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## SOCIO-EKONOMSKI ZNAČAJ I PREVENCIJA KARIJESA RANOG DETINJSTVA

### SOCIOECONOMIC SIGNIFICANCE AND PREVENTION OF EARLY CHILDHOOD CARIES

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#### Sažetak

Karijes u ranom detinjstvu ima epitet najčešćeg infektivnog i hroničnog pedijatrijskog oboljenja, koje podrazumeva prisustvo karijesa na bilo kom mlečnom zubu kod dece starosti do šest godina, a nastaje kompleksnim procesom, koji uključuje transmisiju infektivnih bakterija, navike u ishrani i oralnu higijenu. Često nastaje kao posledica prolongiranog dojenja ili učestalog konzumiranja zaslađenih napitaka putem flašice.

Danas se smatra aktuelnim problemom javnog zdravlja ne samo u zemljama koje su u razvoju nego i u razvijenim zemljama širom sveta usled visokog stepena zastupljenosti. Rezultati mnogobrojnih studija ukazuju na postojanje vodećih faktora rizika koji su zajednički za sva podneblja, poput socio-ekonomskih, kulturoloških i faktora vezanih za higijensko-dijetske navike. Ipak, najvećim pojedinačnim faktorom rizika smatra se siromaštvo.

Ovo oboljenje je često praćeno komplikacijama, kao što su pulpitisi i hronični apikalni parodontitisi i može izazvati jak bol, koji remeti svakodnevne aktivnosti deteta, ishranu i spavanje. Takođe, utiče na rast i razvoj dece.

Neophodni ekstenzivni i skupi stomatološki tretmani se nekada moraju obaviti u opštoj anesteziji, a krajnji rezultati nisu zadovoljavajući. Međutim, donošenjem, evaluacijom i kontinuiranim sprovođenjem programa prevencije i strateških mera, mogu se postići dobri rezultati. Veoma je važna uloga države i zajednice u donošenju odluka o usmeravanju resursa na prevenciju, kao najekonomičniju meru i podizanju svesti građana o značaju oralnog zdravlja.

Uloga profesionalaca i roditelja u prenošenju znanja, o veštinama i navikama u održavanju oralne higijene, neophodna je mera u cilju očuvanja zdravlja čitave populacije.

**Cljučne reči:** karijes ranog detinjstva, socio-ekonomski faktori, prevencija

#### Abstract

Early childhood caries is considered to be the most common infectious and chronic pediatric disease, which is defined as the presence of tooth decay that implies any primary tooth in a child six years of age or younger and develops through a complex process that involves the transmission of infectious bacteria, dietary habits and oral hygiene. It often occurs as a result of prolonged breastfeeding and frequent consumption of sugar-containing beverages in a baby bottle.

Nowadays, it is considered one of the topical public health issues in developing countries, as well as developed countries around the world, due to its high prevalence. The results of many studies indicate that there are leading risk factors common to all regions, such as socio-economic, cultural and factors related to hygiene and dietary habits.

However, the greatest single risk factor is poverty.

This disease is often followed by complications, such as chronic pulpitis and apical periodontitis, and can cause severe pain that disturbs children's daily activities, eating, sleeping, and affects growth and development.

It requires extensive and expensive dental treatments which sometimes need to be performed under general anesthesia, and the final results are still unsatisfactory. However, significant results can be achieved by the introduction, evaluation and implementation of prevention programs and strategic measures. The role of the state and the community is very important in making decisions on directing their resources to prevention, as the most cost-effective measure, as well as in increasing public awareness of the importance of oral health as part of general health. The role of professionals prior to medical treatment and also parents at family level in providing the knowledge, skills and oral hygiene habits with their children is a necessary measure aimed at preserving the health of the entire population.

**Key words:** early childhood caries, socioeconomic factors, prevention

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## Uvod

Karijes ranog detinjstva (KRD) ima epitet najčešćeg infektivnog i hroničnog pedijatrijskog oboljenja<sup>1</sup>. To je bolest usne duplje koja podrazumeva prisustvo bar jednog karioznog, izvađenog (kao posledica karijesa) ili plombranog mlečnog zuba kod dece starosti do 71. meseca<sup>2</sup>, a nastaje kompleksnim procesom, koji uključuje transmisiju infektivnih bakterija, navike u ishrani i oralnu higijenu<sup>3</sup>. Ovo oboljenje je često posledica prolongiranog dojenja ili učestalog konzumiranja zaslađenih napitaka putem flašice, naročito noću, pa se drugačije zove i 'baby-bottle' karijes (engl. Baby bottle tooth decay). Smatra se da je jedan od predisponirajućih faktora i hipoplazija gleđi, koja može biti posledica dejstava velikog broja činilaca<sup>4</sup>. Ipak, najvećim pojedinačnim faktorom rizika smatra se siromaštvo<sup>5</sup>. Prisustvo socio-kulturološke komponente kao faktora rizika ukazuje na to da se KRD mora posmatrati kao simptom pogoršanja zdravstvenog stanja deteta i odsustva adekvatne oralne nege<sup>6</sup>.

Danas se KRD smatra aktuelnim problemom javnog zdravlja ne samo u zemljama koje su u razvoju nego i u razvijenim zemljama širom sveta usled visokog stepena zastupljenosti. Prevalencija ove specifične vrste karijesa je visoko promenljiva (4-90%) i zavisna od geografskog područja, kao i od vrste i broja prisutnih faktora rizika<sup>7,8</sup>. Rezultati mnogobrojnih studija ukazuju na postojanje vodećih faktora rizika koji su zajednički za sva podneblja<sup>3,4,6,9-12</sup>, a to su: socio-ekonomski, kulturološki i faktori vezani za dijetetski režim, način ishrane, kao i navike u održavanju oralne higijene. Ovo oboljenje često prate komplikacije, kao što su pulpitis i hronični apikalni parodontitis i može izazvati jak bol, koji remeti svakodnevne aktivnosti deteta, ishranu i spavanje i utiče na rast i razvoj. Neophodni ekstenzivni i skupi stomatološki tretmani se nekada moraju obaviti u opštoj anesteziji, a krajnji rezultati nisu zadovoljavajući.

Primena preventivnih strategija predstavlja jedini adekvatan i finansijski isplativ pristup za očuvanje i unapređenje oralnog zdravlja dece, a pomocija oralnog zdravlja treba da bude deo strategija za zdrav život<sup>3</sup>. Preventivne metode su već razvijene i treba da budu implementirane u preventivne programe čiji su nosioci društvo i porodica. Ne manje važna je i uloga profesionalaca, koja se ogleda u identifikaciji i eliminaciji faktora rizika pre stomatološkog tretmana i osnova je uspešnog menadžmenta KRD-a<sup>13</sup>.

## Introduction

Early childhood caries (ECC) is the most common infectious and chronic pediatric disease<sup>1</sup>. It is a disease of the oral cavity which implies at least one decayed (noncavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a child 71 months of age or younger<sup>2</sup> and develops through a complex process that involves the transmission of infectious bacteria, dietary habits and oral hygiene<sup>3</sup>. This disease is often the result of prolonged breastfeeding and frequent consumption of sugar containing beverages in a baby bottle, especially at night, and is otherwise known as 'baby bottle tooth decay'. It is believed that one of the contributing factors is hypoplasia of the enamel, which may be a consequence of multiple factors<sup>4</sup>. However, the greatest single risk factor is poverty<sup>5</sup>. The presence of socio-cultural components as a risk factor suggests that ECC needs to be seen as a symptom of a child's health deterioration and lack of adequate care<sup>6</sup>.

Nowadays, it is considered one of the topical public health issues in developing countries, as well as developed countries around the world, due to its high prevalence. The presence of this specific type of tooth decay varies significantly, from 4-90% and depends on the geographic area, as well as the type and number of risk factors present<sup>7,8</sup>. Results of numerous studies<sup>3,4,6,9-12</sup> indicate the presence of risk factors that are common to all the countries of the world, such as socioeconomic, cultural and factors related to hygiene and dietary habits.

This disease is often followed by complications, such as chronic pulpitis and apical periodontitis and can cause severe pain that disturbs children's daily activities, eating and sleeping, and affects growth and development. It requires extensive and costly dental treatments that sometimes need to be performed under general anesthesia, and the final results are still unsatisfactory.

Implementation of preventive strategies is the only adequate and cost-effective approach to maintain and improve the oral health of children and the promotion of oral health should be part of healthy life strategies<sup>3</sup>.

Preventive methods have already been developed and should be applied within prevention programs, with the community and family as primary factors. The role of oral health care professionals is identification and elimination of risk factors prior to dental treatment, which is crucial for successful management of ECC<sup>13</sup>.

## **Uticaj socio-ekonomskog faktora na pojavu karijesa ranog detinjstva**

Postoji evidentna diskrepancija u zastupljenosti karijesa ranog detinjstva kod dece koja pripadaju etničkim manjinama i čiji roditelji imaju niža ekonomska primanja<sup>3,4,12,14-18</sup>, u odnosu na decu koja žive u porodicama koje su bolje situirane. U siromašnim, višočlanim porodicama uočen je nedostatak brige ne samo o oralnom već i o opštem zdravlju dece, što ima za posledicu učestalu pojavu malnutricije, koja može dovesti do češćeg oboljevanja dece u ranom detinjstvu i pojave hipoplazija gleđi, koje povećavaju rizik za razvoj KRD-a<sup>4</sup>. Takođe, faktori rizika su i nizak nivo obrazovanja roditelja, naročito samohranih<sup>19</sup> i nepismenih majki<sup>20-25</sup> i loša dostupnost stomatološkim službama u ruralnim sredinama<sup>3,4</sup>. To kao rezultat ima nedovoljnu informisanost roditelja u vezi sa ovim oboljenjem, i izostanak redovnih kontrola. Svi navedeni uzroci imaju za posledicu visok procenat dece obolele od KRD-a u rizičnim sredinama.

Velika varijabilnost podataka o zastupljenosti KRD-a u različitim zemljama je verovatno posledica postojanja različitih dijagnostičkih kriterijuma. U razvijenim zemljama koje imaju unapređene programe za zaštitu oralnog zdravlja prevalenca KRD-a je oko 59%<sup>26</sup>, dok je u zemljama severoistočne Evrope situacija lošija, sa vrednostima do 20%<sup>26,27</sup>. Znatno veće vrednosti su zabeležene u Iranu 59%<sup>26</sup> i na Aljasci (66,8%)<sup>3</sup>. Američka akademija za dečju stomatologiju (AADS), koja se bavila analizom KRD-a kod dece urođenika sa teritorije Kanade i Amerike, objavila je podatak da je prevalencija ovog oboljenja u pojedinim zajednicama i preko 90%<sup>3</sup>. Visok procenat dece sa netretiranim karijesima iz ovakvih sredina ima za posledicu obavljanje skupih hirurških intervencija u opštoj anesteziji, sa pratećim izdacima vezanim za transport i smeštaj porodica ove dece iz ruralnih u urbane centre<sup>28</sup>.

Imajući u vidu potencijalni rizik opšte anestezije po zdravlje, korist ove intervencije može biti kratkog roka, jer dolazi do pojave recidiva i novih karijesa, ako postoperativno izostanu navike u održavanju adekvatne oralne higijene<sup>3</sup>. Postoje podaci o značajnom procentu urođeničke dece koja moraju ponovo da se podvrgavaju stomatološkom tretmanu u uslovima opšte anestezije<sup>3</sup>. Rezultati istraživanja u zemaljama istočnog Balkana pokazuju da je u Sofiji rasprostranjenost KRD-a kod trogodišnjaka 32,0%, u Hrvatskoj kod dece od 2-5

## **Impact of socioeconomic factors on the occurrence of ECC**

There is an evident discrepancy in the prevalence of early childhood caries among children belonging to ethnic minorities whose parents have lower economic income<sup>3,4,12,14-18</sup>, compared to children living in families that are better-off. Lack of care regarding children's oral as well as general health has been evident in poor, large families, resulting in frequent occurrence of malnutrition, which can lead to more illness in early childhood and the occurrence of enamel hypoplasia which increase the risk of ECC<sup>4</sup>. Risk factors are also low educational level of parents, especially single<sup>19</sup> and illiterate mothers<sup>20-25</sup>, and poor access to dental care in remote communities<sup>3,4</sup>, which has resulted in parents lack of awareness regarding this disease, and irregular visits to the dentist. All the above stated causes have led to a high percentage of children suffering from ECC in high-risk communities.

The high variability of data regarding the presence of ECC in different countries is probably the consequence of different diagnostic criteria of the disease. In developed countries with advanced programs for oral health care ECC prevalence is approximately 5%<sup>26</sup>, while in north-eastern Europe the situation is worse, with values up to 20%<sup>26,27</sup>. Significantly higher values have been recorded in Iran, 59%<sup>26</sup> and Alaska (66.8%)<sup>3</sup>. After conducted survey of ECC among children of the indigenous population in the territory of Canada and the United States, the American Academy of Pediatric Dentistry has announced that the prevalence of this disease in some communities exceeds 90%<sup>3</sup>. The high percentage of children with untreated caries in such communities has resulted in undergoing expensive pediatric dental surgeries under general anesthesia, with additional costs related to transportation and accommodation of children's families from remote communities to urban centers<sup>28</sup>. Considering that general anesthesia comes as a potential health risk, the benefits of this treatment may be short-lived, because there may be a relapse and recurrent cavities if proper oral hygiene behaviors are not maintained postoperatively<sup>3</sup>. There are data on a significant number of indigenous children who need to repeat dental treatment under general anesthesia<sup>3</sup>. The results of research conducted in the eastern Balkans indicate that the incidence of ECC in Sofia among three-year-old children is

godina 30,0%, u Srbiji u Južnobačkom regionu kod trogodišnjaka 22,07%, a kod dece predškolskog uzrasta na istom području 30,5%<sup>29</sup>. Ove vrednosti su kategorizovane kao srednje, u odnosu na nisku, koja je zabeležena u Finskoj i Švedskoj, odnosno visoku, kod dece Srednjeg Istoka, iz azijskih zemalja, Hispanoamerikanaca i Meksikanaca<sup>29</sup>. Rezultati istraživanja sprovedenog u Srbiji ukazuju na direktnu povezanost uzrasta deteta i težinu KRD-a<sup>29</sup>. Povećanje broja zuba sa uzrastom, uz nepromenljive uslove sredine, kao što su navike u ishrani, oralna higijena i profilaksa fluorom, povećava i broj obolelih zuba i dovodi do pogoršanja bolesti.

Uticaj pola i prisustvo polnog dimorfizma zabeleženo je od strane pojedinih autora, čiji rezultati istraživanja ukazuju na povećanu učestalost KRD-a kod muške dece<sup>29,30</sup>. Međutim, potrebno je sprovesti dodatna ispitivanja i utvrditi da li je polna razlika u rasprostranjenosti posledica bolje higijene kod devojčica ili kulturnološki uslovljenog načina ishrane kod dečaka.

Postoji podatak da treće i svako naredno dete u porodici ima veći rizik za razvoj KRD-a<sup>29</sup>. Američka akademija za dečju stomatologiju, kao najverovatniji razlog, navodi raniju „vertikalnu“ i „horizontalnu“ transmisiju mutanog streptokoka između majke i muške dece, odnosno između bliskih srodnika muškog pola<sup>31</sup>. Međutim, podaci iz literature nisu konzi-stentni kada je u pitanju uticaj ukupnog broja dece u porodici na razvoj ovog oboljenja<sup>32,33</sup>.

Analiza pojave KRD-a u predškolskim ustanovama i izvan njih ustanovila je dva puta manju prevalenciju kod dece koja borave u vrtiću i pored dokazane veće mogućnosti širenja mutanog streptokoka sa jednog deteta na drugo u kolektivu<sup>29</sup>. Teži oblici bolesti su bili češći kod dece koja ne idu u vrtić<sup>29</sup> a kao razlog tome navodi se uobročena ishrana<sup>34</sup> i intenzivan zdravstveno-vaspitni rad sa decom u predškolskim ustanovama, u koji su pored pedagoga uključeni i stomatolozi<sup>29</sup>.

Rezultati više studija otkrivaju postojanje obrnute proporcionalnosti između učestalosti KRD-a i nivoa obrazovanja majki<sup>29,33,35</sup>. Takođe, zabeleženo je postojanje direktne korelacije između radnog statusa roditelja i prevalencije i težine bolesti<sup>29,36,37</sup>. Manja zastupljenost i stepen težine oboljenja kod dece zaposlenih roditelja, naročito majki, objašnjava se nivoom obrazovanja ovih žena i činjenicom da njihova deca provode dosta vremena u vrtićima, koji su integrisani u sistem preventivne stomatološke zaštite.

32.0%, 30.0% in Croatia among children from 2-5 years of age, 22.07% in Serbia in the South Backa region among three-year-old children, while it is 30.5% among preschool children in the same area<sup>29</sup>. These figures were marked as mean values, compared with the low ones recorded in Finland and Sweden, and high ones among children of the Middle East, Asian countries, Hispanics and Mexicans<sup>29</sup>. The results of research in Serbia indicate a correlation between the age of the child and the severity of ECC<sup>29</sup>. As the number of teeth increases with age in unchanging environmental conditions such as eating habits, oral hygiene and use of fluoride, the number of teeth affected by decay also increases and leads to a worse degree of disease.

The influence of gender and the presence of gender dimorphism have been recorded by some authors, whose findings indicate an increased incidence of ECC among male children<sup>29,30</sup>. However, it is necessary to conduct more studies to assess if the different prevalence of the disease between the genders is a consequence of better hygiene among girls or culturally conditioned eating habits among boys.

It has been recorded that the third and each subsequent child in a family is at a higher risk of developing ECC<sup>29</sup>. According to the American Academy of Pediatric Dentistry the most probable explanation is early ‘vertical’ and ‘horizontal’ transmission of mutant streptococci among male children and mothers or close male relatives<sup>31</sup>. However, the recorded data is not consistent with respect to the impact of the total number of children in the family on the occurrence of the disease<sup>32,33</sup>.

Analysis of ECC occurrence in preschool institutions and other environments has shown that the prevalence of ECC is twice lower among children in kindergarten, even though there is a greater possibility of transmission of mutant streptococci from one child to another within a group<sup>29</sup>. More severe forms of the disease were common among children who were not in kindergarten<sup>29</sup>, and the reason for this is the importance of regular consumption of meals<sup>34</sup> and intensive medical and educational work with children in preschool institutions, which includes not only teachers but dentists as well<sup>29</sup>.

The results of several studies reveal an inverse proportion between ECC incidence and mothers level of education<sup>29,33,35</sup>.

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Ukupna mesečna primanja, kao pokazatelj socio-ekonomskog statusa, značajan su faktor rizika za pojavu i težinu ove bolesti. Zapaženo je linearno povećanje prevalencije i težih oblika KRD-a, sa smanjenjem ukupnog godišnjeg porodičnog prihoda<sup>29,32,33</sup>. Veća materijalna izdvajanja imućnijih roditelja za kvalitativno-kvantitativno izbalansiranu ishranu, profilaksu fluorom i oralnu higijenu, najverovatnije su razlog niže zastupljenosti oboljenja kod njihove dece<sup>29</sup>.

Obaveštenost i zdravstveno ponašanje roditelja predisponirajući su faktori. Znanje i spremnost roditelja da prvenstveno koriguju svoje ponašanje radi očuvanja sopstvenog, a zatim i zdravlja svoje dece, utiče na rasprostranjenost i na težinu bolesti<sup>29</sup>.

Uticao je životne sredine je takođe bio u fokusu ispitivanja, koja su zabeležila veću učestalost KRD-a u ruralnim sredinama<sup>29</sup>. Loša dostupnost stomatološkim i socijalnim ustanovama zbog udaljenosti, stanovništvo bez stalnog zaposlenja, koje zavisi od poljoprivrede, socijalne i jezičke barijere, verovatno su razlog tome.

### ***Preventivne mere i smernice u borbi protiv karijesa ranog detinjstva***

Tendencija povećanja broja obolele dece od KRD-a je upozoravajuća činjenica, bez obzira na to što je poznato da je karijes oboljenje koje se može sprečiti. Veoma jednostavnim i jeftinim metodama koje se mogu primeniti na nivou porodice, gde se stiču prva znanja i navike u održavanju oralne higijene, može se sprečiti ili usporiti razvoj ove bolesti. Posebnu ulogu imaju država i zajednica, kao i profesionalno osoblje u prepoznavanju značaja KRD-a i otkrivanju mera prevencije, čijom primenom će se smanjiti prevalencija i uspostaviti kontrola bolesti. Promocija zdravlja, dobro osmišljene strategije i preventivni pro-grami neki su od načina delovanja koji su se pokazali kao efikasni.

There is also a direct correlation between the employment status of parents and the prevalence and severity of the disease<sup>29,36,37</sup>. Lower prevalence and degree of severity of disease among children whose parents are employed, especially mothers, are explained by the level of education and the fact that their children spend considerable time in kindergartens, which are integrated into the program of preventive oral health care.

The total monthly income as an indicator of the socioeconomic status is a significant risk factor for the occurrence and severity of this disease. A linear increase in the prevalence and more severe forms of ECC has been followed by a decrease of the total annual family income<sup>29,32,33</sup>. The most probable reason for low prevalence of this disease among wealthy children is the fact that their parents spend more on their wellbalanced nutrition in terms of quality and quantity as well as on fluoride prophylaxis and oral hygiene<sup>29</sup>.

Parent awareness and attitude towards oral health are one of the crucial factors. The parents knowledge and willingness to primarily correct own behaviours in order to maintain their own oral health as well as their children's oral health, affect the incidence and severity of the disease<sup>29</sup>.

The influence of environment has also been the focus of studies, indicating a higher incidence of ECC in remote communities<sup>29</sup>.

The most probable reasons are poor access to dental and social services due to remoteness, unemployed population depending on agriculture, social and language barriers.

### ***Preventive measures and guidelines in fighting ECC***

The tendency of an increased number of ECC affected children can serve as a warning, considering that it is well known that tooth decay is a preventable disease. ECC development can be reduced or prevented by implementing simple and low-cost measures at family level, where children receive their first knowledge about the importance of oral hygiene. The state and the community have a special role, as well as professionals, in recognizing the importance of ECC and discovering preventive measures, the implementation of which will decrease its prevalence and establish control of the disease. Oral health promotion, well designed strategies and preventive programs are the methods that have proved to be effective.

### *Uloga porodice u prevenciji KRDA*

Dobra oralna higijena i upotreba pasti sa fluoridima najvažniji su faktori prevencije karijesa<sup>10</sup>. Deca starosti do 8 godina nisu sposobna da peru zube samostalno, zbog čega je kvalitetna oralna higijena odgovornost roditelja<sup>10</sup>. Upotreba adaptiranih pasti sa niskim koncentracijama fluorida (do 500 ppm) u maloj količini (veličina 'zrna graška'), preporuka je Evropske akademije za dečju stomatologiju (EADS)<sup>38</sup>. Znanje o faktorima rizika i prevenciji KRDA veoma je važno za roditelje, a stiče se u toku prve posete stomatologu<sup>10</sup>.

### *Preventivne strategije*

Primarna prevencija karijesa nema samo ulogu u očuvanju zdravlja usta i zuba već i u smanjivanju potreba za restorativnim i hirurškim intervencijama<sup>3</sup>. Kako je KRDA rezultat međusobnog delovanja oralnih bakterija, supstrata i domaćina, kao i uticaja porodice, ekonomskog i socijalnog stanja, zdravstveno-promotivne strategije, koje ističu razvoj zajednice i bave se determinantama zdravlja, u vezi su sa strategijama koje se fokusiraju na prevenciju bolesti<sup>10</sup>.

### *Promocija oralnog zdravlja*

Promocija oralnog i opšteg zdravlja treba da bude deo strategija za zdrav život, jer sve zdravstvene strategije imaju u osnovi slične problem, kao što su socio-ekonomski izazovi, dostupnost, cena i izbor hranljivih namirnica u udaljenim zajednicama, izloženost životne sredine duvanskom dimu, neprihvatljivo niske stope dojenja, svest o kvalitetnoj hrani, kao i njena dostupnost i raspoloživost<sup>3</sup>.

### *Prevencija bolesti*

Prevencija KRDA započinje podizanjem svesti populacije o značaju oralnog zdravlja. Ona se sprovodi za vreme prenatalnog, perinatalnog i nastavlja se na postnatalni period majke i odojčeta u kontekstu porodice i predškolskih programa<sup>39,40</sup>. S obzirom na to da postoje dokazi o vertikalnoj transmisiji kariogenih bakterija, prvenstveno sa majke na dete, uključivanje trudnih žena u skrining preglede i sanaciju zuba, edukacije u vezi sa oralnom higijenom i ishranom, kao i davanje saveta o primeni pasti sa fluoridima, strategije su koje mogu značajno da pomognu u prevenciji i usporavanju razvoja bolesti<sup>39</sup>.

### *Role of family in ECC prevention*

Proper oral hygiene and the use of fluoride tooth paste are the most important factors in the prevention of tooth decay<sup>10</sup>. Children up to 8 years of age are not able to brush their teeth on their own, which makes proper oral hygiene there responsibility of parents<sup>10</sup>. The use of adapted toothpastes with low fluoride concentration (up to 500 ppm) in a small amount (a 'pea-size') is a recommendation of the European Academy of Pediatric Dentistry (EAPD)<sup>38</sup>. The information on ECC risk factors and prevention is very important for parents, and is provided during the first visit to the dentist<sup>10</sup>.

### *Preventive strategies*

Not only does the primary prevention of tooth decay have a role to maintain oral health, but it also decreases the need for restorative and dental surgical interventions<sup>3</sup>. Since ECC results from the interplay of oral bacteria, substrate and the host, as well as from the family, economic and social situation, oral health-promotion strategies which emphasize the community development and address the determinants of health are related to strategies that focus on disease prevention<sup>10</sup>.

### *Promotion of Oral Health Care*

Promotion of oral health care, as well as of general health, should be part of healthy life strategies, because all health strategies are based on similar problems, such as socioeconomic challenges, availability and price of nutritious foods in remote communities, exposure of environment to tobacco smoke, unacceptably low rates of breastfeeding and awareness of quality food and its accessibility<sup>3</sup>.

### *Prevention of disease*

ECC prevention begins by raising people's awareness of the importance of oral health. It is implemented during the prenatal, perinatal and continuing on postnatal period of mother and infant, in the context of family and preschool programs<sup>39,40</sup>. Since there is evidence of vertical transmission of cariogenic bacteria, primarily from mother to child, including pregnant women in screening examinations and dental rehabilitation, educating them about the importance of oral hygiene and diet, as well as providing advice on the use of fluoride toothpaste, are strategies that

Postojeći vodiči u razvijenim zemljama podržavaju bezbednu oralnu negu u trudnoći, u cilju redukcije ili usporavanja razvoja KRD-a kod odojčadi<sup>41-43</sup>.

#### *Primena fluorida u prevenciji KRD-a*

Mnoge nacionalne i internacionalne organizacije, udruženja i vlade (Svetska zdravstvena organizacija (SZO), Američko stomatološko udruženje (ASU), Američka akademija za dečju stomatologiju (AADS), Kanadsko stomatološko udruženje (KSU), Kanadska akademija za dečju stomatologiju (KADS) i druge) prepoznale su i podržale primenu fluorida, kao bezbednu i visoko efikasnu strategiju u cilju prevencije i kontrole karijesa<sup>3</sup>. Postoji veliki broj preparata fluorida, kao i načina i preporuka za njihovu primenu.

*Fluorizacija vode* – Fluorizacija vode je najefikasnija i najskuplja metoda koja ne zahteva dnevne obaveze i promoviše jednakost, jer korist imaju svi građani, bez obzira na socio-ekonomski status<sup>44,45</sup>. Svetska organizacija je izdala obaveštenje da fluorizacija vode ima značajnu prednost, posebno u populacijama sa visokim rizikom, gde je ova metoda primene kulturološki prihvatljiva i tehnički izvodljiva<sup>46</sup>.

*Lokalni fluoridi* – Fluoridi za lokalnu primenu su takođe efikasni u prevenciji karijesa. Kohranov pregledni članak otkriva da lakovi sa fluoridima značajno redukuju karijes i u mlečnoj i u stalnoj denticiji<sup>47</sup>. U populaciji sa visokim rizikom preporučuju se četiri aplikacije laka, u periodu između 9. i 24. meseca života<sup>3</sup>.

*Sistemske fluoridi* – Sistemske fluoridi su pogodni za primenu kod dece sa visokim rizikom za karijes i mogu biti neophodni ukoliko ne postoje drugi izvori fluorida za primenu, kao što su paste za zube ili voda<sup>3</sup>. Ipak, ne postoje konzistentni podaci o efikasnosti ovog načina primene fluorida u prevenciji karijesa u mlečnoj denticiji<sup>48</sup>.

*Zubne paste sa fluoridima* – Vodiči koje su podržale KSU i AADS, preporučuju primenu pasti sa fluoridima veličine 'zrna graška' dva puta dnevno kod dece u uzrastu od 2-5 (AADS) ili 3-6 (KSU) godina starosti uz asistenciju roditelja, a kod odojčadi ispod dve (AADS) ili tri godine starosti (KSU) primenu paste veličine 'zrna pirinča', naročito kod dece sa visokim rizikom za karijes<sup>3</sup>.

can substantially help in preventing and reducing ECC development<sup>39</sup>. The existing guidelines support safe oral health care during pregnancy with a view to decreasing and slowing down the disease progression among infants<sup>41-43</sup>.

#### *Use of fluoride in ECC prevention*

Many national and international organizations, associations and governments (World Health Organization, the American Dental Association, the American Academy of Pediatric Dentistry, the Canadian Dental Association, the Canadian Academy of Pediatric Dentistry and others) have recognized and supported the use of fluoride as a safe and highly efficient strategy aimed at caries prevention and control<sup>3</sup>. There are a lot of fluoride products, as well as methods and recommendations for their use.

*Water Fluoridation* – Water fluoridation is the most efficient and expensive method that does not require daily responsibilities and it promotes equality, because all citizens benefit, regardless of their socioeconomic status<sup>44,45</sup>. The World Health Organization has announced that water fluoridation is a significant advantage, especially in high risk populations, where this implementing method is culturally acceptable and technically feasible<sup>46</sup>.

*Topical fluoride* – Topical fluorides are also effective in preventing caries. A Cochrane review article reveals that fluoride varnishes significantly reduce tooth decay in both primary and permanent teeth<sup>47</sup>. Four varnish applications are recommended for the high-risk population between 9 and 24 months of age<sup>3</sup>.

*Systemic fluoride* – Systemic fluorides are suitable for use among children at high risk of dental caries, and may be necessary in case there are no other sources of fluoride to be applied, such as toothpaste or water<sup>3</sup>. However, there are no consistent data on the efficiency of this method of applying fluorides in caries prevention in primary dentition<sup>48</sup>.

*Fluoride toothpaste* – Guidelines supported by the CAD and the AAPD recommend the use of fluoride toothpaste in a 'pea-size' amount twice a day for children aged 2-5 (AAPD) or 3-6 (CAD) with their parents assistance, and for infants under 2 (AAPD) or 3 years of age (CAD), in a 'rice grain-size' amount, especially for children at high risk of dental caries<sup>3</sup>.

*Zalivači fisura* – Zalivači kao preventivna mera su indikovani za primenu na okluzalnim površinama zuba u cilju zaštite jamica i fisura od pojave karijesa. Postoji preporuka na osnovu nekih istraživanja za upotrebu ove metode kod sve dece koja su u visokom karijes riziku i na stalnim i na mlečnim molarima<sup>49,50</sup>.

#### *Uloga profesionalaca u prevenciji KRD-a*

Uloga stomatologa se ogleda prvenstveno u informisanju roditelja/staratelja o značaju mlečne denticije, etiologiji i prevenciji KRD-a, kao i značaju brige o sopstvenom oralnom zdravlju. Uključivanje profesionalnog osoblja u savetovališta i edukativne programe za roditelje, omogućava prenošenje znanja o merama koje treba sprovoditi da bi se eliminisali faktori rizika za razvoj ove bolesti. Davanje saveta o primeni fluorida za kućnu upotrebu i sprovođenje profilaktičkih mera u stomatološkoj ordinaciji uz praćenje savremenih vodiča, takođe su važne mere prevencije karijesa ranog detinjstva. AADS je dala preporuku da se prva procena rizika za karijes kod dece obavi najranije u 6. mesecu života<sup>41</sup>. Deci sa povećanim rizikom za razvoj oralnih oboljenja ili kod kojih su identifikovane bele mrlje ili karijesne lezije, treba pružiti neophodan tretman<sup>42</sup>.

Ulogu u prevenciji ima i zdravstveno osoblje drugih specijalnosti, kao što su ginekolozi, neonatolozi i pedijatri, jer njihova saradnja sa stomatolozima omogućava sprovođenje mera prevencije KRD-a na prenatalnom, perinatalnom i postnatalnom nivou. U zajednicama sa visokim rizikom za karijes (urođeničke populacije Amerike i Kanade), izdate su smernice i preporuke o pokretanju obuke i zdravstvenog osoblja drugih profila, radi efikasnijeg sprovođenja preventivnih mera<sup>3</sup>.

*Fissure sealants* – The use of sealants is an established preventive measure for occlusal tooth surfaces to protect pits and fissures from tooth decay. According to some research, it is recommended to implement this method among children with a high risk of dental caries on both permanent and primary molars<sup>49,50</sup>.

#### *Role of health care professionals in ECC prevention*

The role of dentists refers primarily to informing parents/caregivers about the importance of primary dentition, etiology and prevention of ECC, as well as the importance of their own oral health care. Including professional providers in counselling and educational programs for parents makes it possible to maintain knowledge about the measures to be implemented in order to eliminate risk factors for developing this disease. Providing advice on the use of fluoride at home and implementing prophylactic measures at the dentist's surgery in accordance with contemporary guidelines are also important measures for preventing early childhood caries. AAPD has recommended that every infant should receive an oral health risk assessment from a child health professional by 6 months of age<sup>41</sup>. Children with an increased risk of oral diseases or identified white spots or caries lesions should be provided with necessary treatment<sup>42</sup>.

Medical providers specializing in other fields, such as gynaecologists, neonatologists and paediatricians, also have an important role in ECC prevention, because their collaboration with dentists enables the implementation of ECC preventive measures at prenatal, perinatal and postnatal levels. In populations at high risk of dental caries (the indigenous population of the U.S. and Canada), guidelines and recommendations have been issued for initiating the training of other dental health and primary health care providers, for the purpose of implementing preventive measures more efficiently<sup>3</sup>.



*Smernice za prevenciju KRD-a*

AADS je definisala karijes „kao najčešće hronično oboljenje koje nastaje kao posledica disbalansa između multiplih faktora rizika i protektivnih faktora u određenom vremenskom periodu. U cilju smanjenja rizika za razvoj KRD-a, AADS je preporučila profesionalne i individualne mere prevencije:

1. redukovanje količine mutantnog streptokoka kod roditelja/bliskih rođaka u cilju smanjenja transmisije kariogenih bakterija;
2. minimiziranje aktivnosti koje podrazumevaju „deljenje pljuvačke“ u cilju smanjenja transmisije kariogenih bakterija;
3. implementiranje mera oralne higijene odmah po izbijanju prvih mlečnih zuba. Pranje zuba deci treba da obavljaju roditelji dva puta dnevno, primenom mekane četkice čija je dimenzija prilagođena uzrastu. Kod dece koja imaju umeren ili visok rizik za karijes starosti do dve godine treba upotrebljavati količinu paste koja odgovara pre-mazu, a kod dece uzrasta od 2-5 godina količinu koja odgovara veličini ‘zrna graška’;
4. obaviti prvi stomatološki pregled u periodu do 6 meseci posle nicanja prvog zuba ili najkasnije u 12. mesecu života, da bi se izvršila procena rizika za karijes i obezbedila edukacija roditelja uključivanjem ranih mera prevencije oralnog oboljenja;
5. izbegavanje učestalog konzumiranja tečne i/ili čvrste hrane koja sadrži šećere; naročito:
  - izbegavati davanje napitaka koji sadrže šećer (zaslađeni sokovi, čaj, mleko) putem bebine flašice,
  - izbegavati uspavlivanje odojčadi u krevetu sa flašicom zaslađenog mleka ili drugih zaslađenih napitaka,
  - izbegavati ‘dojenje na zahtev’ posle nicanja prvih mlečnih zuba i davanje drugih ugljenih hidrata,
  - roditelji bi trebalo da podstiču decu da piju iz čaše posle navršene prve godine života. Decu treba odviknuti od korišćenja flašice u periodu od 12 do 18 meseci života
  - saradivati sa svim medicinskim osobljem u cilju sveobuhvatnog sprovođenja skrining pregleda, savetovanja i preventivnih mera kod odojčadi i male dece<sup>51</sup>.

*ECC prevention guidelines*

The AAPD recognizes caries “as a common chronic disease resulting from an imbalance of multiple risk factors and protective factors over time. To decrease the risk of developing ECC, the AAPD encourages professional and at home preventive measures that include:

1. reducing the parent’s/sibling’s MS levels to decrease transmission of cariogenic bacteria.
2. minimizing saliva-sharing activities (eg, sharing utensils) to decrease the transmission of cariogenic bacteria.
3. implementing oral hygiene measures no later than the time of eruption of the first primary tooth. Toothbrushing should be performed for children by a parent twice daily, using a soft toothbrush of age appropriate size. In children considered at moderate or high caries risk under the age of two, a ‘smear’ of fluoridated toothpaste should be used. In all children aged two to five, a ‘pea-size’ amount should be used.
4. establishing a dental home within six months of eruption of the first tooth and no later than 12 months of age to conduct a caries risk assessment and provide parental education including anticipatory guidance for prevention of oral diseases.
5. avoiding high frequency consumption of liquids and/or solid foods containing sugar. In particular:
  - sugar-containing beverages (eg, juices, soft drinks, sweetened tea, milk with sugar added) in a baby bottle or no-spill training cup should be avoided.
  - infants should not be put to sleep with a bottle filled with milk or liquids containing sugars.
  - ad libitum breastfeeding should be avoided after the first primary tooth begins to erupt and other dietary carbohydrates are introduced.
  - parents should be encouraged to have infants drink from a cup as they approach their first birthday. Infants should be weaned from the bottle between 12 to 18 months of age.
  - working with medical providers to ensure all infants and toddlers have access to dental screenings, counseling, and preventive procedures<sup>51</sup>.

## Zaključak

KRD je oboljenje sa problematikom na globalnom nivou, koje i pored preduzimanja mera prevencije, još uvek opstaje u visokom procentu u pojedinim zajednicama. Razlog tome je učešće velikog broja faktora rizika vezanih ne samo za higijensko-dijetetsku disciplinu već i za nivo obrazovanja roditelja, socio-ekonomske uslove života i kulturološka obeležja. Donošenjem, evaluacijom i kontinuiranim sprovođenjem programa prevencije i strateških mera mogu se postići dobri rezultati. Veoma važna je uloga države i zajednice u donošenju odluka o usmeravanju resursa na prevenciju, kao najekonomičniju meru, i podizanju svesti građana o značaju oralnog zdravlja. Uloga profesionalaca i roditelja, koja se tiče prenošenja znanja, veština i navika u održavanju oralne higijene, neophodna je mera u cilju očuvanja zdravlja čitave populacije.

## Conclusion

ECC is a disease with global-level issues that, despite preventive measures, is still largely present in some communities. The main reasons are a multiple risk factors, related not only to hygiene and dietary habits, but also the level of parental education, socioeconomic living conditions and cultural distinctions. Significant results can be achieved by the introduction, evaluation and implementation of prevention programs and strategic measures. The role of the state and the community is very important in making decisions on directing their resources to prevention, as the most cost-effective measure, as well as in increasing public awareness of the importance of oral health has part of general health. The role of professionals prior to medical treatment and also parents at family level in providing the knowledge, skills and oral hygiene habits with their children is a necessary measure aimed at preserving the health of the entire population.

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