

Primljen/ Received on 8.7.2011.  
Revidiran/ Revised on 13.8.2011.  
Prihvaćen/ Accepted on 17.10.2011.

KLINIČKI RAD  
CLINICAL STUDY  
doi: 10.5937/asn11640784K

## KORELACIJA PREVALENCIJE GINGIVITISA KOD DECE RAZLIČITE POLNE I UZRASNE ZASTUPLJENOSTI

### CORRELATION OF THE PREVALENCE OF GINGIVITIS IN CHILDREN OF DIFFERENT AGE AND GENDER

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#### Apstrakt

**Uvod.** Kako je gingivitis uvod u periodontitis, sa rezultujućim kobnim ishodom i gubitkom zuba, on predstavlja veliki socijalni, društveni i medicinski problem.

**Cilj rada** bio je utvrditi prevalenciju gingivitisa kod dece, kao i vezu između gingivalne inflamacije i plak akumulacije.

**Materijal i metod rada.** Klinički pregled gingive, kao i plak detekcija, rađeni su kod dece uzrasta 12-18 god. Za procenu stanja gingive korišćen je gingivalni indeks inflamacije po Cowell-u (GI), dok se za detekciju dentalnog plaka-biofilma koristio plak indeks (PI) po Silness Loeu. Reprezentativni uzorak činilo je 86 ispitanika.

**Rezultati.** Od ukupnog broja pregledanih ispitanika, 28(32,6%) ispitanika bilo je sa zdravom gingivom. U grupi ispitanika sa izmenjenom gingivom - 50(58,1%) ispitanika imalo je lakši oblik promena na gingivi; 8 (9,3%) ispitanika imalo je teži oblik obolele gingive. Svi pregledani ispitanici imali su PI>0. Najviše ispitanika, 47,7%, imalo je PI u rasponu 1-2; 36,0% ispitanika imalo je PI 2-3, a najmanje, tj. 16,3% ispitanika bilo je sa PI 0-1.

**Zaključak.** Analizom statističkih podataka može se zaključiti da je PI direktno proporcionalan GI-u. Srednje vrednosti PI od 1,757 za ispitivanu populaciju poklapaju se sa srednjim vrednostima GI od 1,894, što odgovara nađenom stanju gingive.

**Ključne reči:** gingivitis, dentalni plak-biofilm, etiologija gingivitisa

#### Uvod

Inflamatio gingivae - gingivitis je oboljenje gingive multikauzalne etiologije, gde dominantnu ulogu u nastanku bolesti ima infektivna etiologija. Gingivitis je veoma rasprostra-

#### Abstract

**Introduction.** As gingivitis precedes periodontitis with the results poor outcome and loss of teeth, it poses a serious social and medical problem.

**Aim.** Our aim was to assess the prevalence of gingivitis in children, and to establish the association of gingival inflammation with accumulation of dental plaque.

**Methods.** Clinical examinations of the gingiva and detection of dental plaque were performed in children aged 12-18 years. The Cowell Index (CI) of gingival inflammation was used to assess the gingival status, while the plaque index (PI) by Silness-Löe was used to detect dental plaque (biofilm). Our representative sample consisted of 86 examinees.

**Results.** Out of the total number of examined children, there were 28 children (32.6%) with healthy gingiva. In the group of those with altered gingiva, 50 children (58.1%) had some milder forms of gingival change; 8 children (9.3%) had more severe gingival changes. All the examined children had their PI>0. Most children (47.7%) had PI in the range 1-2; 36.0% children had PI in the range 2-3, and there were only 16.3% of children with PI 0-1.

**Conclusion.** The analysis of statistical data suggested that PI was directly proportional to GI. The median values of PI of 1.757 for the studied population correlated with the median values of GI of 1.894, which corresponded to the perceived gingival status.

**Key words:** gingivitis, dental plaque - biofilm, etiology of gingivitis

#### Introduction

Inflamatio gingivae - gingivitis - is a gingival disease of multicausal etiology, with infection playing the dominant role. Gingivitis is a widespread human disease, occurring even in

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njena bolest kod čoveka, a javlja se i kod dece najmlađeg uzrasta<sup>1</sup>. Predstavlja uvod u periodontitis, ali ne znači da će svaka forma gingivitisa preći u periodontitis, što zavisi od brojnih faktora.

Infektivna etiologija dovodi do interakcije domaćin-patogen, što rezultira, najčešće, ali ne i uvek, u korist domaćina<sup>2</sup>. Postoje osobe koje su „visoko suspektne“ ili „rizične“ na pojavu i dalju progresiju bolesti gingive. Ovaj termin može govoriti o aspektima životnog stila, faktorima sredine i urođenim karakteristikama. U proučavanju faktora rizika važno je identifikovati jedan ili nekoliko individualnih faktora koji su u vezi sa ispitivanom bolešću. U slučaju multipnih faktora, kao model može poslužiti kombinacija faktora koji čine da se napravi razlika između osoba sa visokim i niskim rizikom za nastanak gingivitisa<sup>3</sup>. Kada je počela bolest, gingiva može biti bez vizuelno pratećih znakova koji bi karakterisali gingivitis. Prisutno krvarenje iz sulkusne regije na blagu provokaciju, tj. sondiranje, predstavlja prvi simptom oboljenja. Dentalni plak-biofilm obiluje masom bakterija koje će ispoljiti svoja negativna svojstva u jednom trenutku, što je u direktnoj zavisnosti od lokalizacije i mikrobnog sastava dentalnog plaka. Pri tom, ne sme se zaboraviti da su broj i virulentnost mikroorganizama, kao i imunološki status domaćina, od presudnog značaja u kom pravcu će bolest krenuti, ili će se zaustaviti na tom nivou.

Mnogobrojne systemske bolesti, kao što su infekcije herpes virusom, krvne diskrazije (leukemije), autoimune bolesti (pemfigus), bolesti metabolizma i dr. manifestuju se na gingivi sa karakterističnim promenama koje prate gingivitis. Pojedini lekovi, kao antiholinergici, antihistaminici, antidepresivi, dovode do patoloških promena na gingivi sa karakterističnim lezijama<sup>4</sup>.

Brojnim preventivnim i profilaktičkim merama i postupcima treba sprečiti nastanak bolesti ili suzbiti dalju progresiju bolesti.

Webster-ov rečnik definiše preventivu sa krajnjim ciljem da spreči nešto što bi moglo da se desi ili praveći nešto nemogućim da se desi. Termin „preventivna periodontika“ obuhvata širok dijapazon preventivnih mera: od zdravstvenog vaspitanja, lečenja, rehabilitacije, do specifične zaštite<sup>5</sup>.

youngest children<sup>1</sup>. The disease represents an introduction into periodontitis, which does not mean that any form of gingivitis will necessarily develop into periodontitis; that depends on a multitude of factors.

Infectious etiology implies that the interaction host-pathogen occurs, most commonly (but not always) to the benefit of the host<sup>2</sup>. There are individuals who are „highly suspect“ or with „risk“ of occurrence and progression of the disease. The term can describe the aspects of a life style, environmental factors, and hereditary traits. In any study of risk factors, it is vital to identify one or more individual factors associated with the disease. In case of multifactoriality, the combination of factors which differentiate those with high from those with low risk of gingivitis may serve as a model<sup>3</sup>. The disease in its initial stages may not be accompanied by visual signs characterizing gingivitis. Bleeding from the sulcus region after slight provocation, i.e. probing, is the first symptom of the disease. Dental plaque – biofilm – abounds with bacteria which will exert their detrimental effects at one moment, which directly depends on the site and microbial composition of dental plaque. It should be kept in mind that the number and virulence of microorganisms, as well as the immune status of the host are of crucial importance regarding further course of the disease.

Numerous systemic diseases, such as herpes virus infection, blood dyscrasias (leukemias), autoimmune diseases (pemphigus), metabolic diseases, etc. produce gingival manifestations characteristic of gingivitis. Some drugs, such as anticholinergics, antihistaminics, antidepressants, lead to pathological changes in the gingiva, with characteristic lesions<sup>4</sup>.

Numerous prevention and prophylactic measures and procedures should serve to prevent the disease or suppress its further progression.

The Webster Dictionary defines prevention as the measure taken to keep something from happening or make it impossible. The term „preventive periodontics“ contains a wide range of prevention measures, from health education, treatment, rehabilitation to specific protection<sup>5</sup>.

## **Cilj**

Cilj rada bio je utvrditi prevalenciju gingivitisa kod dece različitog uzrasta i pola, kao i korelaciju gingivalne inflamacije i plak akumulacije.

## **Metode**

Klinički pregledi gingive kod dece obavljani su u Osnovnoj školi „Ivan Goran Kovačić“ u Niškoj Banji i Srednjoj ekonomskoj školi u Nišu. Pregledom su obuhvaćeni ispitanici uzrasta 12-18 god. Reprezentativni uzorak činilo je 86 ispitanika: 44 ispitanika iz osnovne škole i 42 ispitanika iz srednje škole. Po starosnoj zastupljenosti bilo je 22 ispitanika uzrasta od 12 godina (10 devojčica i 12 dečaka), 22 ispitanika bilo je uzrasta od 14 godina (10 devojčica i 12 dečaka). Broj ispitanika od 16 godina bio je 21 (12 devojčica i 9 dečaka), a u uzrasnoj grupi od 18 godina bio je 21 ispitanik (12 devojčica i 9 dečaka).

Za procenu stanja gingive korišćen je gingivalni indeks (GI) - indeks inflamacije gingive po Cowell-u. Detekcija dentalnog plaka – plak indeks (PI), rađena je Silness-Loe-ovom metodom. Određivana je količina dentalnog plaka stomatološkom sondom. Pre ispitivanja, ispitanik je snažno ispirao usta vodom, kako bi se uklonila materija alba i ostaci hrane sa zuba. Ispitivani su gingivalni delovi vestibularne, oralne, mezijalne i distalne strane svih prisutnih zuba. Plak indeks, kao i gingivalni indeks, izraženi su numerički.

Prilikom formiranja grupa vodilo se računa da ne postoje značajne razlike u sastavu grupa, ni u pogledu polne, ni u pogledu starosne zastupljenosti, kako bi se na osnovu dobijenih rezultata mogli doneti validni zaključci. Ispitanici su odabrani metodom slučajnog izbora.

## **Rezultati**

Struktura ispitanika po polu i uzrastu data je na tabeli 1.

Značajne razlike u sastavu grupa ne postoje, ni u pogledu starosne, ni u pogledu polne zastupljenosti.

Kod svih ispitanika određen je gingivalni indeks /GI/ i plak indeks /PI/. Od ukupnog broja pregledanih ispitanika, 28(32,6%) ispitanika

## **Aim**

The aim of the paper was to establish the prevalence of gingivitis in children of different age and gender, and the correlation of gingival inflammation with plaque accumulation.

## **Methods**

Clinical examination of the gingiva in children were performed in the elementary school „Ivan Goran Kovačić“ in Niška Banja and Secondary School of Economics in Niš. The examination involved children aged 12-18 years. The representative sample consisted of 86 examinees: 44 from primary and 42 from secondary school. There were 22 children aged 12 years (10 girls and 12 boys) and 22 children aged 14 years (10 girls and 12 boys). There were 21 children aged 16 years (12 girls and 9 boys), and 21 children aged 18 years (12 girls and 9 boys).

The gingival index (GI) by Cowell was used to assess the gingival status – index of inflammation of the gingiva. Dental plaque detection was done using the plaque index (PI) by Silness-Löe. Dental plaque amount was determined by dental probe. Children were asked to wash out their mouth thoroughly before the examination in order to remove the materia alba and food debris from the teeth. Gingival portions of the vestibular, oral, mesial, and distal sides of all teeth were examined. Both PI and GI were expressed numerically.

Group forming was done taking care that there were no significant differences in the group composition regarding age or gender in order to draw valid conclusions from the obtained results. The examinees were randomly chosen.

## **Results**

The structure of the examinees by age and gender was presented in Table 1.

There were no significant differences in the composition of groups regarding both age and gender.

GI and PI were determined in all children. Out of the total number of children, 28 children (32.6%) had healthy gingiva („Healthy“). In the group of those with changed gingiva („Affect-

Tabela 1. Struktura ispitanika po polu i uzrastu  
 Table 1. Structure of examinees by gender and age

Godine Years	Dečaci Boys		Devojčice Girls		Ukupno Total	
	Broj №	%	Broj №	%	Broj №	%
12	12	28,6	10	22,7	22	25,6
14	12	28,6	10	22,7	22	25,6
16	9	21,4	12	27,3	21	24,4
18	9	21,4	12	27,3	21	24,4
Ukupno Total	42	49	44	51	86	100

bilo je sa zdravom gingivom (zdravi). U grupi ispitanika sa izmenjenom gingivom (bolesni), 50 (58,1%) je imalo lakši oblik promena na gingivi, tj. GI se kretao u opsegu od 1-2, dok je 8 (9,3%) ispitanika imalo teži oblik obolele gingive, tj. GI je bio veći od 2. Nijedan ispitanik nije imao GI od 0-1.

U tabeli 2. prikazana je rasprostranjenost GI kod dece različite polnosti. Odnos ispitanika sa zdravom gingivom, obolelom sa GI od 1-2 i obolelom sa GI od 2-3 i kod dečaka i kod devojčica je sličan odnosu za celu ispitivanu populaciju. Rezultati pokazuju da nema bitnijih razlika između dečaka i devojčica, sem što je kod dečaka nešto veći procenat sa zdravom gingivom i manji procenat sa GI od 1-2.

GI ispitanika različite uzrasne zastupljenosti prikazan je u tabeli 3.

Procenat ispitanika sa zdravom gingivom opada od 12. do 14. godine, a onda raste kod 16-togodišnjaka i ulazi u saturaciju (bez promena). Procenat ispitanika sa obolelom gingivom, tj. GI od 1-2 raste kod dece od 14 godina, a zatim kod dece od 16 godina značajno opada sa istovremenim pojavljivanjem ispitanika sa GI od 2-3. Zapaženo je da u 12. i u 14. godini nijedan ispitanik nije imao GI od 2-3, dok je procenat

ed“) 50 children (58.1%) had milder gingival changes, i.e. their GI ranged from 1-2, while 8 children (9.3%) had more severe gingival changes (GI>2). None of the children had GI 0-1.

Table 2 presents the distribution of GI in children of different gender. The ratio of examinees with healthy gingiva, affected with GI 1-2, and affected with GI 2-3, both in boys and girls, was similar for the whole studied population. The results demonstrate that there were no essential differences between boys and girls, except for the fact that in boys the percentage of those with healthy gingiva was somewhat higher and the percentage of those with GI 1-2 somewhat lower.

Table 3 shows the GI of children of different ages.

The percentage of those with healthy gingiva drops from 12 to 14 years of life, and then rises in 16 years old children and enters saturation („no change“). The percentage of those with affected gingiva with GI 1-2 increases in 14 years old children, and then drops at the age of 16 with those with GI 2-3 emerging simultaneously. It was noted that at 12 and 14 years of age none of the examinees had GI 2-3, while

Tabela 2. Gingivalni indeks kod ispitivane dece u zavisnosti od pola  
Table 2. Gingival index in studied children by gender

Pol Gender	GI							
	Zdrava gingiva Healthy gingiva		0-1		1-2		2-3	
Dečaci Boys	15	35,7%	-	-	24	57,1%	3	9,3%
Devojčice Girls	13	29,5%	-	-	26	59,1%	5	9,3%
Ukupno Total	28	32,6%	-	-	50	58,1%	8	9,3%

Tabela 3. Gingivalni indeks kod ispitivane dece po uzrasnoj zastupljenosti  
Table 3. Gingival index in studied children by age

Uzrast Age	GI							
	Zdravi Healthy		0-1		1-2		2-3	
12	7	31,8%	-	-	15	68,2%	-	-
14	5	22,7%	-	-	17	77,3%	-	-
16	8	38,1%	-	-	9	42,9%	4	19,0%
18	8	38,1%	-	-	9	42,9%	4	19,0%

ispitanika sa zdravom gingivom, sa GI od 1-2 i GI od 2-3 isti za uzrast od 16 i od 18 godina. Sa 16 godina promene ulaze u saturaciju.

Analiziranjem prevalencije GI kod dečaka u zavisnosti od uzrasta dobijeni su sledeći podaci: procenat ispitivane dece sa klinički zdravom gingivom opada u uzrastu 12-14 godina, dok se sa uzrastom procenat povećava. Zapaženo je da se u 16. godini pojavljuje i određen broj ispitanika sa obolelom gingivom, tj. sa GI većim

the percentages of those with healthy gingiva, with GI 1-2 and GI 2-3, were the same for the ages of 16 and 18 years. With 16 years of age the changes entered the saturation stage.

The analysis of prevalence of GI in boys related to their age produced the following results: the percentage of those with clinically healthy gingiva dropped in the period 12-14 years of age, while in more advanced ages the percentage increased. It was noted that at 16 years of



od 2. U grupi dece od 18 godina se procenat ispitanika sa GI od 2-3 se smanjuje.

Kod devojčica je situacija slična kao kod dečaka, sa nekim minimalnim razlikama. Naime, u 14. godini opada procenat ispitivanih devojčica sa zdravom gingivom, a raste procenat sa obolelom gingivom. U grupi dece od 14 godina ne nalazimo ispitanike sa GI većim od 2, ali je veći procenat sa GI od 1-2. U grupi od 16 godina procenat ispitanika sa obolelom gingivom se smanjuje, ali se pojavljuje GI > 2. U grupi dece od 18 godina ponovo dolazi do porasta ispitanika sa GI<2 i GI >2. Kod određenog broja ispitanika bolest je progredirala, a pojavili su se i novi ispitanici sa obolelom gingivom.

Na slici 1 prikazano je kako se menja procenat ispitanika sa zdravom gingivom u odnosu na uzrasnu i polnu zastupljenost. Zapaža se da kod dečaka sa odrastanjem ova pojava ima trend porasta, dok kod devojčica vrednosti osciluju oko neke srednje vrednosti. Gledano na celu ispitivanu populaciju, veći je procenat dečaka sa zdravom gingivom u odnosu na devojčice.

Analiziranjem vrednosti PI, za ispitivanu populaciju dobijeni su sledeći rezultati: svi pregledani ispitanici imali su PI>0. Najviše ispitanika, 47,7%, imalo je PI od 1-2, 36% ispitanika imalo je PI od 2-3, a 16,3% ispitanika imalo je PI od 0-1.

Odnos između ispitanika sa PI od 1-2 i PI od 2-3 i kod devojčica i kod dečaka sličan je odnosu koji je dobijen posmatranjem cele populacije koja je ispitivana. Zapaženo je da je kod devojčica u odnosu na dečake nešto veći

age, the number of children with affected gingiva (GI>2) emerged. The percentage of those with GI 2-3 dropped in 18 year olds.

Among girls the situation was similar, with some minor differences. In 14 year olds, the percentage of those with healthy gingiva dropped, with the percentage of those with affected gingiva rising. At the age of 14, we did not identify children with GI>2, but the percentage of those with GI 1-2 was higher. At 16 years of age, the percentage of those with affected gingiva was lower, but GI>2 appeared. At 18 years of age, there were again rises of those with GI<2 and GI>2. In some of the examinees the disease progressed and new cases of affected gingiva appeared.

Figure 1 shows the changing percentages of those with healthy gingiva related to age and gender factors. In boys, the phenomenon had a growing tendency, while in girls the values oscillate around the median value. In the total studied population, the percentage of boys with healthy gingiva was higher compared to girls.

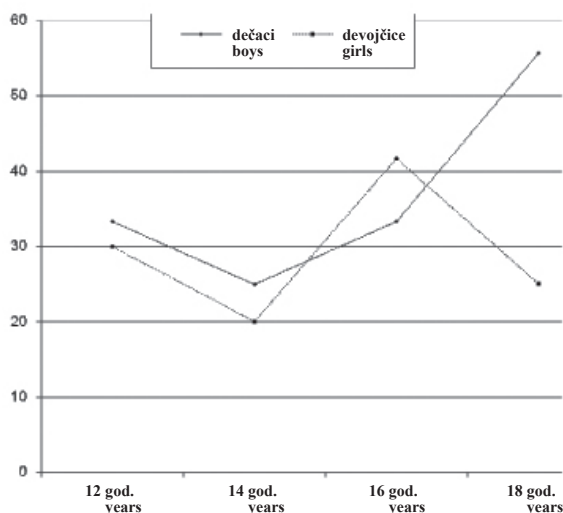
The following results were obtained by the analysis of PI values for the studied population: all studied children had PI>0; most children (47.7%) had PI 1-2; 36.0% children had PI 2-3; and 16.3% had PI 0-1.

The ratio of the examinees with PI 1-2 and PI 2-3 for both genders was similar to the ratio for the whole observed population. It was noted that there were slightly more girls with PI 1-2 compared to boys, and less of those with PI 2-3.

The analysis of PI distribution depending on age showed that at 12 years of age the numbers of those with PI 1-2 and PI 2-3 were equal. At the age of 14 the children with PI 0-1 were most pronounced, and the percentage of these rose with advancing age. It was also noted that the percentage of children with PI 2-3 at the age of 16 was markedly lower. The percentage of children with PI 1-2 was the one least affected by age (Figure 2).

The results of PI for girls match the results for the whole studied population. In girls, PI 0-1 was found already at the age of 14, and PI values rose with age for these children.

In boys, higher PI value at the age of 12 was observed, with subsequent abrupt drop, mostly at the age of 16 years. Later, after 16 years of life, PI dropped slower. In boys, the median PI value dropped for the whole studied popula-



Sl. 1. Prevalenca zdravih u odnosu na polnu i uzrasnu zastupljenost  
Fig. 1. Prevalence of healthy individuals by gender and age

procenat ispitanika sa PI od 1-2, a manji procenat ispitanika sa PI od 2-3.

Analiziranjem rezultata rasprostranjenosti PI u zavisnosti od uzrasta uočeno je da su u grupi dece od 12 godina podjednako zastupljeni ispitanici sa PI od 1-2 i PI od 2-3. U grupi dece od 14 godina zapažaju se ispitanici sa PI od 0-1. Procenat ovih ispitanika raste sa uzrastom. Uočava se da procenat ispitanika sa PI od 2-3 u 16. godini značajno opada. Procenat ispitanika sa PI od 1-2 se sa uzrastom najmanje menja (Sl. 2).

Rezultati PI za devojčice poklapaju se sa rezultatima cele populacije. Kod devojčica se već u 14. godini nalazi PI od 0-1, dok vrednosti PI za ove ispitanike raste sa uzrastom.

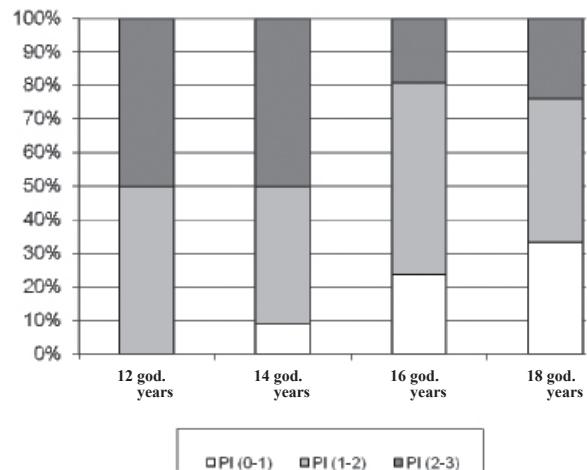
Kod dečaka se zapaža viša vrednost PI u 12. godini, da bi sa uzrastom došlo do naglog pada, uglavnom do 16. godine. Kasnije, posle 16. godine, pad PI je manji. Kod dečaka se smanjuje srednja vrednost PI cele ispitivane populacije, ali se smanjuje i srednja vrednost PI u strukturi: PI od 0-1, PI od 1-2 i PI od 2-3.

Takođe, vrednost PI ispitanika od 2-3 prisutan je kod većeg broja devojčica u odnosu na dečake za svaku starosnu grupu. Srednja vrednost PI za sve ispitanike iznosila je 1,757. Vrednosti PI za ispitanike različitog uzrasta i pola prikazane su na Sl. 3.

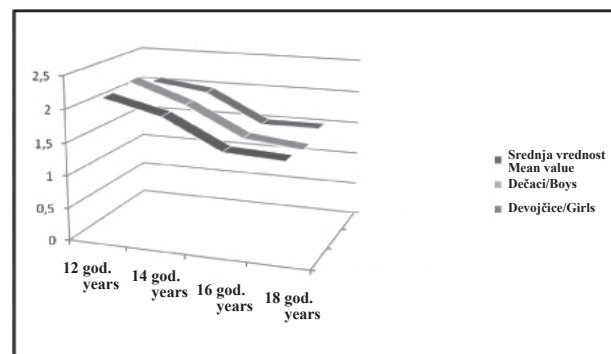
Vrednosti GI se sa uzrastom menjaju, tj. dolazi do njegovog povećanja. Najveći porast je u periodu između 12. i 14. godine, dok od 16. do 18. godine je minimalno promenjen, takoreći zanemarljiv. Kod devojčica je situacija slična. Razlika je jedino zapažena u periodu od 16. do 18. godine, gde dolazi do pada vrednosti GI.

Kod dečaka se u periodu od 12. do 16. godine zapaža zanemarljiv porast vrednosti GI, da bi od 16. do 18. bio izraženiji. Međutim, sve ove promene su tako male, da se može reći da je vrednost skoro konstantna (promene vrednosti GI od 12. do 18. godine su manje od 10%) (Sl. 4).

Upoređivanjem vrednosti GI za devojčice i dečake za pojedina godišta, dolazi se do podatka da se jedino u 12. godini javlja statistička značajnost ( $p < 0,005$ ). Upoređivanjem vrednosti GI za devojčice za pojedina godišta zapaža se da između 12. i 14. između 12. i 16. i 12. i 18. godine postoji statistička značajnost ( $p < 0,005$ ). Kod dečaka se ne zapaža statistička značajnost.



Sl. 2. Rasprostranjenost plak indeksa po uzrastu  
Fig. 2. Plaque index distribution by age



Sl. 3. Vrednosti plak indeksa za ispitanike  
Fig. 3. Plaque index values in studied children

tion, but the individual median PI values also dropped: PI 0-1, PI 1-2, and PI 2-3.

Moreover, PI 2-3 was present in a larger number of girls compared to boys in each of the age groups. Median PI value for all the examinees was 1.757. PI values obtained for the children of different ages and gender are shown in Figure 3.

GI values changed with advancing age, i.e. they increased. The most significant increase was observed in the period from 12 to 14 years of age, while from 16 to 18 years GI values changed only slightly (and can even be ignored). In girls, the situation was similar. The difference was observed only in the period from 16 to 18 years of age, where the registered GI values decreased.

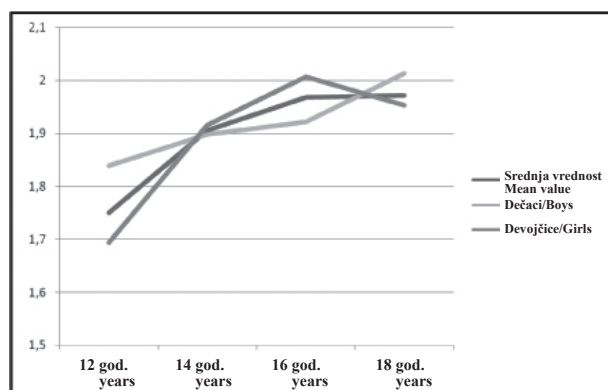
In boys aged 12 to 16 years, a negligible increase of GI values was noted, while in the period from 16 to 18 years the increase was more pronounced. However, these changes were so

## Diskusija

Formirane grupe ispitanika u ovom istraživanju bile su podjednake uzrasne i polne zastupljenosti, kako bi se na osnovu dobijenih rezultata izveli validni zaključci.

Od 86 pregledanih ispitanika, 28 (32,6%) ispitanika bilo je sa zdravom gingivom (zdravi). U grupi ispitanika sa izmenjenom gingivom (bolesni), 50 (58,1%) ispitanika je imalo lakši oblik promena na gingivi, tj. GI se kretao u opsegu od 1-2; 8 (9,3%) ispitanika je imalo teži oblik promena na gingivi, tj. GI je bio veći od 2. Nijedan ispitanik nije imao GI od 0-1. Nađeno stanje obolele gingive je u 67,4% ispitanika, što se poklapa sa nalazima drugih istraživača. Marschal je još 1955. god. došao do podataka da u Engleskoj 77,4% ispitanika uzrasta od 10-14 godina ima neki oblik gingivitisa<sup>5</sup>.

Baba Milkić<sup>6</sup> je 1975. godine u niškom regionu ustanovio da 73,4% dece ima gingivitis.



Sl. 4. Vrednosti gingivalnog indeksa za ispitanike  
Fig. 4. Gingival index values in studied children

minute that these may be thought of as a constant value (the changes of GI value were below 10% in the period from 12 to 18 years of age) (Figure 4).

By comparing the GI values obtained in girls and boys for particular age groups, we found that a statistical significance appeared only for the age of 12 ( $p < 0,005$ ). Comparing the values of GI in girls for particular ages, we observed a statistical significance ( $p < 0,005$ ) from 12 to 14 years of age, from 12 to 16, and from 12 to 18 years. In boys, we were unable to detect any statistical significance.

## Discussion

The groups of examinees in this study had equal age and gender distribution, so the results could provide valid conclusions.

Out of 86 studied children, 28 (32.6%) had healthy gingiva („Healthy“). In the group with changed gingiva („Affected“), 50 children (58.1%) had milder gingival changes, with GI 1-2; 8 children (9.3%) had more serious changes, with  $GI > 2$ . None of them had GI 0-1. Affected gingiva was found in 67.4% of children, which corresponds to other studies' results. Marshall concluded back in 1955 that in England 77.4% of examinees aged 10-14 years had some form of gingivitis<sup>5</sup>.

Baba Milkić<sup>6</sup> found in 1975 that in the Municipality of Niš 73.4% of children had gingivitis.

Tabela 4. Prevalenca plak indeksa za ispitanike  
Table 4. Prevalence of plaque index in studied children

Vrednost PI PI values	Br. dece № of children	%	$\bar{X}$	SD
0-1	14	16,3	0,844	0,205
1-2	41	47,7	1,612	0,339
2-3	31	36	2,351	0,275
Ukupno Total	86	100	1,757	0,612



Đajić i sar.<sup>7</sup> (1980) su došli do rezultata tokom istraživanja da u ekonomski razvijenim zemljama sveta čak 90% dece ima obolelu gingivu.

Popović V. i sar.<sup>8</sup> su u jednoj sveobuhvatnoj studiji, tzv. „beogradskoj studiji“, našli da od 45056 ispitanika, dve trećine (75,4%) u uzrastu od 15. do 18. godine ima promene na parodontu.

Kako gingivitis spada u najučestalije oboljenja kod dece i adolescenata, veoma je važno otkriti ga na vreme, tj. u početnoj fazi i primeniti odgovarajuću terapiju, kako ne bi došlo do progresije bolesti u ostala tkiva parodonta<sup>9</sup>.

Prevalencija gingivitisa po polnoj zastupljenosti i odnosom ispitanika sa zdravom gingivom, obolelom gingivom sa GI od 1-2, GI od 2-3 i kod devojčica i kod dečaka sličan je odnosu za celu ispitivanu populaciju. Rezultati pokazuju da nema bitnijih razlika između devojčica i dečaka, sem što je kod dečaka nešto veći procenat sa zdravom gingivom i manji procenat sa GI od 1-2.

Nađeni rezultati se poklapaju sa ispitivanjima drugih istraživača, koji takođe ukazuju da su oboljenja parodonta prema polu po učestalosti podjednako zastupljena i da su statističke razlike zanemarljive<sup>10,11</sup>.

Nađeni rezultati ukazuju da se GI menja sa uzrastom. Najveći procenat ispitanika sa zdravom gingivom je u 12. godini, zatim opada kod ispitanika u 14. godini. U 16. godini je bolja situacija, jer nalazimo povećan procenat ispitanika sa zdravom gingivom, da bi situacija bila skoro identična kod ispitanika u 18. godini. Istovremeno, dolazimo do rezultata koji pokazuju i pojavu ispitanika sa GI od 2-3 i u 16. i u 18. godini. Glavne ili izraženije promene se dešavaju u mlađem uzrastu. One se mogu zaustaviti i dovesti na nivo zdrave gingive ili mogu progredirati i dovesti do pogoršanja i daljeg napredovanja bolesti u ostale strukture parodonta. Bolje stanje gingive ili manji procenat ispitanika u starijem uzrasnom dobu sa obolelom gingivom može se protumačiti činjenicom da su deca sa odrastanjem naučila i shvatila značaj zdravija usta i zuba i da su adekvatno tome primenjivala preventivne mere u cilju suzbijanja bolesti. Edukovana deca, kroz zdravstveno vaspitni rad, preduzela su odgovarajuće mere, u prvom redu, redovno su upražnjavala pranje zuba, tj. najmanje dva puta dnevno. Prihvatila su i savete o pravilnoj, izbalansiranoj ishrani i frekventnosti

Đajić et al.<sup>7</sup> (1980) found that in economically developed countries of the world even 90% of children had gingival disease.

Popović et al.<sup>8</sup> found in a comprehensive study, the so called „Belgrade study“, that out of 45.056 children, two thirds (75.4%) of those aged 15-18 years had changes in the parodontium.

Since gingivitis is among the most common diseases in children and adolescents, it is of utmost importance to detect the disease timely, i.e. in initial phases, and to apply adequate therapy in order to prevent disease progression into other periodontal tissues<sup>9</sup>.

The prevalence of gingivitis by gender and the ratio with those with healthy gingiva, affected gingiva with GI 1-2, GI 2-3, was similar in both genders for the whole examined population. There were no significant differences between genders, except for a slightly higher percentage of those with healthy gingiva in boys and a lower percentage of GI 1-2 in boys.

Our results confirm other studies' results, indicating almost equal distribution of periodontal disease by gender, with minor statistical differences<sup>10,11</sup>.

The results indicated that GI altered with age. The highest percentage of healthy gingiva was found at 12 years of age, dropping then at 14 years of age. The situation was better at 16 year olds, since we found an increased number of healthy gingivas, with an almost identical situation in 18 year olds. At the same time, the children with GI 2-3 appeared in the groups of those aged 16 and 18 years. Major or most prominent changes occur in younger age groups. These can be checked and reduced to the level of healthy gingiva, or they can progress and exacerbate, involving other periodontal structures. Better gingival status or a low percentage of older children with affected gingiva can be explained by the fact that these children learnt and understood the importance of oral and dental health, applying prevention measures in order to suppress the disease. Educated children had taken appropriate measures in that regard, i.e. they regularly (at least twice a day) brushed their teeth; they had adopted advice about proper, well-balanced

unosna hrane, što je rezultiralo zadovoljavajućim oralnim stanjem, tj. zdravljem<sup>12</sup>. Ustanovljena razlika u pogledu stanja gingive kod dečaka i devojčica u različitom uzrasnom dobu i lošijim oralnim zdravljem kod dvojičica, gde je bolest progredirala, može se protumačiti ne samo neadekvatnom oralnom higijenom već i nekim drugim dokazanim činjenicama koje su bitno uticale na zdravlje gingive. Naime, podatak da devojčice ranije sazrevaju od dečaka i da pubertet donosi niz promena u organizmu, evidentno i na gingivi, tumači se povećanjem koncentracije gonadotropnih hormona. Gingiva menja svoj izgled, postaje edematozna i hiperemična zbog dodatnog neodržavanja oralne higijene. Edematozna, uvećana gingiva predstavlja idealno mesto za zadržavanje dentalnog plaka bogatog mikroorganizmima, i pored postojanja želja i znanja o važnosti održavanja higijene, deca izbegavaju četkicu, jer iritacija već izmenjene gingive pranjem zuba rezultira pojavom krvarenja. Deca se plaše kada vide krv i tu prestaje prihvatanje bilo kakvog saveta ili obrazloženje da se nastavi sa pranjem zuba. I iz tih razloga, decu treba motivisati i često remotivisati i objasniti im da ukoliko prestanu da održavaju oralnu higijenu da će time samo još pogoršati postojeće stanje, a da do izlečenja neće doći. Socijalni status dece, takođe, igra glavnu ulogu u ovom procesu. Zapaženo je da deca lošijeg socijalnog statusa upražnjava oralnu higijenu u uzrasnoj strukturi od 15. do 16. godine u 35,5%, a da deca dobrog socijalnog statusa, koja su i edukovana, u istom uzrasnom dobu upražnjava oralnu higijenu u 57% ispitanika<sup>13,14</sup>.

Na osnovu dobijenih rezultata o prisustvu dentalnog plaka-biofilma, dolazi se do zaključka da je prevalencija podjednaka kod ispitanika oba pola, a da razlike nisu statistički značajne. Podaci iz literature pokazuju visoki procenat dentalnog plaka u svim uzrasnim grupama. Postavlja se pitanje: „Kako je veći GI kod devojčica u nađenom uzrastu u odnosu na dečake, a da istovremeno postoji podjednaka prevalencija PI i kod jednih i kod drugih ispitanika?“ Odgovor se može naći u razlici koja postoji u kvalitetu dentalnog plaka, u starosti, zastupljenosti odgovarajućih mikroorganizama, njihovom broju, virulentnosti, kao i otpornosti, tj. imunološkom statusu domaćina<sup>15,16</sup>. Niske vrednosti PI (PI<1) nalaze neki istraživači u 6,9% ispitanika<sup>17</sup>.

diet and frequency of food intake, with the resultant satisfactory oral health<sup>12</sup>. The observed difference in gingival status between boys and girls in different age groups, with worse oral health in girls, can be explained not only by inadequate oral hygiene, but also by some other proven factors of influence on gingival health. The fact that girls mature earlier than boys and that adolescence induces a sequence of changes in the organism, including gingiva, can be explained by increased concentrations of gonadotropic hormones. The gingiva changes its appearance, becoming edematous and hyperemic as the result of additional lack of oral hygiene. Edematous, enlarged gingiva is an ideal place for the accumulation of dental plaque rich in microorganisms; in spite of the knowledge and wish to maintain adequate hygiene, children avoid the toothbrush since any irritation of the gingiva results in bleeding. Children are afraid of bleeding and there stops any acceptance of the advices or explanations of the necessity to continue with oral hygiene. Children have to be motivated and re-motivated, explaining that this would only aggravate the situation and that healing will not occur. Socioeconomic status of children plays a major role in the process. It has been noted that children of lower socioeconomic status aged 15-16 years maintain oral hygiene in 35.5%, and that age-matched children of higher socioeconomic status, who are well educated as well, maintain their oral hygiene in 57% of cases<sup>13,14</sup>.

Based on the obtained results about the presence of dental plaque (biofilm), a conclusion may be drawn about similar prevalence in both genders, with differences never reaching statistical significance. Literature data indicate a high percentage of dental plaque in all age groups. Why the observed GI is higher in girls compared to age-matched boys, with simultaneous equal prevalence of PI in both genders? The answer to the question can be found in the quality of dental plaque, in age, presence, amount, and virulence of certain microorganisms, and host immunity<sup>15,16</sup>. Low PI values (PI<1) have been observed by some authors in 6.9% of cases<sup>17</sup>.

Gingivitis is a disease of the young, and it can be cured. Timely detection is vital, as well

Gingivitis je bolest najranijeg uzrasta i može se izlečiti. Veoma je važno otkriti je na vreme i ukloniti etiološke faktore koji su je izazvali (meke i čvrste naslage, kariozni zubi, unilateralno žvakanje, ortodontske nepravilnosti i dr.)<sup>18</sup>.

Rezultat koji ukazuje da je kod dečaka u 12. godini veći PI (2-3), može se protumačiti činjenicom da su dečaci nemarniji i nezainteresovani za svoj izgled, pa i za zdravlje usta i zuba. Njihova preokupacija nije izgled, za razliku od devojčica, već otkrivanje svega nepoznatog i nedozvoljenog, kao i prevelika želja za dokazivanjem, u smislu hrabrosti, jačine, najčešće u oblasti sporta. Tek kasnije, sa odrastanjem, dečaci počinju da obraćaju pažnju na svoj izgled, kada i zapažaju da je ružno što imaju crne rupe na zubima i zadah iz usta. PI kod dečaka je najmanji u 18. godini i kreće se u rasponu od 1-2.

Vrednosti PI kod devojčica su veće u odnosu na dečake za svaku starosnu grupu. Dobijeni rezultati se poklapaju sa rezultatima drugih istraživača<sup>19</sup>.

Srednja vrednost PI za sve ispitanike iznosi je 1,757. Sličan nalaz otkriven je i kod drugih istraživača, gde se srednja vrednost PI kretala od 1,00-1,99, što odražava njegovu umerenu količinu. Podaci ukazuju na veoma nisku oralnu higijenu<sup>20</sup>.

Upoređivanjem vrednosti PI i GI za ispitivana godišta dobija se statistička značajnost samo kod devojčica u 16. i 18. godini. Slične podatke nalazimo i u literaturi<sup>21,22</sup>.

Analizom statističkih podataka može se zaključiti da je PI direktno proporcionalan GI. Srednje vrednosti PI od 1,757 za ispitivanu populaciju poklapaju se sa srednjim vrednostima GI od 1,894. Ovaj nalaz potvrđuje da su dentalni plak, tj. neuredna ili odsutna oralna higijena odgovorni za nađeno stanje na gingivi i ostalim delovima parodonta. Uzajamna veza prevalencije gingivitisa i neadekvatne ili odsutne oralne higijene, koja omogućava pogodne uslove za razvoj i opstanak mikroorganizama, odražava zapaljenske promene na gingivi i njeno širenje u ostale strukture parodonta. Epitel gingive ne predstavlja dobru barijeru za prodor patogena zbog brojnih varijacija u strukturi. Pripojni i sulkusni epitel, zbog nemogućnosti keratinizacije, kao i širokih intercelularnih prostora, sa ograničenim su sposobnostima zaštite dubljih tkiva. Pljuvačka svojom sekrecijom i antibakterijskim sposobnostima obezbeđuje integritet oralnom epitelu, ali ne u potpunosti. Nađen

as the removal of etiologic factors of influence (soft and hard sediment, carious teeth, unilateral chewing, orthodontic irregularities and so on)<sup>18</sup>.

The result that in boys aged 12 years PI was higher (2-3) can be explained by the fact that boys are negligent and less interested in their appearance, including their oral and dental health. Their preoccupation is not the appearance, but exploration of unknown things (often illicit things too), and wish for self affirmation (with an emphasis on strength, bravery) most commonly in sports. Only later, with growing, boys learn to pay more attention to their look, when they notice that it is not desirable to have black holes in their teeth and bad breath. PI in boys is lowest at the age of 18 (range, 1-2).

PI values were higher in girls compared to boys in all age groups. Our results confirmed other authors' results<sup>19</sup>.

Median value of PI for all studied children was 1.757. Similar findings have been registered by other authors as well, with PI value from 1.00-1.99, reflecting a moderate amount of dental plaque. The data have indicated a very poor oral hygiene<sup>20</sup>.

Comparing PI and GI values for the studied ages, statistical significance was found only in girls aged 16 and 18 years. Similar data can be found in the literature<sup>21,22</sup>.

Analysis of the statistical data brought us to the conclusion that PI was directly proportional to GI. The mMedian PI value of 1.757 for the studied population correspond to the median GI of 1.894. The finding confirmed that dental plaque, i.e. poor or absent oral hygiene could be held responsible for the observed status of the gingiva and other parts of parodontium. The reciprocal association of gingivitis prevalence and inadequate or absent oral hygiene, creating favorable conditions for development and survival of microorganisms, reflects the inflammatory gingival changes and their spread throughout the parodontium. The gingival epithelium is not a good barrier against pathogens because of its numerous structural variations. Attached and sulcus epithelia are limited in their protective properties of deeper tissues due to the impossibility of keratinization and broad intercellular spaces. The saliva partly provides the integrity of the oral epithelium. The perceived level of

određen nivo mikroorganizama u nivou gingive je u ravnoteži sa tkivom gingive. Disbalans vodi ka poremećaju stanja gingive i rezultira pojavom gingivitisa<sup>23</sup>. Subgingivalni dentalni plak omogućava opstanak i kolonizaciju anaerobnih mikroorganizama, u dovoljnom broju i odgovarajuće virulentnosti, što zasigurno vodi u gingivitis<sup>24</sup>.

S obzirom na izuzetnu rasprostranjenost gingivitisa, primarna stomatološka prevencija i profilaksa su ne samo najefikasnije, nego i neodložne i jedine pouzdane i racionalne mere u borbi protiv nastanka bolesti.

### **Zaključak**

Gingivitis se može javiti kod dece i mlađih osoba. U odnosu na strukturu ispitanika po polu, veći je procenat dečaka sa zdravom gingivom. GI u odnosu na uzrasnu strukturu pokazuje rast od 12. do 16. godine, a zatim značajno opada, ali sa istovremenim pojavljivanjem ispitanika sa GI od 2-3. Bolest kreće ka izlečenju ili ka progresiji. Kod devojčica se sa uzrastom PI povećava. Utvrđivanjem vrednosti za PI i GI dobija se statistička značajnost kod devojčica od 16. do 18. godine gde je PI direktno proporcionalan GI. Dentalni plak je odgovoran za nađeno stanje na gingivi.

microorganisms at the gingival level was in balance with the gingival tissue. Any disbalance lead to disturbed gingival status, and results in gingivitis<sup>23</sup>. Subgingival dental plaque enables the survival and colonization of anaerobic microorganisms, in a sufficient number and with appropriate virulence to lead to gingivitis<sup>24</sup>.

In view of the fact that gingivitis is a widespread disease, primary dental prevention and prophylaxis are not only the most efficient, but also the irremissible, and the only reliable and rational measures to fight the disease.

### **Conclusion**

Gingivitis can occur in children and young individuals. In view of gender structure of the examinees, there were more boys with healthy gingiva. GI demonstrated growth from 12 to 16 years of age, and markedly decreased afterwards, but with simultaneous appearance of the examinees with GI 2-3. The disease moves towards healing or progression. In girls, PI grew with advancing age. Statistical significance was observed for PI and GI in girls aged 16 to 18 years. PI was directly proportional to GI. Dental plaque was responsible for the observed gingival status.



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