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Utjecaj antikorozivnih kemijskih čimbenika na zdravlje parodonta

The Effect of Anticorrosive Chemical Factors on Periodontal Health

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Sažetak
Svrha istraživanja bila je ispitati parodontno stanje zaposlenih u Kemijskom odjelu Brodogradilišta u Rijeci. Sudjelovala su 34 radnika u dobi od 25 do 55 godina i većina izravno radi s kemikalijama. Kontrolna skupina imala je 90 ispitanika iste dobi, ali nitko od njih nije zaposlen u Kemijskom odjelu Brodogradilišta. Prisutnost parodontnih promjena kod ispitanika temeljila se na gingivnom krvarenju, zubnom plaku i kamencu, dubini sondiranja od 3 mm i više te gubitku pričvrstka. Za usporedbu dviju neovisnih skupina – sudionika ispitivanja i kontrolne skupine - primijenjen je neparametrijski Mann - Withneyjev U-test. Rezultati su pokazali upalne promjene gingive kod 85 posto radnika. Najveća dubina sondiranja parodontnih džepova u ispitivanoj skupini bila je kod donjih srednjih sjekutića 3,06 ± 1,51 mm i 3,09 ± 1,58 mm, što je bila statistički znatna razlika u odnosu prema kontrolnoj skupini ($p < 0,001$). Najveći gubitak pričvrstka u ispitivanoj skupini bio je također na donjim srednjim sjekutićima i iznosio je 3,56 ± 2,67 mm i 3,53 ± 2,62, što se znatno razlikovalo od nalaza ispitanika u kontrolnoj skupini ($p < 0,001$). Na temelju nalaza upalnih promjena parodonta te dubine sondiranja i gubitka pričvrstka - što upućuje na kroničan parodontitis kod većine ispitanika u odnosu prema kontrolnoj skupini - može se reći da specifično okruženje ima negativan utjecaj na parodontno stanje radnika u Kemijskom odjelu Brodogradilišta, pa to zahtijeva stalnu kontrolu tih ispitanika.

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Ključne riječi
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Uvod

Različite industrijske grane, tako i brodogradnja, koriste se ili proizvode, manje ili više kontaminirane tvari štetne za čovjekovo zdravlje. Zato se može očekivati da neke od njih utječu i na zdravlje usne šupljine, pa i na parodont. Prvi jasni znaci promjena u usnoj šupljini javljaju se na gingivi. Gingivne bolesti nastaju zbog patološkog djelovanja bakterija i virusa, ali mogu biti modificirane sistemskim stanjima, lijekovima i kemikalijama (1). Kemikalije koje potiču gingivitis najčešće sadržavaju metale

Introduction

Various industrial branches, including shipbuilding, use or produce more or less contaminated substances which are harmful to the health of man. Thus, it can be expected that some of them have an effect on the health of the oral cavity, including the periodontium. The first obvious signs of changes connected with the oral cavity are visible on the gingiva. Gingival diseases occur as a result of the pathological activity of bacteria and viruses, but can also be modified by systemic conditions, med-

koji se koriste i u brodogradnji. Za razvoj parodontne bolesti vrlo su često odgovorni mikroorganizmi, a najčešći rizični čimbenici su šećerna bolest, pušenje te posljednjih godina stres (2, 3). Ovisno o radnom mjestu, radnici u brodogradilištu izravno su u doticaju s mnogobrojnim organskim otapalima (na primjer trikloretilenom) i plinovima koji se rabe tijekom zavarivanja (acetilenom, kisikom, argonom, butanom). Isto su tako pod utjecajem plinova (CO_2, CO, NO_X, O_3) i dimova (željeznog oksida, silicijeva dioksida, titanova oksida i dr.) koji nastaju tijekom plinskoga i elektrolučnoga zavarivanja. Primjena različitih pomoćnih sredstava, kao što je boraks, a ranije i azbest, može također uzrokovati pare i dimove koji mogu neizravno oštetiti parodont i zube. Kod pripreme metalnih površina broda, prije nego što se nanesu organske boje, površina se pjeskari kako bi se skinula hrđa i postigao određen stupanj hrapavosti. Kao sredstvo koristi se silicijev dioksid ili sačma (čelične kuglice), a to također može utjecati na eroziju mekih i tvrdih zubnih tkiva usne šupljine radnika. Organska otapala koja se koriste kao sredstva za odmašćivanje metalne površine (na primjer trikloretilen, metilenklorid, toluen, m-ksilen, formaldehid i dr.) agresivne su kemikalije. Vrlo su otrovne i kancerogene, a mnoge i mutagene. Razaranjem dijelova gingive agresivnim otapalom, bakterije mogu brže uništavati tkivo parodonta (4).

Prema istraživanjima, argon je kancerogen, mutagen, korozivan i zapaljiv plin. Rad s tim plinom tijekom lučnog zavarivanja (tzv. zavarivanja plazmom) može uzrokovati različite patogene reakcije organizma. Pad imuniteta u cijelom organizmu omogućuje i razvoj bakterija u usnoj šupljini (5-7).

Zato je svrha rada bila ispitati stanje parodonta ispitanika koji duže od 15 godina rade u Kemijskom odjelu Brodogradilišta "Viktor Lenac" u Rijeci. Pregledom se željelo ustanoviti kolik je opseg i intezitet promjena na parodontu te naći pokazatelje upalnih simptoma i destrukcije tkiva povezanih sa štetnim utjecajem kemikalija koje se koriste u radu, u odnosu prema kontrolnoj skupini.

ications and chemicals (1). Chemicals which accelerate gingivitis most often contain metals which are used in shipbuilding. Micro-organisms are usually responsible for the development of periodontal diseases, and risk factors which are most frequently mentioned are sugar diabetes, smoking and more recently stress (2,3). Depending on the workplace employees in shipyards are in direct contact with a large number of organic solvents (e.g. trichlorethylene) and with gases which are used during welding (acetylene, oxygen, argon, butane). They are also under the influence of gases (CO_2, CO, NO_x, O_3) and smoke (iron oxide, silicon dioxide, titan dioxide etc.), which arise during gas and electro arc welding. The application of different auxiliary means, such as borax, and in previous years asbestos, can also lead to the occurrence of various vapours/steam and smoke which can indirectly cause damage to the periodontium and teeth. During preparation of the metal surfaces of a ship, prior to the application of organic paint, the surface is sanded in order to remove rust and achieve a certain degree of roughness, and as a means for its removal silicon dioxide or steel pellets are used which can also have an effect on erosion of soft and hard dental tissues of the oral cavity of employees. The organic solvents which are used as a means for degreasing the metal surface (e.g. trichlorethelene, methylchloride, toluene, m-xylene, formaldehide etc.) are aggressive chemicals. They are extremely poisonous, cancerogenic and many are mutagenic. Destruction of parts of the gingiva by an aggressive solvent accelerates activity of bacteria and destruction of the tissue of the periodontium (4).

According to investigations argon is a cancerogenic, mutagenic, corrosive and combustible gas. Work with argon during shipyard welding (so-called plasma welding) can cause different pathogenic reactions of the organism. Decrease in the organism's immunity facilitates the growth of bacteria in the oral cavity (5-7).

Thus the object of the study was to examine the condition of the periodontium in examinees working for longer than 15 years in the Chemistry Department of the "Viktor Lenac" Shipyard in Rijeka. The aim was to determine the extent and intensity of changes in the periodontium by means of an examination, using indicators of inflammatory symptoms and tissue destruction connected with the harmful effect of chemicals which are used during work in relation to a control group.

Ispitanici i postupci

U eksperimentalnoj skupini bila su 34 muškarca u dobi od 25 do 55 godina, a svi su proveli više od 15 godina radnog vijeka u Kemijskom odjelu Brodogradilišta. Kontrolna skupina sastojala se od 90 ispitanika približno iste dobi, ali nisu bili zaposleni u Brodogradilišta niti su bili u doticaju s antikorozivnim kemijskim tvarima, no žive na istom zemljopisnom području. Na temelju upitnika (Slika 1.) i kliničkog pregleda dobiveni su anamnestički podaci te koje su im loše navike – na primjer pu-

Material and Methods

The experimental group consisted of 34 men, aged 25 to 55 years, who had spent longer than 15 years of their working life in the Chemistry Department of the Shipyard. The control group consisted of 90 examinees of around the same age, who were not employees of the Shipyard and were not in contact with anticorrosive chemical factors, and who live in the same geographic area. On the basis of a questionnaire (Fig. 1) and clinical examination, history data were recorded and also bad habits, such as smoking,

1. ZUBNI PLAK/DENTAL PLAQUE	DA/YES	NE/NO
2. ZUBNI KAMENAC/DENTAL CALCULUS	0 1 2	NE/NO
3. KRVARENJE GINGIVE/GINGIVAL BLEEDING	1 2 3 4	NE/NO
4. DNEVNI BROJ PRANJA ZUBA/NUMBER O F DAILY TOOTHBRUSHING	1 2 3 4	NE/NO
5. RECESIJA GINGIVE/GINGIVAL RECESSION V O 16 11 21 26 46 41 31 36 O V	V = vestibularno/vestibular O = oralno/oral	
6. DUBINA SONDIRANJA/POCKET DEPTH V A O 16 11 21 26 46 41 31 36 O A V	V = vestibularno/vestibular A = aproksimalno/approximal O = oralno/oral	
7. GUBITAK PRIČVRSTKA/LOSS OF ATTACHMENT V O 16 11 21 26 46 41 31 36 O V	V= vestibularno/vestibular O= oralno/oral	
8. PIGMENTACIJA GINGIVE • GINGIVAL PIGMENTATION	DA	NE
9. PROMJENE NA ORALNOJ SLUZNICI/ORAL MUCOSA CHANGES	DA/YES	NE/NO
10. PUŠENJE CIGARETA/SMOKER	DA/YES	NE/NO

Slika 1. Upitnik o parodontnom stanju
Figure 1 Periodontal status questionnaire

še li - i podaci o stanju parodonta. Obje su skupine imale slične oralno-higijenske navike. Gingivitis je dijagnosticiran nalazom zubnog plaka i kamenca te krvarenja gingive, uz pomoć graduirane parodontne sonde referentnih zuba - gornjih i donjih molara te srednjih inciziva – PBI-ja (8). Zbog velikog gubitka tih zuba, u ispitivanje su uključeni i susjedni. Kronični parodontitis kod ispitanika temeljio se na nalazu parodontnih džepova, dubine sondiranja veće od 3 mm i više, te gubitka pričvrstka. Razina higijene usne šupljine određena aproksimativnim indeksom plaka – API-jem, struganjem plaka parodontnom sondom po zubu i obilježena je kao prisutan ili manjkav zubni plak (9).

Kod dijagnosticiranja recesije gingive najprije je vizualno procijenjeno postoji li ona ili ne. Mjerenja su obavljena u milimetrima pomoću graduirane (stupnjevane) parodontne sonde u gornjoj i donjoj čeljusti, na srednjim sjekutićima i prvim kutnjacima - vestibularno i oralno. Dubina sondiranja parodontnih džepova izmjerena je također u milimetrima na istim zubima i to aproksimalno - vestibularno i oralno. Gubitak pričvrstka ocijenjen je u milimetrima za srednje sjekutiće i prve kutnjake u donjoj i gornjoj čeljusti. Vrijednost njihova gubitka izračunala se zbrajanjem izmjera recesije gingive i dubine sondiranja s istih mjesta mjerenja.

Za statističku analizu koristila se programska potpora Statistica (StatsSoft, Inc.2005, date analysis Software system, version 7.1). Podaci su prikazani sljedećim parametrima deskriptivne statistike: aritmetičkom razinom, standardnom devijacijom, medijanom i interkvartilnim rasponom. Numerički podaci su testirani na normalnost raspodjele *Kolmogorov–Smirnov*im testom. S obzirom na to da kod većine varijabli nije ustanovljena normalna distribucija, primijenjen je neparametrijski statistički test za usporedbu dviju neovisnih skupina - *Mann–Whitneyjev U-* test. Rezultati su grafički prikazani uz pomoć *prikaza Box – plota*.

Rezultati

U ispitivanoj skupini bilo je oko 58 posto pušača, a u kontrolnoj 50 posto. Ustanovljeno je da su u objema skupinama oralno-higijenske navike bile slične te da većina ispitanika zube pere jedanput na dan. Vidljive naslage plaka te krvarenje gingive pronađeno je kod 94 posto ispitanika iz Kemijskoga odjela, a zubni kamenac kod njih 85 posto, što upućuje na to da većina radnika ima početne znakove parodontne bolesti. Promjene na oralnoj sluznici imalo je oko 3 posto ispitanika, i to u obli-

and data on the condition of the periodontium. Gingivitis was diagnosed by means of a finding of dental plaque and tartar and gingival bleeding by means of a graduated periodontal probe of referent teeth, maxillary and mandibular molars and central incisors - PBI (8). Because of the great loss of those teeth adjacent teeth were included in the examination. The presence of chronic periodontitis in examinees was based on a finding of periodontal pockets, probing depth of more than 3 mm and loss of attachment. The level of oral hygiene was determined by means of the Approximal Plaque Index – API – by scraping plaque with a periodontal probe at each tooth and recording the presence or absence of dental plaque (9).

For diagnosis of gingival recession visual assessment was first made of whether recession existed or not. Measurements were performed in millimetres by means of a graduated/calibrated periodontal probe in the maxillary and mandibular jaw on central incisors and first molars, vestibularly and orally. The probing depth of periodontal pockets was also measured in millimetres on the same teeth, approximally, vestibularly and orally. Loss of attachment was assessed for the central incisors and first molars in the mandibular and maxillary jaw in millimetres. The value of loss of attachment was calculated by summing up the measurements of gingival recession and the depth of probing from the same measurement sites.

For statistical analysis programme support Statistics was used (StatsSoft, Inc. 2005, data analysis Software system, version 7.1). Data are presented in the following parameters of descriptive statistics: arithmetic level, standard deviation, median and interquartal range. Numerical data were tested for normal distribution by Kolmogorov - Smirnov test. As normal distribution was not determined for the majority of the variables non-parametric statistical test was applied for comparison of two independent groups by Mann - Whitney U test. The results are presented graphically by means of Box - plot presentation.

Results

There were approximately 58% of smokers in the examined group and 50% in the control group. Oral hygiene habits were similar in both the examined groups, and the majority of the examinees brush their teeth once a day. Visible layers of dental plaque and gingival bleeding were found in 94% and dental tartar in 85% of the examinees from the Chemistry Department, which indicates that a large majority of the employees had initial signs of periodontal disease. Changes on the oral mucous membrane were visible in approximately

ku pigmentacije gingive i obloženog jezika kod njih 35 posto. U kontrolnoj skupini nalaz zubnog plaka bio je 78 posto, a zubnog kamenca 60 posto, što je statistički znatna razlika u odnosu prema ispitivanoj skupini (p<0,001). Određivanje recesije gingive pokazalo je najveću recesiju na donjim prvim incizivima oralno - 1,73 ± 1,80 mm u ispitivanoj skupini radnika Kemijskog odjela i 1,06 ± 1,20 mm u kontrolnoj skupini (Tablica 1.). Sondiranjem dubine parodontnih džepova i izračunom deskriptivnih statističkih vrijednosti, ustanovljeno je da je najveća dubina sondiranja kod donjih prvih lijevih sjekutića 3,06 ± 1,51 mm aproksimalno te 1,94 ± 1,15 mm oralno, što čini statistički znatnu razliku u odnosu prema nalazu kontrolne skupine (p < 0,001). Također je statistički znatna razlika u dubini sondiranja donjih prvih desnih inciziva - 3,09 ± 1,58 mm aproksimativno i 1,94 ± 1,07 mm oralno između ispitivane i kontrolne skupine (p < 0,001) (Tablica 2.). Na Tablici 3. je nalaz gubitka pričvrstka referentnih zuba za ispitivanu i kontrolnu skupinu. Najveći gubitak bio je na donjim prvim desnim incizivima i iznosio je 2,85 ± 2,45 mm vestibularno i 3,53 ± 2,62 mm oralno u ispitivanoj skupini. Nalaz gubitka pričvrstka na donjim prvim desnim incizivima bio je 1,64 ± 1,06 mm vestibularno i 1,42 ± 3% of the examinees in the form of gingival pigmentation and coated tongue in 35% of the examinees. In the control group a finding of dental plaque was found in 78%, dental tartar in 60% of examinees, which is a statistically significant difference in relation to the examined group (p<0.001). Determination of gingival recession showed most gingival recession on the lower first incisors orally 1.73 ± 1.80 mm in the examined group of employees from the Chemistry Department and 1.06 ± 1.20 mm in the control group (Table 1). By probing the depth of periodontal pockets and calculating descriptive statistical values it was established that the greatest probing depth in the lower first left incisors was 3.06 ± 1.51 mm approximally and 1.94 ± 1.15 mm orally, which is a statistically significant difference in relation to the finding in the control group p < 0.001. Statistically significant difference was also found for the depth of probing the lower first right incisors of 3.09 ± 1.58 mm approximally and 1.94 ± 1.07 mm orally between the examined and the control group p < 0.001 (Table 2). Table 3 shows the loss of attachment of referent teeth for the examined and the control group. The greatest loss of attachment was on the lower first right incisors and amounted to 2.85 ± 2.45 mm vestibularly and 3.53 ± 2.62 mm orally in the examined group. In the control group loss of attach-

Tablica 1. Klinički parametri – recesija gingive (mm)
Table 1 Clinical parameters – gingival recession (mm)

Zub • Tooth	Kontrolna skupina • Control group					Ispitivana skupina • Experimental group				
	Ploha • Surface	Sred. vr. • Mean	SD	Median	IR	Sred. vr. • Mean	SD	Median	IR	p
16	V	1,15	1,3	0	3	0,63	1,33	0	1	0,046
	O	0,47	0,99	0	0	0,47	1,31	0	0	0,494
11	V	0,23	0,66	0	0	0,18	0,46	0	0	0,859
	O	0,13	0,43	0	0	0,48	0,97	0	0	0,169
21	V	0,17	0,59	0	0	0,24	0,61	0	0	0,536
	O	0,7	0,25	0	0	0,39	0,89	0	0	0,14
26	V	0,85	1,46	0	2	0,59	1,16	0	1	0,477
	O	0,5	1,24	0	0	0,77	2,02	0	0	0,917
36	V	0,19	0,59	0	0	0,2	1,09	0	0	0,363
	O	0,2	1,09	0	0	0,2	1,09	0	0	0,302
31	V	0,65	0,95	0	1	0,88	1,21	0	2	0,564
	O	1,06	1,2	0,5	2	1,73	1,8	2	3	0,141
41	V	0,81	1,16	0	2	0,88	1,24	0	2	0,886
	O	1,03	1,08	0	0	1,73	1,77	2	3	0,111
46	V	0,16	0,88	0	0	0,13	0,56	0	0	0,564
	O	0	0	0	0	0,06	0,35	0	0	0,31

Legenda • Legend:
Sred. vr. – srednja vrijednost
SD – standardna devijacija • standard deviation
IR – interkvartilni raspon • interquartile range
V – vestibularno • vestibular
O – oralno • oral

Tablica 2. Dubina sondiranja parodontnih džepova (mm)
Table 2 Pocket probing depth (mm)

Zub • Tooth	Kontrolna skupina • Control group					Ispitivana skupina • Experimental group				
	Ploha • Surface	Sred. vr. • Mean	SD	Median	IR	Sred. vr. • Mean	SD	Median	IR	p
16	V	1,3	1,02	1	2	1,32	1,37	2	3	0,914
	A	2,24	1,71	3	3	2,16	2,28	3	4	0,783
	O	1,08	0,83	1	2	1,39	1,52	1	3	0,624
11	V	1,46	0,81	1	1	1,73	1,46	2	3	0,46
	A	2,31	1,13	2	1	2,88	2,2	3	3	0,8
	O	1,26	0,71	1	1	1,67	1,42	2	2	0,181
21	V	1,49	0,72	1	1	1,48	1,25	2	2	0,839
	A	2,38	1,02	2	1	2,61	2,07	3	4	0,333
	O	1,3	0,67	1	1	1,48	1,48	1	2	0,882
26	V	1,23	1,06	1	2	1,23	1,47	0	3	0,553
	A	2,12	1,64	3	3	1,94	2,17	0	4	0,576
	O	1,11	0,95	1	2	1,39	1,7	0	3	0,983
36	V	0,96	1,13	1	2	0,61	1,31	0	0	0,027
	A	1,49	1,65	1	3	0,82	1,7	0	0	0,019
	O	0,83	0,98	1	1	0,57	1,23	0	0	0,031
31	V	1,38	0,71	1	1	1,94	1,25	2	2	0,009
	A	2,22	0,91	2	1	3,06	1,51	3	2	<0,001
	O	1,28	0,61	1	1	1,94	1,15	2	2	<0,001
41	V	1,41	0,71	1	1	1,97	1,38	2	2	0,037
	A	2,22	0,93	2	1	3,09	1,58	3	2	<0,001
	O	1,3	0,62	1	1	1,94	1,07	2	2	<0,001
46	V	0,81	1,05	0	2	0,52	1,05	0	0	0,071
	A	1,3	1,62	0	3	0,83	1,73	0	0	0,061
	O	0,67	0,88	0	1	0,48	1,05	0	0	0,071

Legenda • Legend:
Sred. vr. – srednja vrijednost
SD – standardna devijacija • standard deviation
IR – interkvartilni raspon • interquartile range
V – vestibularno • vestibular
A – aproksimalno • approximal
O – oralno • oral

0,99 mm oralno u kontrolnoj skupini, što je statistički znatna razlika između ispitivane i kontrolne skupine ($p < 0,001$).

Nalaz gubitka pričvrstka na donjim prvim lijevim incizivima u ispitivanoj je skupini iznosio 2,85 ± 2,27 mm vestibularno (p=0,002) i 3,56 ± 2,67 mm oralno ($p < 0,001$), a u kontrolnoj je bio 1,54 ± 0,95 mm vestibularno i 1,63 ± 1,03 mm oralno, što je također statistički znatna razlika. Zatim, velika razlika u nalazu gubitka pričvrstka bila je i kod donjih lijevih prvih molara vestibularno i oralno (p=0,003).

Na Slikama 2. i 3. prikazan je gubitak pričvstka referentnih zuba, kako za kontrolnu tako i za ispitivanu skupinu i to *Box – Plot* grafičkim prikazom, a radi preglednosti uklonjene su pojedinačne vrijednosti nekih ispitanika koje su odstupale od većine mjerenja.

ment on the lower first right incisors was 1.64 ± 1.06 mm vestibularly and 1.42 ± 0.99 mm orally, which represents a statistically significant difference between the examined and the control group ($p < 0.001$).

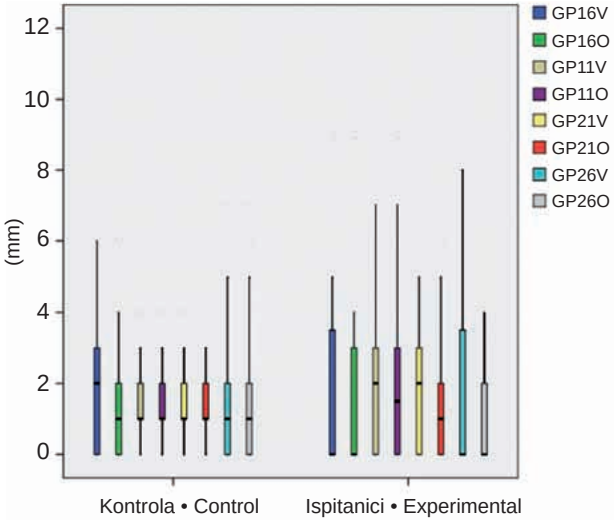
Loss of attachment on the lower first left incisors amounted to 2.85 ± 2.27 mm vestibularly (p<0.002) and 3.56 ± 2.67 mm orally ($p < 0.001$) in the examined group, while in the control group it amounted to 1.54 ± 0.95 mm vestibularly and 1.63 ± 1.03 mm orally, which is also a statistically significant finding. Furthermore, significant difference in the finding of loss of attachment was also found for the lower left first molars vestibularly and orally (p=0.003).

Figures 2 and 3 show loss of attachment of referent teeth for the control and the examined group, by Box - Plot graphic presentation. For the sake of easy reference certain values for some examinees, which deviated from the majority of measurements, were excluded.

Tablica 3. Gubitak pričvrstka (mm)
Table 3 Attachment loss (mm)

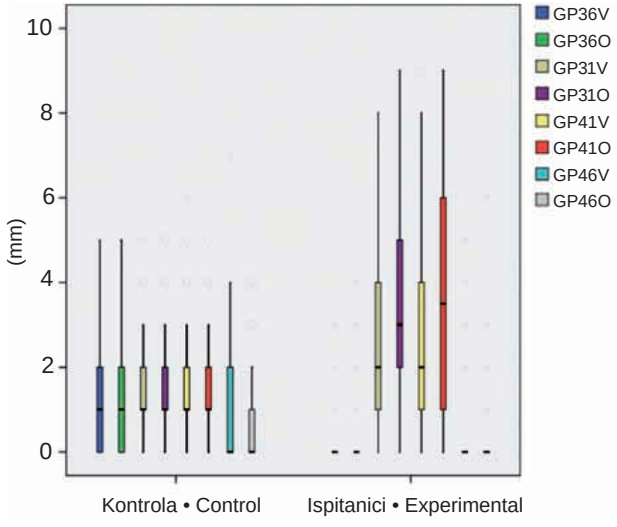
Zub • Tooth	Kontrolna skupina • Control group					Ispitivana skupina • Experimental group				
	Ploha • Surface	Sred. vr. • Mean	SD	Median	IR	Sred. vr. • Mean	SD	Median	IR	p
16	V	1,7	1,49	2	3	1,81	2,26	0	4	0,623
	O	1,29	1,21	1	2	1,69	2,4	0	3	0,783
11	V	1,52	0,89	1	1	1,91	1,69	2	3	0,373
	O	1,32	0,79	1	1	2,09	2,22	1,5	3	0,315
21	V	1,5	0,75	1	1	1,68	1,53	2	3	0,925
	O	1,32	0,71	1	1	1,82	2,23	1	2	0,728
26	V	1,48	1,57	1	2	1,84	2,29	0	4	0,953
	O	1,33	1,34	1	2	1,84	3	0	2	0,596
36	V	1,01	1,22	1	2	0,4	0,96	0	0	0,003
	O	0,89	1,07	1	2	0,4	1	0	0	0,003
31	V	1,54	0,95	1	1	2,85	2,27	2	3	0,002
	O	1,63	1,03	1	1	3,56	2,67	3	3	<0,001
41	V	1,64	1,06	1	1	2,85	2,45	2	3	0,014
	O	1,42	0,99	1	1	3,53	2,62	3,5	5	<0,001
46	V	0,91	1,27	0	2	0,58	1,31	0	0	0,039
	O	0,71	0,95	0	1	0,48	1,26	0	0	0,027

Legenda • Legend:
Sred. vr. – srednja vrijednost
SD – standardna devijacija • standard deviation
IR – interkvartilni raspon • interquartile range
V – vestibularno • vestibular
O – oralno • oral



Legenda • Legend:
GP – gubitak pričvrstka • Attachment loss
V – vestibularno/Vestibular
O – oralno/Oral

Slika 2. Gubitak pričvrstka u mm
Figure 2 Attachment loss in mm



Legenda • Legend:
GP – gubitak pričvrstka • Attachment loss
V – vestibularno/Vestibular
O – oralno/Oral

Slika 3. Gubitak pričvrstka u mm
Figure 3 Attachment loss in mm

Rasprava

Radnici koji rade u Kemijskom odjelu Brodogradilišta "Viktor Lenac" u Rijeci u najboljim su radnim godinama. Velika većina - oko 91 posto radi izravno s kemikalijama, a ostali ih rabe indirektno te tako dolaze u doticaj s vrlo agresivnim kemijskim tvarima koje mogu utjecati na njihovo zdravlje. Podaci u literaturi o utjecaju različitih profesionalnih toksičnih tvari na parodontno zdravlje, vrlo su oskudni. Osim štetnih utjecaja okoline, ne može se isključiti ni učinak pušenja i konzumiranja alkohola na stanje zuba i parodonta. Bergstrom i suradnici (10) te Al – Wahadni sa suradnicima (11) dokazali su da su dubina sondiranja parodontnih džepova i gubitak pričvrstka češći i teži kod pušača negoli nepušača. Također je ustanovljeno da pušači s parodontitisom lošije reagiraju na terapiju i prije gube zube zbog parodontne bolesti. Prestanak pušenja pozitivno djeluje na uspjeh terapije (12-16). Utjecaj pušenja i konzumiranje alkohola ispitivali su Horneker i njegovi suradnici (17) te Tezal sa suradnicima (18). Svi su upozorili na njihov štetan utjecaj i na osteoporozu, pa se može zaključiti da alkohol i pušenje izravno utječu na stanje zuba i parodonta. U našem ispitivanju pušilo je 58 posto ispitanika. U skladu s tim je i nalaz zubnog plaka i kamenca te upalne promjene gingive, što upućuje na to da oko 85 posto ispitanika ima početne znakove parodontne bolesti (17, 18). Susin i suradnici (19) dokazali su na populaciji Brazila znatno veći rizik od gubitka pričvrstka (> 5mm) kod pušača negoli nepušača.

Sondiranjem dubine parodontnih džepova, u našem je ispitivanju potvrđeno da postoji statistički znatna razlika u njihovoj dubini i gubitku pričvrstka u ispitivanoj skupini u odnosu prema kontrolnoj. Najveća dubina sondiranja bila je na prvim donjim sjekutićima i iznosila je 3,06 ± 1,51 mm, što čini veliku razliku u odnosu prema kontrolnoj skupini ($p < 0,001$). Najveći gubitak pričvrstka bio je također na donjim prvim sjekutićima 3,53 ± 2,62 mm, što čini statistički znatnu razliku u odnosu prema kontrolnoj skupini ($p < 0,001$). Velika razlika u nalazu gubitka pričvrstka bila je i kod donjih lijevih molara - $p < 0,001$. Taj nalaz govori o patološkim promjenama na parodontu, što kod oko 35 posto ispitanika upućuje na kronični parodontitis s promjenama na oralnoj sluznici u obliku obloženog jezika. Rezultate ispitivanja možemo usporediti s epidemiološkim istraživanjem dentalnog zdravlja kod ispitanika Brodogradilišta u Nagasakiju. Kliničkim oralnim pregledom procijenjeni su stupanj oralne higijene, krvarenje pri sondiranju te parodontni džepovi pomoću epidemi-

Discussion

Employees in the Chemistry Department of the "Viktor Lenac" Shipyard in Rijeka are in their most productive working years. The large majority of employees, around 91%, work in direct contact with chemicals and the others use them indirectly, and thus they are all in contact with very aggressive chemical substances which can have an effect on their health. Data in the literature on the effect of various occupational toxic substances on periodontal health are extremely scarce. Apart from the harmful influence of the environment the effect of smoking and alcohol consumption on the condition of the teeth and periodontium cannot be excluded. Bergstrom et al (10) and Al-Wahadni et al (11) demonstrated that the probing depth of periodontal pockets and loss of attachment are more frequent and severe in smokers than non-smokers. It was also determined that smokers with periodontitis react poorly to periodontal therapy and lose teeth earlier due to periodontal disease. Giving up smoking has a positive effect on the success of periodontal therapy (12-16). The effect of smoking and alcohol consumption was investigated by Horneker et al (17) and Tezal et al (18), who showed their harmful effect on the occurrence of osteoporosis and it can therefore be concluded that alcohol and smoking have a direct effect on the condition of teeth and the periodontium. In our examination 58% of the examinees were smokers, and accordingly the finding of dental plaque and tartar, and inflammatory gingival changes indicates that around 85% of the examinees have initial signs of periodontal disease. Susin et al (19) demonstrated significantly greater risk of loss of attachment (> 5mm) in smokers than non-smokers in the population of Brazil.

By probing the depth of periodontal pockets we determined statistically significant difference in the depth of periodontal pockets and loss of attachment in the examined group in relation to the control group. The greatest probing depth was found on the first lower incisors and amounted to 3.06 ± 1.51 mm, which is a significant difference in relation to the control group, $p < 0.001$. The greatest loss of attachment was also on the lower first incisors 3.53 ± 2.62 mm, which is a statistically significant difference in relation to the control group ($p < 0.001$). Significant difference in the finding of loss of attachment was also found for the lower left molars $p < 0.001$). This finding suggests pathological changes on the periodontium, which indicate chronic periodontitis, accompanied by changes on the oral mu-

ološkog indeksa CPITN-a. Nakon provedenog programa za profilaksu parodontnih bolesti, smanjio se postotak zuba s parodontnim džepovima dubine 4 do 5 mm i poboljšalo se stanje svih zuba u ispitivanoj skupini (20). Podaci u literaturi, o utjecaju različitih profesionalnih toksičnih tvari na parodontno zdravlje, vrlo su oskudni. Ispitivanja štetnog utjecaja azbestnih čestica na opće zdravlje ljudi, posebice onih koji od mladosti rade u toj industriji, proteklih su godina bila češća negoli danas kada je taj materijal zamijenjen drugim manje štetnim tvarima (21,22). Međunarodne udruge i propisi u vezi s tim problemima navode zakonom kontrolirano izlaganje utjecaju para ili aerosoli u radnim prostorijama, posebice u brodogradilištu, kako se ne bi oštetilo zdravlje tijekom svakodnevnoga rada (5, 23).

Promjene na parodontu zaposlenika u Kemijskom odjelu Brodogradilišta "Viktor Lenac" u skladu su s okruženjem u kojem rade. Zato je potrebno organizirati stalne sistematske preglede i izobrazbu o pravilnom održavanju oralne higijene, štetnosti pušenja te kemijskih tvari i plinova i njihovu utjecaju kako na opće tako i na parodontno zdravlje radnika. Zdravstvenu skrb o radnicima svakako treba obavljati ovisno o ekološkim uvjetima u kojima rade, ali nužno je usavršiti i tehnološke procese rada sa što manje štetnih učinaka.

Na temelju dobivenih rezultata zaključujemo da dugotrajno djelovanje antikorozijskih kemijskih tvari te loše oralno-higijenske navike i specifični uvjeti rada, imaju štetan utjecaj na zdravlje parodonta ispitivane skupine.

cous membrane in the form of a coated tongue in around 35% of examinees. The results of this examination can be compared with an epidemiological investigation of dental health in examinees from a Shipyard in Nagasaki. A clinical oral examination was used to evaluate the degree of oral hygiene, bleeding during probing and the presence of periodontal pockets by means of epidemiological index – CPITN. After carrying out a programme for prophylaxis of periodontal diseases the percentage of teeth with periodontal pockets of 4-5 mm decreased and the periodontal condition of all teeth improved in the examined group (20).

A study by Werkmeister and Ruppe (21), published in 1990, on the frequency of damages of dental, oral and jaw areas among workers exposed to substances in chemical industry can be compared to our study. They found greater frequency of the dental damage, higher plaque and calculus scores, greater inflammation, and deeper periodontal pockets in subjects, when compared to the controls. There was statistically significant correlation between the inflammatory changes on the periodontium and strength and duration of the exposure to the chemical substances.

Data in the literature on the effect of different occupational toxic substances on periodontal health are extremely scarce. Investigations into the harmful effect of asbestos particles on general health, particularly of workers in the industry, were more frequent years ago due to the fact that asbestos was later replaced with other less harmful substances (21,22). International associations and regulations which investigate these problems stipulate legally controlled exposure to the effect of vapour/steam or aerosols in the working environment, particularly in shipyards, in order to avoid harmful effects on health during daily work (5,23).

Changes on the periodontium of employees in the Chemistry Department of the "Viktor Lenac" Shipyard reflect the environment in which they work. Thus, it is necessary to carry out regular systematic examinations and education on the correct maintenance of oral hygiene and harmful effect of smoking, chemical substances and gases, both on the general and periodontal health of employees. Health care of employees should be carried out in accordance with the ecological conditions in which they work and technological processes should also be improved in order to decrease harmful pollutants.

This research has established that almost 85% of the subjects have some signs of periodontal dis-

ease. The changes on the oral mucosa, such as pigmentations, were observed in 3% of the subjects, while tongue deposits were observed in 35% of the subjects. The deepest periodontal pockets were noted at mandibular incisors, and the results were statistically significant when compared to the controls ($p<0.001$)

On the basis of the results obtained it can be concluded that the long-term effects of anticorrosive chemical substances, together with poor oral hygiene habits and specific working conditions, have a harmful effect on the health of the periodontium in the examined group of employees.

Abstract

The object/purpose of this investigation was to examine the condition of the periodontium in employees working in the Chemistry Department of the Shipyard in Rijeka. Thirty-four employees participated in the examination, aged 25 to 55 years, the majority of which work in direct contact with chemicals. The control group consisted of 90 examinees/subjects of the same age, not employed in the Chemistry Department of the Shipyard. The presence of periodontal changes in the examinees were based on a finding of gingival bleeding, dental plaque and tartar, probing depth of 3 mm and more and loss of attachment. Non-parametric Mann-Whitney U test was used for comparison of two independent groups, the examinees and a control group. The results of the examination showed inflammatory gingival changes in 85% of the employees. In the examined group the greatest probing depth of periodontal pockets was in the lower central incisors, 3.06 ± 1.51 mm and 3.09 ± 1.58 mm, which was statistically significantly different in relation to the control group ($p < 0.001$). The greatest loss of attachment in the examined group was also in the lower central incisors, and amounted to 3.56 ± 2.67 mm and 3.53 ± 2.62, which differed significantly from the findings in examinees in the control group ($p < 0.001$). On the basis of the findings of inflammatory changes in the periodontium and the presence of probing depth and loss of attachment, indicating chronic periodontitis in the majority of examinees compared to the control group, it can be said that the specific environment has a negative effect on the periodontal condition of employees in the Chemistry Department of the Shipyard, which requires regular control of the periodontal condition of these employees.

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