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COMPARATIVE EVALUATION OF THE EFFICACY  
OF SOME REMINERALIZING AGENTS**

**Abstract.** A comparative evaluation of the efficacy of two remineralizing agents used for treatment at home was conducted. The objects under study were Remars Gel and Elmex Gel (Elmex, Germany). The therapeutic efficacy of the two options was evaluated by determining the OHI-S (simplified index of oral hygiene) and CFEI (index of carious, filled, extracted teeth). This was done by measuring a white spot square and by vital staining of the teeth. Combined remineralization therapy has proved to be more efficient.

**Key words:** remineralization therapy for home use, vital staining of teeth.

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**СРАВНИТЕЛЬНАЯ ОЦЕНКА РЯДА РЕМИНЕРАЛИЗУЮЩИХ СРЕДСТВ**

**Аннотация.** В работе проведена сравнительная оценка эффективности реминерализирующей терапии в домашних условиях с использованием геля Remars Gel и геля Elmex Gel (Элмекс, Германия). Оценка эффективности лечения проводилась определением индекса ОНI-S, КПУ, измерением площади белого пятна, витальным окрашиванием зубов. Сочетанная методика реминерализирующей терапии оказалась наиболее эффективной.

**Ключевые слова:** реминерализирующая терапия в домашних условиях, витальное окрашивание зубов.

**Introduction.** Caries is one of the most common diseases that causes tooth loss in people [2; 5; 6; 7]. Currently, the number of patients with caries in the stage of a white spot is increasing. This is due to improved diagnostics of this disease in early stages and due to a better organized prophylaxis of dental diseases [1; 4; 8]. One of the means used for caries treatment is the remineralization therapy, based on the concept of permeability. Enamel is a semi-permeable membrane for phosphates, bicarbonates, chlorides, fluorides, cations of Ca, Mg, K, Na, F, Ag and other substances that determine tooth enamel composition [3]. Due to a growing dental product market, multiple remineralizing agents have become available for home use.

The study goal is to compare the efficiency of remineralizing agents for home use.

**Materials and methods.** The study involved 30 patients (13 men and 17 women aged 18 to 21) with an initial-stage caries of smooth dentured surfaces, without somatic pathology and with a

satisfactory state of oral hygiene (1.3 to 3.0). A control group was also formed. The number of teeth examined – 50 in each group.

The following techniques were used for the diagnostics and assessment of the therapeutic treatment:

1. Estimation of the Green-Vermillion index. This simplified index of oral hygiene (OHI-S) estimates the square of a tooth crown that is covered with a plaque and for a dental calculus; no special dyes are required for determination. To determine the OHI-S index, buccal surface 16 and 26, labial surface 11 and 31 and lingual surface 36 and 46 were examined by moving the tip of the probe from the cutting edge toward the gum. Absence of a plaque was indicated as 0, the plaque covering 1/3 of tooth surface, as 1, the plaque from 1/3 to 2/3, as 2, and of the plaque covered over 2/3 of enamel surface, as 3. The same principle was applied to a dental calculus. The index was estimated by the formula, where is the number of the teeth; DP-dental plaque, DC-dental calculus.

2. The number of CFE teeth before and after the therapy. The CFE index is a sum of carious, billed and extracted teeth in one individual.

3. Measurement of white spot square, using millimeter paper.

4. Vital staining of the teeth with 1% methylene blue solution with subsequent assessment of color intensity by L. A. Aksamit's technique. The examined teeth were stained with 1% aqueous methylene blue solution for 1 min. Before staining, the tooth surface was cleaned using a corner tip and a brush for professional hygiene. When the time was over, the dye was washed off. Diagnostics was made visually by comparing the obtained data with a 10-point scale of a blue color elaborated by L. A. Aksamit.

The remineralizing agents used for the therapy were Remars Gel and Elmex Gel (Elmex, Germany).

In the course of the study, two groups of patients were examined and treated. The first group was applied Remars Gel based on combinations of calcium nitrate and ammonium hydrophosphate and the second group used Elmex gel (Elmex, Germany) based on fluorine (a combination of amine fluoride and sodium fluoride, the total content of fluorides being 12500 ppm). All the patients used R.O.C.S. Uno Calcium toothpaste (Russia) for personal oral hygiene that contains active substances: calcium glycerophosphate, xylitol, magnesium chloride.

Prior to the therapy, all the patients underwent professional oral hygiene with the use of fluorine-free paste. They were instructed on a rational technique of tooth cleaning with Innova toothbrush with silver ions and R.O.C.S. Uno Calcium (Russia) toothpaste.

Group 1 used Remars Gel for a 4-week course, which was applied to the tooth surface with a tooth brush after cleaning the teeth before bedtime.

Group 2 used Elmex Gel 2 times per week. The gel was applied to the tooth surface for 2-3 minutes after cleaning the teeth before bedtime. The course lasted 4 weeks.

The outcome of the therapy was assessed 1.3 six months after the therapy.

**Results of the study.** In the course of the study of the Green-Vermillion index, all the patients were found to have a satisfactory state of hygiene (1.8-3.0), with mean value of the index 2,5. If at the beginning of treatment in the first group, the Green-Vermillion was 80.64%, then after 1 month of using Remars Gel in combination with R.O.C.S. Uno Calcium toothpaste, the cleaning efficiency was 60.18%. After 3 months, the Green-Vermillion was 45.79%, after 6 months – 39.40%. A similar process can be observed in the second group, which used Elmex Gel (Elmex, Germany) in combination with toothpaste R.O.C.S. Uno Calcium. Before treatment, Green-Vermillion was 79.19%. 1 month after treatment, IGV was 54.93%. After 3 months, 40.79%. After 6 months, 31, 65%. Thus, the hygiene index improved in the first group by 41.24%, that is, to 1.5 units, in the second by 47.54%, to 1.4 units.

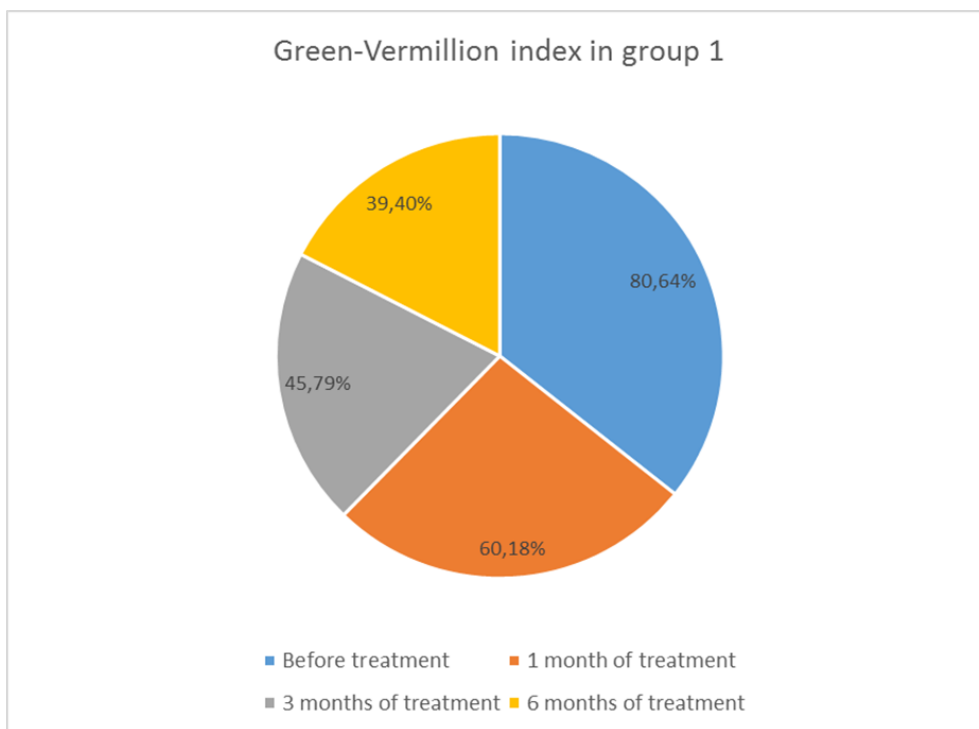


Fig. 1. Level of oral hygiene in group 1.

The study of the CFE index showed that the intensity level of dental caries in the groups was average, with prevalence of caries. Ninety percent of the patients under study had initial stages of caries at that stage.

Vital staining of the teeth before the therapy showed that 100 percent of the demineralization foci acquired a blue color of various intensity. The minimal index was 2 points (determined by

Aksamit's technique), maximal index was 8. The mean value was 5.7 points, that corresponds to an average, extent of activity of the demineralization process.

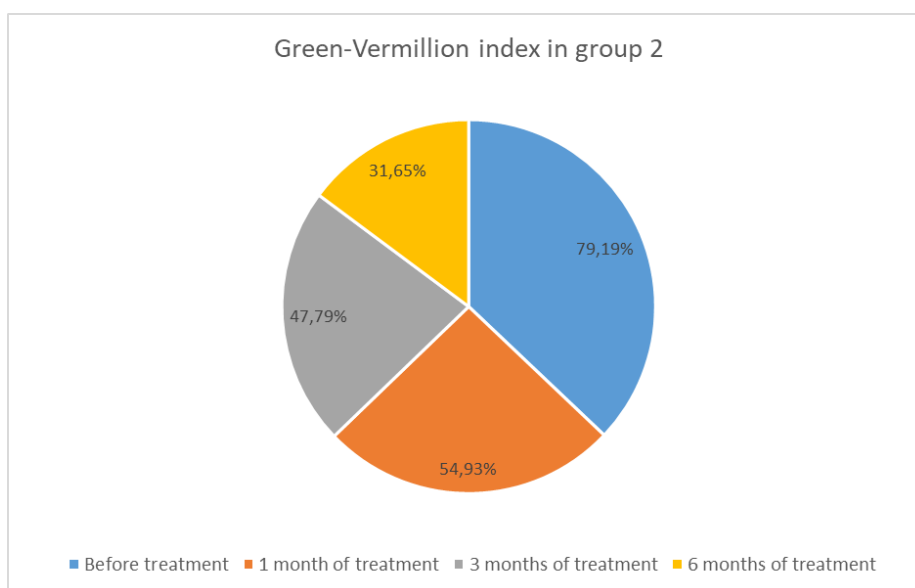


Fig. 2. Level of oral hygiene in group 2.

The measurement of the square of the demineralization focus showed that minimal square was 2 mm, maximal – 4 mm.

In group 1 some changes in the number of intensely dyed teeth were observed (4-5 points) and transition of intensity of staining within the range of 2-3 units by Aksamit's technique (Table 1). In group 2 the intensity of tooth staining changed within the range of 4 units, on average, by Aksamit's technique (Table 2).

Table 1

**Dynamics of colour intensity of teeth in group 1 during therapy (according to Aksamit's scale)**

Points by Aksamit's scale	Number of teeth			
	Before therapy	Right after therapy	3 months after therapy	6 months after therapy
0	0	2	1	1
1	2	4	5	5
2	4	11	11	11
3	6	8	7	7
4	8	10	10	10
5	15	10	9	9
6	2	0	0	0

Table 2

**Dynamics of colour intensity of teeth in group 2 during therapy (according to Aksamit's scale)**

Points by Aksamit's scale	Number of teeth			
	Before therapy	Right after therapy	3 months after therapy	6 months after therapy
0	0	10	9	9
1	1	17	18	18
2	6	12	12	12
3	10	9	9	9
4	15	2	2	2
5	18	0	0	0
6	0	0	0	0

The study of the changes in the white spot square showed more intense changes in Group 2 compared to Group 1, as shown in the charts.

Six months after the therapy, reduction of caries intensity was observed in Group 1 to 0.7 unit on average, compared to the control group, in group 2 to 0.8 unit on average. The index of oral hygiene improved to 1.5 unit in group 1 and to 1.4 in group 2.

This means that use of Elmex Gel has proved to be more efficient than the use of Remars Gel alone as agents for the remineralization therapy at home.

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