10 (p 0.05). The changes in VAS scores daily are depicted in the graph. At baseline, there was no significant difference in lightness scores between the MI Paste-treated arches and the control arches (mean = 72.1 vs. 72.1; p=0.69). There was no difference between the maxillary and mandibular arches (p=0.81). Regardless of the arch allocation group, both MI Paste®-treated and MI Paste®-bleached arches demonstrated significant shade change relative to baseline (all p values were less than 0.01). The shade shift was substantially greater in the maxillary arch than in the mandibular arch (p=0.010). Lightness scores for treatment and control arches at baseline, Time 1, and Time 2 are summarized. The average brightness values in various arches are depicted. Vita Shade Match Arches treated with MI Paste®, as well as those bleached without MI Paste®, revealed a substantial net shade change (p 0.0001) compared to baseline, with no significant difference (p=0.42) between the treatment and control groups. Approximately 80% of participants reported bleaching-related sensitivity, with 38% reporting gingival irritation. MI Paste® was rated as easy to use by 92% of the participants. With MI Paste® use, around 80% of participants reported a reduction in insensitivity, and 18% reported a reduction in gingival irritation.

Conclusions

This study aimed to see how effective MI Paste® is at reducing bleaching-related sensitivity and how it affects color change. The use of MI Paste® during bleaching was linked to a reduction in insensitivity. However, MI Paste® was not added to the treatment regimen and did not affect the whitening results. As a result, several solutions have been developed to help people cope with the sensitivity that comes with bleaching. These treatments include therapies used in the dentist's office and those used by patients at home.

Tubular occlusion and nerve depolarization are two treatments used to treat dentinal hypersensitivity. Tubular occluding substances such as stannous fluoride (SnF2), arginine, and strontium salts block exposed dentinal tubules, whereas nerve depolarizing agents such as

potassium ions interfere with neural pain conduction. Therefore, the addition of these compounds to dentifrices effectively reduced sensitivity.

MI Paste ®'s active ingredient is CPP-ACP. MI Paste® CPP-ACP crystals fill in microscopic enamel surface imperfections, making teeth smoother, firmer, and less prone to sensitivity. MI Paste® has also been suggested to stimulate enamel remineralization, which may aid in the reduction of sensitivity. Microscopic examination of samples bleached with 40% hydrogen peroxide and treated with CPP-ACP revealed the formation of amorphous crystals on the surface, indicating remineralization. Glycerol is also added to MI Paste® to improve the paste's smoothness and viscosity. Glycerol is a humectant (it absorbs water and keeps the teeth moist by clinging to the enamel surface). Therefore it may help to minimize the dehydration that bleaching causes. The initial mechanism for preventing tooth sensitivity is thought to be a glycerol plug, followed by calcium and phosphate ion precipitation, which leads to tubular occlusion, continuing the effect of MI Paste® in lowering sensitivity. The impact of CPP-ACP on postbleaching sensitivity has been documented after in-office bleaching. CPP-ACP showed a significant reduction in sensitivity compared with sodium fluoride after in-office bleaching with 40% carbamide peroxide. However, CPP-ACP had some impact on shade stability.

On the other hand, Alexandrino et al. reported a significant reduction in sensitivity using CPP-ACPF with 35% hydrogen peroxide with no effect on color change. In vivo studies using the CPP-ACP and bleaching have shown no interference with color change and improved the enamel irregularities and porosities, which can explain the reduction in sensitivity. This study supports previous reports that CPP-ACP effectively reduces sensitivity with no impact on color change. Only one previous study looked at at-home bleaching in combination with MI Paste®. When MI Paste® was used in conjunction with at-home bleaching, the study looked at how it affected tooth sensitivity and color change. Patients in that trial were told to use bleaching gel in bespoke trays for four hours, followed by 30 minutes of MI Paste® in the same tray. Even though bleaching was employed for an extended amount of time (6–8 hours) and MI Paste® was applied for a shorter period, the study found a reduction in sensitivity using MI Paste® throughout a two-week bleaching period (5 minutes). One possible explanation is that this study employed separate trays for bleach and MI Paste®, which reduces the chance of cross-contamination and may result in better outcomes.

Furthermore, in the previous study, sensitivity was solely recorded using a Visual Analogue Scale log, whereas this study used different methods for evaluating sensitivity with similar results. More research is needed to validate the effectiveness of MI Paste® in lowering sensitivity caused by at-home bleaching. Only one application of MI Paste® was employed before bleaching treatment in our study because there were no clear instructions about how to apply MI Paste® at the time.

According to the manufacturer's instructions, MI Paste® is applied with a finger or in a tray for 5 minutes before and after bleaching. MI Paste® was put in the custom tray for 5 minutes only before bleaching in this in vivo investigation to increase subject compliance. One of the current study's drawbacks is this. Better results may have been reported if the manufacturer's recommendations were followed and the second application of MI Paste® was used after bleaching. In addition, because there was no clinical standard for how long to wait between MI Paste® application and bleaching therapy, the study adopted a one-hour wait time to control any possible MI Paste® and bleach gel interaction. The patient considered the wait to be a significant inconvenience. Future investigations may test a shorter waiting interval because there was no interaction between the MI Paste® and the bleaching gel in this trial.

Your impression

According to the study, I believe this research is required. For decades, everyone has wanted whiter teeth, yet many individuals avoid bleaching since the bleaching ingredient can increase sensitivity. However, thanks to this research, we may avoid sensitivity while still getting whiter teeth, which will benefit many individuals. This research shows how MI Paste can reduce sensitivity while not affecting the color of the teeth. It is excellent for people like myself who want whiter teeth but are afraid of developing sensitive teeth. During this study, I learned a lot about MI paste; I had no idea what it was before, and MI paste helps condition, protect, and restore the surface of the teeth. Perhaps we can learn more about MI Paste in the future and provide additional information to those who need aid with sensitivity. We can discover more effectiveness of MI Paste.