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PRIMENA MEDICINSKIH PREPARATA U PRETPROTETSKE I PROTETSKE SVRHE

THE USE OF MEDICINAL PREPARATIONS FOR PREPROSTHETIC AND PROSTHETIC PURPOSES

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Sažetak

Uvod. Parodontopatija počinje inflamacijom gingive, nastavlja se oboljevanjem parodonticijuma i gubitkom zuba. Ovo vodi neophodnom proteziranju pacijenata u cilju uspostavljanja funkcionalnog i anatomskog integriteta stomatognatog sistema. Pre početka protetske rahabilitacije, promene na oralnoj sluzokoži moraju biti sanirane, a oralna higijena na zavidnom nivou. Lcalut aktiv pasta i rastvor koriste se kod pacijenata sa parodontopatijom jer ispoljavaju svoje antikarijesno, antiseptičko, antiinflamatorno i umirujuće dejstvo. **Cilj** istraživanja bio je ispitati efikasnost Lcalut paste i Lcalut rastvora u terapiji parodontalnih oboljenja u okviru preprotetske pripreme pacijenta. **Materijal i metode.** Ispitivanje je sprovedeno kod 120 pacijenata koji su se javili lekaru na Odeljenju za stomatološku protetiku Klinike za stomatologiju u Nišu radi izrade protetskih nadoknada. Urađena je procena stanja parodonticijuma uz pomoć gingivalnog indeksa Loe-Silness (Gi), plak indeksa (Pl), indeksa zubnog kamenca (Izk), indeksa zubnih kongremenata (Ikon) i nivoa pripojnog epitela (NPE), a zatim primenjena bazična parodontalna terapija. Ispitanici su podeljeni u četiri grupe od 30 ispitanika; pored redovnog održavanja oralne higijene četkicom za zube, ispitanici grupe I koristili su Lcalut pastu, ispitanici grupe II komercijalnu pastu i Lcalut rastvor, grupe III Lcalut pastu i Lcalut rastvor, a ispitanici IV grupe komercijalnu. Nakon nedelju dana, određeni su Gi, Pl, Izk, Ikon, a nakon mesec dana Gi, Pl, Izk, Ikon i NPE. Za statističku obradu rezultata korišćen je softverski program SPSS Statistics **Rezultati.** Vrednosti indeksa su značajno manje kod svih ispitivanih grupa nakon terapije sa najistaknutijim smanjenjem u III grupi koja je koristila Lcalut pastu i rastvor. **Zaključak.** Lcalut pasta i rastvor pokazali su se efikasnim u eliminaciji inflamacije gingive i preporučuju se kao pomoćno sredstvo u terapiji parodontopatije i preprotetskoj pripremi pacije-nata.parodo-ntološkom i protetskom terapijom većine osoba. Neophodno je poboljšati stomatološku zdravstvenu zaštitu pacijenata u staračkim domovima.

Cljučne reči: parodontopatija, Lcalut pasta, Lcalut rastvor

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Abstract

Introduction: Periodontal disease starts as gingival inflammation which progresses to degradation of periodontal tissues and loss of teeth. This condition requires the placement of dental prosthesis in order to establish the functional and anatomical integrity of the stomatognathic system. Before the beginning of prosthetic rehabilitation, changes of the oral mucosa must be eliminated, and oral hygiene must be maintained at high level. Lcalut active paste solution is used in patients with periodontal disease manifesting because of its anticariogenic, antiseptic, antiinflammatory and palliative effect. **The aim** of the study was to examine Lcalut paste and Lcalut solution efficacy in the treatment of periodontal disease within preprosthetic preparation of the patient. **Materials and Methods:** The study was conducted on a sample of 120 patients who visited the Department of Prosthodontics Dental Clinic Niš for the prosthetic rehabilitation. The evaluation of periodontal tissues was performed using Gingival Index Loe-Silness (GI), Plaque Index (PI), Tartar Index (TI), Subgingival Dental Calculus Index (SCI) and the Attachment Level Index (AL); the patients then underwent the basic periodontal therapy. The examinees were divided into four groups of 30 subjects who all maintained regular oral hygiene with their toothbrush; group I used the Lcalut paste, group II commercial paste and Lcalut solution, group III used the Lcalut toothpaste and Lcalut solution, and IV group used a commercial paste. After a week, GI, Pl, Izk and Ikon were determined, and a month after GI, Pl, TI and AL. For statistical analysis of the results, a software program SPSS Statistics 21 was used. **Results:** The investigated indexes were significantly lower among all groups after treatment with the most notable reduction in the group III which used the Lcalut toothpaste solution. **Conclusion:** Lcalut paste and solution proved to be effective in the elimination of gingival inflammation and are recommended as an adjunct in the periodontal and preprosthetic therapy.

Key words: periodontitis, Lcalut paste, Lcalut solution

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Uvod

Parodontopatija predstavlja inflamatorno oboljenje potpornog aparata zuba izazvano dejstvom specifičnih bakterija oralnog biofilma¹. Patološki proces počinje inflamacijom gingive, nastavlja se postepenim oboljevanjem parodonticijuma i njegovom anatomskom i funkcionalnom dezintegracijom sa postepenim rasklaćenjem, a kasnije i gubitkom zuba.¹⁻³ Sve ovo vodi neophodnom proteziranju pacijenata u cilju uspostavljanja funkcionalnog i anatomskog integriteta stomatognatnog sistema. Pacijenti kod kojih je neophodna stomatološka protetska rehabilitacija moraju biti parodontološki pripremljeni, a parodonticijum zdrav, kako bi se postigla uspešna funkcija i sprečilo dalje propadanje parodontalnog tkiva. Pre početka protetske rehabilitacije, sve promene na oralnoj sluzokoži moraju biti sanirane, a oralna higijena na zavidnom nivou.^{2,3} Od velikog praktičnog značaja za utvrđivanje prognoze i plana protetske terapije, jeste utvrditi stepen aktivnosti parodontopatije i veličinu destrukcije potpornog aparata zuba. Smatra se da intenzitet inflamacije gingive predstavlja dobar pokazatelj aktivnosti oboljenja, a precizno određivanje gubitka nivoa pripojnog epitela definiše stepen destrukcije parodontalnog tkiva.^{4,5} Istraživači preporučuju upotrebu kliničkih parametara (kao što su gingivalni indeks (GI), koji određuje stepen inflamacije gingive; plak indeks (PI), indeks zubnog kamenca (Izk) i indeks zubnih konkremenata (Ikon), koji su pokazatelji nivoa oralne higijene; nivo pripojnog epitela (NPE), koji je pokazatelj stepena destrukcije parodontalnog tkiva), kako bi se postavila adekvatna dijagnoza, prognoza i plan terapije parodontopatije i adekvatno pratili postignuti rezultati i uspešnost primenjene terapije.⁶⁻¹⁰ Lacalut aktiv pasta i Lacalut aktiv rastvor često su korišćeni kod pacijenata sa parodontopatijom. Pasta daje subjektivni osećaj očvršćenja gingive, smanjuje inflamaciju gingive i krvarenje, a značajna je i u prevenciji karijesa zuba. Sadrži aluminijum laktat i aluminijum fluorid (1360 ppm fluorida), hlorheksidin i alantoin bisabolol. Aluminijum laktat utiče na zaustavljanje krvarenja, aluminijum fluorid

Introduction

Periodontitis is an inflammatory disease of periodontal tissues caused by the specific bacterial oral biofilm¹. The pathological process begins with gingival inflammation, continuing in gradual degradation of the periodontal tissues which leads to its anatomical and functional disintegration with movement and loss of teeth.¹⁻³ All this leads to a necessary prosthetic rehabilitation in order to establish the functional and anatomical integrity of the stomatognathic system. Patients who need a dental prosthetic rehabilitation should receive periodontal therapy first; periodontal tissues should be healthy in order for the periodontal tissue to be functional and preserved. Before the start of prosthetic rehabilitation all of the oral mucosa alterations must be repaired, and oral hygiene maintained at a high level.^{2,3} The determination of periodontal disease activity degree and the size of the periodontal tissue destruction are of great practical importance in determining the prognosis and plan of prosthetic treatment. It is believed that the intensity of gingival inflammation is a good indicator of disease activity, and precise determination of the gingival attachment loss measures the size of periodontal tissue destruction.^{4,5} The conducted research recommend the use of clinical parameters such as Gingival Index (GI) which determines the degree of gingival inflammation; Plaque Index (PI), Tartar Index (TI) and the Subgingival Dental Calculus Index (SCI) which are indicators of the oral hygiene; Attachment level index (AI) which is an indicator of the periodontal tissue destruction in order to set up adequate diagnosis, prognosis and treatment plan for periodontitis and adequately track the achieved results and the success of the applied therapy.⁶⁻¹⁰ Lacalut active paste and Lacalut active solution are often used in patients with periodontal disease. Paste produces a feeling of gingival solidification, reduces gingival inflammation and bleeding, and is important in the prevention of dental caries. It includes aluminum lactate and aluminum fluoride (1360 ppm fluoride), chlorhexidine and allantoin bisabolol.

deluje antikarijesno, hlorheksidin diguklonat antiseptički, a bisabolol i allantoin antiinflamatorno i umirujuće. Lacalut aktiv rastvor sprečava stvaranje oralnog biofilma i zubnog kamenca, smanjuje gingivalnu inflamaciju i incidenciju karijesa, što ga čini indikovanim i kod osoba sa zubnim protezama. Hlorheksidin je antimikrobni katjonski bisbiguanid, koji u svojoj aktivnoj formi poseduje jedinstvenu osobinu adsorbovanja na oralna tkiva. Vezuje se za hidroksiapatit, površine zuba, oralnu sluzokožu i salivarne mucine za duži period vremena, a oslobađa se kada njegova koncentracija u usnoj duplji opadne. Njegova adsorpcija i lagano otpuštanje omogućavaju antimikrobni efekat i sprečavanje rekolonizacije bakterija u toku 24 časa.^{11,12} Proučavanjem hlorheksidina utvrđeno je da deluje na gram pozitivne i negativne bakterije, gljivice, fakultativne aerobne i anaerobne mikroorganizme.¹³ Fluoridi (anioni) se koriste u prevenciji karijesa i jačanju strukture zuba.^{14,15} Tokom razvoja zuba i po nicanju, bitno je prisustvo fluora, kako bi se formirao fluoroapatit koji je otporniji na dejstvo kiselina (demineralizaciju) od hidroksiapatita. Pošto je u jonskoj formi, toksičan je za *Streptococcus mutans* u visokim koncentracijama, dok u niskim koncentracijama ispoljava antienzimski efekat. Inhibicijom enzima smanjuje sposobnost *Streptococcus mutans*a za produkciju kiselina i metabolizam glukoze. Allantoin je veoma aktivna supstanca koja stimuliše ćelijski rast, ubrzava epitelizaciju sluzokože, snažno keratolitički i adstringentno deluje, smanjuje bol i otok. Bisabolol, aktivni sastojak kamilice, sprečava zapaljenske procese, umiruje iritiranu i upaljenu sluzokožu i ispoljava snažno antiinfekcijsko dejstvo. Aluminium laktat deluje hemostatski i adstringentno.

Cilj istraživanja

Cilj istraživanja bio je ispitati efikasnost Lacalut paste i Lacalut rastvora u terapiji parodontalnih oboljenja u okviru preprotetske pripreme pacijenta.

Aluminium lactate blocks bleeding, aluminum fluoride has anticariogenic property, chlorhexidine digluconate has antiseptic property, bisabolol and allantoin have anti-inflammatory and soothing properties. Lacalut active solution prevents the oral biofilm and dental calculus formation, reduces gingival inflammation and caries incidence, which makes it indicated in people with dentures. Chlorhexidine is a cationic antimicrobial bisbiguanid, which in its active form can be adsorbed on the oral tissues. It binds to hydroxyapatite, tooth surface, oral mucosa and salivary mucins for a long period of time, and is released when its concentration in the oral cavity decreases. Its adsorption and slow release enable antimicrobial effect and prevent bacterial recolonization within 24 hours.^{11,12} The investigations showed chlorhexidine to be effective against gram-positive and negative bacteria, fungi, facultative aerobic and anaerobic microorganisms¹³. Fluoride (anions) are used in the prevention of tooth decay and tooth structure strengthening.^{14,15} During the development of the teeth and after its eruption, the presence of fluorine is essential to form the fluoroapatite that is more resistant to acid (demineralization) from the hydroxyapatite. In high concentrations, the ionic form is toxic to *Streptococcus mutans*, and at low concentrations it exhibits antienzymatic effect. Inhibition of the enzymes decreases the ability of *S. mutans* to produce acid and perform glucose metabolism. Allantoin is a very active substance that stimulates cell growth, accelerates epithelization of mucous membranes, has a strong keratolytic and astringent effect, and reduces pain and swelling. Bisabolol, the active ingredient of chamomile, prevents inflammation, soothes irritated and inflamed mucous membranes and exerts strong anti-infective effect. Aluminium lactate exhibits hemostatic and astringent properties^{14,15}.

Aims

The aim of the study was to examine the efficacy of Lacalut paste and Lacalut solution in the treatment of periodontal disease within preprosthetic preparation of the patient.

Materijali i metode

Ispitivanje je sprovedeno kod pacijenata koji su se javili lekaru na Odeljenju za stomatološku protetiku Klinike za stomatologiju u Nišu radi izrade protetskih nadoknada. Osnovni kriterijumi za izbor ispitanika utvrđeni su pre pristupa ispitivanju, zatim su prikupljeni potrebni anamnestički podaci i urađen je stomatološki pregled. Izabrani ispitanici su imali parodontopatiju. U ispitivanje nisu uključene osobe mlađe od 18 godina, trudnice, bolesnici sa krvnim oboljenjima, akutnim i hroničnim infekcijama, autoimunim oboljenjima, bolesnici na imunosupresivnoj terapiji i osobe koje su na antibiotskoj ili kortikosteroidnoj terapiji u poslednja tri meseca.

Istraživanje je u skladu sa etičkim standardima Etičkog odbora Klinike za stomatologiju Niš, tj. sa Deklaracijom iz Helsinkija (1964, amandmani iz 1975. i 1983.) Svetske medicinske asocijacije.

Od 120 ispitanika, 60 su bila muškog, a 60 ženskog pola, starosti od 18 do 65 godina. Ispitanici su bili podeljeni u četiri grupe od po 30 ispitanika.

Pre protetske terapije, svi ispitanici su upućeni na Odeljenje za oralnu medicinu i parodontologiju, gde je pre terapije parodontopatije urađena procena stanja parodonticijuma uz pomoć gingivalnog indeksa Löe-Silness (Gi), plak indeksa (PI), indeksa zubnog kamenca (Izk), indeksa zubnih konkrementata (Ikon) i nivoa pripojnog epitela (NPE).^{3,15} Nakon toga, primenjena je bazična parodontalna terapija, koja obuhvata identifikaciju i uklanjanje oralnog biofilma i ostalih naslaga sa zuba, motivaciju i obučavanje bolesnika za održavanje oralne higijene, eliminaciju mogućih faktora rizika. Meke naslage uklonjene su pomoću paste (Vantal, Galenika) i rotirajućih četkica.

Čvrste naslage (zubni kamenac i konkrementi) uklonjene su ultrazvučnim aparatom Woodpecker (UDS-J) i srpastim instrumentom. Dodatno, parodontalni džepovi su obrađeni parodontalnom kiretom i ispiranjem 3% vodonik-peroksidom. Zatim su svim ispitanicima dati saveti o pravilnom održavanju oralne higijene. Pored redovnog održavanja oralne higijene četkicom za zube,

Materials and methods

The study was conducted on a sample of 120 patients who visited the Department of Prosthodontics, Clinic of Dentistry Niš for the prosthetic rehabilitation. The main criteria for selection of patients were determined before testing; then, medical history was taken and dental examination was done. Selected examinees had periodontal disease. The study did not include the population under the age of 18, pregnant women, patients with blood diseases, patients with acute and chronic infections, autoimmune diseases, patients on immunosuppressive therapy and those who were on antibiotic or corticosteroid therapy in the past three months.

The study is in accordance with the ethical standards of the Ethics Committee of the Clinic of Dentistry Niš, i.e. the Helsinki Declaration (1964, amended in 1975 and 1983) of the World Health Organization.

Of the 120 patients, 60 were males and 60 females, aged 18 to 65 years. The examinees were divided into four groups with 30 patients each.

Before prosthetic treatment, all patients were referred to the Department of Oral Medicine and Periodontology, where the periodontal assessment was done before the application of periodontal therapy with the help of Gingival Index Loe-Silness (GI), Plaque Index (PI), Tartar Index (TI), Subgingival Dental Calculus Index (SCI) and the Attachment Level Index (AL).^{3,15} After that, the basic periodontal therapy that includes the identification and elimination of oral biofilm and other deposits from teeth, motivation and education of patients to maintain oral hygiene, elimination of potential risk factors was applied. Soft deposits were removed using a paste (Vantal, Galenika) and rotating brushes.

Solid deposits (tartar and subgingival dental calculus) were removed with ultrasound Woodpecker (UDS-J) and the rotary instruments. Additionally, periodontal pockets were treated with periodontal curettes and washed with 3% hydrogen peroxide. All patients were given advice concerning proper oral hygiene. In addition to regular oral hygiene measurements group I

ispitanici grupe I koristili su Lacalut pastu, grupe II komercijalnu pastu po svom izboru i Lacalut rastvor, grupe III Lacalut pastu i Lacalut rastvor, a ispitanici IV (kontrolne) grupe komercijalnu pastu po svom izboru.

Pri prvom kontrolnom pregledu, nedelju dana nakon uključenja u istraživanje, određeni su Gi, Pl, Izk, Ikon, a nakon mesec dana od uključenja u istraživanje, Gi, Pl, Izk, Ikon i NPE.

Za analizu primarnih podataka korišćene su deskriptivne statističke metode (aritmetička sredina, medijana, standardna devijacija i relativni brojevi) i metode za testiranje statističkih hipoteza (Kruskal-Wallisov, Mann-Whitney U, Friedmanov i Wilcoxonov test). Kriterijum za statističku značajnost je bio $p < 0,05$ i $p < 0,01$. Za statističku obradu rezultata korišćen je softverski program SPSS Statistics 21.

Rezultati

Rezultati ispitivanja dobijeni su upoređivanjem vrednosti indeksa u odnosu na vreme ispitivanja.

Razlika GI unutar grupe ispitanika koji su koristili samo pastu i samo rastvor (I i II grupa) je statistički značajna ($p < 0,01$) između svih posmatranih perioda. U grupi ispitanika koji su koristili pastu i rastvor (III) razlika GI je statistički značajna između vremena pre terapije i nedelju dana posle terapije ($p < 0,01$), kao i između vremena pre terapije i mesec dana posle terapije ($p < 0,01$). Razlika Gi nema statistički značajnu razliku u vremenu između nedelju dana posle terapije i mesec dana posle terapije. Razlika GI je u kontrolnoj grupi (IV) statistički značajna između vremena pre terapije i nedelju dana posle terapije ($p < 0,01$), kao i između vremena nedelju dana posle terapije i mesec dana posle terapije ($p < 0,01$). Razlika Gi nema statistički značajnu razliku u vremenu pre terapije i mesec dana posle terapije.

Unutar grupa I, II i III razlika Pl i Izk je statistički značajna između vremena pre terapije i nedelju dana posle terapije, kao i između vremena pre terapije i mesec dana posle terapije ($p < 0,01$). Razlika Pl nema statistički značajnu razliku u vremenu između nedelju dana posle terapije i mesec dana posle terapije. Unutar grupe

used the Lacalut paste, group II used a commercial paste of their choice and Lacalut solution, group III used the Lacalut toothpaste and Lacalut solution, and group IV (control) used a commercial paste of their choice.

At the first follow-up examination one week after the beginning of the study, GI, Pl, TI and Ikon were determined, and a month after GI, Pl, TI, SCI and AL.

For the primary data analysis, descriptive statistical methods (mean, median, standard deviation and relative numbers) and methods for testing statistical hypotheses (Kruskal-Wallis's, Mann-Whitney U, Friedman and Wilcoxon's test) were used. The criterion for statistical significance was $p < 0.05$, $p < 0.01$. For statistical analysis of the results, a software program SPSS Statistics 21 was used.

Results

Comparing the index values in relation to the time of the study, we observed:

The difference in the GI values within the group which used a toothpaste or solution (group I and II) was statistically significant ($p < 0.01$) among all the study periods. In the group which used the toothpaste and the solution (group III), the difference in GI values was statistically significant between the time before treatment and one week after treatment ($p < 0.01$) and between the time before treatment and one month after treatment ($p < 0.01$). Gingival index was not statistically significantly different with respect to time between one week after treatment and one month after treatment. In the control group (group IV), the difference in GI values was statistically significant between the time before treatment and one week after treatment ($p < 0.01$), and between the time one week after treatment and one month after treatment ($p < 0.01$). Gingival index was not statistically significantly different with respect to the time between the period before treatment and one month after treatment.

Within the groups I, II and III the differences in Pl and Izk values were not statistically significant between the time before treatment and one week after treatment, as well as between the time before treatment and one month after treatment ($p < 0.01$). The difference in Pl values was not statistically significant with respect to time between one week after treatment and one month after treatment. Within the group

IV razlika PI je statistički značajna između svih posmatranih vremena ($p < 0,01$)

Unutar svih grupa, razlika Ikon je statistički značajna između vremena pre terapije i nedelju dana posle terapije, kao i između vremena pre terapije i mesec dana posle terapije ($p < 0,01$). Razlika Ikon nema statistički značajnu razliku u vremenu između nedelju dana posle terapije i mesec dana posle terapije.

Unutar svih grupa vrednost NPE indeksa je statistički značajno manja mesec dana nakon terapije u odnosu na vrednost pre terapije ($p < 0,01$) (Tabela 1).

IV, the difference in PI values was statistically significant between all the observed periods ($p < 0.01$).

Within each group, the difference in Ikon values was statistically significant regarding the time before treatment and one week after treatment, as well as between the time before treatment and one month after treatment ($p < 0.01$). The difference in Ikon values was not statistically significant with regard to the time between one week after treatment and one month after treatment.

Within each group AI value was significantly lower one month after treatment compared to the value before treatment ($p < 0.01$) (Table 1).

Tabela 1. Vrednosti posmatranih indeksa u definisanom vremenskom intervalu i prema grupama ispitanika

Table 1. The values of indexes in the observed period

Indeks/ Index	Gr/ Gr	Br/ No	Vreme merenja/ Observed time						χ^2
			Pre terapije/ Before therapy		Nakon nedelju dana/ After one week		Nakon mesec dana/ After one month		
			$\bar{x} \pm SD$	Med	$\bar{x} \pm SD$	Med	$\bar{x} \pm SD$	Med	
Gi/ GI	I	30	1,73±0,45	2,0	0,50±0,51 ^{a*}	0,5 ^{AB**C*}	0,10±0	0 ^{C*}	52,918
	II	30	1,70±0,47	2,0	0,80±0,48 ^{a*}	1,0 ^{DE*}	0,17±0,38 ^{b*c*}	0 ^{E*}	53,906
	III	30	1,73±0,45	2,0	0,20±0,41 ^{a*}	0 ^{F*}	0,13±0,35 ^{b*}	0 ^{F*}	58,783
	IV	30	1,80±0,41	2,0	1,30±0,65 ^{a*}	1,0	0,16±0,56 ^{c*}	2,0	19,00
PI/ PI	I	30	2,10±0,85	2,0	0,20±0,41 ^{a*}	0 ^{C*}	0,20±0,41 ^{b*}	0 ^{B C*}	54,521
	II	30	2,47±0,63	3,0	0,27±0,45 ^{a*}	0 ^{E*}	0,27±0,45 ^{b*}	0 ^{DE*}	51,314
	III	30	2,30±0,65	2,0	0,13±0,35 ^{a*}	0 ^{F*}	0,03±0,18 ^{b*}	0 ^{F*}	53,835
Izk/ TI	IV	30	2,20±0,67	2,0	0,80±0,55 ^{a*}	1,0	1,20±0,66 ^{b*c*}	1,0	37,537
	I	30	2,10±0,85	2,0	0±0 ^{a*}	0	0±0 ^{b*}	0 ^{C*}	60,0
	II	30	2,23±0,73	2,0	0±0 ^{a*}	0	0±0 ^{b*}	0 ^{E*}	60,0
	III	30	2,07±0,69	2,0	0±0 ^{a*}	0	0±0 ^{b*}	0 ^{F*}	60,0
Ikon/ SCI	IV	30	2,07±0,74	2,0	0±0 ^{a*}	0	0,53±0,51 ^{b*c*}	1,0	51,703
	I	30	1,83±0,95	2,0	0±0 ^{a*}	0	0±0 ^{b*}	0	54,0
	II	30	1,43±1,10	2,0	0±0 ^{a*}	0	0±0 ^{b*}	0	42,0
	III	30	1,77±1,14	2,0	0±0 ^{a*}	0	0±0 ^{b*}	0	46,0
NPE/ AL	IV	30	1,70±1,02	2,0	0±0 ^{a*}	0	0±0 ^{b*}	0,0	48,0
	I	30	4,73±0,83	4,75			3,83±0,58 ^{b*}	4,0 ^{C*}	Z = 4,790
	II	30	4,86±0,90	5,15			4,07±0,75 ^{b*}	4,10 ^{DE*}	Z=4,807
	III	30	4,77±0,67	4,85			3,54±0,44 ^{b*}	3,50 ^{F*}	Z=4,709
IV	30	5,01±0,52	4,95			4,65±0,52 ^{b*}	4,65	Z=4,814	

^a – pre terapije vs nakon nedelju, ^b – pre terapije vs nakon mesec, ^c – nakon nedelju vs nakon mesec
^a – a – before therapy vs after one week, ^b – before therapy vs after one month, ^c – after one week vs after one month,

^A-I vs II, ^B-I vs III, ^C-I vs IV, ^D-II vs III, ^E-II vs IV, ^F-III vs IV, * - $p < 0,01$, ** - $p < 0,05$

Upoređujući vrednosti medijana ispitivanih indeksa između grupa

nakon nedelju dana od primenjene terapije uočena je:

- statistički značajna razlika GI između svih grupa,
- statistički značajna razlika PI ispitivanih grupa u odnosu na kontrolnu grupu, ali ne i između ispitivanih grupa,
- između grupa ne postoji statistički značajna razlika vrednosti Izk i Ikon (Tabela 1).

Mesec dana od primenjene terapije uočena je:

- statistički značajna razlika Gi, Izk ispitivanih grupa u odnosu na kontrolnu grupu, ali ne i između ispitivanih grupa,
- razlika medijana PI je statistički značajna između pacijenata svih grupa osim I i II,
- između grupa pacijenata ne postoji statistički značajna razlika Ikon indeksa,
- razlika medijana NPE indeksa je statistički značajna između pacijenata svih grupa osim I i II, I i III (Tabela 1).

By comparing the median values of investigated indexes among the groups, a week after applied therapy, we observed the following:

- A statistically significant difference between the GI values in all the groups;
- A statistically significant difference in PI values among the examined and control groups, but not among the examined groups;
- Among the groups there was no statistically significant difference in Izk and Ikon values (Table1).

After one month of applied therapy we observed:

- Statistically significant differences in GI and Izk values among the examined groups compared to the control group, but not among the examined groups;
- The difference in median of PI values was statistically significant between patients in all groups except in groups I and II;
- There was no statistically significant difference in Ikon values between the groups of patients;
- The difference in median of AI values was statistically significant between patients in all groups except for groups I and II, I and III (Table1).



Slika 1. Promene na oralnoj sluzokoži pre terapije
Figure 1. Changes in the oral mucosa before therapy



Slika 2. Oralna sluzokoža mesec dana posle terapije
Figure 2. Oral mucosa one month after therapy



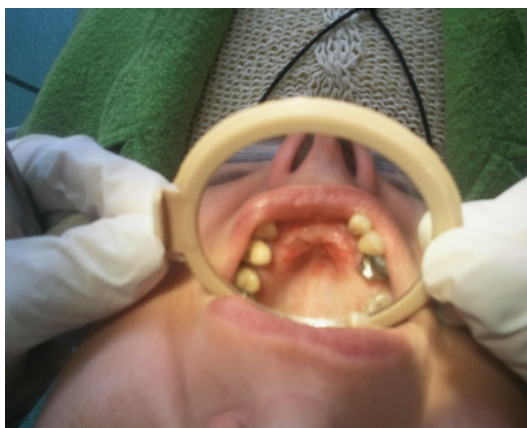
Slika 3. Promene na mekim i čvrstim tkivima pre terapije
Figure 3. Changes in the soft and hard tissue before therapy

Figure 3. Changes in the soft and hard tissue before therapy



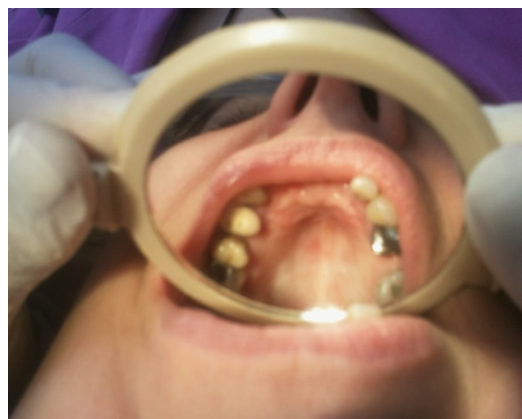
Slika 4. Meka i čvrsta tkiva mesec dana posle terapije
Figure 4. Changes in the soft and hard tissue one month after therapy

Figure 4. Changes in the soft and hard tissue one month after therapy



Slika 5. Promene na mekim i čvrstim tkivima pre terapije

Figure 5. Changes in the soft and hard tissue before therapy



Slika 6. Meka i čvrsta tkiva mesec dana posle terapije

Figure 6. Changes in the soft and hard tissue one month after therapy

Diskusija

Masovna pojava i česti recidivi parodontopatije čine ovo oboljenje pravim socijalnim problemom koji ističe sve veći značaj profilakse, blagovremene dijagnoze i kontrolisane terapije. Istraživači preporučuju upotrebu kliničkih parametara kao što su Gi, Pl, Izk, Ikon i NPE radi postavljanja precizne prognoze i plana terapije parodontopatije, kao i adekvatnog praćenja postignutih rezultata.⁶⁻¹⁰ U ovom istraživanju su korišćeni navedeni klinički parametri koji su pokazali kod svih pacijenata u vreme uključenja u istraživanje nizak stepen oralne higijene (slike 1,3 i 5) i njeno poboljšanje nedelju dana nakon primenjene terapije. Zavidan nivo oralne higijene se održao i mesec dana nakon završene terapije kod ispitanika koji su primenjivali neki od Lacalut preparata, dok se pogoršao u kontrolnoj grupi mesec dana po primenjenoj terapiji, što se videlo povećanjem vrednosti Pl. Navedeni rezultati pokazuju blagotvoran efekat Lacalut preparata, koji se ogleda u dugotrajnom održanju dobre oralne higijene osoba koje ih koriste, a najbolji rezultati u ovom istraživanju uočeni su kod pacijenata koji su koristili kombinaciju Lacalut rastvora i paste (grupa III) (slike 2, 4. i 6.).

Discussion

Mass occurrence and frequent relapses of periodontitis makes this disease a real social problem that highlights the growing importance of prophylaxis, diagnosis and controlled therapy. The researchers recommend the use of clinical parameters such as GI, PI, Izk, Ikon and NPE in order to establish precise anticipation and plan of periodontal therapy, and adequate monitoring of the achieved results⁶⁻¹⁰. Similarly, in this study the clinical parameters showed in all patients a low level of oral hygiene at the time of beginning of the study (Figures 1, 3 and 5) and an improvement in maintaining it one week after the applied therapy. Good level of oral hygiene was present one month after the completion of therapy in patients who had applied the Lacalut preparations, whereas it was worse in the control group one month after the applied therapy. An increase in the value of PI can be observed. The above results show a beneficial effect of the Lacalut products that are reflected in the long-term maintenance of good oral hygiene, and the best results were observed in patients who used a combination of the Lacalut solution and paste (group III) (Figures 2, 4 and 6).

Hemijska sredstva za neutralizaciju oralnog biofilma svojim antibakterijskim delovanjem sprečavaju stvaranje oralnog biofilma. Ova sredstva se nalaze u vidu rastvora za ispiranje usta, gelova, a dodaju se i pastama za zube. Najpoznatija sredstva su hlorheksidin diglukonat i fluoridi⁸⁻¹⁰. Slično je i u ovom istraživanju, gde su aktivni sastojci Lacalut paste i rastvora doprineli značajnije nižim vrednostima Pl kod ispitanika koji su ih koristili. Najveće smanjenje vrednosti ispitivanih indeksa uočeno je u grupi koja je koristila kombinaciju Lacalut paste i rastvora (grupa III). Ova sredstva nikako ne mogu da zamene standardna mehanička sredstva za održavanje oralne higijene, kao što je četkica za zube, a terapija hemijskim sredstvima ima sekundarnu ulogu, upotpunjujući ostale metode primenjene u prevenciji i lečenju parodontopatije. Izbor hemijskih sredstava bi trebalo da bude individualan i po preporuci stomatologa¹⁶.

McDermid i saradnici¹⁷ su uočili da kombinacija sredstava koja imaju antikariogeno i antiplak dejstvo može biti korisna i obezbediti dodatni zaštitni efekat ukoliko svaka supstanca deluje na različite prouzrokovane oboljenja. Uočeno je da kombinacija hlorheksidina i fluorida u sredstvima za oralnu higijenu može doprineti u sprečavanju nastanka karijesa i gingivitisa.¹⁸ Hlorheksidin ima inhibitorni efekat na formiranje oralnog biofilma i produkciju kiselina, što znatno smanjuje kariogeni potencijal i tako povećava efekat fluorida.¹⁹ Uprkos njihovom suprotnom naelektrisanju, mogu se uspešno kombinovati, bez narušavanja njihovih individualnih efekata, a kombinacijom hlorheksidina i fluorida ostvaruje se veći baktericidni efekat na strukturu *Streptococcus mutans* nego kada deluju pojedinačno.^{20,21} Osobe kojima se preporučuje upotreba kombinacije ovih preparata su osobe sa visokim rizikom za nastanak karijesa, kao što su deca, stariji i osobe sa fiksnim protetskim radovima, pacijenti pod zračnom terapijom i osobe ugroženog zdravlja^{22,23}. Ispitanicima u ovom istraživanju bila je neophodna protetska sanacija i imali su povećani rizik za nastanak karijesa.

Rathe i sar.²⁴ su ispitivali uticaj rastvora na bazi hlorheksidina i aluminijum laktata na inflamaciju gingive i akumulaciju oralnog

Chemical agents for the neutralization of the oral biofilm have antibacterial activity which inhibits the formation of oral biofilm. They are in the form of mouth rinses, gels, and they can be added to the toothpaste, too. The best known agents are chlorhexidine digluconate and fluorides⁸⁻¹⁰. Similarly, in this study the active ingredients of the Lacalut paste and solutions contributed significantly to the lower values of Pl. The largest decrease in the value of the examined index was observed in the group that used a combination of the Lacalut paste and solutions (group III). These products can never replace the standard toothbrush, and a treatment by chemical means has a secondary role, complementing the other methods in the prevention and treatment of periodontal disease. The choice of chemical agents should be individual and recommended by a dentist¹⁶.

McDermid et al.¹⁷ noted that the combination of products that have anticariogenic and antiplaque effect can be helpful and provide an additional protective effect, if any substance acts on different causal agents of disease. It was observed that the combination of chlorhexidine and fluoride in products for oral hygiene can contribute to the prevention of caries and gingival inflammation¹⁸. Chlorhexidine has an inhibitory effect on the formation of oral biofilm and acid production, which significantly reduces cariogenic potential and increases the fluoride effects¹⁹. Despite their opposite charges they can be successfully combined, without losing individual effects. A combination of chlorhexidine and fluoride has a greater bactericidal effect on *Streptococcus mutans* structure than when acting alone.^{20,21} People who are recommended to use a combination of these preparations are those with a high risk of caries, such as children, the elderly, patients with fixed dental restorations, patients under radiotherapy and medical compromised patients.^{22,23} Patients in this study needed prosthetic rehabilitation and had an increased risk of tooth decay.

Rathe et al.²⁴ examined the effect of chlorhexidine and aluminum lactate solution on gingival inflammation and accumulation

biofilma kod dve grupe ispitanika u toku 6 meseci. Ispitanici prve grupe su, pored komercijalne paste, po svom izboru koristili rastvor na bazi hlorheksidina i aluminijum laktata, a ispitanici kontrolne grupe samo komercijalnu pastu po svom izboru. Uočeno je kod ispitanika obe grupe smanjenje inflamacije gingive u odnosu na početak terapije sa značajnijim smanjenjem u grupi ispitanika koja je dodatno koristila rastvor na bazi hlorheksidina i aluminijum laktata. Slično je uočeno i u ovom istraživanju, gde je kod svih ispitanika koji su koristili Lacalut preparate uočeno značajnije smanjenje GI u odnosu na kontrolnu grupu. Gi je zadržao niske vrednosti i nakon mesec dana od uključenja u istraživanje, a ispitanici kontrolne grupe koji nisu upotrebljavali Lacalut preparate imali su povećanje vrednosti Gi nakon mesec dana u odnosu na vrednosti nakon nedelju dana od početka istraživanja. Sve ovo ističe blagotvoran uticaj Lacalut preparata na smanjenje inflamacije gingive i manju akumulaciju oralnog biofilma kroz duži vremenski period.

Bellamy i sar.²⁵ su ispitivali uticaj rastvora (Lacalut aktiv) na bazi hlorheksidindiglukonata, aluminijum laktata i aluminijum fluorida na formiranje oralnog biofilma kroz ispitivani period od 17 dana uz pomoć analize za digitalno snimanje oralnog biofilma (digital plaque imaging analysis - DPIA) i uočili značajno smanjenje akumulacije oralnog biofilma nakon korišćenja ispitivanog rastvora. Slično je uočeno i u ovom istraživanju, gde je vrednost PI bila značajno manja u ispitivanim grupama u odnosu na kontrolnu grupu u svim ispitivanim periodima sa značajnim održanjem niskih vrednosti PI kroz ispitivani period.

Individualni preventivni program obuhvata i organizovano sprovođenje preventivnih mera u rizičnim grupama stomatoloških pacijenata. Posebnu pažnju u toku individualnog preventivnog rada treba posvetiti osobama sa visokim rizikom za nastanak oboljenja parodontijuma, kao što su i osobe uključene u ovo istraživanje. Za sve oblike individualnog rada značajno je intenzivno, aktivno zdravstveno-vaspitno delovanje, uz primenu svih poznatih motivacionih tehnika, a zbog poznatog gubljenja motivacije kod pacijenata, neophodna je i česta remotivacija.²⁶

of the oral biofilm in two groups of patients for six months. The subjects of the first group used commercial toothpaste and a solution of chlorhexidine and aluminum lactate, whereas control subjects used only commercial toothpaste of their choice. Reduced gingival inflammation was observed in both groups when compared to the beginning of therapy with a significant reduction in the group, with the additional benefit of chlorhexidine and aluminum lactate solution. Similar observations were noticed in this study, in which a significant reduction in GI values was observed among all groups which have used the Lacalut products compared to the control group. Gingival index had a low value even one month after entering the study. Control group which did not use the Lacalut preparations had an increased GI values after a month compared to the values after a week since the beginning of the study. This highlights the beneficial influence of the Lacalut products on reducing gingival inflammation and on lowering the accumulation of oral biofilm over a longer period of time.

Using the analysis for digital recording of oral biofilm (plaque digital imaging analysis - DPIA), Bellamy et al.²⁵ examined the influence of the solution with chlorhexidine-digluconate, aluminum lactate and aluminum fluoride (Lacalut active) on oral biofilm formation during the period of 17 days, and observed a significantly reduced accumulation of the oral biofilm after solution usage. Similar observations were noticed in this study, where the value of PI was significantly lower in all investigated groups compared to the control group in all investigated periods with significant maintenance of low PI value. Although the response of periodontal tissue of the host may be sufficient to counteract the aggressive factors of oral biofilm during the preprosthetic therapy, preventive prophylactic measures should not be underestimated and must be implemented in periodontal treatment.

Iako u toku preprotetske pripreme odgovor parodontalnog tkiva domaćina može biti dovoljan da se suprotstavi agresivnim faktorima oralnog biofilma, ne smeju se potceniti preventivno-profilaktičke mere koje se sprovode u toku parodontalnog lečenja i konstantan rad na održanju zavidnog nivoa oralne higijene, koji zahteva veliku odgovornost pacijenata. Pre početka protetskog tretmana, pacijentu treba ukazati na rizik za nastanak karijesa i oboljenja parodontijuma i neophodnost besprekornog i redovnog održavanja oralne higijene. Izbor pacijenata, edukacija i obuka o redovnom i pravilnom održavanju oralne higijene udružena sa preventivno-profilaktičkim merama doprineće funkcionalnom i estetskom uspehu terapije. Uspostavljanje navike pravilnog održavanja oralne higijene je od velike koristi za očuvanje zdravlja parodontijuma za ceo život.

Zaključci

Na osnovu primenjene metodologije i dobijenih rezultata, uočeno je značajnije smanjenje akumulacije oralnog biofilma, inflamacije gingive i nivoa pripojnog epitela nakon terapije parodontopatije kod osoba koje su dodatno upotrebljavale Lacalut pastu i/ili Lacalut rastvor, u odnosu na povoljne ishode terapije parodontopatije kod osoba koje nisu koristile iste.

Najbolje vrednosti i održanje postignutih rezultata uočene su primenom kombinacije Lacalut rastvora i paste.

Lacalut pasta i rastvor pokazali su se efikasnim u eliminaciji inflamacije gingive i preporučuju se kao pomoćno sredstvo u terapiji parodontopatije u preprotetskoj pripremi pacijenata.

Zahvalnost

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Constant efforts to maintain an exceptional level of oral hygiene are necessary and they require great responsibility of patients. Prior to the prosthetic treatment, patient should be informed about the risk of caries and periodontitis and the necessity of impeccable and regular maintenance of oral hygiene. Selection of patients, education and oral hygiene training associated with preventive prophylactic measures will contribute to the functional and aesthetic success of therapy. Maintaining proper oral hygiene is of great benefit for the health of periodontal tissues throughout life.

Conclusion

Based on the methodology and the obtained results, a significant reduction in the oral biofilm accumulation as well as gingival inflammation of junctional epithelium after periodontal therapy were observed in patients who additionally used the Lacalut toothpaste and/or Lacalut solution, compared to the favorable outcome of periodontal therapy in patients who have not used it.

The best values and maintaining of the obtained results were observed with the application of the Lacalut solution and Lacalut paste.

The Lacalut paste and solution proved to be effective in the elimination of gingival inflammation and are recommended as an adjunct to the treatment of periodontitis in preprosthetic therapy.

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