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ОЦЕНКА КАЧЕСТВЕННЫХ, КОЛИЧЕСТВЕННЫХ И ОРГАНОЛЕПТИЧЕСКИХ ПАРАМЕТРОВ НОВОЙ ЗУБНОЙ ПАСТЫ С РЕМИНЕРАЛИЗУЮЩИМ КОМПОНЕНТОМ

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Аннотация

Предмет исследования — лечебно-профилактическая зубная паста «DentaSwiss Enamel Repair & Protect».

Цель исследования — оценка органолептических характеристик новой лечебно-профилактической зубной пасты «DentaSwiss Enamel Repair & Protect», ее влияния на функциональную активность малых слюнных желез и слизистую оболочку полости рта.

Методология. Исследование проведено на кафедре терапевтической стоматологии и пропедевтики стоматологических заболеваний, на кафедре общей химии ФГБОУВО УГМУ Минздрава России. Обследовано 65 пациентов-добровольцев из числа студентов стоматологического факультета (юношей — 24, девушек — 41; средний возраст пациентов составил 21,25 ± 1,65 лет). Проводили исследование смешанной слюны по следующим параметрам: качественный анализ секрета — характеристика цвета, прозрачности, определение включений, водородного показателя, функциональной активности малых слюнных желез, микрокристаллизации смешанной слюны.

Выводы. Высокий результат показали такие параметры зубной пасты «DentaSwiss Enamel Repair & Protect» как вкус, «ощущение чистоты», «сенситивность» — 9,7 ± 0,3 балла. «DentaSwiss Enamel Repair & Protect» обладает хорошими пенообразующими свойствами — 9,25 ± 0,75 балла. Это можно объяснить наличием поверхностно-активных веществ в ее составе. Параметр «отбеливающий эффект» оценен на 8,5 ± 1,5 балла. Результаты исследования применения зубной пасты «DentaSwiss Enamel Repair & Protect» показали достоверное изменение значений водородного показателя, функциональной активности малых слюнных желез и микрокристаллизации смешанной слюны, что способствует увеличению реминерализующих свойств смешанной слюны и восстановлению эмали зубов. Органолептические свойства зубной пасты «DentaSwiss Enamel Repair & Protect» высоко оценены участниками исследования по всем параметрам и составили в среднем 9,95 ± 0,05 балла.

Ключевые слова: *водородный показатель, зубная паста с реминерализирующим эффектом, функциональная активность малых слюнных желез, микрокристаллизация слюны, смешанная слюна*

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EVALUATION OF QUALITATIVE, QUANTITATIVE AND ORGANOLEPTIC PROPERTIES OF NEW REMINERALIZING TOOTHPASTE

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Annotation

Subject. The subject of this study is "DentaSwiss Enamel Repair & Protect" treatment-and-prophylactic toothpaste.

Objective. The purpose of this study is to evaluate organoleptic properties of the new "DentaSwiss Enamel Repair & Protect" treatment-and-prophylactic toothpaste, and its effects on the functional activity of minor salivary glands and oral mucosa.

Methodology. The study was carried out by the Department of Therapeutic Dentistry and Propedeutics of Dental Disease together with the Department of General Chemistry, Ural State Medical University of the Ministry of Health of the Russian Federation. The study involved 65 volunteer patients recruited from the dental students (24 young male adults, 41 young adult women; the average age of patients was 21.25 ± 1.65 years old). The assessment of mixed saliva was performed for the following parameters: the qualitative analysis of such characteristics of saliva secretions such as color, transparency, presence of inclusions, the hydrogen-ion concentration, the functional activity of minor salivary glands, microcrystallization of mixed saliva.

Conclusions. The research results showed that the use of "DentaSwiss Enamel Repair & Protect" toothpaste reliably changes the pH-value, the functional activity of minor salivary glands and microcrystallization of mixed saliva which consequently enhances remineralizing effects of mixed saliva and the ability of the tooth enamel to restore. On all parameters, organoleptic properties of "DentaSwiss Enamel Repair & Protect" toothpaste were highly ranked by the study participants scoring the average of 9.95 ± 0.05.

Keywords: *pH-value, remineralizing toothpaste, the functional activity of minor salivary glands, microcrystallization of saliva, mixed saliva*

The authors declare no conflict of interest.

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Introduction

The professional attention of dental practitioners and students shall be drawn to the new "DentaSwiss Enamel Repair & Protect" treatment-and-prophylactic toothpaste manufactured by Svoboda Factory, Moscow. This toothpaste contains a unique multifunctional Omyadent formulation for efficient remineralization and enamel strengthening, as well calcium glycerophosphate, the source of bioavailable calcium needed to keep tooth enamel healthy [5, 7]. The toothpaste is safe. Besides, it contains aqua-complex of titanium glycerosolvate ensuring efficient drug delivery via the mucous membranes/dental tissues and penetration via epithelial cell membranes, and, as the multifunctional controlled periodontal drug delivery system, having the important role to play in periodontics and the thriving interest in future research [2, 5, 6, 7].

The purpose of this study is to evaluate organoleptic properties of the new "DentaSwiss Enamel Repair & Protect" treatment-and-prophylactic toothpaste, and its effects on the functional activity of minor salivary glands and oral mucosa.

Materials and Methods

The study was carried out by the Department of Therapeutic Dentistry and Propedeutics of Dental Disease together with the Department of General Chemistry, Ural State Medical University of the Ministry of Health of the Russian Federation. The study involved 65 volunteer patients recruited from the dental students (24 young male adults, 41 young adult women; the average age of patients was 21.25 ± 1.65 years old).

Inclusion criteria:

- Subject provides the informed consent to enter the research;
- Subject is between 18 and 24 years of age;
- Subject has at least 26 teeth in the mouth;
- There are no gingival margin defects of hard dental tissues;
- There are no symptoms of acute gun inflammation or chronic gingivitis exacerbations;
- There are no symptoms of acute somatic diseases or exacerbations of chronic somatic diseases;
- There are no medical contraindications.

Exclusion criteria:

Subject has refused to participate in the research;

Subject experiences problems with drug abuse or addiction.

The assessment of mixed saliva was performed for the following parameters: the qualitative analysis of such characteristics of saliva secretions as color, transparency, presence of inclusions, the hydrogen-ion concentration (pH), the functional activity of minor salivary glands, microcrystallization of mixed saliva. Dental records were made up. There were no medical contraindications for patients. The study was conducted by using samples of unstimulated mixed saliva [2–5, 14, 15].

Microcrystallization of mixed saliva was studied by using mixed saliva samples taken by sterile tips of forceps in the floor of each patient's mouth 3 hours after eating and rinsing the mouth with distilled water before and after single brushing with "DentaSwiss Enamel Repair & Protect" toothpaste. The droplet of mixed saliva, 10 mm in diameter, was placed on the slide [2–4]. 74 measurements were conducted. Samples were subjected to the same drying conditions: at the temperature of 22–23 °C and relative humidity of 58–60%, horizontally. The evaluation of mixed saliva microcrystallization was performed using such qualitative and quantitative parameters as the pattern (the presence of crystals, their sizes, well-defined and regular patterns, the lack of structures, the site of an organic compound), sizes, amounts [2–5, 7–12].

For the assessment of organoleptic properties of "DentaSwiss Enamel Repair & Protect" toothpaste, questions completed by the study participants were ranked on a 10-level rating scale, where 1 indicated "very dissatisfied", 2 was "moderately dissatisfied", 3 was "satisfied", 4 was "very satisfied", 5 was "good", 6 was "somewhat better", 7 was "very good", 8 was "much better", 9 was "excellent", 10 was "exceptional" [1, 5, 8].

The perspectives on appearance, color, flavor, smell and other characteristics were determined. During the study, all subjects used medium bristled toothbrushes.

The analysis of research findings was made using methods of mathematical statistics. The software package Statistica 6.0, MS Excel were used together with a set of tools for medical statistics. The representative values of data were arithmetic means and the standard error of the mean (M ± m). The statistical significance was assessed using Student's t-distribution. The results were considered significantly different at $p \leq 0.05$ [2–5, 9–14].

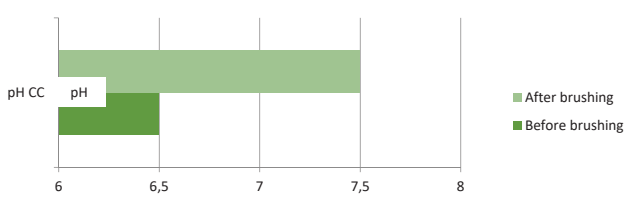

Fig. 1. Mixed saliva pH values in patients before and after brushing with "DentaSwiss Enamel Repair & Protect" toothpaste

Рис. 1. Значения pH смешанной слюны у пациентов до и после применения зубной пасты «DentaSwiss Enamel Repair & Protect»

Results and Discussion

According to our study, Oral Hygiene Index was 1.75 ± 0.15 before the patients brushed their teeth, and 1.55 ± 0.15 after single brushing with the new "DentaSwiss Enamel Repair & Protect" toothpaste. The pH

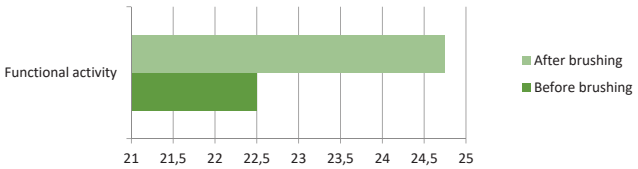

Fig. 2. The functional activity of minor salivary glands before and after brushing with "DentaSwiss Enamel Repair & Protect" toothpaste

Рис. 2. Значения функциональной активности малых слюнных желез до и после применения зубной пасты «DentaSwiss Enamel Repair & Protect»

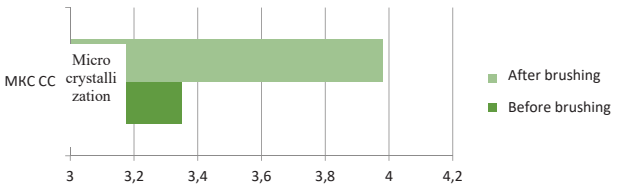

Fig. 3. Microcrystallization of mixed saliva in the patients before and after brushing with "DentaSwiss Enamel Repair & Protect" toothpaste

Рис. 3. Коэффициент микрокристаллизации смешанной слюны у пациентов до и после применения зубной пасты «DentaSwiss Enamel Repair & Protect»

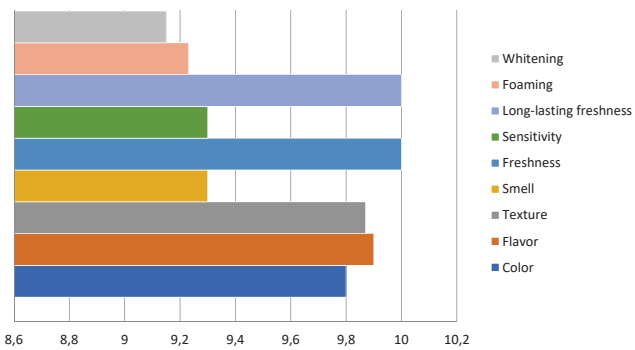

Fig. 4. Evaluations of organoleptic properties of "DentaSwiss Enamel Repair & Protect" toothpaste

Рис. 4. Оценка органолептических свойств зубной пасты «DentaSwiss Enamel Repair & Protect»

change of mixed saliva was found to increase the alkalinity and pH from 6.5 ± 0.5 to 7.5 ± 0.5 ($p \leq 0.5$). Such faintly alkaline medium causes remineralization and helps strengthen tooth enamel [7, 12–15].

The teeth brushing improved the functional activity of minor salivary glands to 24.75 ± 2.55 compared to initial indicators of 22.5 ± 2.5 (Fig. 2).

According to analysis of the microcrystallization process, the initial microcrystallization parameters of 3.35 ± 0.5 reached 3.98 ± 0.25 after single brushing with the new "DentaSwiss Enamel Repair & Protect" toothpaste.

Accordingly, the mineralizing potential of mixed saliva in patients increased after single brushing with the new "DentaSwiss Enamel Repair & Protect" toothpaste. This demonstrates occurrence of some adaptive processes and restoration mechanisms [2, 4, 5, 7].

All patients positively evaluated the organoleptic properties of the used "DentaSwiss Enamel Repair & Protect" toothpaste. According to the survey, appearance and texture of the toothpaste were scored as 9.87 ± 0.35. Flavor of the toothpaste was scored as 9.3 ± 1.95. The evaluation of toothpaste freshness was scored as 10.00 ± 0.00 which could be attributable to the faintly alkaline medium caused by the components of the toothpaste.

The evaluation of long-lasting freshness of the toothpaste was ranked 9.25 ± 1.25 (Fig. 4).

High evaluations of 9.7 ± 0.3 were demonstrated by flavor, clean feeling and sensitivity parameters. "DentaSwiss Enamel Repair & Protect" toothpaste created a good foaming action scored as 9.25 ± 0.75 which was due to detergents included in the toothpaste. The evaluation of whitening action of the toothpaste was scored as 8.5 ± 1.5.

The study participants highly evaluated all parameters of organoleptic properties of the toothpaste scoring the average of 9.95 ± 0.05 (Fig. 4).

In summary, single brushing with the new "DentaSwiss Enamel Repair & Protect" toothpaste changed pH of mixed saliva to increase the alkalinity, improved microcrystallization pattern and enhanced the mineralizing potential of mixed saliva. All these were supported by the specific kinetics of calcium release from the toothpaste, as found by our earlier research, and demonstrated a higher adaptation of the oral mucosa in young adults [2–5, 7, 9, 15].

Conclusions

1. The research results showed that the use of "DentaSwiss Enamel Repair & Protect" toothpaste reliably changes the pH-value, the functional activity of minor salivary glands and microcrystallization of mixed saliva which consequently enhances remineralizing effects of mixed saliva and the ability of the tooth enamel to restore.

2. On all parameters, organoleptic properties of "DentaSwiss Enamel Repair & Protect" toothpaste were highly ranked by the study participants scoring the average of 9.95 ± 0.05.

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