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Antropometrijske mjere lica u populaciji odraslih kosovskih Albanaca

Facial Anthropometric Norms among Kosovo - Albanian Adults

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Sažetak
Razvoj antropometrijskog profila kraniofacijalne regije određene populacije važan je multidisciplinarni zadatak. Svrha istraživanja bila je utvrditi antropometrijske mjere i istražiti spolni dimorfizam s obzirom na varijable lica među odraslom populacijom kosovskih Albanaca. **Ispitanici i metode:** Uzorak je uključivao 204 studenta Stomatološkog Odseka, Medicinskog Fakulteta, Sveuciliste u Pristini, Kosova. Direktnom metodom na svakom je subjektu provedeno 8 standardnih antropometrijskih mjerenja na licu digitalnom pomičnom mjerkom s točnošću od 0,01 mm (Boss, Hamburg, Njemačka). Izračunati su normativni podaci i rangovi postotaka. Analizirane su spolne razlike u varijablama lica s pomoću t-testa za neovisne uzorke ($p < 0,05$). Za svaku dobivenu mjeru lica izračunat je indeks spolnog dimorfizma (ISD) i postotak spolnog dimorfizma. **Rezultati:** Normativni podaci za sva antropometrijska mjerenja lica kod muškaraca bili su veći nego kod žena. Muške prosječne standardne vrijednosti statistički su se značajno razlikovale od ženskih ($p > 0,05$). Najveći indeks spolnog dimorfizma (ISD-a) pronađen je za visinu donje trećine lica s 1,120, za koju je utvrđen i najveći postotak spolnog dimorfizma, 12,01 %. Najmanji ISD pronađen je za interkantalnu udaljenost s 1,022, uz najmanji postotak spolnog dimorfizma, tj. 2,23 %. **Zaključak:** Na temelju dobivenih rezultata uspostavljene su antropometrijske norme lica za odraslu populaciju kosovskih Albanaca. Spolni dimorfizam potvrđen je za svaku mjeru lica.

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Ključne riječi
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Uvod

Kraniofacijalna antropometrija, kao važan dio antropologije i medicine, koristi se za određivanje morfoloških značajki glave i lica (1). Kraniofacijalna regija je najsloženiji i poseban dio tijela koji se sastoji od 22 zasebne kosti s 20 mliječnih i 32 stalna zuba (2). Istraživanja ljudske morfologije lica mogu se primijeniti na različitim područjima, uključujući antropologiju i genetiku (3). Morfologija lica važna je fenotipska značajka koja pomaže u dijagnostici nekoliko kraniomaksilofacijalnih i genetskih poremećaja (4). Na morfološke značajke kod ljudi utječu ekološki, biološki, geografski, rasni, etnički, rodni i dobni čimbenici (5 – 9).

Kako bi se uspješno liječile različite malformacije, poput kongenitalnih malformacija i/ili posttraumatskih deformacija lica u različitim etničkim skupinama, kirurzi trebaju imati pristup bazama podataka temeljenih na antropometrijskim mjerenjima kraniofacijalne regije. Za mnoge etničke i rasne skupine uspostavljene su forenzičke norme u kojima su dokazane razlike među skupinama i definirane standardne vrijednosti (10). Standardizirani podaci mjera lica potrebni su za specifično određivanje razine odstupanja od norme. Nadalje, normirani podaci vrlo su korisni za plastične kirurge i medi-

Introduction

Craniofacial anthropometry, as an important part of anthropology and medicine, is used for determination of morphological characteristic of the head and face (1). The craniofacial region represents the most complex and special part of the body, consisting of 22 separate bones in addition to 20 deciduous and 32 permanent teeth (2). Studies of human facial morphology can impact various areas including anthropology and genetics (3). Facial morphology is an important phenotypic feature that aids in the diagnostic of several craniomaxillofacial and genetic disorders (4). Morphological characteristics in human beings are affected by ecological, biological, geographical, racial, ethnic, gender and age factors (5-9).

In order to successfully treat various deformities such as congenital facial malformation and/or post-traumatic facial disfigurements in different ethnics groups, surgeons need an access to databases based on correct anthropometric craniofacial measurements. For many ethnic and racial groups, the forensic norms have been set up where the differences among racial/ethnic groups have been proved and normative data have been developed (10). The normative data of facial measurements are necessary to a specific determination of the

cinske stručnjake čiji rad uključuje korekciju i analizu različitih oštećenja, malformacija ili posttraumatskih deformacija lica i glave (11).

Spolni dimorfizam postoji u različitim oblicima kod svih ljudi. Općenito, odnosi se na razlike između muških i ženskih jedinki iste vrste što se tiče veličine, izgleda i ponašanja (12). Iako ljudi pokazuju relativno malo spolnog dimorfizma u usporedbi s ostalim primatima, muškarci i žene i dalje se u prosjeku razlikuju u mnogim fizičkim obilježjima, kao što su visina i mišićna masa. U ortodontskoj, forenzičkoj i antropološkoj literaturi dobro je dokumentirano da se muškarci i žene razlikuju u različitim aspektima kada je riječ o kraniofacijalnom kompleksu (13). I dalje se vjeruje da je spolni dimorfizam u kraniofacijalnoj regiji povezan s odabirom partnera i seksualnim ponašanjem, što je rezultiralo razlikama u fizičkim svojstvima između muškaraca i žena. Te razlike uključuju veće i izražajnije čeone grebene, masivnije lubanje i izraženije nosove i nosne šupljine kod muškaraca. Žene imaju veće oči, manju čeljust i nos te sveukupno gracilnije su građe (14). Karakterizacija spolnog dimorfizma ljudskoga kraniofacijalnog kompleksa važna je za mnogobrojna područja, uključujući antropologiju, forenziku, kognitivnu znanost, plastičnu i rekonstruktivnu kirurgiju i ortodonciju (12, 15 – 18). Međutim, najveći broj objavljenih istraživanja usredotočuje se na spolne razlike koje se odnose na lubanju (15, 19, 20). Spolni dimorfizam na kraniofacijalnom mekom tkivu kod odraslih osoba također je opsežno dokumentiran (10, 21 – 25)

Mnogi su znanstvenici prepoznali važnost istraživanja spolnog dimorfizma i korist od prepoznavanja specifičnosti stanovništva (26). Genetska pozadina određuje fizička svojsva i čini svako stanovništvo jedinstvenim, među ostalim i prema spolnom dimorfizmu (27). Važno je uspostaviti bazu za svaku populaciju i stvoriti unutarpopulacijske standarde mjera lica i spolnog dimorfizma. Trenutačno su dostupni vrlo ograničeni podaci o antropometrijskim mjerama lica u populaciji kosovskih Albanaca. Ovo je istraživanje osmišljeno radi utvrđivanja antropometrijskih mjera lica i istraživanja spolnog dimorfizma varijabli lica u populaciji kosovskih Albanaca.

Ispitanici i metode

Odabir ispitanika

Uzorak za ovo istraživanje obuhvaćao je 204 studenta Stomatoloskog Odseka, Medicinskog Fakulteta, Sveuciliste u Pristini. Među njima 101 muškarac i 103 žene u dobi od 18 do 30 godina. Istraživanje je odobrilo Etičko povjerenstvo Stomatološkog fakulteta pri Medicinskom fakultetu Sveučilišta u Prištini, Republika Kosovo (referentni broj: 2363/2005). Da bi sudjelovali u istraživanju, ispitanici su morali biti izvorni kosovski Albanci, uključujući sva četiri djeda i bake. Sudionici su se složili da donesu rodne listove roditelja kojima su potvrdili podrijetlo djedova i baka. Uz to,

level of deviations from the norm. Furthermore, the normative data have significant implications for facial plastic surgeons and medical professionals whose work involves correction and analysis of different impairments, malformations or post-traumatic disfigurements of the face and head (11).

Sexual dimorphisms exist in various forms in all humans. In general, it refers to differences between males and females of the same species in terms of size, appearance, and behaviours (12). Although humans show relatively little sexual dimorphism compared with other primates, males and females still differ, on average, in many physical features of physical appearance such as height and muscle mass. In orthodontic, forensic and anthropological literature, it has been well documented that males and females differ in various aspects regarding the craniofacial complex (13). It is still believed that sexual dimorphism in the crania within a genius or species is related to sexual selection and mating preference, which has resulted in differences in physical attributes between males and females. These differences include larger, and heavier brow ridges, more robust crania, and more pronounced noses and nasal cavities in males. Females have larger eyes, smaller jaws and noses and an overall more gracile appearance (14). Characterizing sexual dimorphism of the human craniofacial complex is of interest to numerous fields, including physical anthropology, forensics, cognitive science, plastic and reconstructive surgery and orthodontics (12, 15-18). However, the largest number of studies in the literature focuses on sex differences involving the skull (15, 19, 20). A sexual dimorphism in craniofacial soft tissue has also been extensively demonstrated in adults (10, 21-25)

Many scientists recognized the importance of the research on sexual dimorphism and have since determined the usefulness of recognizing population specific traits and values (26). The genetic background determines physical qualities and characteristics and makes each population unique in its characterization as well as in sexual dimorphism (27). It is important to establish a baseline for each distinct population and to create intra-population standards of facial measurements and sexual dimorphism. At present, very limited data are available regarding the facial anthropometric norms in Kosovo Albanian population. The present study was designed to establish the facial anthropometric norms and to investigate the sexual dimorphism in facial variables among Kosovo Albanian population.

Materials and methods

Subjects and sample selection

The sample for this study included 204 students of the Dental School, Faculty of Medicine, University of Pristina. There were 101 males and 103 females ranging in age from 18 to 30 years. The study was approved by the Ethics Committee of the Dental School, Faculty of Medicine, University of Pristina, Republic of Kosovo (Reference Number: 2363/2005). In order to participate in the study, the subjects had to be native Kosovo-Albanian, all four grandparents. The participants agreed to bring birth certificates from both parents, wherein the origin of both grandparents was confirmed.

kako bi bili uključeni u istraživanje, u povijesti bolesti nisu smjeli imati traume lica ili ortodontsku terapiju, rekonstrukciju lica ili estetsku plastičnu operaciju, ortognatsku kirurgiju ili bilo koje drugo zdravstveno stanje koje bi moglo utjecati na strukturni integritet glave i lica. Nadalje, u obiteljskoj povijesti nije smjelo biti nikakvih kraniofacijalnih anomalija ili sindroma koji su uključivali kraniofacijalni kompleks. Svi su ispitanici pregledani prije uključivanja u istraživanje i dobro su informirani o svrsi i postupku istraživanja. Prije početka, svi su dali pisani informirani pristanak. Mjerenja je provodio jedan ispitivač kako bi se smanjila interopservacijska varijacija. Kako bi se smanjila intraopservacijska pogreška, svako mjerenje ponovljeno je tri puta te je zabilježena prosječna vrijednost.

Antropometrijska mjerenja lica

Korištenjem direktne antropometrije na svakom je ispitaniku provedeno 8 standardnih mjerenja lica prema Kolaru i Salteru (28), s pomoću digitalne pomične mjerke s točnošću od 0,01 mm (Boss, Hamburg, Njemačka). Opisi svih mjerenja lica navedeni su u Tablici 1. Kako bi se smanjila intraopservacijska pogreška, sva mjerenja ponovljena su tri puta, a prosječne vrijednosti korištene su za analizu.

In addition to that, the inclusion criteria was no facial traumas in their health history or orthodontic treatments, facial reconstruction or aesthetic plastic surgery, orthognathic surgery, or any other medical condition that might affect the structural integrity of the head and face. Furthermore, there were no family histories of any craniofacial anomalies or syndromes that involved the craniofacial complex. All subjects were screened for those criteria prior to inclusion in this study and were well informed on the purpose and the procedure of the research. Prior to the start of the study, they all provided a written informed consent Measurements were carried out by a single examiner to reduce interobserver error. To minimize the intra-observer error, each measurement was taken three times and the average of the three values was noted.

Anthropometrical facial measurements

Using direct anthropometry, a series of 8 standard facial measurements by Kolar and Salter (28) was performed on each subject with digital caliper with an accuracy of 0.01 mm (Boss, Hamburg-Germany). The descriptions of all facial measurements are listed in Table 1. To minimize intra-observer error, all the measurements were taken three times and the average values were utilized for the analysis.

Tablica 1. Popis direktnih antropometrijskih mjera korištenih u ovom istraživanju (Kolar i Salter, 1997.)
Table 1 List of the direct anthropometric measurements used in the present study (Kolar and Salter,1997)

Mjera • Measurement	Skraćenica • Abbreviation	Opis • Description
Interkantalna udaljenost • Intercanthal width	en-en	Udaljenost između desnog i lijevog endokantiona (unutarnjeg kuta oka) • The straight distance between right and left endocanthion
Indeks lica • Morphological facial	n-gn	Udaljenost od točke nasion do točke gnathion • The straight distance from nasion to gnathionheight
Visina donje trećine lica • Lower facial height	sn-gn	Udaljenost od točke subnasale do točke gnathion • The straight distance from subnasale to gnathion
Maksimalna širina lica • Maximum facial width	zy-zy	Udaljenost od najlateralnijih točaka obaju zigomatičnih lukova • The straight distance between most lateral point on both zygomatic arches
Visina nosa • Nasal height	n-sn	Udaljenost od točke nasion do točke subnasale • The straight distance from nasion to subnasale
Širina nosa • Nasal width	al-al	Udaljenost od lijeve do desne točke alare • The straight distance between right and leftalare
Širina labijalnih fisura • Labial fissure width	ch-ch	Udaljenost od desne do lijeve točke cheilion • The straight distance between right and left cheilion
Širina mandibule • Mandibular width	go-go	Udaljenost od desne do lijeve točke gonion • The straight distance between right and left gonion

Statistička analiza

Normativni podaci dobiveni su za reprezentativnu populaciju kosovskih Albanaca, muškaraca i žena, kako bi se utvrdile antropometrijske norme lica. Normativni podaci izračunati su primjenom metoda deskriptivne analize: srednje vrijednosti, medijan, modus, raspon (maksimalne i minimalne vrijednosti) i rang postotaka. Spolne razlike u varijablama lica analizirane su s pomoću t-testa za neovisne uzorke. Statistička ispitivanja provedena su u programu SPSS 20 (SPSS Inc., Chicago, IL, SAD) i Excelu 2007 (Microsoft Corporation, Redmond, WA, SAD). Razina značajnosti postavljena je na $p < 0,05$.

Spolni dimorfizam varijabli lica analiziran je indeksom spolnog dimorfizma (ISD):

$$ISD = Xm/Xž$$

Statistical analysis

Normative data were obtained by administering the test for representative sample population, among Albanian males and females in Kosovo in order to establish facial anthropometric norms. Normative data were calculated by applying the methods of descriptive analysis: mean median, mode, range (maximum and minimum values) and percentiles rankings. The gender differences in the facial variables were analyzed using t test for independent samples. The statistical tests were performed with SPSS 20 (SPSS Inc., Chicago, IL, USA) and Excel 2007 (Microsoft Corporation, Redmond, WA, USA). The significance level was set up at $p<0.05$.

The sexual dimorphism between facial variables was analyzed using the index of sexual dimorphism (ISD):

$$ISD = Xm / Xf$$

Xm = srednja vrijednost za muškarce; Xž = srednja vrijednost za žene. Taj indeks upućuje na razinu razlike među spolovima. Vrijednosti oko 1 pokazale su najnižu razinu spolne razlike, a povećanjem iznad 1 povećavala se razina spolne razlike [29].

Postotak spolnog dimorfizma za svako mjerenje izračunat je korištenjem jednadžbe prema Garnu i Lewisu [30], kako slijedi:

$$\% = Xm/Xž\text{-}1x100$$

Xm = srednja vrijednost za muškarce; Xž = srednja vrijednost za žene.

Rezultati

U Tablicama 2. i 3. prikazani su prosječni rezultati mjerenja lica i normativni podaci za odrasle kosovske Albance (srednja vrijednost, medijan, modus, standardna devijacija, raspon i postoci). Norme su utvrđene za oba spola za niz od osam standardnih mjera lica izmjerenih u milimetrima. Medijan vrijednosti svih antropometrijskih mjerenja lica bio je veći kod muškaraca nego kod žena. Tablica 4. prikazuje usporedbu prosječnih mjera lica muškaraca i žena kosovsko-albanske populacije. Sva mjerenja pokazala su statistički značajnu razliku kada su muške prosječne mjere uspoređene sa ženskima ($p > 0,05$).

Indeks spolnog dimorfizma (ISD) i postotak svakog mjerenja lica izračunati su i prikazani u Tablici 5. Najviši ISD bio je 1,120 za visinu donje trećine lica, koja je imala i najveći postotak spolnog dimorfizma, 12,01 %. Najmanji ISD utvrđen je za interkantalnu širinu, 1,022 (najniži postotak spolnog dimorfizma 2,23 %).

Xm = mean value for males; Xf = mean values for females. This index indicated the level of difference between sexes. The values close to 1 indicated the lowest level of sexual difference and, by increasing the distance from 1, the level of sexual difference increased [29].

The percentage of sexual dimorphism for each measurement was calculated using the formula given by Garn and Lewis [30], as follows:

$$\% = Xm/Xf\text{-}1x100$$

Xm = mean value for males; Xf = mean values for females.

Results

The average facial measurements and normative data, for the Kosovo-Albanian adults, males, and females (mean, median, mode, standard deviation, range, and percentiles) are presented in Table 2 and Table 3. Decile norms were established for both, males and females for all series of eight standard facial measurements which were measured in millimeters. The median values for all facial anthropometric measurements were higher in males than in females. Table 4 shows comparison between the average facial measurements of the males and females of the Kosovo-Albanian population. All of the measurements have shown a statistically significant difference when male average measures were compared to female ones ($p>0.05$).

The index of sexual dimorphism (ISD) and percentage of each facial measurements were calculated and presented in Table 5. The highest ISD was 1.120 for the lower facial height, which also had the highest percentage of sexual dimorphism, 12.01%.The lowest ISD was found for the intercanthal width, 1.022, (the lowest percentage of sexual dimorphism 2.23%).

Tablica 2. Norme antropometrijskih mjera lica za mušku populaciju kosovskih Albanaca (mm)
Table 2 Facial anthropometric norms among males in Kosovo - Albanian population (mm)

Mjera • Measurements	en-en	n-gn	sn-gn	zy-zy	n-sn	al-al	ch-ch	go-go
N	101	101	101	101	101	101	101	101
Sredina • Mean	32.49	125.82	72.44	131.93	55.26	36.90	51.99	110.34
Medijan • Median	32.19	125.39	72.11	132.00	55.05	36.39	52.12	110.00
Modus • Mode	30.00	120.00	72.11	125.00	51.94	35.57	51.51	110.00
SD	2.590	6.366	5.695	6.724	3.567	2.669	3.238	5.944
Min	25.72	106.00	55.78	118.00	46.49	30.29	42.52	95.00
Max	38.78	143.00	84.80	148.61	64.54	43.86	60.14	127.01
Rangovi postotaka • Percentiles								
10	29.04	118.88	65.15	123.00	50.85	33.70	48.16	103.20
20	30.12	120.92	67.50	125.00	52.14	34.69	49.17	105.00
30	31.00	121.70	68.95	128.00	52.99	35.50	50.59	107.00
40	31.64	123.41	71.03	130.00	54.18	35.95	51.50	109.00
50	32.19	125.39	72.11	132.00	55.05	36.39	52.12	110.00
60	33.36	127.48	73.13	135.00	55.97	37.55	52.58	110.00
70	33.88	128.81	75.63	136.00	57.27	38.31	53.40	113.00
80	34.81	131.15	78.28	137.00	58.57	39.08	55.03	115.00
90	36.22	134.55	80.86	140.00	59.68	40.53	55.63	118.00

Tablica 3. Norme antropometrijskih mjera lica za žensku populaciju kosovskih Albanaca (mm)
Table 3 Facial anthropometric norms among females in Kosovo - Albanian population (mm)

Mjera • Measurements	en-en	n-gn	sn-gn	zy-zy	n-sn	al-al	ch-ch	go-go
N	103	103	103	103	103	103	103	103
Sredina • Mean	31.78	115.53	64.67	123.93	52.01	33.12	49.06	103.39
Medijan • Median	31.64	116.14	65.03	125.00	51.87	33.34	49.20	104.00
Modus • Mode	30.00	116.00	64.25	120.00	50.10	31.01	50.77	100.00
SD	2.250	5.004	4.7343	5.593	3.011	2.224	2.961	4.96
Min	27.61	103.00	51.13	110.00	44.24	27.60	38.50	93.00
Max	38.52	130.00	77.55	135.00	61.13	38.04	56.16	113.66
Rangovi postotaka • Percentiles								
10	28.97	108.98	57.87	116.00	48.16	30.19	45.60	95.80
20	29.78	110.71	61.33	119.75	50.10	31.10	46.81	99.00
30	30.33	112.64	62.82	120.00	50.70	31.83	47.83	100.00
40	31.02	114.62	64.14	122.17	51.26	32.82	48.60	102.00
50	31.64	116.14	65.03	125.00	51.87	33.34	49.20	104.00
60	32.19	117.48	65.70	126.00	52.67	33.91	49.82	105.00
70	32.94	118.49	66.77	127.00	53.20	34.35	50.64	105.00
80	33.52	119.61	68.49	130.00	54.31	34.91	51.19	108.04
90	34.97	121.58	70.05	130.60	55.22	35.71	52.65	110.00

Tablica 4. Usporedba antropometrijskih mjera lica među spolovima
Table 4 Comparison of facial anthropometric measurements between genders

Mjera • Measurements	Spol • Gender	X	SD	t	*p*
en-en	Muški • Male	32.4894	2.58993	2.078	0.039
	Ženski • Female	31.7839	2.25061		
n-gn	Muški • Male	125.82	6.366	12.857	0.001
	Ženski • Female	115.53	5.004		
sn-gn	Muški • Male	72.4441	5.69554	10.611	0.001
	Ženski • Female	64.6699	4.73377		
zy-zy	Muški • Male	131.9334	6.72387	9.244	0.001
	Ženski • Female	123.9349	5.59267		
n-sn	Muški • Male	55.2624	3.56725	7.040	0.001
	Ženski • Female	52.0110	3.01098		
al-al	Muški • Male	36.9047	2.66910	11.022	0.001
	Ženski • Female	33.1163	2.22378		
ch-ch	Muški • Male	51.9873	3.23829	6.743	0.001
	Ženski • Female	49.0588	2.96146		
go-go	Muški • Male	110.3370	5.94436	9.069	0.001
	Ženski • Female	103.3901	4.96090		

t-test za nezavisne uzorke, $p < 0,05$ • t-test for independent samples, $p<0.05$.

Tablica 5. Indeks spolnog dimorfizma i postotak spolnog dimorfizma za svaku antropometrijsku mjeru lica
Table 5 Index of sexual dimorphism and percentage of sexual dimorphism of each facial measurement

Mjera • Measurement	ISD	%
en-en	1.022	2.23
n-gn	1.088	8.87
sn-gn	1.120	12.01
zy-zy	1.064	6.45
n-sn	1.062	6.24
al-al	1.114	11.41
ch-ch	1.059	5.97
go-go	1.067	6.72

ISD = Omjer srednje vrijednosti kod muškaraca nakon dijeljenja sa srednjom vrijednosti kod žena • Ratio of male mean value divided by female mean value

Rasprava

U ovom istraživanju prikupljeni su kvantitativni podaci mjerenja lica provedenih na tipičnim predstavnicima odrasle populacije kosovskih Albanaca. Velika varijabilnost obilježja ljudskog lica potvrđuje njegovu individualnost. Mjerenja provedena u ovom istraživanju obuhvaćala su osam mjerenja čija je svrha bila izraditi odgovarajuću sliku morfološke konfiguracije facijalnog kompleksa. Metodologija i kriteriji uključivanja odabrani su tako da se omogući razvoj normativnih mjera lica koje mogu pomoći u budućoj analizi, dijagnozi i planiranju korekcija različitih oštećenja, u ortognatskoj kirurgiji ili ortodontskom liječenju, korekciji malformacija ili posttraumatskih deformacija lica kod odraslih kosovskih Albanaca. U istraživanje su uključene odrasle osobe obaju spolova u dobi od 18 do 30 godina. Farkas i sur. izradili su bazu podataka s antropometrijskim mjerama lica koristeći se metodom manualne antropometrije na 25 različitih populacija, pri čemu je uzeto u obzir više od stotinu mjera, a također su napravljene usporedbe koje su prikazane u Tablicama 6. i 7. (10). Do sada nije bilo istraživanja o razlikama među spolovima za kosovske Albance. Stoga se naši rezultati uspoređuju s tom bazom podataka.

Najizloženiji dio lica za procjenu je endokantion, koji predstavlja jednu od horizontalnih mjera lica – interkantalnu širinu (en-en). Naši normativni podaci za en-en vrijednost bili su slični skupini sjevernoameričkih bijelaca i bijelaca iz Europe: Mađara, Slovaka, Slovenaca, Turaka za oba spola i muških Bugara te Egipćana i Indijaca s Bliskog istoka. Normativni podaci manji od naših pronađeni su među Azerbajdžancima, Česima, Hrvatima, Grcima, Talijanima, Poljacima, Portugalcima, Irancima za muškarce i žene, te za žene iz Bugarske. Vrijednosti en-en veće od naših pronađene su kod Rusa, singapurskih Kineza, Vijetnamaca, Tajlanđana, Japanaca, Angolaca, Zulua i afroameričke populacije obaju spolova te među indijskim muškarcima.

Nadalje, naši normativni podaci za indeks lica (n-gn) slični su onima za talijanske i portugalske muškarce, singapurske Kineskinje i oba spola Afroamerikanaca. Veće vrijednosti od naših za n-gn pronađene su među grčkim i portugalskim ženama, te među Irancima i Turcima obaju spolova. Uz to, manje normativne vrijednosti od naših za oba spola pronađene su među sjevernoameričkim bijelcima, Azerbajdžancima, Bugarima, Česima, Hrvatima, Nijemcima, Mađarima, Poljacima, Rusima, Slovacima, Slovencima, Egipćanima, Indijcima, Vijetnamcima, Tajlanđanima, Japancima, Angolcima i Zuluima, talijanskim ženama te grčkim i kineskim muškarcima iz Singapura.

Tako su našim normativnim podacima za visinu donje trećine lica (sn-gn) slični oni koji pripadaju sjevernoameričkim bijelcima i talijanskoj populaciji za oba spola te za kineske, tajlandske i Zulu muškarce. Manje vrijednosti pronađene su među azerbajdžanskim, bugarskim, hrvatskim, njemačkim, grčkim, mađarskim, poljskim, portugalskim, ruskim, slovačkim, slovenskim, turskim, egipatskim, indijskim, japanskim i angolskim stanovništvom obaju spolova, zatim za češke i vijetnamske muškarce i tajlandske žene. Veće normativne vrijednosti od naših pronađene su u iranskoj i afroame-

Discussion

In the present study, quantitative data of the facial area measures were collected in typical individuals among Kosovo Albanian adults. The widespread variability in the human face confirms its individuality. The measurements selected for this study consisted of eight measurements which were performed for development of a suitable figure of the facial complex morphological configuration. The methodology and inclusion criteria were selected to develop facial normative values that can assist in future analysis, diagnosis, and planning of correction of different impairments, orthognathic surgery or orthodontic treatment, malformations or posttraumatic disfigurements of the face for Kosovo Albanian adults. Adults of both sexes 18 to 30 years of age were included in this study. Farkas et al., have established a data base of anthropometric measurements made on the face, using the method of manual anthropometry among twenty-five different population, which were considered over a hundred ratios and they also made comparisons which are presented in Tables 6 and 7 (10). So far there has not been any study of differences between the sexes for the Kosovo Albanian population. Therefore, our results are compared with that database.

The most exposed to image judgment and situated between the face is endocanthion, which represents one out of many horizontal measurements of facial areas - intercanthal width (en-en). Our normative data for the en-en value was found to be similar to the North American White (NAW) and the Caucasian groups from Europe: Hungarian, Slovak, Slovenian, Turkish for both sexes, and to Bulgarian males; from Middle Eastern: Egyptian and Indians. The normative data lower than ours were found among Azerbaijan, Czech, Croatian, Greeks, Italian, Polish, Portuguese, Iranian, for both males and females, and for Bulgarian females. Higher values than ours for the en-en were found among Russian, Singaporean Chinese, Vietnamese, Thai, Japanese, Angolan, Zulu and Afro-American population of both sexes, and among Indian males.

Furthermore, our normative data for morphological facial height (n-gn) were similar to those belonging to Italian and Portuguese males, Singaporean Chinese females and both sexes of Afro-Americans. The higher values than ours for the n-gn were found among Greek and Portuguese females and among Iranian and Turkish, both females, and males. Additionally, lower normative data than ours, for both sexes, were found among NAW, Azerbaijan, Bulgarian, Czech, Croatian, German, Hungarian, Polish, Russian, Slovak, Slovenian, Egyptian, Indian, Vietnamese, Thai, Japanese, Angola and Zulu, Italian females, and Greek and Singaporean Chinese males.

Thus, our normative data for the lower facial height (sn-gn) were found to be similar to those belonging to NAW and Italian population, for both sexes as well as for Singaporean Chinese, Thai, and Zulu males. The lower data were found among Azerbaijan, Bulgarian, Croatian, Germans, Greek, Hungarian, Polish, Portuguese, Russian, Slovak, Slovenian, Turkish, Egyptian, Indian, Japanese and Angola population of both genders as well as for Czech and Vietnam-

Tablica 6. Sredine i standardne devijacije varijabli lica za 25 različitih populacija - muškarci
Table 6 Mean and standard deviation of the facial variables for 25 different populations - males

Populacija • Populations	Muškarci • Males																							
	en-en			n-gn			sn-gn			zy-zy			n-sn			al-al			ch-ch			go-go		
	-2SD	x	+2SD	- 2SD	x	+ 2SD	-2SD	x	+2SD	-2SD	x	+ 2SD	-2SD	x	+2SD	-2SD	x	+2SD	-2SD	x	+2SD	-2SD	x	+ 2SD
Sjevernoamerički bijelci • North American White	27.5	32.9	38.3	107.7	121.3	134.9	59.9	71.9	83.9	128.5	137.1	145.7	46.0	53.0	60.0	29.5	34.7	39.9	46.7	53.3	59.9	85.5	97.1	108.7
Azerbajdžanci • Azerbaijan	23.8	30.8	37.8	110.5	121.3	132.1	60.0	69.0	78.0	136.7	147.5	158.3	49.1	55.9	62.7	30.9	35.7	40.5	46.4	53.4	60.4	98.1	106.3	114.5
Bugari • Bulgarian	25.3	32.3	39.3	107.7	122.9	138.1	59.9	69.5	79.1	128.3	139.5	150.7	46.4	54.0	61.6	29.4	36.0	42.6	42.2	49.8	57.4	90.6	108.8	127.0
Česi • Czech	24.7	30.9	37.1	107.5	117.5	127.5	61.1	70.7	80.3	108.3	134.9	161.5	45.8	54.0	62.2	31.2	36.2	41.2	46.6	53.8	61.0	101.9	109.5	117.1
Hrvati • Croatian	26.1	31.5	36.9	104.0	119.8	135.6	53.6	66.0	78.4	128.7	140.7	152.7	47.8	53.8	59.8	31.1	36.5	41.9	42.7	50.5	58.3	89.5	102.1	114.7
Nijemci • German	26.0	31.2	36.4	99.4	116.0	132.6	53.3	67.9	82.5	118.2	133.2	148.2	40.8	52.0	63.2	29.6	34.0	38.4	44.1	50.9	57.7	85.6	97.6	109.6
Grci • Greek	22.8	30.0	37.8	105.4	120.0	134.6	50.4	65.8	81.2	105.8	128.6	151.4	47.3	55.5	63.7	29.9	35.7	41.5	42.4	51.8	61.2	90.5	108.7	126.9
Mađari • Hungarian	27.1	31.7	36.3	103.8	120.0	136.2	56.4	64.2	72.0	131.5	142.1	152.7	49.8	55.0	60.2	32.3	37.3	42.3	48.8	57.0	65.2	92.6	106.6	120.6
Talijani • Italian	25.4	30.2	35.0	113.3	124.7	136.2	61.0	71.4	81.8	131.4	143.2	155.0	48.4	56.2	64.0	27.9	32.1	36.3	43.2	50.8	58.4	102.5	116.3	130.1
Poljaci • Polish	25.5	30.3	35.1	105.3	117.5	129.7	60.5	68.1	75.7	133.2	142.6	152.0	46.9	53.7	60.5	31.2	35.2	39.2	46.1	52.5	58.9	85.8	98.8	111.8
Portugalci • Portuguese	23.3	30.5	37.7	113.1	124.5	135.9	58.2	69.6	81.0	114.3	125.1	135.9	51.7	59.5	67.3	30.8	36.6	42.4	41.8	50.0	58.2	80.0	87.6	95.2
Rusi • Russian	30.4	34.2	38.0	110.3	122.9	135.5	53.9	64.5	75.1	132.4	141.2	150.0	46.5	51.7	56.9	31.2	35.8	40.4	44.9	52.5	60.1	93.0	103.8	114.6
Slovaci • Slovak	27.0	32.6	38.2	99.2	115.0	130.8	50.7	63.7	76.7	123.7	134.7	145.7	47.9	53.5	59.1	29.2	33.6	38.0	45.2	53.2	61.2	101.6	118.6	135.6
Slovenci • Slovenian	28.0	32.0	36.0	103.6	116.6	129.6	57.0	66.8	76.6	124.6	136.2	147.8	48.2	56.2	64.2	30.1	35.9	41.7	45.2	53.0	60.8	92.3	106.3	120.3
Iranci • Iranian	31.9	27.3	32.7	116.6	132.4	148.2	63.7	73.3	82.9	127.0	138.4	149.8	56.2	62.6	69.0	29.3	35.3	41.3	44.1	50.3	56.5	92.5	105.9	119.3
Turci • Turkish	27.6	32.8	38.0	121.9	127.7	133.5	57.5	65.9	74.3	124.0	140.4	156.8	51.1	58.1	65.1	32.2	36.8	41.4	46.6	53.0	59.4	100.9	109.5	118.1
Egipćani • Egyptian	27.6	31.8	36.0	101.2	116.4	131.6	51.3	64.1	76.9	126.0	139.8	153.6	43.4	54.6	65.8	24.4	32.4	40.4	40.9	48.3	55.7	88.7	97.9	107.1
Indijci • Indian	29.7	34.1	38.5	101.1	112.5	124.9	52.7	62.7	72.7	127.2	135.8	144.4	39.8	47.2	54.6	30.9	37.9	44.9	41.8	51.0	60.2	96.2	102.8	109.4
Kinezi/Singapur • Singaporean Chinese	31.0	37.6	44.2	113.0	123.6	134.2	62.2	72.8	83.4	133.4	144.6	155.8	47.8	53.8	59.8	33.4	39.2	45.0	44.0	49.6	55.2	96.1	107.3	118.5
Vijetnamci • Vietnamese	32.1	36.7	41.3	112.0	121.2	130.4	59.7	71.1	82.5	135.2	144.0	152.8	46.1	52.1	58.1	36.0	40.2	44.4	38.3	47.5	56.7	99.8	110.4	121.0
Tajlanđani • Thai	31.2	37.2	43.2	111.5	123.5	135.5	62.2	72.4	82.6	136.1	147.1	158.1	47.1	51.5	55.9	36.4	40.8	45.2	45.5	50.3	55.1	100.0	109.5	119.0
Japanci • Japanese	31.3	37.5	43.7	109.0	122.8	136.6	57.2	69.4	81.6	136.0	147.2	158.4	47.1	56.9	66.7	33.2	38.2	43.2	41.4	48.4	55.4	101.5	117.3	133.1
Angolci • Angolan	28.3	36.3	44.3	90.1	112.1	134.1	57.7	67.3	76.9	129.6	139.8	150.0	42.6	49.8	57.0	41.5	46.3	51.1	48.4	54.4	60.4	88.0	97.4	106.8
Zulu • Zulu	29.1	36.5	43.9	108.0	121.8	135.6	64.4	72.2	80.0	120.1	129.3	138.5	39.0	50.2	61.4	36.2	42.0	47.8	47.6	56.2	64.8	93.2	104.4	115.6
Afroamerikanci • Afro-Americans	30.2	35.8	41.4	109.5	125.9	142.3	65.5	78.9	92.4	127.5	138.7	149.9	45.9	51.9	57.5	37.3	44.1	50.9	46.4	54.6	62.8	92.2	104.2	116.2

Antropometrijske mjere za 25 etničkih skupina kavkaskog, srednjoeuropskog, azijskog i afričkog podrijetla i sjevernoameričkih bijelaca na temelju analize Farkasa i sur [10]. •
The facial measurements of 25 ethnic groups of Caucasoid, Middle Eastern, Asian, African origins and North American White, derived from analyses developed by Farkas et al., [10].

Tablica 7. Sredine i standardne devijacije varijabli lica za 25 različitih populacija - žene
Table 7 Mean and standard deviation of the facial variables for 25 different populations - females

Populacija • Populations	Žene • Females																							
	en-en			n-gn			sn-gn			zy-zy			n-sn			al-al			ch-ch			go-go		
	-2SD	x	+2SD	- 2SD	x	+ 2SD	-2SD	x	+2SD	-2SD	x	+ 2SD	-2SD	x	+2SD	-2SD	x	+2SD	-2SD	x	+2SD	-2SD	x	+ 2SD
Sjevernoamerički bijelci • North American White	26.8	31.6	36.4	101.4	111.8	122.2	56.5	65.5	74.5	119.3	129.9	140.5	43.7	48.9	54.1	27.6	31.4	35.2	43.4	49.8	56.2	79.3	91.1	102.9
Azerbajdžanci • Azerbaijan	26.1	30.5	34.9	103.5	111.5	119.5	56.8	63.6	70.4	128.3	138.7	149.1	45.1	52.3	59.5	28.4	33.8	39.2	42.3	49.7	57.1	91.1	102.9	114.7
Bugari • Bulgarian	25.3	29.7	34.1	101.4	111.0	120.6	52.8	61.6	70.4	122.1	130.9	139.7	45.7	52.1	58.5	23.6	33.0	42.4	42.0	46.2	50.4	89.1	98.7	108.3
Česi • Czech	24.3	29.1	33.9	104.0	112.6	121.2	50.6	66.0	81.4	97.6	126.4	155.2	44.7	52.1	59.5	28.8	33.8	38.8	43.4	50.2	57.0	100.3	107.1	113.9
Hrvati • Croatian	24.9	29.7	34.5	98.6	110.4	122.2	51.3	60.7	70.1	119.6	133.2	146.8	42.8	50.0	57.2	28.9	32.9	36.9	40.1	46.9	53.7	83.6	94.6	105.6
Nijemci • German	22.6	28.6	34.6	99.5	109.5	119.5	52.9	63.3	73.7	105.0	123.4	141.8	45.8	51.4	57.0	25.6	31.0	36.4	41.2	48.2	55.2	81.5	91.5	101.5
Grci • Greek	24.5	29.5	34.5	102.2	116.4	130.6	54.7	63.3	71.9	122.6	132.2	141.8	46.2	52.8	59.4	28.0	32.4	36.8	41.7	50.3	58.9	90.2	99.2	108.2
Mađari • Hungarian	27.6	31.2	34.8	101.6	112.4	123.2	49.1	56.7	64.3	124.3	131.3	138.3	45.5	52.5	59.5	29.7	33.5	37.3	44.0	51.6	59.2	83.6	95.0	106.4
Talijani • Italian	21.2	27.6	34.0	102.8	113.8	124.8	53.6	64.4	75.2	125.1	133.3	141.5	38.5	52.1	65.7	24.7	29.5	34.3	40.1	47.7	55.3	95.3	104.9	114.5
Poljaci • Polish	24.8	29.2	33.6	98.2	111.6	125.0	51.7	60.5	69.3	124.5	135.5	146.5	44.8	51.2	57.6	27.2	32.6	38.0	43.4	49.0	54.6	85.5	93.9	102.3
Portugalci • Portuguese	23.5	29.1	34.7	104.2	118.2	132.2	53.6	62.8	72.0	109.6	120.4	131.2	49.0	57.8	66.6	27.1	31.9	36.7	39.5	45.3	51.1	76.7	84.3	91.9
Rusi • Russian	26.7	32.7	38.7	101.4	114.2	127.0	47.4	61.4	75.4	122.7	132.3	141.9	43.6	50.4	57.2	28.8	33.2	37.6	41.9	48.1	54.3	90.4	98.6	106.8
Slovaci • Slovak	25.9	30.7	35.5	98.5	109.3	120.1	50.0	58.6	67.2	113.6	125.0	136.4	44.6	49.4	54.2	27.0	30.6	34.2	42.9	48.9	54.9	96.6	105.4	114.2
Slovenci • Slovenian	24.6	30.2	35.8	90.2	108.8	127.4	51.4	61.4	71.4	119.1	129.5	139.9	47.4	52.0	56.6	28.1	33.1	38.1	42.8	49.2	55.6	89.9	100.7	111.5
Iranci • Iranian	17.6	24.6	31.6	108.7	120.3	131.9	57.4	66.2	75.0	118.3	131.7	145.1	52.9	58.5	64.1	27.1	32.1	37.1	39.8	45.0	50.2	88.7	102.7	116.7
Turci • Turkish	27.3	31.7	36.1	102.2	116.4	130.6	51.5	59.1	66.7	125.9	134.5	143.1	47.2	55.2	63.2	28.7	32.9	37.1	41.8	47.6	53.4	84.4	100.0	115.6
Egipćani • Egyptian	26.3	30.9	35.5	92.1	103.1	114.1	48.8	57.8	66.8	119.9	130.3	140.7	37.0	47.4	57.8	21.9	39.3	36.7	29.3	46.7	54.1	84.0	91.2	98.4
Indijci • Indian	25.1	30.9	36.7	90.5	101.5	112.5	48.2	57.2	66.2	108.0	124.9	141.7	36.5	43.7	50.9	29.0	33.8	38.6	40.5	46.5	52.5	86.6	97.4	107.9
Kinezi/Singapur • Singaporean Chinese	29.7	36.1	42.5	105.1	114.9	124.7	55.2	66.4	77.6	128.2	136.2	244.2	45.1	51.7	58.3	33.0	37.2	41.4	40.7	47.3	53.9	95.5	102.3	109.1
Vijetnamci • Vietnamese	31.2	36.6	42.0	103.7	113.1	122.5	56.2	64.0	71.8	128.5	134.3	140.1	42.4	50.4	58.4	35.6	39.8	44.0	38.5	48.5	58.5	98.8	104.8	110.8
Tajlanđani • Thai	31.0	36.0	41.0	102.4	112.8	123.2	53.6	62.6	71.6	125.7	138.3	150.9	43.1	49.5	55.9	34.2	40.2	46.2	38.8	45.4	52.0	96.2	106.0	115.8
Japanci • Japanese	29.4	35.0	40.6	102.4	113.8	125.2	51.0	62.8	74.6	129.4	141.2	153.0	43.5	53.3	63.1	32.3	37.1	41.9	28.9	46.5	54.1	104.4	115.6	126.8
Angolci • Angolan	27.4	36.6	45.8	83.7	106.5	129.3	49.0	63.2	76.4	124.4	132.8	141.2	37.6	46.6	55.6	34.6	40.8	47.0	41.7	52.9	64.1	78.9	90.3	101.7
Zulu • Zulu	29.7	34.5	39.3	102.5	113.7	124.9	57.2	65.4	73.6	118.8	128.4	138.0	34.9	49.5	64.1	32.2	38.0	43.8	44.2	52.2	60.2	87.0	102.0	113.4
Afroamerikanci • Afro-Americans	27.6	34.4	41.2	104.3	116.5	128.7	61.6	71.5	81.9	120.9	130.5	140.1	41.4	48.8	56.2	33.7	40.1	46.5	45.6	53.6	61.6	86.7	96.7	106.7

Antropometrijske mjere za 25 etničkih skupina kavkaskog, srednjoeuropskog, azijskog i afričkog podrijetla i sjevernoameričkih bijelaca na temelju analize Farkasa i sur. [10]. •
The facial measurements of 25 ethnic groups of Caucasoid, Middle Eastern, Asian, African origins and North American White, derived from analyses developed by Farkas et al., [10].

ričkoj populaciji obaju spolova te među Čehinjama i singapurskim Kineskinjama.

Normativni podaci za maksimalnu širinu lica (zy-zy) bili su slični samo s onima njemačkih žena. U azijskim etničkim skupinama, maksimalna širina lica bila je ekstremno veća kod oba spola u Indijaca, singapurskih Kineza, Vijetnamaca, Tajlanđana i Japanaca nego u populaciji kosovskih Albanaca. Veća širina lica pronađena je među sjevernoameričkim bijelcima, Azerbajdžancima, Bugarima, Česima, Hrvatima, Mađarima, Talijanima, Poljacima, Rusima, Slovacima, Slovencima, Irancima, Turcima, Egipćanima, Afroamerikancima obaju spolova, također kod grčkih i Zulu žena te njemačkih muškaraca. Uska maksimalna širina lica otkrivena je kod portugalskih žena i muškaraca te grčkih i Zulu muškaraca.

Visina nosa (n-sn) odgovarala je mjerama kod Azerbajdžanaca, Grka, Mađara, obaju spolova; bugarskih, čeških, njemačkih, talijanskih, poljskih, slovenskih, kineskih žena i egipatskih muškaraca. Visina nosa bila je veća kod Portugalaca, Turaka, Iranaca i Japanaca obaju spolova te talijanskih i slovenskih muškaraca. Nasuprot tome, kod sjevernoameričkih bijelaca, Hrvata, Rusa, Slovaka, Indijaca, Vijetnamaca, Tajlanđana, Angolaca, Zulua i afroameričkih muškarca i žena te bugarskih, čeških, njemačkih, poljskih i kineskih muškaraca i egipatskih žena izmjerene su manje visine nosa nego u našoj populaciji.

Nadalje, utvrđena je sličnost širine nosa (al-al) za oba spola kod Bugara, Čeha, Hrvata, Grka, Mađara, Rusa, Slovenaca, Turaka i Indijaca, azerbajdžanskih i poljskih žena te portugalskih muškaraca. U azijskim etničkim skupinama, širina nosa bila je ekstremno veća u oba spola kod kineske, vijetnamske, tajlandske, japanske, angolske, Zulu i afroameričke populacije. Manja vrijednost širine nosa utvrđena je kod oba spola sjevernoameričkih bijelaca, njemačkog, talijanskog, slovačkog, iranskog i egipatskog stanovništva te portugalskih žena i azerbajdžanskih i poljskih muškaraca.

Širina usta (ch-ch) bila je identična onoj kod žena sjevernoameričkih bijelaca, Azerbajdžanaca, Čeha, Slovenaca i Slovaka te muškaraca iz Italije i Indije, kao i u oba spola Nijemaca, Grka, Poljaka i Rusa. Značajno veći ch-ch pronađen je među muškarcima sjevernoameričkih bijelaca, Azerbajdžanaca, Čeha, Slovenaca, Slovaka i Turaka te kod oba spola Mađara, Angolaca, Zulua i afroameričke populacije. Značajno manja ch-ch vrijednost pronađena je kod oba spola Bugara, Hrvata, Portugalaca, Iranaca, Egipćana, singapurskih Kineza, Vijetnamaca, Tajlanđana i japanske populacije te kod talijanskih, turskih i indijskih žena.

Naši normativni podaci o širini mandibule (go-go) bili su slični onima za azerbajdžanske žene i češke, turske, tajlandske i vijetnamske muškarce. Značajno manji go-go u usporedbi s našom populacijom pronađen je kod oba spola sjevernoameričkih bijelaca, Bugara, Hrvata, Nijemaca, Grka, Mađara, Poljaka, Portugalaca, Rusa, Slovenaca, Iranaca, Egipćana, Indijaca, singapuranskih Kineza, Zulua i afroameričke populacije te turskih žena i azerbajdžanskih muškaraca. Značajno širi go-go pronađen je kod oba spola talijanske, slovačke i japanske populacije, a također među češkim, tajlandskim i vijetnamskim ženama. Stoga su naši normativni podaci pokazali najmanju razliku prema populacijama kavkaskih skupina.

ese males and Thai females. Higher normative data than ours were found among Iranian and Afro-American population of both genders as well as among Czech and Singaporean Chinese females.

The normative data for the maximum facial width (zy-zy) were found to be similar only to German females. In Asian ethnic groups, the maximum facial width was extremely wider in both sexes of Indians, Singaporean Chinese, Vietnamese, Thai and Japanese population groups than in Kosovo Albanian population. The wider maximum facial width was found among NAW, Azerbaijan, Bulgarian, Czech, Croatian, Hungarian, Italian, Polish, Russian, Slovak, Slovenian, Iranian, Turkish, Egyptian, Afro-American population of both sexes; also Greeks and Zulu females and among German males. The narrow maximum facial width was found among Portuguese females and males as well as Greek and Zulu males.

Additionally, the nasal height (n-sn), was found identical to those of normal range among Azerbaijan, Greek, Hungarian, both males and females; Bulgarian, Czech, German, Italian, Polish, Slovenian, Singaporean Chinese females and Egyptian males. The nasal height was found greater than ours among Portuguese, Turkish, Iranian and Japanese individuals of both sexes; and Italian and in Slovenian males. In contrast, a shorter nasal height than in our population was found among NAW, Croatian, Russian, Slovak, Indians, Vietnamese, Thai, Angola, Zulu, and Afro-American males and females, also Bulgarian, Czech, Germans, Polish and Singaporean Chinese males and Egyptians females.

Moreover, the nasal width (al-al) was found to be similar to both sexes of Bulgarian, Czech, Croatian, Greek, Hungarian, Russian, Slovenian, Turkish, and Indian Azerbaijan and Polish females and Portuguese males. In Asian ethnic groups, the nasal width was extremely wider in both sexes of Singaporean Chinese, Vietnamese, Thai and Japanese population, also among Angola, Zulu, and Afro-American population. The slimmer value of nasal width was found among both sexes of NAW, German, Italian, Slovak, Iranian and Egyptian population as well as Portuguese females and Azerbaijan and Polish males.

The mouth width (ch-ch) was identical to that of the NAW, Azerbaijan, Czech, Slovenian, and Slovakian females, and Italian and Indians males as well as both sexes of German, Greek, Polish and Russian population. Significantly greater ch-ch were found among NAW, Azerbaijan, Czech, Slovenian, Slovakian and Turkish males, both sexes of Hungarian, Angola, Zulu, and Afro-American population. Significantly smaller ch-ch values were found among both sexes of Bulgarian, Croatian, Portuguese, Iranian, Egyptian, Singaporean, Chinese, Vietnamese, Thai, and Japanese population as well as Italian, Turkish and Indian females.

Our normative data regarding mandibular width (go-go) were found to be similar to those for Azerbaijan females and Czech, Turkish, Thai and Vietnamese males. Significantly smaller go-go compared to one belonging to our population was found among both sexes of NAW, Bulgarian, Croatian, German, Greek, Hungarian, Polish, Portuguese, Russian, Slovenian, Iranians, Egyptian, Indian, Singaporean, Chinese,

pina u Europi i bijelaca u Sjevernoj Americi, nakon čega je slijedilo bliskoistočno, azijsko i afričko stanovništvo, kako se i očekivalo.

Naši nalazi upućuju na utjecaj genetskih i ekoloških čimbenika koji pridonose razlikama zabilježenima u dimenzijama lica unutar i između ljudskih populacija (31, 32). Nekoliko istraživača navelo je da genetski čimbenici utječu na varijaciju koja se očituje u obliku i konfiguraciji ljudskog lica (33 – 35).

Udio i vrsta genetske kontrole variraju između pojedinaca i skupina, što može objasniti morfološke razlike između populacija (31). Čimbenici okoliša također mogu pridonijeti razlikama u obilježjima lica među populacijama. Uočeno je da klima može utjecati na visinu i širinu lica te visinu nosa i kranijalnu širinu u populacijama sjeveroistočne Azije (36, 37).

Rezultati ovog istraživanja pokazali su da većina značajki ljudskog lica ima izražena obilježja spolnog dimorfizma. Naši rezultati pokazuju da je spolni dimorfizam prisutan u većini mjera lica. Kod svih osam mjera lica; en-en, n-gn, sn-gn, zy-zy, n-sn, al-al, ch-ch i go-go pokazalo se da postoje statistički značajne razlike između muškaraca i žena. Izražen spolni dimorfizam mjera lica prikazan u ovom istraživanju potkrijepljen je rezultatima ISD-a. Omjeri muških/ženskih vrijednosti bili su veći od jedan za sva mjerenja. Pokazalo se da su muške varijable lica bile veće od ženskih u svim dimenzijama. Najviši ISD pronađen je za visinu donje trećine lica, a najmanji za interkantalnu udaljenost.

Međutim, nismo uspjeli pronaći objavljene podatke koji dokumentiraju razine spolnog dimorfizma. Spolne razlike u kraniofacijalnom području bile su uglavnom izražene kvantitativno, a ne kvalitativno; širina lica 4,01 %, indeks lica 3,77 % i širina mandibule 5,29 % (38). Spolni dimorfizam u strukturi kostiju lica dobro je definiran kod modernih ljudi. U europskim populacijama, prosječne dimenzije visine i širine lica veće su do 6 % kod muškaraca nego kod žena (39). Većina dimenzija mandibule veće su za 5 – 13 % (40 – 42). Naši rezultati, koji se odnose na postotak spolnog dimorfizma, slični su dužini i širini lica europske populacije.

Zaključak

Na temelju dobivenh rezultata uspostavljene su antropometrijske norme lica među odraslim kosovskim Albancima. Značajno veće vrijednosti zabilježene su kod muškaraca nego kod žena. Kliničke norme prikazane u ovom istraživanju bit će korisne u antropologiji, forenzičkoj medicini i mogu se koristiti kao lokalni standardi za dijagnostiku i planiranje korekcija različitih oštećenja, malformacija ili posttraumatskih deformacija lica te u ortognatskoj kirurgiji.

Angola, Zulu, and Afro-American population as well as Turkish females and Azerbaijani males. Significantly wider go-go was found among both sexes of Italian, Slovak and Japanese population, also among Czech, Thai, and Vietnamese females. Therefore, our normative data showed the smallest differences with Caucasian groups of Europe and North American white population, following the Middle East, Asian and African population, as expected.

Our findings reflect the influence of genetic and environmental factors that contribute to the differences observed in facial dimensions within and between human populations (31, 32). Several researchers have proposed that genetic factors exert substantial influence on the variation observed in the shape and configuration of the human face (33-35).

The proportion and type of genetic control varies between individuals and groups, which may account for the morphological differences noted between populations (31). Environmental factors may also contribute to differences in facial features among populations. It has been observed that climate could influence facial height and width, as well as nasal height and cranial width in Northeast Asian populations (36,37).

The result of this study indicated that most features of the human face show strong evidence of sexual dimorphism. Our results reveal that strong sexual dimorphism is present in most of facial measurements. All eight facial measurements; en-en, n-gn, sn-gn, zy-zy, n-sn, al-al, ch-ch and go-go showed that there were significant differences between males and females. The presence of strong sexual dimorphism of facial measurements reported in this study was supported by the results of the ISD. The ratios of male/female values were greater than one for all measurements. It indicated that male facial variables were larger than female ones in all dimensions. The highest ISD was found for the lower facial height and the lowest was found for the intercanthal width.

However, we were unable to identify any published data documenting the levels of sexual dimorphism. Gender differences in the craniofacial region were mainly expressed in size, not in shape, facial width 4.01%, morphological facial height 3.77% and mandibular width 5.29% (38). Sexual dimorphism of facial skeletal structures is well described in modern humans. In European populations, the average male facial length and width dimensions are up to 6% larger than female dimensions (39). Most mandible dimensions are 5-13 % larger (40-42). Our results, regarding the percentage of sexual dimorphism are found to be similar to the facial length and width of European population.

Conclusion

The obtained results have established the facial anthropometric norms among Kosovo Albanian adults. Significantly higher facial values were present in males than in females. The clinical norms presented in this study will be useful in anthropology, forensic medicine, and can be used as local standards for diagnostics and planning of correction of different impairments, malformations or post-traumatic aberrations of the face and the orthognathic surgery treatment.

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Autori niječu sukob interesa.

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Conflict of interest

The authors declare that they have no conflict of interest.

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Abstract

The development of an anthropometric craniofacial database is a necessary multidisciplinary proposal. **Aim:** The aim of this study was to establish facial anthropometric norms and to investigate into sexual dimorphism in facial variables among Kosovo Albanian adults. **Materials and Methods:** The sample included 204 students of Dental School, Faculty of Medicine, University of Pristina. Using direct anthropometry, a series of 8 standard facial measurements was taken on each subject with digital caliper with an accuracy of 0.01 mm (Boss, Hamburg-Germany). The normative data and percentile rankings were calculated. Gender differences in facial variables were analyzed using t- test for independent samples ($p<0.05$). The index of sexual dimorphism (ISD) and percentage of sexual dimorphism were calculated for each facial measurement. **Results: N**ormative data for all facial anthropometric measurements in males were higher than in females. Male average norms compared with the female average norms differed significantly from each other ($p>0.05$).The highest index of sexual dimorphism (ISD) was found for the lower facial height 1.120, for which the highest percentage of sexual dimorphism, 12.01%., was also found. The lowest ISD was found for intercanthal width, 1.022, accompanied with the lowest percentage of sexual dimorphism, 2.23%. **Conclusion:** The obtained results have established the facial anthropometric norms among Kosovo Albanian adults. Sexual dimorphism has been confirmed for each facial measurement.

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Key words
Cephalometry; Sexual Dimorphism; Population Characteristics; Albanians Adult; Kosovo

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