

Primljen/ Received on: 04.04.2016
 Prihvaćen/ Accepted on :25.05.2016

INFORMATIVNI RAD
 INFORMATIVE ARTICLE
 doi:10.5937/asnl673584P

PARODONTALNA MEDICINA – NOVA GRANA U OBLASTI PARODONTOLOGIJE

PERIODONTAL MEDICINE – THE EMERGENCE OF A NEW BRANCH IN PERIODONTOLOGY

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Sažetak

Uvod: Parodontalna medicina predstavlja novu granu u oblasti parodontologije. Parodontalna medicina je termin koji se koristi za različite namene u različitim delovima sveta. U nekim zemljama, to se odnosi na proučavanje se dinamičnog odnos između parodontalnih oboljenja i sistemskih stanja, kao što su kardiovaskularne i cerebrovaskularne bolesti prevremeni porodaj i rođenje beba male telesne težine, šećerna bolest, osteoporozna i oboljenja respiratornog trakta. Ovakve studije istražuju periferni uticaj zapaljenja parodonta na sistemsko zdravlje.

U drugim zemljama, "parodontalna medicina" je termin koji se koristi za opis parodontalnih gingivalnih manifestacija raznih medicinskih stanja. Ovo uključuje ispitivanje, dijagnostiku i terapijski tretman i kako sanacija oralnog stanja utiče na medicinsko praćenje pacijenata kao deo sveobuhvatnog pristupa u okviru definisanih puteva tretmana i nege.

Zaključak: Tekst je sveobuhvatna analiza istraživanja o parodontopatiji i njenoj vezi sa sistemskim stanjima. Parodontalni tretman može biti važan u smislu preventivne opšteg zdravlja pacijenta. Parodontolozi ukazuju na realnost i edukaciju javnosti na činjenicu da infekcije u ustima mogu izazvati zdravstvene probleme u drugim delovima tela.

Gljučne reči: parodontopatija, sistemsko zdravlje, parodontalna medicina

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Abstract

Introduction: Periodontal medicine is the emergence of a new branch of periodontology. Periodontal medicine is a term used for different purposes in different parts of the world. In certain countries, it relates to the study of the dynamic relationship between periodontal diseases and systemic conditions, such as cardiovascular and cerebrovascular disease, preterm delivery low-birth-weight babies, diabetes mellitus, osteoporosis, and disorders of the respiratory tract. Such studies investigate the peripheral impacts of periodontal inflammation on systemic health.

In other countries, "periodontal medicine" is a term used to describe the periodontal (and gingival) manifestations of medical conditions. This includes their investigation, diagnosis and therapeutic management and how management of the oral condition integrates with the patient's medical management as part of a holistic approach within defined care pathways.

Conclusion: The text is a comprehensive analysis of research on periodontal disease and its link to systemic conditions. The periodontal treatment may be important in terms of preventing a patient's overall health. Periodontologists emphasize that infections in the mouth can cause health problems in other parts of the body.

Key words: periodontitis, systemic health, periodontal medicine

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Uvod

Parodontopatija kao faktor rizika za opšte zdravlje

Postoji mnogo podataka o tome da parodontalne infekcije mogu uticati na sveukupno zdravlje i pojavu neke sistemske bolesti¹. Parodontopatiju karakteriše inflamacija i bakterijska infekcija gingive koja okružuje zube. Bakterije koje su povezane sa parodontalnim oboljenjima mogu dospeti u krvotok i do drugih delova tela, čime se dovodi u opasnost opšte zdravlje². Ljudi misle da se oboljenja gingive tiču samo oboljenja njihovih zuba, ali ne razmišljaju o tome da je bolest gingive ozbiljna infekcija koja može osloboditi bakterije u krvotok. Na kraju, rezultati bi mogli značiti dodatne zdravstvene rizike za ljude čije je zdravlje ugroženo drugim bolestima ili da dovedu do ozbiljnih komplikacija kao što su bolesti srca.

Veza između oboljenja gingive i srčanih bolesti (udara i šloga)

Kardiovaskularna oboljenja (KVO), uključujući infarkt miokarda i moždani udar, glavni su uzroci smrti u svetu. Klasični faktori rizika - starost, hipertenzija, lipidi u krvi, pušenje cigareta, stres, neprijateljstva, dijabetes, težina, porodična istorija, dijeta, konzumiranje alkohola i fizička aktivnost - samo mogu objasniti 2/3 varijacija kod učestalosti kardiovaskularnih oboljenja³. Neprepoznatljivi faktori rizika mogu da doprinesu patogenezi KVO. Nedavne studije su pokazale da pacijenti sa parodontopatijom imaju 1,5 do 2,0 puta veći rizik od nastanka fatalnog KVO od pacijenata bez parodontopatije. U stvari, izgleda da oralne infekcije povećavaju rizik od koronarne bolesti u sličnom stepenu kao i klasični faktori rizika⁴. Potrebno je obaviti puno istraživanja da bi se razumela veza između parodontopatije i sistemskih bolesti kao što su kardiovaskularne. Veze između parodontalnih i sistemskih bolesti mogu imati značajan uticaj na javno zdravlje^{5,6}. Upravo ovi nalazi mogu spasiti skoro milion ljudi koji umiru svake godine od srčanih bolesti.

Oboljenje gingive, takođe, poznato kao parodontopatija, jedno je od čestih infekcija, često više prisutna nego obična prehlada. Uobičajeni znaci bolesti gingive uključuju krvarenje gingive ili gnoj između zuba. Ako se ne leči, ova hronična infekcija može da uništi

Introduction

Periodontal disease as a risk factor for the patient's general health

There is a growing body of evidence that periodontal infections could influence the overall health and occurrence of some systemic diseases¹. Periodontal disease is characterized by inflammation and bacterial infection of the gums surrounding the teeth. The bacteria that are associated with periodontal disease can travel into the bloodstream to other parts of the body, which puts health at risk². People think of gum disease in terms of their teeth, but they do not consider the fact that gum disease is a serious infection that can release bacteria into the bloodstream. At the end, results could mean additional health risks for people whose health is already affected by other diseases or lead to serious complications like heart disease.

The link between gum disease and heart disease (attack and stroke)

Cardiovascular diseases (CVDs), including myocardial infarction and stroke, are the leading causes of death in the world. The classic risk factors - age, hypertension, blood lipids, cigarette smoking, stress, hostility, diabetes, weight, family history, diet, alcohol and physical activity - can only account for 2/3 of the variation in the incidence of CVD cases³. Again, unrecognized risk factors may contribute to the pathogenesis of CVD. Recent studies have found that patients with periodontal disease have a 1.5- to 2.0-fold greater risk of incurring fatal CVD than patients without periodontal disease. In fact, oral infections seem to increase the risk of coronary artery disease to a degree similar to the classic risk factors⁴. There is still much research to be done to understand the link between periodontal diseases and systemic diseases, such as cardiovascular diseases. The emerging area of periodontal and systemic links is one that could have significant impact on public health^{5,6}. The findings may be life-saving for some of the nearly one million people who die annually from heart disease.

Gum disease, also known as periodontal diseases, is one of the most common infections - often more prevalent than the common cold. Common signs of

kost u kojoj se nalaze zubi i može dovesti do gubitka zuba⁷. Veliki broj istraživanja pokazuje da infekcije i zapaljenja izazvana parodontopatijom značajno povećavaju rizik za koronarna oboljenja⁸⁻¹⁰. Studije predlažu dve hipoteze za ovu pojavu. Jedna hipoteza je da parodontalni patogeni, prisutni kod oboljenja gingive, ulaze u krvotok, napadaju zidove krvnih sudova i na kraju prouzrokuju aterosklerozu (ateroskleroza je više-stadijumski proces pokrenut kada se ćelije koje oblažu arterije oštete usled visokog krvnog pritiska, pušenja, toksičnih supstanci i drugih agenasa). Usna duplja može biti glavni izvor hroničnog ili trajnog oslobađanja toksičnih bakterijskih komponenti u krvotok tokom normalnih oralnih funkcija^{11,12}.

Druga hipoteza se zasniva na nekoliko studija, koje su pokazale da parodontalna infekcija i zapaljenje gingive mogu biti u korelaciji sa povećanim nivoima inflamatornih markera u plazmi¹³, kao što je C-reaktivni protein¹⁴, fibrinogen (stvara krvne ugruške) ili više citokina (hormonski proteini)¹⁵ i lipoproteini^{16,17}. Pokazano je da pacijenti sa teškom parodontopatijom imaju povećane serumske nivoe CRP-a, fibrinogena, umerenu leukocitozu, kao i povećane serumske nivoe IL-1 i IL-6. Dalje, kod pacijenata sa parodontopatijom, povišeni serumski nivo CRP-a povezan je sa visokim nivoom infekcije parodontalnih patogena i time se utvrđuje da parodontopatija ima etiološku ulogu u nastanku sistemskih inflamatornih bolesti, kao što je ateroskleroza¹⁸. Inflamatornim markerima se objašnjava razlog zbog kojeg parodontopatija može biti faktor rizika za kardiovaskularna oboljenja^{14,19-22}.

Ateroskleroza i parodontopatija su inflamatorna stanja koja su obično hronična i asimptomatske prirode. Aktivacija lokalnih makrofaga u parodontocijumu i intimi arterija igra ulogu u inflamatornom procesu ovih bolesti. Formiranje penastih ćelija makrofaga u intimi karotidnih arterija ključni je korak za početak ateroskleroze. Preduslov za formiranje penastih ćelija je u išak tereta holesterola prvenstveno transportovanih u LDL. Stoga, LDL može biti značajan posrednik između oralne infekcije i arterijske inflamacije²³. Pokazano je takođe da lipopolisaharidi (LPS) iz oralnog biofilma prodiru u gingivu, a pojava bakterijemije se povećava sa povećanjem težine inflamacije gingive. Stoga, po prvi put u okviru našeg saznanja, visoke koncentracije serumskih nivoe LPS-a ukazuju da su zapravo povezani

gum disease include bleeding gums or pus between the teeth. If left untreated, this chronic infection can destroy the bone that supports the teeth and may lead to tooth loss'. A large body of research has showed that infection and inflammation caused by periodontal disease significantly increase the risk for coronary heart disease⁸⁻¹⁰. Studies propose two hypotheses for this occurrence. One hypothesis is that periodontal pathogens present in gum diseases could enter the bloodstream, invade the blood vessel walls, and ultimately cause atherosclerosis (atherosclerosis is a multistage process set in motion when cells lining the arteries are damaged as a result of high blood pressure, smoking, toxic substances, and other agents). The mouth can be a major source of chronic or permanent release of toxic bacterial components in the bloodstream during normal oral functions^{11,12}.

Another hypothesis is based on several studies that have shown that periodontal infection and inflammation can be correlated with increased plasma levels of inflammatory markers¹³, such as C-reactive protein¹⁴, fibrinogen (this creates blood clots), or several cytokines (hormone proteins)¹⁵, and lipoproteins^{16,17}. It has been shown that patients with severe periodontitis have increased serum levels of CRP, fibrinogen, moderate leukocytosis, as well as increased serum levels of IL-1, and IL-6 when compared with unaffected population. Furthermore, in periodontitis patients, elevated serum CRP is associated with high levels of infection caused by periodontal pathogens, which shows that periodontitis plays a role in the etiologic pathway of systemic inflammatory diseases such as atherosclerosis¹⁸. Inflammatory markers explain one reason why periodontal disease could be a risk factor for cardiovascular disease^{14,19-22}.

Both atherosclerosis and periodontitis are inflammatory conditions that are commonly chronic and asymptomatic in nature. Local macrophage activation in periodontium and in arterial intima plays a role in the inflammatory process of both diseases. Formation of macrophage-derived foam cells in the arterial intima is the pivotal step in early atherosclerosis. The prerequisite for foam cell formation is the excess cargo of cholesterol preferentially transported in LDL. Therefore, LDL may be an important mediator between oral infection and arterial inflammation²³.

sa površinom zahvaćenog tkiva u parodontopatiji. U cirkulaciji, LPS saraduju sa svim klasama lipoproteina i mogu inicirati aterogenezu, kada se transportuju u arterijski zid sa LDL-om²⁴.

Američka akademija parodontologa poziva ljude koji imaju rizik za pojavu kardiovaskularnih bolesti ili imaju znake oboljenja gingive da se konsultuju sa stomatolozima-parodontolozima radi lečenja parodontalnih oboljenja²⁵.

Dijabetes i parodontopatija

Postoji dvosmerna veza između parodontopatije i dijabetesa. Ova veza se ogleda u tome da dijabetičari imaju veći rizik za razvoj infekcije kao što je parodontopatija, a parodontopatija otežava ljudima koji imaju dijabetes da kontrolišu šećer u krvi²⁶. Osim toga, ljudi sa dijabetesom i parodontopatijom su skloni pojavi rekurentnih parodontalnih apscesa (područja oko zuba koji su upaljena, inficirana i bolna). Pretpostavlja se da se ova veza javlja zbog činjenice da ljudi sa dijabetesom imaju kompromitovanu sposobnost da se bore protiv infekcija kao što je parodontalno oboljenje²⁷. Međutim, ovaj odnos se trenutno osporava. Moguće je da parodontopatija predisponira ili raspiruje dijabetično stanje. Nedavno istraživanje je pokazalo da je koncentracija glikoliziranog hemoglobina (mera dijabetesa) povišena kod osoba sa dijabetesom tipa 2 i teškom parodontopatijom. U drugoj studiji osoba sa dijabetesom tipa 2, teška parodontopatija je snažno povezana sa povećanim rizikom loše kontrole glikemije^{28,29}.

Trudnoća i parodontopatija

Parodontopatija može nepovoljno da utiče na ishod trudnoće. Prevremeni porođaj i niska telesna težina dece na rođenju predstavljaju značajan uzrok perinatalnog morbiditeta i mortaliteta. Identifikovani faktori rizika su starost majke (<17 godina ili >34godine), socioekonomski status, neadekvatna prenatalna zaštita, hipertenzija, pušenje i zloupotreba narkotika, infekcije urogenitalnog trakta i dijabetes. Napori da se kontrolišu ovi faktori rizika nisu doveli do značajnog smanjenja broja prevremenih porođaja. Dakle, mogu biti i drugi, nepoznati faktori koji doprinose ovom fenomenu³⁰.

Lipopolysaccharides (LPS) from the oral biofilm have also been shown to penetrate the gingiva, and the occurrence of bacteremia increases with increasing the severity of gingival inflammation. Therefore, for the first time to our knowledge, it has been shown that high serum concentrations of LPS are actually associated with the area of affected tissue in periodontitis. In circulation, LPS associates with all lipoprotein classes and it may initiate atherogenesis, when it is transported into the arterial wall with LDL²⁴.

The American Academy of Periodontology appeals to people who are at risk for cardiovascular disease or have signs of gum disease to consult a dentist having experience in treating periodontal disease²⁵.

Diabetes and periodontitis

There is a two-way relationship between periodontal disease and diabetes. Diabetics are more likely to develop infections like periodontal disease, and periodontal disease makes it more difficult for people who have diabetes to control their blood glucose²⁶. Furthermore, people with diabetes and periodontal disease are more prone to recurrent periodontal abscesses (areas around teeth that are inflamed, infected and painful). It has been assumed that the association is due to the fact that people with diabetes have a compromised ability to fight infections such as periodontal disease²⁷. However, this relation is currently being challenged. It is possible that periodontal disease predisposes to or exacerbates the diabetic condition. A recent survey has shown that the concentration of glycated hemoglobin (a measure of diabetic control) is elevated in people with type 2 diabetes and severe periodontal disease. In another study of people with type 2 diabetes, severe periodontitis was strongly associated with an increased risk of poor glycemic control^{28,29}.

Pregnancy and periodontal disease

One of the examples is the effect of periodontal disease on an adverse pregnancy outcome. Preterm, low-birth-weight (PLBW) infants represent a significant cause of prenatal morbidity and mortality. Identified risk factors include maternal age (<17 years or >34 years), socioeconomic status, inadequate prenatal care, hypertension,

Pored toga, nedavno ispitivanje majki koje su imale manje faktore rizika, a prevremeno su rodile, imale su parodontopatiju. Znatno više u odnosu na sličnu grupu porodilja s normalnom telesnom masom beba na rođenju. Ispitivana veza između generalizovane parodontopatije i prevremenog rođenja pokazuje jačinu uporedo sa stepenom težine parodontopatije³¹⁻³³.

Postoje kontradiktorni rezultati istraživanja odnosa između parodontopatije i neželjenih ishoda trudnoće. Autori studije ukazuju da je primarna teorija koja objašnjava odnos između parodontopatije i preeklampsije zapaljenje parodontalnih tkiva koja oslobađaju povišene nivoe C-reaktivnog proteina (CRP), prostaglandina E2 (PgE2), i drugih inflamatornih medijatora u opštu cirkulaciju, izazivajući oštećenje placente, što dovodi do preeklampsije. Bez obzira na mehanizam koji je okidač prevremenog porođaja, hronična inflamacija, povezana sa parodontopatijom, izgleda da povećava rizik od ovog događaja.

Tri hipoteze koje mogu objasniti odnos između parodontološke infekcije i prevremenog porođaja su: 1) parodontalni patogeni izazivaju direktnu kontaminaciju fetoplacentarne jedinice³⁴, 2) lipopolisaharid, bakterijski endotoksin, koji se nalazi u zaraženom parodontocijumu, oslobađa se i deluje na fetoplacentarnu jedinicu kroz krv³⁵, i 3) inflamatorni medijatori iz zaraženog parodontalnog rezervoara mogu izazvati probleme u fetoplacentarnoj jedinici³⁶.

Određeni broj biološki aktivnih medijatora, poput prostaglandina E2 (PgE2) i faktor nekroze tumora α (TNF- α), uključeni su u proces normalne trudnoće. Ovi medijatori su podignuti na veštački visoke nivoe tokom infekcije i na taj način mogu da podstaknu prerani porođaj³⁷. Lipopolisaharidi iz gram-negativnih anaeroba nalaze se u parodontalnim džepovima i pokreću oslobađanje PgE 2 i TNF - α , koji mogu, zauzvrat, da utiču na tok trudnoće. Dokazi koji bi podržali ovu hipotezu dobijeni su u modelima glodara. Trudnice koje imaju parodontopatiju mogu imati sedam puta veće šanse da decu rode prerano i suviše malu. Pored toga, oko polovina žena dobije "trudnički" gingivitis, 60-70%. Međutim, žene koje održavaju dobru oralnu higijenu nemaju tu vrstu upale gingive. Studije su pokazale da lečenje i rana intervencija parodontopatije može smanjiti ukupne inflamatorne komplikacije, a razmatranje načina lečenja informiše pacijenta.³⁸

substance or tobacco abuse, genitourinary tract infections, and diabetes. Efforts to control these risk factors have not resulted in a significant reduction in the number of PLBW births. Thus, there may be other, unrecognized factors contributing to this phenomenon³⁰.

In addition, a recent study of mothers of PLBW infants, with otherwise low risk, had significantly more periodontal disease than a similar group of women with normal weight infants at birth. The association observed between generalized periodontitis and induced preterm birth shows the strength, along with the extent of periodontitis³¹⁻³³.

There is conflicting research results regarding the relationship between periodontal diseases and adverse pregnancy events. The study authors indicated that the primary theory to explain the relationship between periodontitis and pre-eclampsia is that inflamed periodontal tissues release elevated levels of C-reactive protein (CRP), prostaglandin E2 (PgE2), and other inflammatory mediators into the general circulation, inducing damage to the placenta, resulting in pre-eclampsia. Regardless of the mechanism triggering PLBW, the chronic inflammation associated with periodontal disease seems to increase the risk of PLBW.

Three hypotheses that may explain the relationship between periodontal infection and PLBW are as follows: 1) periodontal pathogens cause direct contamination in the fetoplacental unit³⁴, 2) lipopolysaccharide, a bacterial endotoxin normally found in infected periodontal tissue, is released and acts on the fetoplacental unit through the blood³⁵, and 3) inflammatory mediators from an infected periodontal reservoir provoke problems in the fetoplacental unit³⁶.

A number of biologically active mediators such as prostaglandin E2 (PgE2) and tumor necrosis factor alpha (TNF- α) are also involved in the normal pregnancy process³⁷.

These mediators are raised to artificially high levels during infections and thus may foster premature labour³⁷. Lipopolysaccharides from gram-negative anaerobes found in periodontal pockets trigger the release of PGE2 and TNF- α , which may, in turn, affect the course of pregnancy. Evidence to support this hypothesis has been obtained in rodent models. Pregnant women who have periodontal disease may be seven times more likely to have a baby born too early and too small.

Osteoporoza

Iako je osteoporoza češća kod žena u postmenopauzi, može da se javi u bilo kom uzrastu i pogađa i muškarce i žene. Dijagnozu osteoporoze donosi lekar na osnovu testa koji meri gustinu kostiju, poznat kao "dual energy X-ray absorption" (DXA). Nekoliko faktora rizika mršavu konstituciju porodičnu istoriju osteoporoze, ishranu sa niskim sadržajem kalcijuma i vitamina D, neaktivan način života, pušenje, prekomerno konzumiranje alkohola i nizak nivo estrogena. Neki od tih istih faktora igraju ulogu u progresiji parodontopatije i gubitka zuba.

Osteoporoza je skeletni poremećaj koji se karakteriše ugroženom jačinom kosti, predisponiranom za rizik³⁹. Deficijencija estrogena posle menopauze i gubitak koštane mineralne gustine pokazali su da mogu biti povezani sa povećanom stopom gubitka zuba. Ovi odnosi se mogu objasniti povećanom težinom parodontopatije kod deficijencije estrogena^{40,41}. Pokazalo se da su ukupni kalcijum tela i koštana gustina usko povezani sa koštanom gustinom donje vilice. Nekoliko studija je pokazalo blisku vezu između bezubosti i sistemske osteopenije. Postoji jasna veza između osteoporoze i parodontopatije. Osteoporoza se smatra jednim od faktora rizika za parodontalni gubitak koštane mase. Osteoporoza i parodontopatija su hronična višefaktorna oboljenja sa mnogo genetskih faktora rizika i faktora ponašanja kao i determinante. Obe bolesti mogu se uspešno kontrolisati eliminisanjem nekoliko faktora rizika. Terapija estrogenom može biti zaštita protiv oba oboljenja, postmenopauzalne osteoporoze i teške forme parodontopatije kod žena u postmenopauzi. Pušenje i ishrana su takođe važni faktori rizika za obe bolesti, kao i genetski faktori. Nedavni epidemiološki i klinički podaci daju ograničene, ali uverljive dokaze, koji sugerišu povezanost između osteoporoze i parodontopatije. Mnogi zajednički faktori rizika mogli bi biti otkriveni u nastanku oba oboljenja^{41,42}.

Sistemska osteoporoza razvija se usled gubitka kosti i dovodi do lomljenja kostiju. Slične funkcije se vide u vilici i alveolarnoj kosti, čak i ako je struktura kostiju drugačija. Treba zapamtiti da kako parodontopatija napreduje, dovodi do gubitka pripojnog epitela i gubitka alveolarne koštane mase. Stoga je pacijent sa osteoporozom i niskom gustinom alveolarnih kosti ostaje osetljiviji za brzu progresiju parodontopatije.

In addition, women experience "pregnancy gingivitis, 60-70 % ". However, women who have good oral hygiene have no this kind of gingivitis. Studies have demonstrated that treatment and early treatment of periodontal disease can reduce the patient's overall inflammatory burden, and dental treatment consideration at the same time informs the patient³⁸.

Osteoporosis

Although osteoporosis is more prevalent in postmenopausal women, it can occur at any age and affects both men and women. The diagnosis of osteoporosis is made by the physician based on a test which measures bone density called dual energy X-ray absorption (DXA). Several risk factors include small, thin body frame, family history of osteoporosis, diet low in calcium and vitamin D, inactive lifestyle, smoking, excessive alcohol consumption, and low estrogen levels. Some of these factors play a role in the progression of periodontal disease and tooth loss.

Osteoporosis is a skeletal disorder characterized by compromised bone strength predisposing to risk³⁹. Estrogen deficiency after menopause and consequent loss of bone mineral density have been shown to be associated with increased rate of tooth loss. These relationships may be explained by increased severity of periodontal disease in estrogen deficiency^{40,41}.

It has been shown that total body calcium and bone density was closely associated with mandibular bone density and several studies have demonstrated a close relationship between edentulism and systemic osteopenia. Certain data showed a clear relationship between osteoporosis and periodontal disease, and osteoporosis is considered as one of the risk factors for periodontal bone loss. Both osteoporosis and periodontal disease are chronic multifactorial diseases with many genetic and behavioral risk factors and determinants. Both diseases can be successfully controlled by eliminating several risk factors. Estrogen replacement therapy can be protective against both postmenopausal osteoporosis and severe periodontitis in postmenopausal women. Tobacco smoking and diet are also important risk factors for both diseases and genetic factors have also been identified as important

Parodontopatija i plućne bolesti

Na bakterijsku pneumoniju, hronični bronhitis, emfizem i hroničnu opstruktivnu bolest pluća može negativno uticati oralna mikroflora. Istraživanje potvrđuje nalaze da parodontopatija može da poveća rizik od bolesti respiratornog sistema. Bakterije iz oralnog biofilma mogu biti aspirirane u respiratorni trakt i uticati na pokretanje i progresiju sistemske infekcije kao što je upala pluća. Pacijenti sa parodontopatijom, sa srednjim gubitkom parodontalnog pripoja (većim od 3mm) imaju skoro 1,5 puta veći rizik za pojavu plućne bolesti. Takođe je navedeno da se funkcija pluća smanjuje sa povećanjem parodontalnog pripoja⁴³.

Ovo sugeriše da aktivnost parodontopatija mogu promovisati progresiju plućne bolesti. Pojavljuju se sojevi bakterija otporni na antibiotike, a orofaringealna flora i sekret su direktno odgovorni za potencijalne respiratorne infekcije. Ispiracija oralnih bakterija može biti odgovorna za pogoršanje plućnih oboljenja⁴⁴. Na osnovu ovih i prethodnih nalaza istraživanja, moguće je da poboljšanje oralnog zdravlja može sprečiti napredovanje bolesti pluća. Moguće je da parodontalne bakterije putuju u pluća kroz pljuvačku ili normalnim disanjem i na neki način doprinose razvoju infekcije pluća. Druga mogućnost je da inflamacija izazvana parodontopatijom može da doprinese upali sluzokože disajnih puteva pluća, što ograničava količinu vazduha koji prolazi kroz pluća. Oralni patogeni mogu poslužiti kao rezervoar za ove respiratorne infekcije i uticati na bakterijsku floru donjih bronhija⁴⁵. Potencijalni respiratorni patogeni mogu da se nađu u oralnoj flori pacijenata sa parodontalnim oboljenjima⁴⁶.

Studija je pokazala da su pacijenti sa respiratornim oboljenjima imali loše parodontalno zdravlje, što ukazuje na vezu između respiratornih bolesti i parodontopatije. Istraživači sumnjaju da je prisustvo oralnih patogena, udruženih sa parodontopatijom, može povećati rizik za razvoj ili pogoršanje respiratorne bolesti. Međutim, potrebne su dodatne studije da se konačno shvati ova veza.

Loša oralna higijena, oralna kolonizacija parodontalnih i respiratornih patogena povezani su sa nazokomijalnom upalom pluća

risk factors in the etiology of both diseases. Recent epidemiological and clinical data provide limited but convincing evidence suggesting an association between osteoporosis and periodontal disease, and many common risk factors could have been detected in the etiology of both diseases^{42,41}.

Systemic osteoporosis develops due to bone loss resulting in bone brittleness. The similar features are seen in the jaw and alveolar bones even if the bone structure is different. One should remember that as periodontitis progresses it leads to the loss of attachment and alveolar bone. Hence, a patient with osteoporosis with low bone density of alveolar bones is more susceptible to rapid progression of periodontitis.

Periodontitis and pulmonary disease

Bacterial pneumonia, chronic bronchitis, emphysema, and chronic obstructive pulmonary disease may be adversely affected by oral microflora. Research confirms findings that periodontal disease may increase a person's risk for the respiratory disorder. Bacteria from the oral biofilm may be aspirated into the respiratory tract to influence the initiation and progression of systemic infection such as pneumonia. Patients with periodontal disease, defined by mean periodontal attachment loss, greater than 3mm, were found to have nearly a one-and-a-half time higher risk of pulmonary disease. A distinct trend was also noted that the lung function seemed to diminish with increased periodontal attachment loss⁴³.

This suggests that periodontal disease activity may promote the progression of pulmonary diseases. Antibiotic-resistant strains of bacteria are emerging, and oropharyngeal flora and secretions are directly responsible for potential respiratory infection. Aspiration of oral bacteria may be responsible for exacerbation of pulmonary disease⁴⁴. Based on these and previous research findings, it is conceivable that improved oral health may help prevent the progression of pulmonary disease. It is possible that periodontal bacteria could travel to the lungs through saliva or normal breathing and in some way promote lung infection. Another possibility is that the inflammation caused by periodontal disease may contribute to the inflammation of the lining of the lung airway, which limits the amount of air that passes to and from the lungs. Oral pathogens may serve as a reservoir for these respiratory infections and influence the bacterial flora of the lower bronchi⁴⁵.

Direktna uzročno-posledična veza između parodontopatije i upale pluća nije uspostavljena. Međutim, na osnovu ovde pregledanih studija, čini se da oralna kolonizacija od strane potencijalnih respiratornih patogena doprinosi razvoju plućne infekcije^{47,48}.

Pokazalo se da poboljšana oralna higijena smanjuje pojavu nozokomijalne upale pluća, kako kod pacijenata sa mehaničkom ventilacijom pluća tako i kod stanovnika staračkih domova bez ove ventilacije. Izgleda da oralna kolonizacija potencijalnim respiratornim patogenima, eventualno potpomognuti parodontopatijom i moguće specifičnim bakterijama usne duplje ili parodontopatije, doprinosi pojavi plućnih infekcija. Tako će oralna higijena preuzeti još važniju ulogu u nezi osoba sa visokim rizikom-pacijenata intenzivne nege u bolnici i starijih osoba. U ovom radu izvršen je kritički pregled novije literature o uticaju oralnog biofilma i parodontopatije na pojavu pneumonije.

Usna duplja može biti važan izvor bakterija koje izazivaju infekcije pluća. Oralni biofilm, zubni kamenac koji inicira parodontopatiju i karijes može takođe uticati na pokretanje i progresiju upale pluća zbog relokalizacije bakterija iz biofilma u respiratorni trakt. Bakterije koje izazivaju zajednički stečenu upalu pluća su obično vrste koje koloniziraju orofarinks kao što su *Streptococcus pneumoniae*, *Haemophilus influenzae* i *Mycoplasma pneumoniae*⁴⁹.

Hronična bubrežna bolest i parodontopatija

Hronična bubrežna bolest može imati značajne efekte na parodontalno zdravlje, uključujući hiperplaziju gingive kod pacijenata sa transplantiranim bubregom koji primaju inhibitore kalcineurina i blokere kalcijumovih kanala^{50,51}. Pored toga, većina epidemioloških studija su prikazale povećanje nivoa biofilma, kamenca i zapaljenja gingive u populacijama sa oboljenjem bubrega. Da li povećana učestalost i težina parodontopatije postoji u populaciji sa bubrežnim oboljenjima ostaje otvoreno pitanje. Utvrđeno je da parodontopatija doprinosi sistemskom inflamatornom opterećenju uključujući povećanje C-reaktivnog proteina u opštoj populaciji.

Međutim, s obzirom na visoku stopu smrtnosti od aterosklerotičnih komplikacija, jaka veza između povećanja inflamatornog

Potential respiratory pathogens may become established in the oral flora of patients with periodontal disease⁴⁶.

The study found that patients with respiratory diseases had worse periodontal health, suggesting a relationship between respiratory disease and periodontal disease. Researchers suspect that the presence of oral pathogens associated with periodontal disease may increase a patient's risk of developing or exacerbating respiratory disease. However, the additional studies are needed to more conclusively understand this link.

Poor oral health, oral colonization of periodontal and respiratory pathogens, all possibly influenced by periodontitis, are associated with nosocomial pneumonia. A direct causal relationship between periodontitis and pneumonia has not been established, however, based on the studies reviewed, here it seems that oral colonization by potential respiratory pathogens contributes to pulmonary infections^{47,48}.

Improved oral hygiene has been shown to reduce the occurrence of nosocomial pneumonia, both in mechanically-ventilated hospital patients and non-ventilated nursing home residents. It appears that oral colonization by potential respiratory pathogens possibly fostered by periodontitis, and possibly by bacteria specific to the oral cavity or to periodontal diseases, contributes to pulmonary infections. Thus, oral hygiene will assume an even more important role in the care of high-risk subjects – patients in the hospital intensive care and the elderly. The present paper critically reviews the recent literature on the effect of oral biofilm and periodontitis on pneumonia.

The oral cavity may be an important source of bacteria that cause infections of the lungs. Dental plaque, a tooth-borne biofilm that initiates periodontal disease and dental caries may also influence the initiation and progression of pneumonia because of relocalization of the bacteria from the biofilm into the respiratory tract. Bacteria causing community-acquired pneumonia are typically species that normally colonize the oropharynx such as *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Mycoplasma pneumoniae*⁴⁹.

Chronic renal disease and periodontitis

Chronic renal disease can have significant effects on periodontal health including gingival hyperplasia in renal transplant patients receiving calcineurin inhibitors and calcium channel blockers^{50,51}.

opterećenja i aterosklerotskih komplikacija, kao i mogući doprinos parodontopatije sistemskoj inflamaciji, parodontalni status svih hroničnih pacijenata sa bubrežnom bolešću mora biti pažljivo praćen⁵².

Cilj kampanje mora biti edukacija pacijenata o parodontalnoj infekciji i njenim rizicima za opšte zdravlje. Oralno zdravlje je često dobar pokazatelj onoga što se dešava u čitavom organizmu. Stoga, poseta parodontologu može biti od velike koristi. Važno je da pacijenti imaju redovne oralne preglede, ne samo radi održanja oralnog zdravlja, nego i zbog utvrđivanja mogućih rizika za ozbiljna zdravstvena stanja.

Preporuke za stomatološke lekare uključuju:

1. smanjenje nivoa parodontalne flore održavanjem dobre kućne oralne nege i čestim parodontološkim pregledima;
2. ispiranje hlorheksidinom pre stomatološke/parodontalne terapije;
3. obavljanje potrebne parodontalne terapije radi stabilizacije parodonticijuma;
4. konsultacije sa lekarom za parodontološke / stomatološke ili medicinske potrebe¹.

Zaključak

U novom milenijumu, stomatolozi su dužni da se brinu za ukupno zdravlje pacijenta. Oni su u stanju da vide veze i potencijalnu opasnost parodontalnih i drugih oralnih infekcija na sistemsko zdravlje. Buduća istraživanja će pomoći stomatologiji u otkrivanju složenih interakcija između osetljivosti domaćina, imunog odgovora, genetske veze, komponenti ponašanja, kao i u kontroli bolesti. Stomatolozi ne smeju tretirati samo lokalizovane oralne infekcije, već i upravljati rizikom koji varira kod svakog pojedinačnog pacijenta.

Napomene

Autori nemaju nikakvu finansijsku korist ili sukob interesa.

In addition, most epidemiological studies have reported increased levels of plaque, calculus and gingival inflammation in populations with renal disease. Whether an increased prevalence and severity of periodontitis exist in the population with renal disease remains controversial. Periodontitis has been found to contribute to systemic inflammatory burden including the elevation of C-reactive protein in the general population. However, in view of the high rate of mortality from atherosclerotic complications, the strong association between increased inflammatory burden and atherosclerotic complications, and the possible contribution to systemic inflammation from periodontitis, the periodontal status of all chronic renal disease patients need be monitored carefully⁵².

The goal of the campaign must be to educate patients about periodontal infection and its associated general health risks. Oral health is often a good indicator of what is happening in the rest of the body. Therefore, a visit to a periodontologist may be very helpful. It is important for patients to have regular oral exams not only to maintain oral health, but to identify possible risks for serious medical conditions.

Recommendations for the dental clinician include:

1. Reducing the levels of periodontopathic flora by maintaining good home care and frequent periodontal maintenance.
2. Rinsing with chlorhexidine prior to dental / periodontal therapy.
3. Performing required periodontal therapies to stabilize the periodontium.
4. Consultation with the patient's physician for periodontal/dental or medical concerns¹.

Conclusion

In this new millennium, dental practitioners are obligated to care for the patient's total health. They are able to see the links and potential dangers of periodontal and other oral infections for systemic health. Future research will help dentistry unravel the complex interactions between host susceptibility, immune response, genetic associations, behavioral components, and disease control. Dentists must not only treat localized oral infections but manage the risk that varies with each individual patient.

Acknowledgements

The authors have no any financial benefit or conflict of interests.

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