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Experimental and clinical substantiation of the combined use of resin infiltrate and flowable composite material in minimally invasive treatment of dental fluorosis

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ABSTRACT

BACKGROUND: To eliminate white spots in dental fluorosis, methods of remineralizing therapy, microabrasion, and infiltration are currently used, which have special features in this pathology because of the deep location of the hypomineralization zone.

AIM: To study the adhesive strength of a fluid composite filling material to the infiltrate ICON and tooth enamel in fluorosis and evaluate the results of the combined use of resin infiltration and composite material in the clinic.

MATERIALS AND METHODS: Adhesive tear strength tests of various materials were performed on 60 extracted teeth with fluorosis, such as lesions in the form of white spots. By random sampling, teeth with fluorosis were divided into four groups of 15 teeth each. To induce a defect that allowed for the study of adhesive strength using a sandblaster (Rondoflex, CAVO, Germany), an aluminum oxide powder with a particle size of 27 microns at a distance of 1 cm was treated in the center of the vestibular surface for 3 s.

RESULTS: The best indicators of adhesive tear strength were obtained using a universal adhesive system and a low-modulus composite material and combining an infiltrant and a low-modulus composite material containing a 10-methacryloyloxydecyl dihydrogen phosphate (MDP) monomer. The results of the experimental study indicated that the combination of an infiltrate and a low-modulus composite material based on MDP monomer can be a promising option in the minimally invasive treatment of dental fluorosis in the clinic. After the treatment following the previously described scheme, the examination after 1 month did not reveal disruption of the marginal fit and staining of the border and secondary caries; however, one case of sensitivity was noted. Upon examination after 1 year, no cases of violation of the marginal fit, development of caries along the boundaries of the treatment, and sensitivity were observed.

CONCLUSION: The results of the experimental clinical study indicated the high effectiveness of minimally invasive dental fluorosis treatment using a combination of infiltration and low-modulus composite material based on MDP monomer.

Keywords: dental fluorosis; white spots; infiltration; flowable composite material; MDP monomer.

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Экспериментально-клиническое обоснование сочетанного использования инфильтранта и низкомодульного композитного материала при минимально инвазивном лечении флюороза зубов

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АННОТАЦИЯ

Обоснование. Для устранения белых пятен при флюорозе зубов на сегодняшний день применяются методики реминерализирующей терапии, микроабразии и инфильтрации, которые не лишены некоторых особенностей проведения при данной патологии вследствие глубокого расположения зоны гипоминерализации.

Цель исследования — изучение адгезионной прочности инфильтранта и низкомодульного композитного материала при флюорозе зубов в эксперименте, а также оценка ближайших и отдалённых результатов проведённого лечения в клинике.

Материалы и методы. Изучение адгезионной прочности на отрыв при применении различных материалов проведено на 60 удалённых зубах с флюорозом (поражения в виде пятен белого цвета). Методом случайной выборки зубы с флюорозом были разделены на 4 группы по 15 зубов в каждой. Для формирования дефекта с целью изучения адгезионной прочности проводили обработку в центре вестибулярной поверхности порошком на основе оксида алюминия с размером частиц 27 мк на расстоянии 1 см в течение 3 с.

Результаты. Наилучшие показатели адгезионной прочности на отрыв получены при применении универсальной адгезивной системы и низкомодульного композитного материала, а также при сочетании применения инфильтранта и низкомодульного композитного материала, содержащего MDP-мономер. Полученные в экспериментальном исследовании результаты позволили рассмотреть сочетание инфильтранта и низкомодульного композитного материала на основе MDP-мономера, как перспективный вариант для применения в клинике при минимально инвазивном лечении флюороза зубов. После проведённого лечения по ранее описанной схеме при осмотре через 1 мес не было выявлено нарушения краевого прилегания, окрашивания границы и вторичного кариеса, отмечен 1 случай чувствительности. При осмотре через 1 год не наблюдали нарушения краевого прилегания и развития кариеса по границам проведённого лечения и не отмечено случаев развития чувствительности.

Заключение. Результаты проведённого экспериментального клинического исследования свидетельствуют о высокой эффективности минимально инвазивного лечения флюороза зубов с применением сочетания инфильтрации и низкомодульного композитного материала на основе MDP-мономера.

Ключевые слова: флюороз зубов; белые пятна; инфильтрация; низкомодульный композитный материал; MDP-мономер.

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BACKGROUND

Levels of local hygiene have a significant effect on public health [1–3] as well as on the organization and quality of medical care [4–6]. Long-term consumption of water or food with elevated fluoride content results in dental fluorosis, a non-carious lesion that develops prior to tooth eruption. Dental fluorosis is an endemic condition that is frequently observed in association with odontogenic complications and remains an important area of research in dentistry [7–9].

The International Classification of Diseases (ICD-10) code for dental fluorosis is K00.30 (K00.3 Mottled teeth). Dental fluorosis causes enamel discoloration, with white, yellow, or dark brown spots and streaks, and opaque enamel. Moreover, it results in enamel defects, tooth attrition, and crown destruction. The severity of changes directly correlates with fluoride levels in water.

Impaired enamel mineralization in dental fluorosis necessitates remineralizing therapy. Current remineralizing therapy options include splints with remineralizing gels such as R.O.C.S. medical minerals, Biorepair, Tooth Mousse, and President Profi Rem Minerals. However, this approach does not always provide immediate esthetic improvement and requires rigorous compliance. Moreover, remineralization is limited to the surface layer, leaving the body of the lesion porous, resulting in persistent white spots [10].

To eliminate discoloration limited to the surface enamel, a microabrasion technique was proposed. This involves applying hydrochloric acid and silicon carbide microparticles (Opalustre gel, Ultradent, USA) to the affected surface to remove up to 20 μm of damaged surface enamel [11]. The number of gel applications depends on the degree of enamel discoloration [12]. Celik et al. (2013) recommend five applications for mild enamel discoloration and up to ten for moderate to severe discoloration [13]. Akulovich recommends up to five applications of Opalustre gel per microabrasion session. A course of microabrasion must be followed by a one-month course of remineralizing therapy with customized splints [14].

In dental fluorosis, a layer of well-mineralized enamel covers the underlying hypomineralized enamel. This enables ICON infiltration (DMG), which involves removing the surface enamel with 15% hydrochloric acid and filling the hypomineralized lesion with a resin with low viscosity and high absorption capacity. The porous demineralized enamel is filled with polymer resin as a result of infiltrant absorption and polymerization, which alters light refraction and provides a favorable esthetic outcome.

A deep hypomineralization zone in dental fluorosis makes infiltration difficult [15]. Therefore, the tooth surface must be repeatedly treated with hydrochloric acid until the spot color changes visibly, to provide good access to the hypomineralized lesion with subsequent deep infiltration [16]. Moreover, Gugnani et al. (2014) recommend increasing the time of enamel exposure to hydrochloric acid in dental fluorosis [17].

In the treatment of deep white spots, some authors recommend a combination of microabrasion and subsequent infiltration [18].

Esthetic outcomes of infiltration in dental fluorosis with white spots depend on the spot depth. It can be assessed in advance during infiltration using the so-called ethanol test, where ethanol (Icon-Dry) is applied to the surface enamel after hydrochloric acid (Icon-Etch) treatment. If the spot is not visible, Icon Caries Infiltrant is applied twice, for 1 and 3 minutes, respectively. Each layer is then polymerized, and the surface is polished. If the spot is visible, the surface is treated with an aluminum oxide powder, followed by the standard infiltration algorithm. After the second Icon Caries Infiltrant layer is polymerized, the surface is covered with a composite filling material [19]. Therefore, it is of interest to examine the adhesive strength of low-modulus composite materials to the infiltrate and enamel surface in clinical practice.

This work aimed to examine the tensile bond strength of an infiltrate and a low-modulus composite material in dental fluorosis in an experiment, as well as to assess short- and long-term treatment outcomes.

METHODS

Tensile bond strength tests of various materials were performed on 60 extracted teeth with fluorosis and white spots. Teeth with fluorosis were randomized into four groups, 15 teeth each. A RONDOflex sandblaster (CAVO, Germany) was used to induce a defect for adhesive strength testing. The center of the vestibular surface was treated with a 27 μm aluminum oxide powder at a distance of 1 cm for 3 seconds.

In Group 1, the surface was then treated with phosphoric acid (Travex gel, Omega Dent, Russia), and a 5th generation adhesive system OptiBond Solo Plus (Kerr, Italy) was applied. After polymerization for 20 seconds, a 4 × 3 × 3 mm block of the Estelite Flow Quick low-modulus composite material (Tokuyama Dental, Japan) was applied, followed by another 20-second polymerization. After fabricating the first block, its impression was taken using Speedex putty silicone-based material and cut lengthwise to ensure that the subsequent samples were the same shape.

In Group 2, the surface was treated with phosphoric acid (Travex gel, Omega Dent, Russia), and an adhesive system All Bond Universal (Bisco, USA) was applied. After polymerization for 20 seconds, a 4 × 3 × 3 mm block of the Estelite Flow Quick low-modulus composite material (Tokuyama Dental, Japan) was applied, followed by another 20-second polymerization.

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In Group 3, the enamel surface was treated with Icon-Etch (DMG, Germany) three times for 3 minutes each, using a special Icon Vestibular tip (DMG, Germany). The surface was washed with water and dried after each treatment. Then, Icon-Dry and Icon Caries Infiltrant were applied for 30 seconds and 3 minutes, respectively. The excessive material was removed, and a 40-second polymerization was performed. Icon Caries Infiltrant was then applied again for 1 minute. The excessive material was removed, and a 40-second polymerization was performed. Following that, a 4 × 3 × 3 mm block of the Estelite Flow Quick low-modulus composite material (Tokuyama Dental, Japan) was applied to the surface without prior polishing and polymerized for 20 seconds.

In Group 4, the enamel surface was treated with Icon-Etch (DMG, Germany) three times for 3 minutes each, using a special Icon Vestibular tip (DMG, Germany). The surface was washed with water and dried after each treatment. Then, Icon-Dry and Icon Caries Infiltrant were applied for 30 seconds and 3 minutes, respectively. The excessive material was removed, and a 40-second polymerization was performed. Icon Caries Infiltrant was then applied again for 1 minute. The excessive material was removed, and a 40-second polymerization was performed. Following that, a 4 × 3 × 3 mm block of the Constic low-modulus composite material containing the MDP monomer (DMG, Germany) was applied to the surface without polishing and polymerized for 20 seconds. Constic contains the adhesive MDP monomer; its phosphate functional group ensures tooth tissue etching and chemical bonding to calcium ions in dentin and enamel. The methacrylate group ensures chemical bonding to cements and methacrylate-based materials or cross-linking with other functional and structural monomers.

After fixing composite material blocks, their length, width, and height were measured. The samples were then immersed in distilled water and heated at 37 C for 24 hours. Following sample preparation, shear bond strength tests were performed.

Tensile bond strength was measured using an Instron universal testing machine (USA), which measures the pull-out force (F) applied to a sample, expressed in Newtons (N). Data were processed using the Instron Bluehill 3 software (Instron, USA). Tensile bond strength (Σ) was calculated according to the formula:

$$\Sigma = \frac{3\,Fl}{bh^2},$$

where F is the pull-out force (N) applied to a composite material block; l is the block length, m^2; b is the block width, m^2; and h is the block height, m^2. Tensile bond strength (Σ) was expressed in N/m^2 or MPa.

During the clinical phase of the study, the outcomes of minimally invasive dental fluorosis treatment were assessed in 30 patients with white spots who underwent infiltration. The ethanol test was negative. The treatment included the following stages:

1) Dental prophylaxis;
3) Isolating the intervention site using a latex sheet or liquid cofferdam;
4) Treating the enamel surface with Icon-Etch (DMG, Germany) three times for 3 minutes each using a special Icon Vestibular tip (DMG, Germany), with mechanical activation using the same tip;
5) Washing the gel off with water for 30 seconds and drying the enamel surface with a air-water syringe;

Applying Icon-Dry to the enamel surface for 30 seconds until complete passive drying, followed by gentle airflow drying.

If the ethanol test was negative (i.e., the spot was visible after applying Icon-Dry), the next treatment stages were as follows:

1) Treating spots with a 27 μm aluminum oxide powder at a distance of 1 cm for 3 seconds, using a RONDOflex sandblaster (CAVO, Germany);
2) Treating the enamel surface with Icon-Etch (DMG, Germany) for 3 minutes each using a special Icon Vestibular tip (DMG, Germany), with mechanical activation using the same tip;
3) Applying Icon-Dry to the enamel surface for 30 seconds until complete passive drying, followed by gentle airflow drying;
4) Applying Icon Caries Infiltrant for 3 minutes using the Icon Vestibular tip, then rubbing it in for 3 minutes using the same tip;
5) Removing excessive material with gentle air flow and separating tooth contact surfaces using a floss, followed by LED polymerization for 40 seconds;
6) Applying Icon Caries Infiltrant again and rubbing it in for 1 minute using a new Icon Vestibular tip; removing excessive material and polymerizing for 40 seconds;
7) Applying the Constic low-modulus composite material containing the MDP monomer (DMG, Germany) to restore lost tooth structure and polymerizing for 20 seconds;
8) Polishing the material surface.

The clinical assessment of dental fluorosis treatment outcomes was performed according to Cvar et al. (2005) [20], as modified by Lawson and Robles (2015). The following criteria were used: marginal adaptation, marginal discoloration, secondary caries, and postoperative sensitivity. Follow-up examinations were performed 1 month and 1 year after treatment.

RESULTS

Table 1 summarizes tensile bond strength values in the study groups.

The Kruskal–Wallis test was used to compare adhesive strength between groups, with a significance level of

$p < 0.05$. The test yielded a value of 39.6 ($p < 0.0001$), indicating significant intergroup differences. To identify the groups with significant differences, a pairwise comparison of all groups was performed using the Mann–Whitney *U* test, with the *p*-value recalculated to adjust for multiplicity (p = 0.05/6 = 0,0083).

The results of intergroup comparisons and corresponding *p*-values for each pairwise comparison are summarized in Table 2.

DISCUSSION

The highest tensile bond strength was observed with a universal adhesive system and a low-modulus composite material, as well as with a combination of infiltrant and low-modulus composite material containing the MDP monomer. The experimental findings indicate that this combination can be a promising option for minimally invasive dental fluorosis treatment. A follow-up examination one month after treatment according to the algorithm described above revealed no marginal adaptation defects, marginal discoloration, or secondary caries, with only one case of postoperative sensitivity. A follow-up examination one year after treatment revealed no cases of marginal adaptation defects, secondary caries, or postoperative sensitivity.

CONCLUSION

This experimental clinical study demonstrated the high efficacy of minimally invasive dental fluorosis treatment using a combination of infiltration and a low-modulus composite material containing the MDP monomer.

ADDITIONAL INFORMATION

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Competing interests. The authors declare that they have no competing interests.

Authors' contribution. N.V. Tiunova — conducting research, writing an article, analyzing data; S.S. Naberezhnova — literature review, writing the text of the article; F.Yu. Daurova — statistical data processing, writing the text; D.I. Tomaeva — development of a general concept, design of the article.

Table 1. Tensile bond strength values in the study groups

Value in the group δ, MPa	Minimum	Maximum	Median	Q1	Q3	Mean	Standard deviation
Group 1	17	24	19.13	17.41	20.26	19.11	1.84
Group 2	16	24	20.12	18.88	21.47	20.12	2.08
Group 3	16	25	19.15	17.29	21.69	19.56	2.62
Group 4	13	27	21.43	17.96	23.24	20.84	3.69

Table 2. Intergroup comparisons of adhesive strength

Pair	Mann–Whitney *U* test	P-value To compare with *p*'=0.0018)
Groups 1–2	9	<0.0001
Groups 1–3	77	0.141
Groups 1–4	2	<0.0001
Groups 2–3	14	<0.0001
Groups 2–4	96.5	0.507
Groups 3–4	4	<0.0001

REFERENCES

1. Apolihin OI, sevryukov FA, Sorokin DA, et al. State and prognosis of morbidity in the adult of Nizhny Novgorod region. *Experimental and clinical urology.* 2012;(4):4–7.

2. Sevryukov FA, Malinina OY, Elina YuA. Peculiar features of morbidity of the population with disordes of the genitourinary sistem and diseases of the prostate gland, in particular, in the russian federation, in the privolzhsky (volga) federal district, and in the nizhni novgorod region. *Social aspects of public health.* 2011;(6(22)):1–8. EDN: OPGNQF

3. Kadyrov ZA, Faniev MV, Prokopyev YaV, et al. Reproductive health of the Russian population as a key factor of demographic dynamics. *Bulletin of modern clinical medicine.* 2022;15(5):100–106. doi: 10.20969/VSKM.2022.15(5).100-106

4. Sevryukov FA, Malinina OY. New organizational technologies for providing medical care to patients. *Social aspects of public health.* 2012;1(23):5. EDN: OVYASH

5. Startsev VYu, Dudarev VA, Sevryukov FA, Zabrodina NB. Economic aspects of treating patients. *Urology.* 2019;(6):115–119. doi: 10.18565/urology.2019.6.115-119

6. Sevryukov FA, Kamaev IA, Grib MN, et al. Risk factors and quality of life of patients. *I.P. Pavlov Russian Medical Biological Herald.* 2011;19(3):48–52. EDN: OYKKID

7. Dvoryanchikov VV, Grebnev GA, Balin VV, Shafigullin AV. Complex treatment of odontogenic maxillary sinusitis. *Clinical dentistry.* 2019;(2(90)):65–67. doi: 10.37988/1811-153X_2019_2_65

8. Dvoryanchikov VV, Grebnev GA, Isachenko VS, Shafigullin AV. Odontogenic maxillary sinusitis: the current state of the problem. *Bulletin of the Russian Military Medical Academy.* 2018.(4(64)):169–173. EDN: YOIRQL

9. Soldatov IK, Juravleva LN, Tegza NV, et al. Scientometric analysis of dissertation papers on pediatric dentistry in Russia. *Russian Journal of Dentistry.* 2023;27(6):571–580. doi: 10.17816/dent624942

10. Zawaideh F. Resin infiltration technique: A new era in caries management. *Smile Dent J.* 2014;9(1):22–27. doi: 10.12816/0008318

11. Croll TP. Fluorosis. *J Am Dent Assoc.* 2009;140(3):278–279. doi: 10.14219/jada.archive.2009.0146

12. Nahsan FP, da Silva LM, Baseggio W, et al. Conservative approach for a clinical resolution of enamel white spot lesions. *Quintessence Int.* 2011;42(5):423–426.

13. Celik EU, Yildiz G, Yazkan B. clinical evaluation of enamel microabrasion for the aesthetic management of mild-to-severe dental fluorosis. *J Esthet Restor Dent.* 2013;25(6):422–430. doi: 10.1111/jerd.12052

14. Akulovich AV, Yalyshev RK. Possibilities of enamel microabrasion in combination with remineralizing therapy in the treatment of fluorosis. *Aesthetic Dentistry.* 2015;3–4:56–59. (In Russ.) EDN: WKGJTX

15. Shahroom NSB, Mani G, Ramakrishnan M. Interventions in management of dental fluorosis, an endemic disease: A systematic review. *J Family Med Prim Care.* 2019;8(10):3108–3113. doi: 10.4103/jfmpc.jfmpc_648_19

16. Gugnani N, Pandit IK, Gupta M, Josan R. Caries infiltration of noncavitated white spot lesions: A novel approach for immediate esthetic improvement. *Contemp Clin Dent.* 2012;3(Suppl 2):S199–202. doi: 10.4103/0976-237X.101092

17. Bharath KP, Subba Reddy VV, Poornima P, et al. Comparison of relative efficacy of two techniques of enamel stain removal on fluorosed teeth. An in vivo study. *J Clin Pediatr Dent.* 2014;38(3):207–213. doi: 10.17796/jcpd.38.3.0h120nkl8852p568

18. Giannetti L, Murri Dello Diago A, Silingardi G, Spinas E. "Superficial infiltration to treat white hypomineralized defects of enamel: clinical trial with 12-month follow-up. *J Biol Regul Homeost Agents.* 2018;32(5):1335–1338.

19. Attal JP, Atlan A, Denis M, Vennat E, Tirlet G. White spots on enamel: treatment protocol by superficial or deep infiltration (part 2). Int Orthod. 2014;12(1):1–31. *English, French.* doi: 10.1016/j.ortho.2013.12.011

20. Cvar JF, Ryge G. Reprint of criteria for the clinical evaluation of dental restorative materials. 1971. *Clin Oral Investig.* 2005;9(4):215–232. doi: 10.1007/s00784-005-0018-z

СПИСОК ЛИТЕРАТУРЫ

1. Аполихин О.И., Севрюков Ф.А., Сорокин Д.А., и др. Состояние и прогнозы заболеваемости взрослого населения Нижегородской области // Экспериментальная и клиническая урология. 2012. № 4. С. 4–7.

2. Севрюков Ф.А., Малинина О.Ю., Елина Ю.А. Особенности заболеваемости населения Нижегородской области, Приволжского федерального округа и Российской Федерации болезнями мочеполовой системы и предстательной железы // Социальные аспекты здоровья населения. 2011. № 6(22). С. 1–8. EDN: OPGNQF

3. Кадыров З.А., Фаниев М.В., Прокопьев Я.В. Репродуктивное здоровье населения России как ключевой фактор демографической динамики // Вестник современной клинической медицины. 2022. Т. 15, № 5. С. 100–106. doi: 10.20969/VSKM.2022.15(5).100-106

4. Севрюков Ф.А., Малинина О.Ю. Новые организационные технологии оказания медицинской помощи больным // Социальные аспекты здоровья населения. 2012. № 1(23). С. 5. EDN: OVYASH

5. Старцев В.Ю., Дударев В.А., Севрюков Ф.А., Забродина Н.Б. Экономические аспекты лечения больных // Урология. 2019. № 6. С. 115–119. doi: 10.18565/urology.2019.6.115-119

6. Севрюков Ф.А., Камаев И.А., Гриб М.Н., и др. Факторы риска и качество жизни больных // Российский медико-биологический вестник имени академика И.П. Павлова. 2011. Т. 19, № 3. С. 48–52. EDN: OYKKID

7. Дворянчиков В.В., Гребнев Г.А., Балин В.В., Шафигуллин А.В. Комплексное лечение одонтогенного верхнечелюстного синусита // Клиническая стоматология. 2019. № 2(90). С. 65–67. doi: 10.37988/1811-153X_2019_2_65

8. Дворянчиков В.В., Гребнев Г.А., Исаченко В.С., Шафигуллин А.В. Одонтогенный верхнечелюстной синусит: современное состояние проблемы // Вестник Российской Военно-медицинской академии. 2018. № 4(64). С. 169–173. EDN: YOIRQL

9. Солдатов И.К., Журавлёва Л.Н., Тегза Н.В., и др. Наукометрический анализ диссертационных работ по детской стоматологии в Российской Федерации // Российский стоматологический журнал. 2023. Т. 27, № 6. С. 571–580. doi: 10.17816/dent624942

10. Zawaideh F. Resin infiltration technique: A new era in caries management // Smile Dent J. 2014. Vol. 9, N. 1. P. 22–27. doi: 10.12816/0008318

11. Croll T.P. Fluorosis // J Am Dent Assoc. 2009. Vol. 140, N. 3. P. 278–279. doi: 10.14219/jada.archive.2009.0146

12. Nahsan F.P., da Silva L.M., Baseggio W., et al. Conservative approach for a clinical resolution of enamel white spot lesions // Quintessence Int. 2011. Vol. 42, N. 5. P. 423–426.

13. Celik E.U., Yildiz G., Yazkan B. Clinical evaluation of enamel microabrasion for the aesthetic management of mild-to-severe dental fluorosis // J Esthet Restor Dent. 2013. Vol. 25, N 6. P. 422–430. doi: 10.1111/jerd.12052.

14. Акулович А.В., Ялышев Р.К. Возможности микроабразии эмали в сочетании с реминерализующей терапией при лечении флюороза // Эстетическая стоматология. 2015. Т. 3–4. С. 56–59. EDN: WKGJTX

15. Shahroom N.S.B., Mani G., Ramakrishnan M. Interventions in management of dental fluorosis, an endemic disease: A systematic review // J Family Med Prim Care. 2019. Vol. 8, N. 10. P. 3108–3113. doi: 10.17796/jcpd.38.3.0h120nkl8852p568

16. Gugnani N., Pandit I.K., Gupta M., Josan R. Caries infiltration of noncavitated white spot lesions: A novel approach for immediate esthetic improvement // Contemp Clin Dent. 2012. Vol. 3, Suppl. 2. P. 199–202. doi: 10.4103/0976-237X.101092

17. Bharath K., Subba Reddy V., Poornima P., et al. Comparison of relative efficacy of two techniques of enamel stain removal on fluorosed teeth. An in vivo study // J Clin Pediatr Dent. 2014. Vol. 38, N. 3. P. 207–213. doi: 10.17796/jcpd.38.3.0h120nkl8852p568

18. Giannetti L., Murri Dello Diago A., Silingardi G., et al. Superficial infiltration to treat white hypomineralized defects of enamel: clinical trial with 12-month follow-up . J Biol Regul Homeost Agents. 2018. Vol. 32, N. 5. P. 1335–1338.

19. Attal J.P., Atlan A., Denis M., et al. White spots on enamel: Treatment protocol by superficial or deep infiltration (part 2) // Int Orthodontics. 2014. Vol. 12, N. 1. P. 1–31. doi: 10.1016/j.ortho.2013.12.011

20. Cvar J.F., Ryge G. Reprint of criteria for the clinical evaluation of dental restorative materials. 1971 // Clin Oral Investig. 2005. Vol. 9, N. 4. P. 215–232. doi: 10.1007/s00784-005-0018-z

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