

Evaluation of Extrinsic Stain Removing Efficacy of Snowdent Whitening Multifunction Toothpaste

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ABSTRACT

Aim: To clinically evaluate the extrinsic stain removing efficacy and any adverse effects of Snowdent whitening toothpaste and also to observe other benefits offered by the toothpaste during the course of the clinical study.

Materials and methodology: This was a 6-week clinical study of systemically and periodontally healthy subjects. At baseline Lobenstein Index, Plaque index and gingival index were recorded. All subjects brushed with Snowdent toothpaste for 1 minute twice daily. Stains, Gingiva and plaque examinations were recorded at week 2, week 4, week 6 to measure treatment differences, the safety and efficacy and other beneficial effects offered by the toothpaste.

Results: Compared to baseline scores, there were statistically significant reductions in Lobenstein composite stain scores at 2-week ($p < 0.001$), 4-week ($p < 0.001$) and 6-week ($p < 0.001$). Also plaque and gingival scores had revealed statistically significant reduction from the baseline to week 6 ($p < 0.001$).

Conclusion: There was a significant decrease in discoloration of the teeth in subjects treated with Snowdent toothpaste. The overall response to the treatment in terms of oral hygiene and stain removal was effective with no observed side effects.

INTRODUCTION

Healthy and bright smile is the prime requisite of most of the patients visiting dentist from cosmetic point of view. Proper diagnosis plays an imperative task in influencing the treatment outcome in cases of tooth staining. In the recent years this has led to interest in the advance of a range of methods for stain removal and tooth whitening that may be applied at home. The first phase of efficient scientifically proven, multi-role and multi-benefit pastes began to come into sight with the early- to mid-1990s [1]. As multi-role dentifrices have debuted on store shelves, many patients have become conscious of and are seeking out, these worth-loaded toothpastes which come together with the requisite dental caries protection with anti-gingivitis, plaque control, and potentially other profit like teeth whitening easily delivered in one tube [2]. The toothpaste quality, this has been proficient largely by refining and reformulating the imperative yet inert ingredients. The efficacy and functionality of this toothpaste, is being achieved by adding a variety of harmless, more in nature active yet attuned ingredients that may interact chemically with tooth structure, reduce demineralization, prevent bacterial adhesion to the teeth surface, afford antibacterial act, prevent the formation of supragingival calculus, encourage remineralization and diminish dentinal hypersensitivity [1].

Staining of the teeth is a frequent dental complaint in most people [3]. The intrinsic colour and the presence of any extrinsic stains determines the teeth colour [4]. Tooth staining is caused by various local and systemic conditions. The causes for extrinsic dental stains are dental plaque, foods, beverages, tobacco, chromogenic bacteria, metallic compounds etc.

Causes for Intrinsic dental stains are mainly by dental materials (tooth restorations), caries, trauma, infections, medications, nutritional deficiencies, other disorders (complications of pregnancy, anemia, bleeding disorders, bile duct problems) genetic defects and hereditary diseases (those affecting enamel and dentin development or maturation) [5]. With time and age, the teeth accumulate more stains, causing it to look dull and discoloured. In addition, as people grow older, the enamel that protects the teeth gets eroded, revealing the underlying deeper yellow colour of dentin [6-9]. Studies have shown that women have lighter and lesser yellow teeth than men [9-11]. Several treatment options are available to enhance the colour of the teeth; these include whitening toothpastes, professional cleaning to remove stains, bleaching agents, bleaching strips, bleaching pen, bleaching gel and laser bleaching [3].

The efficacy of toothpastes in sinking or removing extrinsic dental stain has enhanced with the prologue of new whitening toothpastes into the market [12]. These dentifrices help remove surface stains because they have mild abrasive action. Some whitening dentifrices contain gentle polishing or chemical agents that provide additional stain removal effectiveness [5].

Considering the same, Snowdent dentifrice is formulated which contains the advantages of calcium peroxide as tooth whitening agent along with titanium oxide, Calcium Carbonate, Xylitol and sodium Monofluorophosphate which offer other advantages in a single tube.

The present study was aimed to clinically evaluate the extrinsic stain removing efficacy and any adverse effects of Snowdent whitening toothpaste. Also to assess other benefits offered (plaque score and gingival score reduction) by the toothpaste throughout the course of the clinical trial.

MATERIALS AND METHODS

All subjects visiting Department of Periodontics; AME's Dental College were screened and a total of 30 systemically and Periodontally healthy adults with extrinsic stains were recruited after obtaining a fully informed written consent. The study was accepted by the Institutional Ethical Committee and the study period ranged from June 2013 to July 2013.

Subjects 18 years and older of both genders with at least 8 anterior teeth with visible stains on at least half of their teeth were included in the study. Smokers were expelled from the study. Following were the inclusion criteria's and exclusion criteria's for enrolment of the the subjects in the present study.

Inclusion criteria

Periodontally healthy subjects with minimum of 20 teeth present, probing depth less than 4 mm and clinical attachment loss less than 3 mm, BOP in less than 20% of the sites and no evidence of radiographic alveolar bone loss were included in the study.

Exclusion criteria

Subjects with systemic diseases and subjects on medications that could have compromised the result of the study were excluded. Subjects with systemic or oral diseases, oral ulceration and known sensitivity/allergy to oral hygiene products, Pregnant/Lactating women were also excluded from the study. Subjects who had participated in the similar trial for the previous 3 months were excluded. Subjects with teeth having bridge, abutments, crown, veneers or large composite restorations in the 8 anterior teeth and inadequate restorations or untreated caries, orthodontic appliances were excluded.

This was a 6-week clinical trial of systemically and periodontally healthy adults. At baseline all 30 subjects were evaluated for Lobene Stain Index 4 evaluation for the stain area and intensity, Plaque index 14 and Gingival index [13,14]. All the subjects received samples of Snowdent tooth paste and were instructed to brush with it 2 times for 6 weeks with roll method. Other form of oral hygiene was not permitted during this period. All the subjects were evaluated at 2, 4 and 6 weeks from baseline for stains, plaque and gingival scores.

During each visit, extrinsic stain on the buccal surfaces of the maxillary and mandibular central and lateral incisors and canines were scored by using Lobene Stain index. The stains on labial surface of each incisor and canine were observationally scored by using the four point scale:

0 - no stain detected, only tooth colour.

1 - Stain covering up to one-third of the tooth surface.

- 2 - Stain covering between one third and two-thirds of the tooth surface.
- 3- Stain covering more than two-thirds of the tooth.

The second criterion of Lobene Stain Index – the intensity of stain – was observationally scored by using the four-point scale:

- 0 - No stain.
- 1 - Light stain.
- 2 - Moderate stain.
- 3 - Heavy stain.

The Lobene index has two summary variables: The intensity score (sum of all intensity scores divided by all sites graded) and the extent score (sum of all extent scores divided by all sites graded). Additionally, a composite score is calculated for each subject by averaging the product of the intensity and extent scores [2].

On completion of the study, the subjects were asked to fill in questionnaires about the whitening effect of the dentifrice and any adverse effects if encountered.

Statistical analysis

Paired t-test was used to calculate the relation between the two groups and P value 0.05 was considered as significant level. The statistical Analysis was conducted by means of SPSS (version 16) package.

RESULTS

A total number of participant in the study were 30. Relative to baseline scores, there was statistically significant reductions in Lobene composite stain scores at 2-Week (p<0.001), 4-week (p<0.001) and 6-Week (p<0.001) as shown in **Table 1**. Also, Plaque index (**Table 2**) and Gingival index (**Table 3**) had shown statistically significant reduction from the baseline scores to the week 6 (p<0.001).

Results of this study showed a significant reduction in teeth discoloration in the individuals treated with Snowdent toothpaste. The overall response to the treatment was good in almost all the individuals. No adverse reactions were either reported or observed during the entire study period and the overall compliance to the treatment was good.

Table 1. Lobenstein Stain Index results from baseline to 6 weeks.

	Mean ± SD	Mean ± SD diff
0 day	2.99 ± 0.55	1.17 ± 0.22*
2 weeks	1.82 ± 0.77	
0 day	2.99 ± 0.55	1.94 ± 0.06*
4 weeks	1.05 ± 0.61	
0 day	2.99 ± 0.55	2.50 ± 0.18*
6 weeks	0.49 ± 0.37	
*Statistically significant P<0.05.		

Table 2. Plaque index results from baseline to 6 weeks.

	Mean ± SD	Mean ± SD diff
0 day	1.61 ± 0.43	0.46 ± 0.08*
2 weeks	1.15 ± 0.35	
0 day	1.61 ± 0.43	0.79 ± 0.24*
4 weeks	0.82 ± 0.19	

0 day	1.61 ± 0.43	0.97 ± 0.29*
6 weeks	0.64 ± 0.14	
*Statistically significant P<0.05		

Table 3. Gingival Index results from baseline to 6 weeks.

	Mean ± SD	Mean ± SD diff
0 day	0.38 ± 0.26	0.62 ± 0.63*
2 weeks	1.00 ± 0.89	
0 day	0.38 ± 0.26	0.38 ± 0.34*
4 weeks	0.76 ± 0.60	
0 day	0.38 ± 0.26	0.22 ± 0.10*
6 weeks	0.16 ± 0.16	
*Statistically significant P<0.05		

DISCUSSION

Ever since the mid-20th century, a immense deal of research and development has been directed to get better the quality, function and effectiveness of toothpaste [15]. The present clinical trial aimed to evaluate the extrinsic stain removing efficacy of Snowdent toothpaste and also to evaluate other benefits offered (plaque score and gingival score reduction) by the toothpaste. Earlier studies have reported that whitening dentifrices turn out a better reduction and/or inhibition of extrinsic staining on natural teeth than standard commercial toothpaste formulations [16-18].

Whitening substances used by dentists are much more concentrated containing substances with more than 30% Hydrogen Peroxide and Carbamide Peroxide which often results in side effects like increase in tooth sensitivity and irritation of oral soft tissues. At present only a hardly any dentifrices rely on bleaching ingredients to neutralize the stain ensnared on the salivary pellicle and enamel surfaces. Tooth paste that make use of bleaching technology tend to rely on formulations that integrate hydrogen peroxide, and other oxygen producing compounds [19,20]. Peroxide containing toothpastes have shown clinically efficient in dipping extrinsic enamel staining [21]. The toothpastes used in the present study was a commercially available whitening toothpaste containing calcium peroxide which is most gentle form of bleaching available. It is not known to cause soft tissue irritation as a result of the side effect of its bleaching action. Other active ingredient is Titanium Oxide which acts as photocatalyst for Hydrogen peroxide. It thus achieves bleaching effects with fewer side effects also maintains surface texture of enamel. Other ingredient, Calcium Carbonate reduces the plaque from teeth, polishes the enamel surface and improves tooth brightness.

Snowdent also contains Xylitol which prevents demineralization of enamel by facilitating calcium movement and accessibility. It is a natural sweetener used as a substitute for sugar; it also reduces plaque adhering to teeth and inhibits acid producing bacteria.

Compared with previous studies, fluoride, Xylitol demonstrates a good anti-caries effect, as well as an antibacterial impact (especially on *Streptococcus mutans*), a salivary stimulating effect (enhances salivary buffering effect, reduces sugar clearance time, promotes remineralization) and direct biomechanical effects (prevents enamel mineral loss) [22]. Also toothpastes containing olive oil, betaine and Xylitol can stimulate salivary secretion when at rest, thus increasing the basal rate of salivary secretion [23]. In case of xerostomia, the mucous membrane is extra susceptible and weaker so one should keep away from irritating toothpastes. Some whitening toothpastes also claim to eliminate pellicle (external membrane) from a tooth surface [12]. Thus help in oral hygiene maintenance.

Dental caries in its earliest stages appears as a whitish fleck (chalk fleck) on the enamel. At this stage, enamel surface is intact, and these calcified sites can be remineralized, and thus be cured, with improved oral hygiene and use of fluoridated dentifrice i.e., regular brushing with Snowdent an anticaries and whitening formula which enhances the oral health.

The fluoride present in the dentifrice to be effective requires that the fluoride formula is companionable with the ingredients of the toothpaste 1 which was present in the toothpaste of the present clinical trial. Sodium Monofluorophosphate a remineralizing agent along with whitening agent promotes significant remineralization and

calcium uptake into incipient lesions. This provides the patient with teeth whitening alternative and also improves the condition of the teeth.

Manipulating and producing effective, multifunction toothpastes is an enormously complex job, to formulate them a numerous of basic concerns must be satisfied plus safety, best possible rheology, pleasing taste, packaging, shelf-life and up to standard cost.

A head of that, the crucial goal is to make sure that the toothpaste ingredients premeditated to accomplish each specific function will remain companionable in a collective or ultimate formulation. Which require every dynamic ingredient in the formulation to maintain its exact activity above point and beneath a range of storage situation and fuss so without compromising the other dynamic ingredients to achieve in a clinically efficient manner. In the course of the use of modern science and technology, such a target is being more and more realized ^[1]. The present toothpaste offers these advantages.

CONCLUSION

Within the limitations of the study it can be proposed that the whitening toothpaste which is used in this clinical trial had whitening property and decline in plaque and gingival scores on the teeth over a period of six weeks with no adverse effects. There is a require for more clinical trials for the whitening toothpaste with a large sample size, taking into consideration the abrasive consequence, pH and their dynamic ingredients of the toothpastes.

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