KEFALOMETRIJSKI STANDARDI SRPSKIH DEVETOGODIŠNJAKA SA NEUTROOKLUZIJOM

CEPHALOMETRIC STANDARDS FOR 9 YEAR-OLD SERBIAN CHILDREN WITH NEUTROOCCLUSION

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Sažetak

Uvod. Populacije pokazuju razlike u raznim detaljima facijalne morfologije. Ove razlike su lako uočljive kada se porede pojedinci različite etičke pripadnosti.
Cilj rada. Uspostaviti specifične kefalometrijske standarde među polovima za srpsku decu uzrasta od devet godina.
Materijal i metode. Trideset šest dečaka i četrdeset dve devojčice (prosečne starosti 9±0.35), srpske nacionalnosti, izabrani su na osnovu sledećih kriterijuma: molarni odnos I klase, pozitivan horizontalni i vertikalni preklop manji od 4mm, nepostojanje ukrštenog zagrižaja, bukalnog ili oralnog promašaja, adekvatna količina prostora u oba zubna niza, bez prethodne ortodontske terapije, bez vidljivih asimetrija. Analizirani su profilni telerendgen snimci svakog pacijenta po dva puta. Opisna statistika (srednja vrednost, standardna devijacija, minimum, maksimum) izračunata je za sve merene parametre. Rezultati su objavljeni u poređenju sa drugim normama bele populacije. Dobijeni podaci su prezentovani u tabelama.
Rezultati. Poređenje među polovima uključuje dužinu prednje kranijalne baze (sella-nasion), prednju visinu lica (nasion-menton), dužinu corpusa maxile, ugao maksilarnog prognatizma (SNA), ugao mandibularnog prognatizma (SNB), kao i ugao mandibule prema prednjoj kranijalnoj bazi (SN/MP).
Zaključak. Srpski dečaci od devet godina imaju dužu prednju kranijalnu bazu, duži korpus maksile i veću prednju visinu lica, dok su maksila i mandibula više protrudirane kod devojčica.

Ključne reči: kefalometrija, kefalometrijski standardi, neutrookluzija

Abstract

Introduction. The populations show differences in relation to the various details of facial morphology. These differences are easily noticeable when comparing individuals with different ethnic background.
Aim. To establish specific cephalometric standards between the sexes for the nine-year-old Serbian children.
Methods. 36 boys and 42 girls (mean age 9±0.35) of Serbian nationality were selected based on the following criteria: Class I molar relationship, positive overbite and overjet less than 4mm, lack of crossbite, lack of oral and bucal failure, no previous orthodontic treatment, adequate amount of space in both dental arches, no visible asymmetry. Lateral cephalograms of each patient were analyzed twice. Descriptive statistics (mean, standard deviation, minimum and maximum) were calculated for all measured parameters. The results were compared to the published norms of the other Caucasian populations. Normative data were presented in the tables.
Results. Intergender differences included anterior cranial base length (Sella-Nasion), anterior facial height (nasion-menton), corpus maxilla length, SNA angle, SNB angle, angle SN/MP.
Conclusion. Nine-year-old Serbian boys have a larger anterior cranial base, larger corpus maxilla, and larger anterior facial height, while the maxilla and mandible protrusion are more pronounced in girls.

Key words: *cephalometrics, cephalometric norms, neutroocclusion*

Uvod

Populacije pokazuju razlike u raznim detaljima facijalne morfologije. Ove razlike su lako uočljive kada se porede pojedinci različite etičke pripadnosti. Kinezi imaju veću dentalnu

Introduction

The populations show differences in relation to the various details of facial morphology. These differences are easily noticeable when comparing individuals with different ethnic

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protrudiranost, imaju kraću srednju trećinu lica i strmiju mandibularnu ravan, nego britanske kolege [1]. Huang i saradnici[2] su poredili Amerikance afričkog i evropskog porekla koji žive u Birmingemu i pokazali da postoji veća bimaksilarna protruzija kod Amerikanaca afričkog porekla. Neke studije pokazuju da, takođe, postoje razlike među populacijom bele rase[3,4].

Trenauth i saradnici su upoređivali kraniofacijalnu morfologiju kod Nemaca, Engleza i Amerikanca i zaključili da su najveće razlike između posmatranih nemačkih i engleskih grupa[3].

Materijal i metode

Posetili smo dve slučajno odabrane osnovne škole, jednu iz Pančeva, a drugu iz Beograda, upoznali direktore i nastavnike sa našim planom istraživanja. Svim roditeljima dece II razreda podelili smo upitnike sa detaljno objašnjenim postupcima koje smo sproveli kod dece i svrhom ispitivanja. Obe škole su pristale da učestvuju u istraživanju, pa smo odabrali četiri odeljenja II razreda sa po 22 deteta.

Osnovni kriterijumi za odabir bili su: molarni odnos I klase, nepostojanje ukrštenog zagrižaja, bukalnog ili oralnog promašaja, pozitivan horizontalni i vertikalni preklop do 4mm, adekvatan prostor u oba zubna niza, bez prethodne ortodontske terapije, bez vidljivih asimetrija i skladnih crta lica. Deca koja su odabrana i čiji su roditelji pristali da učestvuju u istraživanju, pozvani su na Kliniku za ortopediju vilica Stomatološkog fakulteta u Pančevu. Intraoralno ispitivanje, analiza studijskih modela, ortopan i profilni telerendgen snimci urađeni su kod 88 ispitanika.

Svi profilni telerendgen snimci napravljeni su na Stomatološkom fakultetu u Pančevu. Za sve pacijente urađeni su profilni telerendgen snimci pod istim uslovima. Pacijenti su bili pozicionirani sa glavom u kefalostatu i zubima u maksimalnoj interkuspidaciji, tako da je frankfurtska horizontala bila paralelna sa podom, a srednja sagitalna ravan paralelna sa kasetom i filmom. Udaljenost od fokusa do mediosagitalne ravni pacijenta i od mediosagitalne ravni do filma bila je ista za svakog pacijenta. Snimci su analizirani klasičnim nacinom analize na osnovu kefalometrijskih tačaka i ravni na negatoskopu i acetatnom papiru od strane dva ortodonta.
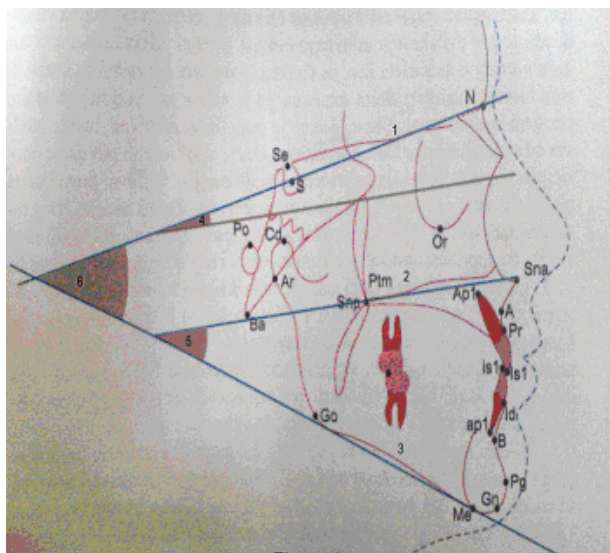
background. Chinese people have more dental protrusion, have shorter midfacial length and steeper mandibular plane, compared to their British Caucasian counterparts[1] Huang et al. compared Americans of African and European descent living in Birmingham and demonstrated greater bidentoalveolar protrusion in the African American sample[2]. Some studies show that differences also exist among populations of the white race[3,4]. Trenouth. et al. compared craniofacial morphology in Dutch, English and American samples and concluded that the greatest differences were observed between the English and Dutch groups[3].

Material and Methods

We visited two randomly selected schools, one in Pančevo, another in Belgrade – and informed principals and teachers of our research plan. We handed out questionnaires containing details of the procedures to be carried out as well as the purpose of the research to all parents of the second grade children. Both school agreed to participate in the research, so we chose four second grade classes with 22 children each, with similar socioeconomic status. The basic criteria for selection were: Class I molar relationship, lack of crossbite, lack of oral and bucal failure, positive overjet and overbite less than 4 mm, no previous orthodontic treatment, adequate space in dental arches, no visibly asymmetry. Of the selected children, those whose parents agreed to participate in the research were invited to come, to the Department of Orthodontics of the Faculty of Dentistry Pančevo. Intraoral inspection, study models analysis and analysis of the panoramic and lateral cephalograms were conducted on 88 subjects.
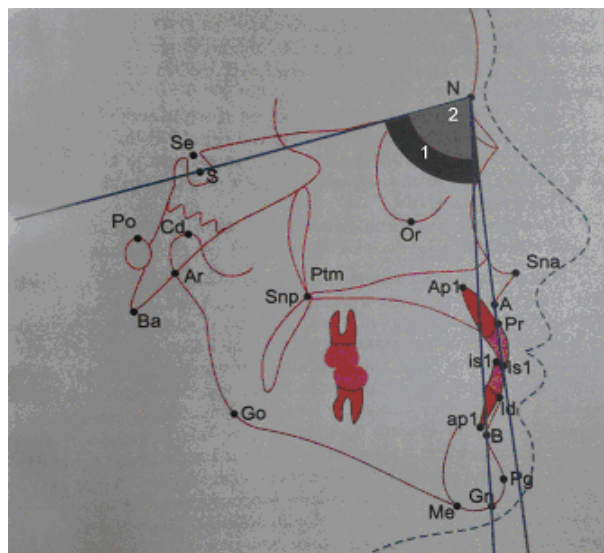
The study conformed to the Declaration of Helsinki. It was approved by the Ethics Committee of the Faculty. All the participants were recruited on the voluntary base, and their parents were asked to sign an informed consent form, since the participants were under 18 years of age.

All lateral cephalograms were made at the Faculty of Dentistry Pancevo. All lateral cephalograms were taken under the same conditions. Patients were positioned with their head in cephalostat and teeth in maximal intercuspation so that the Frankfurt's horizontal was parallel with the floor, and the middle sagital plane was parallel with the tape and the film. The distances between the focus and the mediosagital plane of the patients and between the mediosagital plane
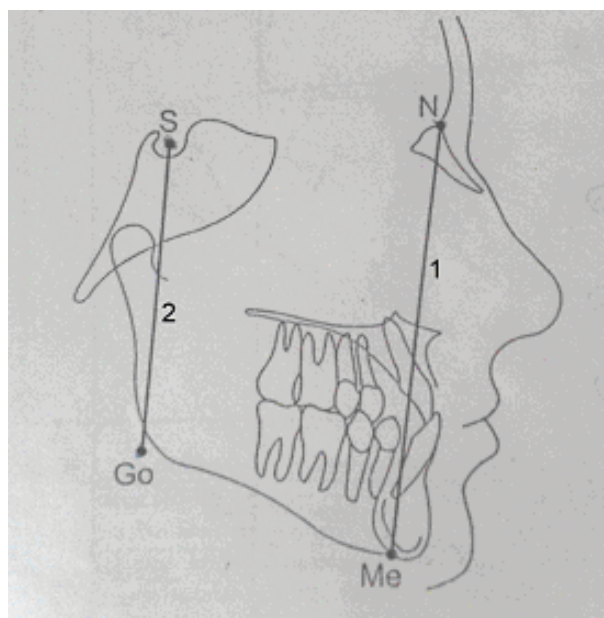
Slika 1. Ugaoni i linearni parametri: (1) Dužina prednje kranijalne baze (SN), (2) Osnovna ravan gornje vilice - Spina planum-SPp (Sna-Snp), (3) Osnovna ravan donje vilice (MP), (4) Ugao nagiba gornje vilice SN/SPp, (5) SPp/MP ugao, (6) Ugao nagiba donje vilice SN/MP
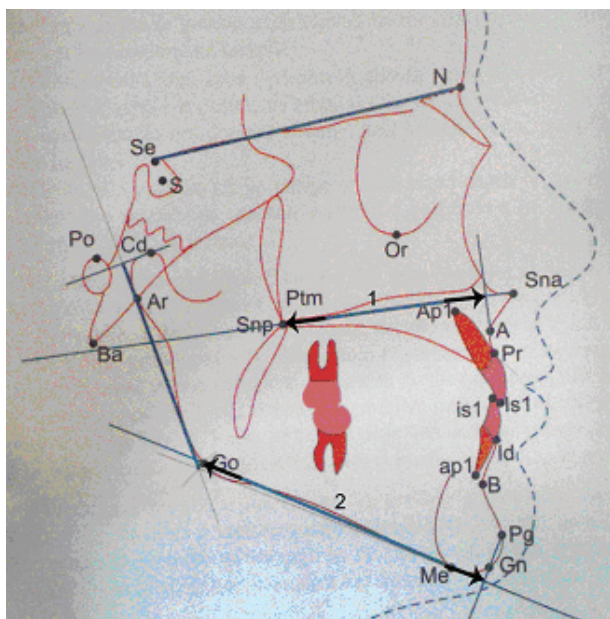
Figure 1. Angular and linear parametars: (1)Anterior cranial base length (SN), (2) Spina planum-SPp (Sna-Snp), (3) Mandible planum (MP) , (4) Maxillar plane angle SN/SPp, (5) SPp/MP angle, (6)Mandibular plane angle SN/MP

Slika 2. Ugaoni parametri: (1) SNA ugao, (2) SNB ugao
Figure 2. Angular parameters: (1) SNA angle, (2) SNB angle

Slika 3. Linearni parametri: (1) Dužina corpusa maksile Snp-A', (2) Dužina corpusa mandibule Go-Pg'

Figure 3. Linear parameters: (1) Corpus maxilla length Snp-A', (2)Corpus mandible length Go-Pg'

Slika 4. Visina lica: (1) Prednja visina lica NMe, (2) Zadnja visina lica SGo
Figure 4. Facial height: (1) Anterior facial height NMe, (2) Posterior facial height SGo

and the film were the same for each patient. Lateral cephalograms were analyzed with classis approach on acetate paper and based on the cephalometric points by the two orthodontists. The identified landmarks, angular and linear measurements are presented in Figures 1 to 4.

Statističke analize

Statistička analiza urađena je korišćenjem SPSS statističkog softvera (SPSS for Windows, release 15.0, SPSS, and Chicago, IL). Deskriptivna statistika (srednja vrednost, standardna

Statistical Analysis

Statistical analysis was performed using the SPSS statistical software (SPSS for Windows, release 15.0, SPSS, and Chicago, IL). Descriptive statistics (mean, standard deviation, mini-

devijacija, minimalna, maksimalna vrednost) izračunata je za sve izmerene vrednosti. Nezavisni t-testovi urađeni su za procenu razlike među polovima za sve merene varijable. U svim testovima p vrednost <0.05 smatrana je statistički značajnom.

Rezultati

Od 88 ispitanika koji su pregledani na Klinici za ortopediju vilica, odabrano je 78 deteta (42 devojčice i 36 dečaka). Desetoro dece bilo je isključeno iz sledecih razloga: kod tri dečaka i dve devojčice profilni telerendgen snimci bili su neodgovarajućeg kvaliteta, a kod petoro dece bila je prethodno sprovedena ortodontska terapija.

Rezultati kefalometrijskih analiza prikazani su u tabeli 1. Poređenje među polovima pokazalo je da se devojčice i dečaci u ovom uzrastu dosta razlikuju u merenim parametrima. Linearna merenja, kao što su udaljenost Sella-nasion (p<0.05), dužina korpusa maxille (p<0.05), prednja visina lica – NMe (p<0.05), veći su kod dečaka, kao i ugao koji označava položaj mandibule prema prednjoj kranijalnoj bazi (SN/MP, p<0.05). Kod devojčica je pronađeno da je veći odnos prednje i zadnje visine lica (SGo/NMe x 100, p<0.05), kao i ugaoni parametri, SNA - ugao maksilarnog prognatizma (p<0.05) i SNB - ugao mandibularnog prognatizma (p<0.05). Ostali linearni i ugaoni parametri su sličnih vrednosti, što govori da nisu pokazali statistički značajne razlike.

Greške merenja

Greške merenja izračunate su na osnovu Cronbah alpha(α) koeficijenta koji meri internu pouzdanost između dva ispitivača i varira od 0.702 do 0.813 za merene varijable[5,6].

Diskusija

U nekim studijama zapisi pojedinaca sa univerzitetskih klinika ili drugih institucija korišćeni su za određivanje kefalometrijskih standarda. U proces istraživanja bili su uključeni objektivni kriterijumi, kao što su klasifikacija po Anglu, pozitivan horizontalni i vertikalni

mum and maximum) were conducted for all measured values. Descriptive statistics were presented as mean values with standard deviations for continuous variables. Categorical data were presented by absolute numbers with percentages. Differences between groups were compared with parametric Student's t test. In all tests, p value <0.05 was considered to be statistically significant.

Results

Out of 88 subjects that were examined at the Department of Orthodontics at the Faculty of Dentistry Pancevo, 78 children were selected (42 girls mean aged 9±0,43 years and 36 boys mean age 9±0,17 years), 10 children were excluded from the study due to the following reasons: lateral cephalograms of 3 boys and 2 girls were of poor quality and 5 children are currently under orthodontic treatment.

Results of the cephalometric analysis are presented in Table 1. Inter-gender comparison showed that girls and boys in this age group significantly differ in measured values. Linear measurements such as Sella-nasion length (p<0.05), corpus maxilla (p<0.05) and anterior facial height – NMe (p<0.05) are more significant in boys as well as the angle which represents the position of the mandible toward anterior cranial base (SN/MP, p<0.05).). It was found that the ratio of the anterior to the posterior facial height points to statistically significant difference between girls and boys (SGo/NMe x 100, p<0.05), as well as the angular parameters; SNA – the angle of maxilar prognathism (p<0.05), and SNB – the angle of mandibular prognathism (p< 0.05). Remaining linear and angular parameters are of similar values which indicates that there are no statistical significant differences.

Method Error

Errors of measurements were calculated based on Cronbah alpha coefficient which measures the reliability between two examiners and vary from 0.702 to 0.813 for measured variables.[5,6]

Discussion

In some studies, notes of the individuals from university clinics and other institutions were used for determinations of cephalometric standards. Objective criteria such as Angle

Tabela 1. Rezultati kefalometrijskih analiza i poređenje među polovima
Table 1. Results of the cephalometric analysis and inter-gender comparison

PARAMETRI PARAM-ETERS	Pol Gender	N	Srednja vrednost Mean	Std. Devi-jacija Std. Devia-tion	Minimum	Maximum	t-Test p t-Test p value
Dužina NS Length NS	M	36	70.17	9.022	48	81	0.003*
	Ž\F	42	63.29	10.444	44	72	
Dužina cor-pusa maxile Corpus maxilla length	M	36	47.5	6.746	30	53	0.028*
	Ž\F	42	43.57	8.44	29	54	
Dužina corpu-sa mandibule Corpus man-dible length	M	36	67.92	9.906	46	80	0.102
	Ž\F	42	63.79	11.829	43	75	
Dužina NMe Length NMe	M	36	11.38	1.657	7	14	0.002*
	Ž\F	42	10.13	1.74	7	12	
Dužina SGo Length SGo	M	36	7.033	0.9187	4,6	7,9	0.071
	Ž\F	42	6.593	1.1644	4,6	7,9	
SGo/NMe x 100 SGo/NMe x 100	M	36	62.0417	3.56576	56.2	67.52	
	Ž\F	42	65.1993	4.13452	58.04	71.61	0.001*
SNA ugao Angle SNA	M	36	80.33	3.372	73	84	
	Ž\F	42	82.57	3.077	77	87	0.003*
SNB ugao Angle SNB	M	36	74.67	4.388	67	82	
	Ž\F	42	77.57	2.881	73	82	0.001*
Go ugao Angle Go	M	36	131.92	6.526	122	145	
	Ž\F	42	130.14	4.867	119	137	0.174
Ugao SN/SPp Angle SN/SPp	M	36	7.17	3.249	4	15	
	Ž\F	42	8.04	3.271	3	14	0.244
Ugao SN/MP Angle SN/MP	M	36	39.08	5.453	30	50	0.011*
	Ž\F	42	36.21	4.194	29	44	

* p<0.05; statistički značajna razlika

Tabela 2. Poređenje kraniofacijanle strukture sa drugim nacionalnostima
Table 2. Comparison of craniofacial structure with other populations

Parametri Parameters	Srbi Serbian		Slovenci[10] Slovenian[10]		Poljaci[9] Polish[9]		Englezi[8] English[8]		Norvežani[4] Norwegian[4]		Amerikanci[13] American[13]		Šveđani[12] Swedish[12]	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F
NS dužina NS Length	70.17	63.29	/	/	63.98	62.61	/	/	/	/	/	/	/	/
NMe dužina NMe Length	113.8	101.3	113.0	107.9	103.1	99.6	103	97.9	100.4	98.6	105.1	101.9	100.5	96.8
SGo dužina SGo Length	70.3	65.9	72.9	68.4	67.7	65.5	/	/	61.3	56.3	65.2	62.2	66.8	64.4
SGo/ NMe x 100 SGo/ NMe x 100	62.0	65.1	64.4	63.4	65.8	65.8			61.2	57.2	62	61	66.4	66.5
Dužina corpusa maxile Corpus Maxilla	47.50	43.57	/	/	/	/	/	/	/	/	/	/	/	/
Dužina corpusa mandibule Corpus Mandible	67.92	63.79	/	/	/	/	/	/	/	/	/	/	/	/
SNA Ugao SNA Degrees	80.33	81.7	81.1	80.3	80.1	81.9	80.8	79.3	82.3	80.8	80.8	80.7	81.2	82.6
SN/SPp SN/SPp	7.17	8.04	/	/	/	/	/	/	/	/	/	/	/	/
SNB Ugao SNB degrees	76	77.5	77.6	76.6	77.5	78.8	77.8	76.3	78.9	78	76.5	76.7	78.5	79
SN/MP SN/MP	39.08	36.21	33.2	33.8	32.9	32.0	34.3	36	33.4	35	34.7	35.5	32.2	31.7
Go Ugao Go degrees	127.9	126.12	127.3	125.9	123.4	123.6	/	/	/	/	128	127.5	126.6	125.4

preklop, nepostojanje ukrštenog zagrižaja, bukalnog ili oralnog promašaja, a jedini subjektivni kriterijum je bio skladan profil lica.

Etnička homogenost postignuta je odabirom uzoraka koji su iste nacionalne pripadnosti. Iako je multietnička sredina u pitanju, sva deca bila su srpske nacionalnosti.

Poređenje među polovima

Na našim prostorima postoji slično istraživanje. Stošić i sar.[7], su otkrili polne razlike prilikom kefalometrijske analize profila lica sa malokluzijom II klase 2 odeljenja.

Samo nekoliko parametara nije pokazalo razlike među polovima u ovom uzrastu. Dužina prednje kranijalne baze (Sella-nasion) veća je kod dečaka nego kod devojčica. Postoji statistički značajna razlika p<0.05, a to je u skladu sa rezultatima Ursi[8] i saradnika, koji su ispitivali 23 muških i 28 ženskih osoba od 6 do 18 godina starosti. Slični zaključci nalaze se kod Bahatia i Leighton[9], koji su pronašli da se javlja signifikantna razlika među polovima od 4 do 20 godina starosti, kao i kod Barbare Obloj i saradnika[10], koji su pokazali da je veća dužina NS kod poljskih dečaka.

Prednja visina lica pokazuje značajne razlike među polovima, tako da je veća kod dečaka za oko 1.25 mm nego kod devojčica (postoji statistički značajna razlika, (p<0.05), dok je zadnja visina lica veća kod devojčica za 0.44 mm, ali bez statistički značajne razlike (p>0.05). Sličan nalaz za prednju visinu lica imali su i Barbara Obloj i saradnici[10]. Ovo potkrepljuje nalaze Drevensk-a i saradnika[11], koji su pregledali 42 dečaka i 46 devojčica sa idealnom okluzijom u uzrastu od 9.31 godina (SD= 1. 52) i našli vrlo značajne razlike među polovima.

Dalji parametri koje smo ispitivali bili su dužina korpusa maksile, dužina corpusa mandibule, maksilarni, mandibularni prognatizam, gonijalni ugao, odnose gornje vilice i donje vilice prema prednjoj kranijalnoj bazi.

Naš nalaz pokazuje da je dužina korpusa maksile veća kod devojčica nago kod dečaka. Maksilarni prognatizam, koji označava ugao SNA, takođe se razlikuje među polovima. Maksila je kod devojčica više protrudirana nego kod dečaka, ugao SNA je veći za 2.24° i postoji statistički značajna razlika (p<0.05). Slične rezultate imali su Barbara Obloj i saradnici[10], ali

classification, positive overjet and overbite, lack of crossbite, and lack of bucal and oral failure were included in the research process, and the only subjective criteria was the good facial proportion. Ethnical homogeneity was achieved through the selection of samples that were of the same national origin. Even though the environment in question is multiethnic, all children were of Serbian nationality.

Comparison among genders

In our country similar study has been performed by Stošić et al[7] in profile cephalometric analysis in patients with class II division 2 malocclusion.

Only several parameters did not show differences between genders in this age group. The length of anterior cranial base (Sella-nasion) was found to be more significant in boys than in girls. There is statically significant difference of p<0.05, which is in accord with the results obtained by the Ursi et al.[8] who examined 23 male and 28 female subjects aged from 6 to 18. Similar results were obtained by Bhatia and Leighton[9] who found the significant difference in genders aged 4 to 20 as well as by Obloj et al.[10] who found that there is greater length of anterior cranial base in Polish boys.

Anterior facial height shows significant differences among genders, such as the greater height in boys of 1.25 mm than in girls (there is statistically significant difference p<0.05), while the posterior facial height is greater in girls by 0.44 mm, but without statistically significant difference, p>0.05). Similar result for the anterior facial height was obtained by Obloj et al.[10]. This supports the results of Drevensek et al. who examined 42 boys and 46 girls with ideal occlusion aged 9.31 on average (SD=1.52) and found significant differences among genders[11].

Additional parameters that we examined were corpus maxilla, corpus mandible, maxillar and mandiblar prognathism, gonial angle, relationship of upper jaw toward anterior cranial base and lower toward anterior cranial base. Our findings show that the corpus maxilla is more developed in boys than in girls. Maxilar prognathism which represents the SNA angle is also different among genders. Maxilla in girls shows more protrusion than in boys, SNA angle is greater by 2.24° and there is also statistically significant difference (p<0.05). Similar findings were obtained by Obloj et al.[10] however;

se naši rezultati ne slažu sa rezultatima Ursi i saradnika[8], koji nisu otkrili nikakvu razliku među polovima kod maksilarnog prognatizma. Takođe, naš nalaz se razlikuje i od El- Batouti i sar.[12] koji su pokazali da je kod norveškog stanovništva maksila više protrudirana kod dečaka nego kod devojčica.

Ugao mandibularnog prognatizma (SNB) takođe pokazuje razliku među polovima, tako da se registruje veći kod devojčica nego kod dečaka. Razlika iznosi 2.9°, što ukazuje da postoji statistički značajna razlika, $p<0.05$. Odnosi maksile i mandibule prema prednjoj kranijalnoj bazi (SN/SPp i SN/MP) pokazuju razliku. Utvrdili smo da razlika među polovima postoji u odnosu mandibule prema prednjoj kranijalnoj bazi i taj ugao je veći kod dečaka. Razlika je statistički značajna, $p<0.05$, dok kod ugla SN/SPp ne postoji statistički značajna razlika $p>0.05$. Gonijalni ugao pokazuje slične vrednosti među polovima (Tabela 2).

Zaključak

- Dečaci od devet godina starosti razlikuju se od devojčica u nekoliko parametara: imaju dužu prednju kranijalnu bazu, korpus maksile, veću prednju visinu lica i strmiju ravan donje vilice.
- Maksila i mandibula su više protrudirane kod devojčica.

our findings do not support the results of Ursi et al.[8] who did not find any difference among genders and with regards to maxillary prognathism. In addition, our findings differ from El-Batouti et al.[12] results which stated that the maxilla in Norwegian population shows greater protrusion in boys than in girls. The angle of mandiblar prognathism (SNB) also shows the difference among genders such as greater angle in girls than in boys. The difference is 2.9° which shows that there is statistically significant difference $p<0.05$. The relationship between maxilla and mandible toward anterior cranial base (SN/SPp and SN/MP) shows the difference. We determined that the difference among genders exists in the relationship of mandible toward anterior cranial base and that the angle is greater in boys. The difference is statistically significant, $p<0.05$, while in the angle SN/SPp there is no statistically significant difference $p>0.05$. Gonial angle shows similar values among genders. Comparisons of craniofacial structure among white populations are presented in Table 2.

Conclusion

- Nine-year-old boys differ from girls in several parameters: they have longer anterior cranial base, corpus maxillae, greater anterior facial height and greater slope of the lower jaw.
- Maxilla and mandible show greater protrusion in girls.

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