ACTA
STOMATOLOGICA
CROATICA
www.ascro.hr

Acta Stomatol Croat. 2011;45(1):24-30.
IZVORNI ZNANSTVENI RAD
ORIGINAL SCIENTIFIC PAPER

Mervana Spahić-Dizdarević[1], Emsudina Deljo[2], Maida Ganibegović-Selimović[3]

Evaluacija učestalosti dentalnih anomalija kod djece u Sarajevskom kantonu

Evaluation of the Prevalence of Dental Anomalies in Children in the Canton of Sarajevo

[1] Javna ustanova *Dom zdravlja* Sarajevskog kantona, Bosna i Hercegovina
The Public Institution Health Centre of Sarajevo Canton, Bosnia and Herzegovina
[2] Javna ustanova *Dom zdravlja* Goražde, Bosna i Hercegovina
The Public Institution Health Centre of Goražde, Bosnia and Herzegovina
[3] Stomatološki fakultet Sarajevskog sveučilišta, Bosna i Hercegovina
Faculty of Dental Medicine University of Sarajevo, Bosna i Hercegovina

Sažetak

Svrha: Zadatak istraživanja bila je evaluacija učestalosti dentalnih anomalija kod predškolske i školske djece u Sarajevskom kantonu te diferencijacija relativnog udjela nasljednih i nenasljednih čimbenika u fenotipskoj ekspresiji dentalnih anomalija. **Ispitanici i postupci:** Za uzorak su odabrana djeca predškolske i školske dobi obaju spolova iz šest vrtića i šest osnovnih škola u Sarajevskom kantonu. Pregledano ih je ukupno 740 – od njih je 270 bilo predškolske dobi (123 dječaka i 147 djevojčica), a 470 školske dobi (231 dječak i 239 djevojčica). Prevalencija dentalnih anomalija procjenjivala se prema tome koliko je česta pojava anomalija u uzorku. Kako bi se prevalencije određenih dentalnih anomalija usporedile s europskim i svjetskim populacijama, bio je odabran test razlike proporcija, varijanta χ^2 testa s granicom statističke značajnosti od $p<0,05$. Primjenom istog testa bila je obavljena i procjena značajnosti razlike u spolnoj strukturi ispitanika. U statističkim analizama koristili smo se znanstveno verificiranim softverom MedCalc Ver. 9.2.0.0. **Rezultati:** Na temelju promatranog uzorka djece predškolske dobi uočena je tendencija porasta dentalnih anomalija kod djevojčica i ustanovljena u postotcima sljedeća zastupljenost dentalnih anomalija: makrodoncija (27%), fuzija (24%), AI hipoplastični tip (13%), mikrodoncija (13%), AI hipokalcifikacijski tip (10%), hipodoncija (8%) i geminacija (5%). U uzorku djece školske dobi bila je u postotcima sljedeća zastupljenost pojedinih dentalnih anomalija: hipodoncija (42%), makrodoncija (27%), mikrodoncija (25%), AI hipoplastični tip (4%) i fuzija (2%). **Zaključak:** Od ukupnog broja ispitanika u uzorku predškolske djece, kod njih 14,8 posto uočene su dentalne anomalije, a kod školske djece taj postotak iznosi 11,7. Postotak dentalnih anomalija kod djece u Sarajevskom kantonu okviru je očekivanoga, nakon što je usporeden s referentnim podacima iz svjetske literature.

Zaprimljen: 23. studenog 2010.
Prihvaćen: 7. veljače 2011.

Adresa za dopisivanje
Prof.dr.sc. Maida Ganibegović-Selimović
Sveučilište u Sarajevu
Stomatološki fakultet
Bolnička 4a, Sarajevo, Bosna i Hercegovina
mganibegovic@sf.unsa.ba

Ključne riječi
zub, malformacije; anodoncija; zubna caklina, hipoplazija; zubi, fuzija; amelogenesis Impefecta, hipoplasitčni tip; djeca; Bosna i Hercegovina

Uvod

Populacija je osnovna biološka jedinica skupne promjenjivosti, to je prirodan oblik postojanja svih živih bića i osnovna cjelina evolucijskih procesa. Svaku populaciju čine jedinke određenih genotipova te o tomu izravno ovisi njezina genska struktura (1,2). Genska struktura populacije primarno je određena relativnim frekvencijama varijanti promatranih gena i njihovih kompleksa te distribucijom genotipova u potomstvu sukcesivnih generacija. Čimbenici koji remete tu ravnotežu manje su ili više djelotvorni u svim realnim populacijama.

U proučavanju dentalnih anomalija vrlo su važne mutacije koje u sklopu genskog ekvilibrija mogu narušiti sklad toga sustava. One predstavljaju jedini bitan izvor nasljedne individualne promjenjivosti jer se javljaju kao posljedica ma-

Introduction

A population is the fundamental biological unit of group variability - natural form of existence of all species of living beings and the fundamental unit of evolutionary processes. Each population consists of individuals of certain genotypes, which directly depends on its genetic structure (1, 2). Genetic population structure is primarily determined by the relative frequencies variants of observed genes as well as their structures and distribution of genotypes in the descendants of successive generations. Factors that disrupt genetic equilibrium are more or less efficient in all real populations.

It is important to note that in the study and observation of dental anomalies, mutations in the genetic equilibrium can disrupt the harmony of the system. Mutations are essentially the only source of heritable individual variability because they

terijalnih promjena u kemijskoj strukturi i kvantiteti genetske informacije (DNK). Sve ostale pojave i oblici nasljedne varijacije rezultat su rekombinacija postojećeg genskog materijala ili različitih efekata njegove interakcije s unutarnjom i vanjskom sredinom (3, 4).

Zbog toga je svrha ovoga rada bila procijeniti koliko su česte dentalne anomalije kod predškolske i školske djece u Sarajevskom kantonu, ustanoviti kolika je diferencijacija relativnog udjela nasljednih i nenasljednih čimbenika u fenotipskoj ekspresiji dentalnih anomalija te populacijsko-genetička analiza i usporedba postignutih rezultata s odgovarajućim podacima Svjetske zdravstvene organizacije.

Ispitanici i metode

Za istraživanje su bila odabrana djeca obaju spolova predškolske i školske dobi, podijeljena u dvije skupine – od 2 do 6 godina i od 7 do 14. Od svakog sudionika bili su uzeti detaljni anamnestički podaci te evidentirani u individualne kartone. Zbog toga što nasljedni čimbenici imaju veliku ulogu u nastanku dentalnih anomalija, bila je obavljena i obiteljska anamneza kako bi se doznalo postoje li anticipacije pojedinih analiziranih anomalija između generacija srodnika i potomaka.

Ukupno je bilo pregledano 270 djece predškolske dobi (123 dječaka i 147 djevojčica). Učestalost dentalnih anomalija kod predškolske djece predstavljena je u Tablici 1.

U sklopu ovog istraživanja pregledano je 470 djece školske dobi (231 dječak i 239 djevojčica). Učestalost pojedinih dentalnih anomalija kod školske djece predstavljena je u Tablici 2.

occur as a result of material changes in the chemical structure and quantity of genetic information (DNA). All other phenomena and forms of hereditary variations are the result of recombination of existing genetic material or different effects of its interaction with internal and external environment (3, 4).

Therefore, the purpose of this study was as follows:

To estimate the incidence of dental anomalies in preschool and school children in the Canton of Sarajevo; to differentiate the relative share of hereditary and nonhereditary factors in the phenotypic expression of dental anomalies; to make a population-genetic analysis and compare the obtained results with the relevant WHO data.

Material and methods

This study included preschool and school age children of both sexes divided into two age groups of 2-6 years and 7-14 years. All anamnestic data for the subjects were entered into specially prepared individual records. Starting from the fact that genetic factors play a major role in the development of dental anomalies, family history was taken to determine the possible anticipation of some anomalies observed between the generations of relatives and descendants.

The method was applied on a sample of 270 preschool children (123 boys, 147 girls). The incidence of dental anomalies in preschool children is presented in Table 1.

A total of 470 school children of both sexes were treated (231 boys, 239 girls).

The incidence of dental anomalies in school children is presented in Table 2.

Tablica 1. Učestalost pojedinih dentalnih anomalija kod predškolske djece
Table 1 The incidence of dental anomalies in preschool children

Vrtić • Kindergarten	Ukupan broj pregledane djece • The total number of examined children	Broj dječaka • Number of boys	Broj djevojčica • Number of girls	Djeca sa dentalnim anomalijama • Children with dental anomalies	Dječaci • Boys	Djevojčice • Girls
"Amel i Nur"	45	20	25	7	3	4
"Kekec"	50	22	28	7	3	4
"Nemil"	40	21	19	3	0	3
"Srećica"	50	25	25	8	3	5
"SOS Kinderdorf"	45	20	25	5	3	2
"Dječiji grad"	40	15	25	10	4	6
	270	123	147	40	16	24

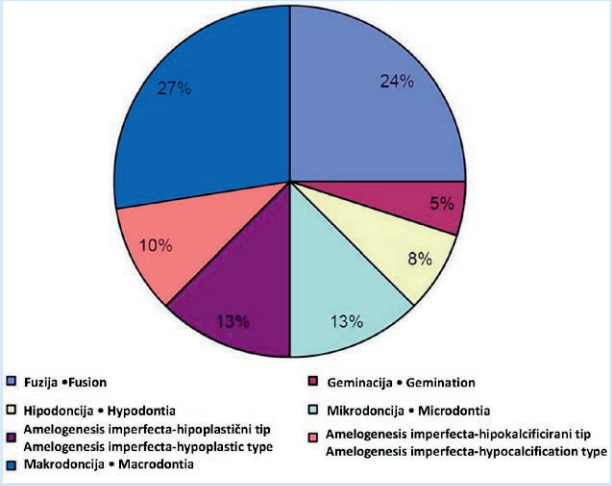
Tablica 2. Učestalost pojedinih dentalnih anomalija kod školske djece
Table 2 The incidence of dental anomalies in school children

Osnovna škola • Primary school	Ukupan broj pregledane djece • The total number of examined children	Broj dječaka • Number of boys	Broj djevojčica • Number of girls	Djeca sa dentalnim anomalijama • Children with dental anomalies	Dječaci • Boys	Djevojčice • Girls
A. Šantić	100	48	52	10	4	6
O.N.Hadžić	70	35	35	9	3	6
Meša Selimović	50	30	20	8	3	5
Skender Kulenović	100	43	57	11	6	5
F. Gunić	70	30	40	9	5	4
Behaudin Selmanović	80	45	35	8	4	4
	470	231	239	55	25	30

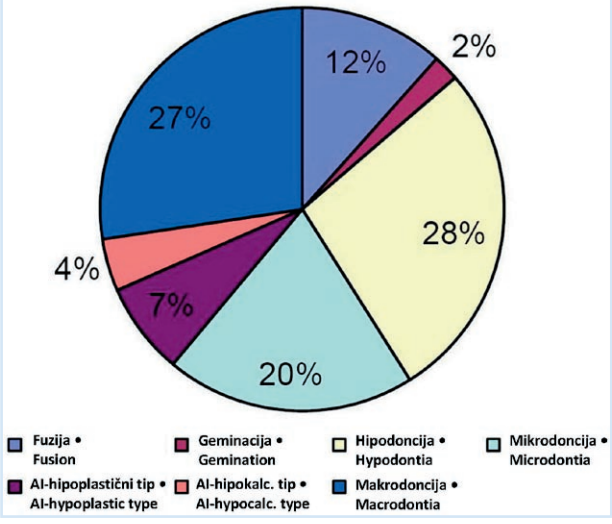
Kako bi se shvatila čestoća pojedinih dentalnih anomalija, bile su obavljene biostatičke i populaciono-genetičke analize. Uključivale su frekvenciju pojedine dentalne anomalije i procjenu genotipskih frekvencija prema Hardy-Weinbergovu modelu. Zatim su tako procijenjene genotipske frekvencije pojedinih dentalnih anomalija uspoređene s općom europskom populacijom upotrebom Fisherova egzaktnog testa ($p<0,05$).

Rezultati

U uzorku djece predškolske dobi uočena je kod djevojčica u odnosu prema dječacima veća učestalost dentalnih anomalija, osim u slučaju mikrodoncije. Vrijednosti prevalencija dentalnih anomalija u uzorku djece predškolske dobi pokazuju najveću zastupljenost makrodoncije (4,07%), fuzije (3,70%) te mikrodoncije i AI-hipoplastičnog tipa (po 1,85%). Također je prikazan postotak zastupljenost dentalnih anomalija u uzorku djece predškolskog uzrasta (Slika 1.).



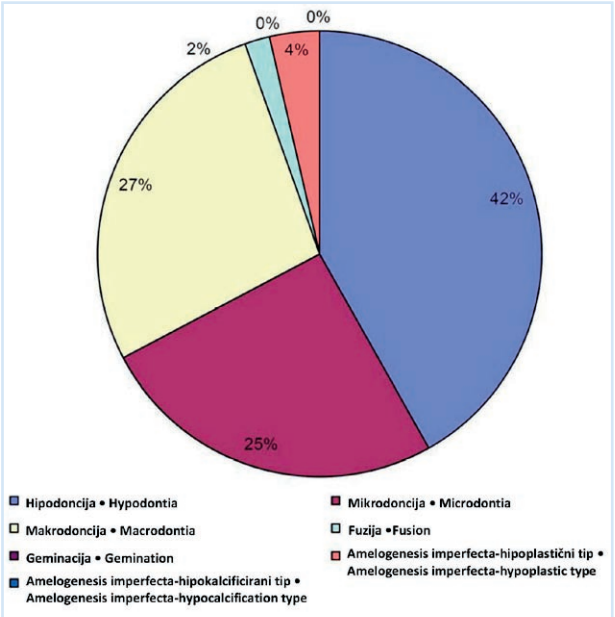
Slika 1. Postotci pojedinih dentalnih anomalija u uzorku djece predškolske dobi
Figure 1. The percentage distribution of dental anomalies in a sample of preschool children



In order to observe the frequency of some dental anomalies, a biostatic and population-genetic analysis was made. This analysis included the frequency of occurrence of individual dental anomalies and estimation of genotypic frequencies in accordance with Hardy-Weinberg model. Genotypic frequencies of some dental anomalies estimated in this way were compared with the general European population using the Fisher exact test ($p <0.05$).

Results

In a sample of preschool children, a higher prevalence of dental anomalies was observed in girls than in boys (except microdontia). Of all dental anomalies in a sample of preschool children macrodontia had the highest prevalence (4.07%) followed by fusion (3.70%) and microdontia and AI-hypoplastic type (with 1.85%). The percentage distribution of dental anomalies in a sample of preschool children is shown in Figure 1.



Slika 2. Postotci pojedinih dentalnih anomalija u uzorku djece školske dobi
Figure 2. The percentage distribution of dental anomalies in a sample of school children

Slika 3. Postotci pojedinih dentalnih anomalija u ukupnom uzorku
Figure 3. The percentage distribution of dental anomalies in a total sample

Za razliku od djece predškolske dobi, kod školske djece uočena je veća učestalost mikrodoncije i makrodoncije kod dječaka u odnosu prema djevojčicama, a hipodoncija je zastupljenija kod djevojčica. Iz prevalencija dentalnih anomalija, u uzorku djece školske dobi vidi se najveća zastupljenost hipodoncije (4,89%), makrodoncije (3,19%) i mikrodoncije (2,98%). Njihova zastupljenost u postotcima prikazana na Slici 2.

U ukupnom uzorku djece obiju dobi uočena je veća zastupljenost fuzije, geminacije, hipodoncije, AI-hipoplastičnog tipa i makrodoncije kod djevojčica za razliku od dječaka kod kojih je bila zastupljenija mikrodoncija. Zastupljenost dentalnih anomalija u postotcima u ukupnom uzorku predstavljena je na Slici 3.

Statistički značajna razlika u prevalenciji analiziranih dentalnih anomalija između djece predškolske i školske dobi zabilježena je u slučaju fuzije (P<0,0005) i hipodoncije (P<0,01).

Alelogenske frekvencije procjenjivale su se samo za one dentalne anomalije za koje postoje razmjerno usklađeni izvori u literaturi o modelu njihova nasljeđivanja. U Tablici 3. su alelne i estimirane genotipske frekvencije dentalnih anomalija u uzorku predškolske djece.

Unlike children of preschool age, in a sample of school children, a higher incidence of microdontia and macrodontia in boys in relation to girls was found, while hypodontia was more prevalent in girls. Prevalence of dental anomalies in a sample of children of school age clearly shows the largest representation of hypodontia (4.89%), macrodontia (3.19%) and microdontia (2.98%). Percentage of these dental anomalies is shown in Figure 2.

In the total sample of children of both sexes, a higher presence of fusion, gemination, hypodontia, hypoplastic type of AI and macrodontia was found in girls compared to boys, while the boys had higher prevalence of microdontia. Percentage of dental anomalies in the total sample is shown in Figure 3.

A statistically significant difference in prevalence of observed dental anomalies among children of preschool and school children was registered for fusion (P<0.0005) and hypodontia (P<0.01).

The *frequency* of alleles was evaluated only for dental anomalies for which there are relatively harmonized reference sources on the model of their inheritance. Table 3 shows the allelic and estimated genotypic frequencies of dental anomalies in a sample of preschool children.

Tablica 3. Alelne i estimirane genotipske frekvencije analiziranih dentalnih anomalija u skupini predškolske djece u Sarajevskom kantonu
Table 3 The allelic and estimated genotypic frequencies of dental anomalies in a sample of preschool children Canton of Sarajevo

Dent. anom.	AA	Aa	aa	"Disease alel" rel. frekv. • "Disease alel" rel. freq.
Hipodoncija autos.-domin. • Hypodontia autos.-domin.	0	3	267	0.0056
Hipodoncija X-vez. reces. • Hypodontia X-linked recessive	♀ = 115	♀ = 30	♀ = 2	♂ = 0.0081 ♀ = 0.1166
Mikrodoncija • Microdontia	-	-	-	-
Makrodoncija • Macrodontia	-	-	-	-
Fuzija • Fusion	0	10	260	0.0187
Geminacija • Gemination	-	-	-	-
AI-hiploplast. autos.-domin. • AI-hypopl. autos.-domin.	0	5	265	0.0093
AI-hiploplast. X-vez. domin. • AI-hypopl. X-linked domin.	♀ = 0	♀ = 3	♀ = 144	♂ = 0.016 ♀ = 0.0103
AI-hipokalc. • AI-hypocalc.	0	4	266	0.0074

Tablica 4. Alelne i estimirane genotipske frekvencije analiziranih dentalnih anomalija u skupini školske djece Sarajevskom kantonu
Table 4 The allelic and estimated genotypic frequencies of dental anomalies in a sample of school children Canton of Sarajevo

Dent. anom.	AA	Aa	aa	"Disease alel"
Hipodoncija autos.-domin. • Hypodontia autos.-domin.	0	23	447	0.0248
Hipodoncija X-vez. reces. • Hypodontia X-linked recessive	♀ = 141	♀ = 85	♀ = 13	♂ = 0.0433 ♀ = 0.2332
Mikrodoncija • Microdontia	-	-	-	-
Makrodoncija • Macrodontia	-	-	-	-
Fuzija • Fusion	0	1	469	0.0011
Geminacija • Gemination	-	-	-	-
AI-hiploplast. autos.-domin. • AI-hypopl. autos.-domin.	0	2	468	0.0021
AI-hiploplast. X-vez. domin. • AI-hypopl. X-linked domin.	♀ = 0	♀ = 1	♀ = 238	♂ = 0.0043 ♀ = 0.0021
AI-hipokalc. • AI-hypocalc.	0	0	0	0

Ako se tablice pozorno pregledaju, može se primijetiti izražena relativna frekvencija recesivnog alelogena odgovornog za hipodonciju prema X-spolno vezanom recesivnom modelu nasljeđivanja u skupini djevojčica. Osim fuzije, kod koje je relativna frekvencija iznad 0,01, nije zabilježena izražena relativna frekvencija „*disease*" alelogena analiziranih dentalnih anomalija u skupini predškolske djece.

U slučaju školske djece frekvencija recesivnog alelogena odgovornog za hipodonciju, prema X-spolno vezanom recesivnom modelu nasljeđivanja, u skupini djevojčica izraženija je nego kod predškolske djece (Tablica 4.). Usporedba distribucije genotipskih frekvencija hipodoncije u skupini školske djece iz Sarajevskog kantona i prosječne europske populacije upozorava na to da nema statistički značajne razlike.

Rasprava

Razvoj zuba primarno je pod genetskom kontrolom i u njihovoj morfogenezi sudjeluje veći dio humanih gena (4). Mutacije pojedinih gena odgovornih za ranu fazu morfogeneze mogu nastati zbog materijalnih promjena u kemijskoj strukturi i kvantiteti genetičke informacije (DNK) i kao takvi djelovati na molekule i mreže za signalizaciju koje reguliraju njegov razvoj. Mnogo je genetski uzrokovanih abnormalnosti u broju, veličini, obliku i strukturi zuba. Neke su dentalne anomalije vrlo važne jer mogu upozoravati na sistemske genetske poremećaje i teške kromosomske abnormalnosti.

Na osnovi prezentiranih podataka u uzorku djece predškolskog uzrasta kod njih 14,8 posto uočene su dentalne anomalije, za razliku od uzorka djece školskog uzrasta kod kojih je bilo 11,7 posto dentalnih anomalija.

Statistički značajna razlika u prevalenciji analiziranih dentalnih anomalija između djece oba uzrasta zabilježena je koda fuzije (P<0,0005) i hipodoncije (P<0,0131).

Komparacija rezultata prevalencije hipodoncije kod predškolske djece u Sarajevskom kantonu s vršnjacima iz osam zemalja Europe, Azije i Oceanije pokazala je da nema statistički znatnee razlike i da je prevalencija hipodoncije kod predškolskog uzrasta u sklopu očekivane (Tablica 5.).

Usporedbom rezultata prevalencije hipodoncije u uzorku školske djece u Sarajevskom kantonu s prevalencijama u osam populacija iz europske, bliskoistočne i sjevernoameričke regije, može se zaključiti da nije pronađena statistički značajna razlika, osim u usporedbama s populacijama iz SAD-a i Danske (Tablica 6.).

Na osnovi rezultata kod procjene alelnih i estimiranih genotipskih frekvencija za hipodonciju, u obje kategorije ispitanika (predškolska i školska djeca) može se argumentirano sumnjati u testirani model (X vezano- recesivno) nasljeđivanja hipodoncije jer su uočene međusobne razlike u frekvenciji „*bolesnih*" alela za hipodonciju. To pokazuje da je nužno u budućim sličnim istraživanjima skupiti odgovarajuće podatke za proučavanje mogućega oligogenskog ili poligenskog nasljeđivanja ove osobine.

The table shows the expressed relative frequency of recessive allelic gene responsible for hypodontia in accordance with the X-linked recessive inheritance model in a group of girls. In a group of preschool children, the expressed relative frequency of "disease" allelic gene observed in dental anomalies was not recorded, except for fusion with relative frequency above 0.01.

In a sample of school children, the frequency of recessive allelic gene responsible for hypodontia in accordance with the X-linked recessive model of sexual inheritance was more prominent in a group of girls than in a sample of preschool children (Table 4).

The comparison of the distribution of genotype frequencies of hypodontia in a group of school children of the Canton of Sarajevo and the average European population indicates a lack of statistically significant differences.

Discussion

Tooth development is primarily under genetic control and most of the human genes are involved in its morphogenesis (4). Mutations of individual genes responsible for the early phase of morphogenesis of teeth may result from material changes in chemical structure and quantity of genetic information and thus affect the molecules and signaling networks that regulate its development. There is a large number of genetically caused abnormalities in number, size, shape and structure of the tooth. Some dental anomalies are very important because they may indicate a possibility of systemic genetic disorders and severe chromosomal abnormalities.

In a sample of preschool children, 14.8% of dental anomalies were found, compared to the sample of children of school age where 11.7% of dental anomalies were observed.

Statistically significant difference in prevalence of observed dental anomalies among children of preschool and school children was registered for fusion (P<0.0005) and hypodontia (P<0.01).

The comparison of the obtained hypodontia prevalence results of preschool children in the Canton of Sarajevo with their peers in eight countries in Europe, Asia and Oceania has indicated that there was no statistically significant differences and that the prevalence of hypodontia in preschool children is within the expected range (Table 5).

It can be concluded that there was no statistically significant difference between the obtained hypodontia prevalence results of school children in the Sarajevo Canton and the corresponding prevalence in eight populations of European, Middle Eastern and North American regions, except in comparisons with populations from the United States and Denmark (Table 6).

Based on the results for hypodontia, the tested model (X-linked recessive) of inheritance of hypodontia is not completely reliable, because it showed mutual differences in the frequency of "disease" alleles for hypodontia. This suggests that further research is needed in order to collect appropriate data for the study of possible oligogenic or polygenic inheritance of this trait.

Tablica 5. Komparacija prevalencije hipodoncije u odabranim svjetskim populacijama (djeca predškolskog uzrasta)
Table 5 Prevalence comparison of hypodontia in selected world populations (preschool children)

	Referenca • Reference	N	Prev.%	χ^2 test
Švedska • Sweden	Grahnen et Granath, 1961	1173	0.4	0.927 P=0.3358
Danska • Denmark	Ravn, 1971	4564	0.6	0.377 P=0.5391
V. Britanija • United Kingdom	Brook, 1974	741	0.3	1.160 P=0.2814
Finska • Finland	Järvinen et Lehtinen, 1981	1141	0.9	0.002 P=9.645
Island • Island	Magnusson, 1984	927	0.5	0.431 P=0.5113
Novi Zeland • New Zealand	Whittington et Durward, 1996	1680	0.4	1.107 P=0.2928
Japan	Yonezu et al., 1997	2733	2.4	1.324 P=0.2498
Belgija • Belgium	Carvalho et al., 1998	750	0.4	0.685 P=0.4078

Tablica 6. Komparacija prevalencije hipodoncije u odabranim svjetskim populacijama (djeca školskog uzrasta)
Table 6 Prevalence comparison of hypodontia in selected world populations (school children)

	Referenca • Reference	N	Prev.% M • Prev.% M	Prev.% Ž • Prev.% F	Prev.%	χ^2 test
Norveška • Norway	Aasheim et Øgaard, 1993	1953	5.8	7.2	6.5	1.406 P=2.357
Italija • Italy	Baccetii, 1998	980	-	-	5.8	0.337 P=0.5618
Island	Johannsdottir et al., 1997	396	4	6	5	0.008 P=0.9285
Portugal	Leitão, 1993	666	-	-	6.3	0.759 P=0.3838
Izrael • Israel	Pilo et al., 1987	702	9.7	6.4	8	3.816 P=0.0508
Danska • Denmark	Rølling,1980	3325	7.7	7.8	7.8	4.616 P=0.0317
Švedska • Sweden	Thilander et Myberg,1973	5459	-	-	6.1	0.902 P=0.3423
SAD • USA	Tavajohi-Kermani et al., 2002	1016	3	6	8.8	6.442 P=0.0111
Iran	Elaheh Vahid-Dastjer et al., 2010	1751	8.5	9.8	9.1	0.832 P=0.36
Slovenija • Slovenia	Ferkonja A., 2005	212	4.2	7.1	11.3	- -

Zaključak

Na temelju ovog istraživanja može se zaključiti slijedeće: dosadašnji nalazi jasno pokazuju da većina analiziranih dentalnih anomalija ima visok stupanj heritabilnosti i razmjerno heterogene modele nasljeđivanja. Također se može konstatirati da je poznavanje prirode i složenosti modela genske kontrole nasljedne komponente uočenih dentalnih anomalija još uvijek nepotpuno, te da je u budućim studijama za odgovarajuće testove prijeko potrebno prikupiti mnogo više relevantnih genealoških podataka. Komparacijom rezultata s referentnim podacima iz relevantne svjetske literature uočeno je da je u ispitivanom uzorku postotak dentalnih anomalija kod djece predškolske i školske dobi u okviru očekivanoga.

Conclusions

In this study we can conclude the following: previous findings clearly indicate that most of the observed dental anomalies have a high degree of heritability and relatively heterogeneous models of inheritance. It has been concluded by the researchers of this study that the knowledge of the nature and complexity of genetic control models and the hereditary component in observed dental anomalies is still incomplete and that wider sources of relevant genealogical data are needed in future studies.

The results compared with reference data from the relevant world literature showed that the percentage of dental anomalies in the observed sample of preschool and school age children was within the expected range.

Abstract

Objectives: The aim of this study was to evaluate the prevalence of dental anomalies in preschool and school children of the Canton of Sarajevo and differentiation of the relative share of hereditary and nonhereditary factors in the phenotypic expression of dental anomalies. **Subjects and Methods:** We analyzed a sample of preschool children and school children of both sexes from six kindergartens and six elementary schools in the Canton of Sarajevo. The study included a total of 740 children, out of which 270 were preschool children (123 boys, 147 girls), and 470 school children (231 boys, 239 girls). The prevalence of dental anomalies was estimated according to frequency of occurance of dental anomalies in the sample. To compare the observed prevalence of certain dental anomalies with European and world populations, the test for proportion differences was used, a variant of the chi-square test with limit of the statistical significance of $p < 0.05$. A significant difference between the subjects according to gender was found using the same test. The statistical analysis was performed using the scientifically verified software MedCalc Ver. 9.2.0.0. **Results:** There was a tendency toward increase of dental anomalies in children of female sex, based on the observed sample of preschool children. The following percentage distribution of dental anomalies was found: macrodontia (27%), fusion (24%), hypoplastic type of AI (13%), microdontia (13%), hypocalcification type of AI (10%), hypodontia (8%) and gemination (5%). The following percentage representation of various dental anomalies was determined in a sample of school children: hypodontia (42%), macrodontia (27%), microdontia (25%), hypoplastic type of AI (4%) and fusion (2%). **Conclusion:** In a sample of preschool children, dental anomalies were observed in 14.8% and among school children this percentage was 11.7% of the total number of subjects. The percentage of dental anomalies in children in the Canton of Sarajevo was compared with reference data from the literature and was within the expected range.

Received: November 23, 2010
Accepted: February 7, 2011

Address for correspondence
Professor Maida Ganibegović-Selimović DDS, PhD
University of Sarajevo Dental faculty
Bolnička 4a, Sarajevo, Bosnia & Herzegovina
mganibegovic@sf.unsa.ba

Key words
Tooth Abnormalities; Anodontia; Dental Enamel Hypoplasia; Fused Teeth; Amelogenesis Impefecta local hypoplastic form; Children; Bosnia and Herzegovina

References

1. Hadžiselimović R. Bioantropologija-biodiverzitet recentnog čovjeka. Sarajevo: Ingeb; 2005.
2. Hadžiselimović R, Pojskić N. Uvod u humanu imunogenetiku. Sarajevo: Ingeb; 2005.
3. Škrinjarić I. Orofacijalna genetika. Zagreb: Školska knjiga; 2006.
4. Townsend GC, Brown T. Heritability of permanent tooth size. Am J Phys Anthropol. 1978 Nov;49(4):497-504.
5. Abramson JH. WINPEPI (PEPI-for-Windows): computer programs for epidemiologists. Epidemiol Perspect Innov. 2004 Dec 17;1(1):6.
6. Alvesalo L, Tigerstedt PM. Heritabilities of human tooth dimensions. Hereditas. 1974;77(2):311-8.
7. Arte S. Phenotypic and genotypic features of familial hypodontia [dissertation]. Helsinki: University of Helsinki; 2001.
8. Berberović Lj, Hadžiselimović R. Rječnik genetike. Sarajevo: Svjetlost; 1986.
9. Dixon GH, Stewart RE. Genetic aspects of anomalous tooth development. In: Stewart RE, Prescott GH, editors. Oral facial genetics. St. Louis: Mosby Co.; 1976.
10. Konjhodžić-Raščić H, Vuković A, Zukić S, Bajsman A, Prcić A. Dental anomalies among Students of Faculty of Dentistry, University of Sarajevo. Acta Medica Academica. 2006;35(1):23-9.
11. Pemberton TJ, Das P, Patel PI. Hypodontia: genetics and future perspectives. Braz J Oral Sci. 2005;4(13):695-706.
12. Pinkham JR, Casamassimo PS, Fields HW, McTigue DJ. Pediatric dentistry: Infancy through adolescence. St. Louis: Mosby Co.; 2005.
13. Pinho T, Tavares P, Maciel P, Pollmann C. Developmental absence of maxillary lateral incisors in the Portuguese population. Eur J Orthod. 2005 Oct;27(5):443-9.
14. Townsend G, Richards L, Hughes T. Molar intercuspal dimensions: genetic input to phenotypic variation. J Dent Res. 2003 May;82(5):350-5.
15. Vahid-Dastjerdi E, Borzabadi-Farahani A, Mahdian M, Amini N. Non-syndromic hypodontia in an Iranian orthodontic population. J Oral Sci. 2010;52(3):455-61.
16. Brough E, Donaldson AN, Naini FB. Canine substitution for missing maxillary lateral incisors: the influence of canine morphology, size, and shade on perceptions of smile attractiveness. Am J Orthod Dentofacial Orthop. 2010 Dec;138(6):705.e1-9; discussion 705-7.
17. Morinaga K, Aida N, Asai T, Tezen C, Ide Y, Nakagawa K. Dens evaginatus on occlusal surface of maxillary second molar: a case report. Bull Tokyo Dent Coll. 2010;51(3):165-8.
18. Celikoglu M, Miloglu O, Oztek O. Investigation of tooth transposition in a non-syndromic Turkish anatolian population: characteristic features and associated dental anomalies. Med Oral Patol Oral Cir Bucal. 2010 Sep 1;15(5):e716-20.
19. Manuja N, Nagpal R, Singh M, Chaudhary S, Suresh BS. Delayed eruption of maxillary permanent central incisors due to bilateral tuberculate supernumerary teeth: case report. J Dent Child (Chic). 2010 May-Aug;77(2):106-10.
20. Kawashita Y, Saito T. Nonsyndromic multiple mandibular supernumerary premolars: a case report. J Dent Child (Chic). 2010 May-Aug;77(2):99-101.
21. Manjunatha BS, Bapure SK. Taurodontism affecting all molars: Report of an unusual case. Acta Stomatol Croat. 2009;43(3):242-7.
22. Hegde KV, Poonacha KS, Sujan SG. Bilateral labial talon cusps on permanent maxillary central incisors: report of a rare case. Acta Stomatol Croat. 2010;44(2):120-2.
23. Kim YH. Investigation of Hypodontia as Clinically Related Dental Anomaly: Prevalence and Characteristics. ISRN Dentistry [serial on the Internet]. 2011; [about 6 p.]. Available from: http://www.hindawi.com/isrn/dentistry/2011/246135.html.
24. Fekonja A. Hypodontia in orthodontically treated children. Eur J Orthod. 2005 Oct;27(5):457-60.