

Morphologic Patterns of Lip Prints in a Sample of Croatian Population

Šimović, Marija; Pavušek, Ivan; Muhasilović, Senad; Vodanović, Marin

Source / Izvornik: **Acta Stomatologica Croatica**, 2016, 50, 122 - 127

Journal article, Published version

Rad u časopisu, Objavljena verzija rada (izdavačev PDF)

<https://doi.org/10.15644/asc50/2/4>

Permanent link / Trajna poveznica: <https://um.nsk.hr/um:nbn:hr:127:856348>

Rights / Prava: [Attribution-NonCommercial-NoDerivatives 4.0 International/Imenovanje-Nekomercijalno-Bez prerada 4.0 međunarodna](#)

Download date / Datum preuzimanja: **2024-07-14**



Repository / Repozitorij:

[University of Zagreb School of Dental Medicine
Repository](#)



Marija Šimović¹, Ivan Pavušek², Senad Muhasilović³, Marin Vodanović^{3,4}

Morfološki obrasci otisaka usnica u hrvatskoj populaciji

Morphologic Patterns of Lip Prints in a Sample of Croatian Population

¹ Privatna stomatološka ordinacija, Zagreb, Hrvatska
Private dental practice, Zagreb, Croatia

² Privatna stomatološka ordinacija, Sarajevo, Bosna i Hercegovina
Private dental practice, Sarajevo, Bosnia and Herzegovina

³ Zavod za dentalnu antropologiju Stomatološkog fakulteta Sveučilišta u Zagrebu, Hrvatska
Department of Dental Anthropology School of Dental Medicine University of Zagreb

⁴ Klinika za stomatologiju KBC-a Zagreb
Dental clinic of the University Hospital Centre Zagreb

Sažetak

Uvod: Heiloskopija je istraživačka tehnika kojom se proučavaju uzdignuća i ulegnuća koja oblikuju karakterističan uzorak na vanjskoj površini usnica. Otisak usnica smatra se jedinstvenim i analognim je otisku prsta. **Svrha:** Željelo se odrediti tipove ragada na zdravim usnicama muškaraca i žena s pomoću otiska usnica u hrvatskoj populaciji, ustanoviti postoji li statistički značajna razlika između muškaraca i žena u tipovima ragada te ima li razlike između otisaka usnica muškaraca i žena. **Ispitanici i postupci:** U istraživanju je sudjelovalo 40 muških i 50 ženskih nasumično odabranih ispitanika iz hrvatske populacije. Uzorak ragada na usnicama klasificiran je metodom prema Tsuchihashiju. **Rezultati:** Istraživanje je pokazalo da većina žena u Hrvatskoj pripada tipu 2 (40 %), a slijedi tip 1 (34 %). Tipovi 3 (12 %), 4 (8 %) i 5 (6 %) su rjeđi. Većina muškaraca pripada tipu 3 (35 %) i tipu 2 (25 %) te malo njih tipu 4 (15 %), zatim slijede tipovi 5 (12,5 %) i 1 (12,5 %). **Zaključak:** Utvrđene su statistički značajne razlike između muškaraca i žena s obzirom na tipove ragada na usnicama.

Zaprimljen: 25. travnja 2016.

Prihvaćen: 1. lipnja 2016.

Adresa za dopisivanje

Marin Vodanović
Sveučilište u Zagrebu
Stomatološki fakultet
Zavod za dentalnu antropologiju
Klinika za stomatologiju KBC-a Zagreb
Gundulićeva 5, HR-10000 Zagreb
tel: 1 4899 214
vodanovic@sfzjg.hr

Gljučne riječi

otisak usana; heiloskopija; Tsuchihashi klasifikacija; forenzična stomatologija; Hrvatska

Uvod

Forenzična identifikacija je multidisciplinarni pristup koji uključuje stručnjake iz različitih područja – forenzičnog patologa, forenzičnog antropologa, forenzičnog stomatologa, serologista, kriminalista i pravnika te prema potrebi i druge stručnjake. To postaje očito posebice u katastrofama s mnogo žrtava, poput ratova, prirodnih katastrofa itd (1 – 3). U takvim slučajevima, osim uobičajenih metoda identifikacije, često se moraju upotrijebiti druge, alternativne metode za utvrđivanje identiteta stradalih (4, 5).

Heiloskopija (od grčkih riječi *cheilos* – usne i *skopein* – vidjeti) forenzična je istraživačka tehnika koja se bavi proučavanjem otisaka usnica, njihovih uzdignuća i ulegnuća koji oblikuju karakterističan uzorak na vanjskoj površini usana (6, 7). Otisci usnica imaju karakteristične obrasce pukotina (*sulcus labiorum*) u obliku uzvišenja i ulegnuća na labijalnoj sluznici u zoni prijelaza između unutarnje labijalne sluznice i vanjske kože (8). Mogu se uočiti već u šestom tjednu intrauterina života i od tada se njihov uzorak rijetko kad mijenja

Introduction

Forensic identification presumes a multidisciplinary approach. It brings together experts from different fields including forensic pathologists, forensic anthropologists, forensic odontologists, serologists, criminalists, lawyers or other professionals, if necessary. This becomes obvious especially in disasters including a large number of victims such as wars, natural disasters etc. (1-3). On such occasions, apart from the application of the usual methods of identification, some alternative methods have been proposed for establishing the identity of victims (4, 5).

Cheiloscopy (from the Greek words *cheilos* - lips and *skopein* - see) is a forensic research technique that deals with the study of lip prints, their elevations and depressions that form a distinctive pattern on the outer surface of the lips (6, 7). Lip prints consist of patterns of cracks (*sulci labiorum*) in the form of elevations and depressions on the labial mucosa present in the transition zone between the inner labial mucosa and outer skin (8). They can be identified in the sixth

(9). Provjeren je da se usnice oporavljaju od malih trauma, upala ili herpesa, a veće traume, kao što su kirurški tretmani i stvaranje ožiljaka, mogu djelovati na veličinu i oblik te tako mijenjati morfologiju usnica (10). Otisci usnica su jedinstveni (11,12). Otisci usnica roditelja i djece te braće i sestara pokazuju neke sličnosti (13). Važnost heiloskopije povezana je s činjenicom da su otisci usnica različiti kod pojedinaca (6). Identifikacija pojedinaca jedan je od najizazovnijih dijelova suvremene forenzične medicine. Samim time, otisci usnica dobili su na važnosti u forenzičnoj stomatologiji (14).

Utvrđivanje identiteta osobe može biti vrlo težak proces. Stomatološki pristup, otisci prstiju i usporedbe DNK, vjerojatno su najčešće tehnike u ovom kontekstu jer omogućuju brze i sigurne identifikacijske procese. Ali kako ne mogu uvijek biti od koristi, katkad je potrebno primijeniti drukčije i manje poznate tehnike (15). Pozitivna identifikacija živih ili umrlih osoba koja se koristi jedinstvenim osobinama i obilježjima zuba i čeljusti, temeljni je kamen forenzične stomatologije. Istražitelji često dobivaju informacije i dokaze zahvaljujući stomatologiji, antropometriji, otiscima prstiju i drugim tehnikama koje pomažu odrediti spol, dob i visinu. Danas se istražitelji mogu osloniti i na otisak usnica kao na način identifikacije mogućih osumnjičenika (7).

Fischer je prvi 1902. godine opisao korištenje otisaka usnica u osobnoj identifikaciji i kriminalističkoj obradi (16). Otisak usnica zapravo je analogan otisku prsta (17). Ako je pronađen na mjestu zločina, može biti osnova za pretpostavke kao što su motiv zločina, broj ljudi uključenih u to zločdelo, spol, korištenje kozmetičkih preparata, navike, profesionalne osobine i patološke promjene na samim usnicama (15). Forenzična znanost odnosi se na područja djelovanja koja se mogu iskoristiti u sudskom okruženju te ih opća i znanstvena zajednica prihvaća u razlučivanju istine od neistine (18). U sudskoj identifikaciji usna šupljina daje bezbroj mogućnosti. Otisci usnica važni su zbog jedinstvenosti i trajnosti (8). U praksi se otisak usnica također otkriva na prozorskom staklu, slikama, vratima, plastičnim vrećicama, opuščima itd. Pronalaženje otiska usnica nije teško. Zapravo, latentni otisci usnica lako se mogu vidjeti ako se koristimo fluorescentnim bojama (6). Postoje razne klasifikacije otisaka usnica, uključujući onu Martina Santosa, zatim Renaudovu i Afchar Bayatovu, ili onu Josea Marije Domingueza, ali stručnjaci se najčešće koriste Suzukijevom i Tsuchihashijevom (6). Otisci usnica klasificirani su u pet tipova (19).

Svrha istraživanja jest analiza usnog crteža muškaraca i žena na području Hrvatske kako bi se stvorile pretpostavke za forenzičnu identifikaciju na temelju analize usnica. Cilj istraživanja je: odrediti tipove ragada na zdravim usnicama muškaraca i žena s pomoću otiska usnica u hrvatskoj populaciji, utvrditi postoji li statistički značajna razlika između muškaraca i žena u tipovima ragada, ustanoviti postoji li razlika između otiska usnica muškaraca i žena.

week of intrauterine life and their pattern is rarely changed (9). Minor trauma such as inflammation or herpes, will not have a pronounced effect on the appearance of the lips and adjacent tissues, while greater trauma such as surgical treatments and scarring may affect the size and shape of the morphology of the lips (10). Lip prints are unique (11, 12). Lip prints of parents and children as well as those of brothers and sisters show some similarities (13). The importance of cheiloscopy is related to the fact that the lip prints are different in individuals (6). Identification of individuals is one of the most challenging parts of modern forensic medicine. Consequently, the analysis of lip prints has gained importance in forensic dentistry (14).

Determining the identity of a person can be a very difficult process. Dental, fingerprint and DNA comparisons are probably the most common techniques used in this context, allowing fast and reliable identification process. However, since they may not always be beneficial, it is sometimes necessary to apply some less well-known techniques (15). The positive identification of living or deceased persons using the unique features and characteristics of the teeth and jaws is a corner stone of forensic dentistry. Researchers often receive information for possible use as evidence. They gather information from different branches of dentistry. In addition, anthropometry, fingerprinting and other techniques are used to determine the gender, age and height. Today, researchers can rely on lip imprints thus facilitating the identification of possible suspects (7).

In 1902, Fischer was the first researcher who described the use of lip prints for personal identification and crime investigation (16). The imprint of lips is analogous to the fingerprint (17). The prints found at a crime scene can establish a scientific basis for identification. The assumption is that they would reveal the nature of crime, the number of people involved in it, the gender, the use of cosmetics as well as habits, occupational characteristics and the pathological changes of the lips themselves (15). Forensic science refers to scientific fields and disciplines that can be used in the court and have been generally accepted as reliable both by trial judges and by the relevant scientific community to distinguish truth from falsehood (18). In the process of identification, oral cavity allows countless possibilities. Lip prints are important because they are unique and do not change during the life of a person (8). In practice, the imprint of the lips can be found on the surface of the window, painting, doors, plastic bags, cigarette butts, etc. Finding lip prints is not difficult. In fact, latent lip prints can be easily viewed using a fluorescent dye (6). There are various classifications of lip prints: Martin Santos classification, Renaud classification, Afchar Bayat classification, Jose Maria Dominguez's classification. However, the classification made by Suzuki and Tsuchihashi is the most commonly used classification for recording the pattern on the lips. (6). Lip prints are classified into five types (19).

The purpose of this research was to analyze the lip drawing of the Croatian men and women in order to create the preconditions for forensic identification based on the analysis of the lips. The aim of the research was: to determine the type

Materijali i metode

U istraživanju je sudjelovalo 50 žena i 40 muškaraca s područja Hrvatske. Svi su bili obaviješteni o svrsi i ciljevnima istraživanja i zamoljeni da sudjeluju. Nakon potpisano-ga informiranog pristanka, fotografirani su uz centimetarsku mjerku digitalnim aparatom *Olympus μ-mini*. Ispitanici su bili zamoljeni da pred zrcalom na usne nanesu crveni mat ruž (*Catrice 080 My Red Card*). Ruž je prije toga bio dezinficiran alkoholnim rupčicama *Alkotip*, te se pričekalo jednu minu-tu da se posuši. Slijedilo je preslikavanje otiska na 100-gram-ski bijeli papir tako da je ispitanik malo rastvorio usne, te laganim dodirima, najprije centralno, a zatim i lateralno, pri-tisnuo usnice na papir. Ruž se uklanjao suhim smotuljcima vate i vodom. Svi skupljeni uzorci prekriveni su prozirnom ljepljivom vrpcom i digitalno fotografirani. Pohranjeni su ar-hivu Zavoda za dentalnu antropologiju Stomatološkog fakul-teta u Zagrebu, Hrvatska.

Određivanje ragada usnica klasificiranih prema Yasouu Tsuchihashiju na pet tipova (19) obavljalo se odgovarajućim povećalom (povećanje od 3 ×) na sljedeći način:

- tip 1 – jasne vertikalne linije koje se prostiru po cijeloj usnici ili ne pokrivaju cijele usne (slika 1.)
- tip 2 – razgranate linije (slika 2.)
- tip 3 – ispresijecane linije (slika 3.)
- tip 4 – retikularne linije (slika 4.)
- tip 5 – linije koje nisu uvrštene ni u jednu skupinu od 1. do 4. (slika 5.)

Hi-kvadrat test i Fisherova egzaktna metoda korišteni su za testiranje statistički značajne razlike između tipova ragada kod muškaraca i žena. Razina statističke značajnosti bila je postavljena na $p < 0,05$.

of grooves on healthy lips of men and women by analyzing lip prints in a sample of Croatian population, to determine if there is a statistically significant difference between men and women in the types of grooves, to determine if there are any differences between male and female lip prints.

Material and methods

The study included 50 women and 40 men from Croatia. Respondents were informed about the purpose and objectives of the research and were subsequently asked to participate in it. After the signed informed consents were collected, lips were photographed with centimeter caliper using a digital camera "Olympus μ – mini". The respondents were asked to put a matte red lipstick on, ("Catrice 080 My Red Card") using a mirror. The lipstick was treated with alcohol wipes ("Alkotip") and left for 1 minute to dry. This was followed by taking lip prints on 100-gram white paper with a subject slightly opening his/her lips and lightly pressing centrally first, and then laterally on the paper. To remove lipstick, the respondents were offered dry cotton rolls and water. All collected samples were covered with a transparent adhesive tape and digitally photographed. The samples were stored in the Department of Dental Anthropology of the School of Dental Medicine University of Zagreb, Croatia.

Lip print patterns were analyzed according to Tsuchihashi Classification by using a magnifying glass (increase in magnification of 3×) (19). The grooves on lips were classified as follows:

- Type 1 - clear vertical lines that reach across the lip or do not cover the entire lip (Figure 1)
- Type 2 - branched lines (Figure 2)
- Type 3 - dotted lines (Figure 3)
- Type 4 - reticular lines (Figure 4)
- Type 5 - lines that do not belong to any group of 1-4 (Figure 5)

The chi-square test and the Fisher's exact method were used for testing the statistical difference between male and female subjects and the types of grooves. The level of significance was set at $p < 0.05$.



Slika 1. Tsuchihashijev tip 1
Figure 1 Tsuchihashi type 1
Slika 2. Tsuchihashijev tip 2
Figure 2 Tsuchihashi type 2
Slika 3. Tsuchihashijev tip 3
Figure 3 Tsuchihashi type 3
Slika 4. Tsuchihashijev tip 4
Figure 4 Tsuchihashi type 4
Slika 5. Tsuchihashi tip 5
Figure 5 Tsuchihashi type 5

Rezultati

Analizirano je ukupno 90 osoba (50 žena i 40 muškaraca). U istraživanje su bili uključeni samo pojedinci sa zdravim usnicama i bez vidljivih znakova ranijih trauma. Istraživanje je pokazalo da većina žena pripada tipu 2 (40 %), a slijedi tip 1 (34 %). Tipovi 3 (12 %), 4 (8 %) i 5 (6 %) bili su znatno rjeđe zastupljeni. Većina muškaraca pripada tipu 3 (35 %) i tipu 2 (25 %), a malo njih tipovima 4 (15 %), 5 (12,5 %) i 1 (12,5 %), Tablica 1.

Hi-kvadrat test, uz razinu pouzdanosti od 95 % ($p < 0,05$ i 4 stupnja slobode), pokazao je statistički značajnu razliku između muškaraca i žena s obzirom na tipove ragada. Možemo zaključiti da su varijable *spol* i *tipovi ragada*, ovisne. Fisherova egzaktna metoda (dvostrani test), uz razinu pouzdanosti od 95 % ($p < 0,05$, $\alpha = 0,05$, $z = 1,96$) također je pokazala statistički značajnu razliku između muškaraca i žena s obzirom na tipove ragada.

Results

A total of 90 people (50 females and 40 males) participated in the study. The study included only individuals with healthy lips and those without any visible signs of previous trauma. The research showed that most women had lip prints Type 2 (40.0%), followed by Type 1 (34.0%). Type 3 (12.0%), Type 4 (8.0%) and Type 5 (6.0%) were much less frequent. Type 3 (35.0%) was the most common lip print pattern among males, followed by Type 2 (25.0%). A small number of men belonged to Type 4 (15.0%), Type 5 (12.5%) and Type 1 (12.5%), Table 1.

The chi square test with 95% confidence level ($p < 0.05$ and 4 degrees of freedom) showed a statistically significant difference between males and females regarding the types of grooves. It can be concluded that the variables of gender and groove types are dependent. The Fisher's exact method (two-sided test) with 95% confidence level ($p < 0.05$, $\alpha = 0.05$, $z = 1.96$) also showed a statistically significant difference between males and females with regard to the types of grooves.

Tablica 1. Distribucija tipova otisaka usnica
Table 1 Distribution of lip prints types

Tip • Type	1		2		3		4		5	
	N	%	N	%	N	%	N	%	N	%
Muškarci • Men	5	12.5	10	25.0	14	35.0	6	15.0	5	12.5
Žene • Women	17	34.0	20	40.0	6	12.0	4	8.0	3	6.0

N = broj analiziranih osoba • number of subjects

Rasprava

Iako nije korisna za identifikaciju ako su dostupni samo skeletalni ostatci, heiloskopija može pružiti vrijedne pravne dokaze. Zbog sve više neriješenih kaznenih djela, kazneno pravo mora ozbiljno shvatiti bilo koju novu metodu koja osigurava dokaze za rješavanje zločina. Otisak usnica varira u različitim dijelovima usne kojim se utvrđuje da svaki pojedinac ima jedinstveni otisak usana, a ako postoji premortalni otisak, može se usporediti s postmortalnim u slučaju osobne identifikacije (20). Obično se osobna identifikacija obavlja usporedbom antemortalnih podataka s podacima dobivenima tijekom obdukcije. Istraživanja i informacije o uzimanju otisaka usnica kao dokaza za osobnu identifikaciju i za kaznene istrage, u forenzičnoj su stomatologiji vrlo oskudna. Unatoč tomu što je dostupno nekoliko studija, proučavanje Tsuchihashija daje standardnu klasifikaciju različitih tipova otisaka usnica (21). Suzuki i Tsuchihashi klasificirali su otiske usnica u pet tipova prema obliku i smjeru ragada. Ta klasifikacija jedna je od najčešće korištenih za analizu uzoraka na usnicama (19).

Primjena forenzične stomatologije u pravnim slučajevima dobila je zamah u razvijenim zemljama Europe i SAD-a tijekom 1950-ih i 1960-ih godina prošloga stoljeća (22). Heiloskopija je razmjerno novo područje među mnogobrojnim identifikacijskim alatima dostupnima forenzičarima. Iako heiloskopija može pružiti korisne informacije u forenzičnim slučajevima, još uvijek postoje ograničenja u korištenju otisaka usnica. Za procjenu otisaka usnica mora biti razvijena

Discussion

Although cheiloscopy is not useful for human identification in situations in which only skeletal remains are available, it can provide a valuable piece of legal evidence. As the number of unsolved criminal cases continues to increase, academics focusing on criminal law together with the experts working as practitioners in criminal law seriously consider any new method for gathering information and providing evidence which will be crucial to effective solving of crime. Lip print varies in different parts of the lip, which points to the fact that every individual has a unique print of his/her lips. It is assumed that a pre-mortem lip print can be compared with the post-mortem lip print for personal identification (20). Personal identification is established by comparing ante-mortem data with data obtained from autopsy. Few studies are available on the use of lip prints as evidence in personal identification and criminal investigation in forensic dentistry. Despite a small number of available studies, the study of Tsuchihashi is the standard for classification of different types of lip prints (21). Suzuki and Tsuchihashi classified lip prints into five types according to the shape and course of grooves. This classification is the most widely used classification system for analyzing lip prints (19).

The earliest accounts of the use of forensic dentistry in legal cases in the developed countries of Europe and the United States date to the 1950s and 1960s (22). Cheiloscopy is a relatively new field among the large number of identifica-

metoda standardizacije (7). Otisci usnica mogu se otkriti kao stratificirani tragovi s vidljivim elementima linija (brazdama). U tom slučaju trag ima oblik ispisa. Svojim svojstvima omogućuje individualno prepoznavanje ljudskoga bića. U slučaju da linije nisu jasne (samo oblik usnica je tiskan), individualna identifikacija čovjeka temeljena na tom tragu iznimno je teška (osim ako tragovi ne sadržavaju druga individualna obilježja, npr. ožiljke). U tom slučaju ispituje se tvar koja čini trag, npr. slina u kojoj se može tragati za DNK. Ako su usnice prekrivene ostatcima hrane ili kozmetike, a linije su tiskane nejasno, trag će imati oblik mrlja, a može se podvrgnuti kemijskom ispitivanju kako bi se ustanovilo koja tvar prekriva usnice. Vrijednost takva traga ovisit će o njegovoj vrsti. Tragovi s jasnim linijama i pojedinačnim elementima omogućuju identifikaciju pojedinačnoga ljudskog bića. Pronalaženje tragova nije teško. Tehnike koje se upotrebljavaju kod otisaka prstiju vrlo su dobre za tu svrhu. Najlakši način je korištenje praha i pričvršćivanje na foliju. Kako bi se potpuno iskoristile mogućnosti heiloskopije u forenzičnim istragama, obvezno je provesti daljnja istraživanja na različitim skupinama stanovništva te analizirati varijacije i uspostaviti bazu podataka. Također je vrlo važno standardizirati protokole (8).

Randhawa, Narang i Arora utvrdili su da je u populaciji na sjeveru Indije kod žena najčešći tip 1 (59,48 %), a slijede tipovi 2 (12,54 %) i 3 (11,89 %). Kad je riječ o muškarcima, dominantan je tip 3 (41,52 %), a slijede tipovi 1 (37,71 %) i 4 (9,68 %). Hi-kvadrat test primijenjen pri testiranju usnog crteža pokazao je značajne razlike između muškaraca i žena s obzirom na tipove ragada (7). Ovo istraživanje pokazalo je da većina žena u Hrvatskoj pripada tipu 2 (40 %), a zatim slijedi tip 1 (34 %). Većina muškaraca pripada tipovima 3 (35 %) i 2 (25 %), a obradom podataka ustanovljeno je da postoji statistički značajna razlika između muškaraca i žena s obzirom na tipove ragada usnica.

Zaključak

Rezultati dobiveni ovim istraživanjem daju uvid u uzorke otisaka usnica u hrvatskoj populaciji. Utvrđeno je da se s pomoću otisaka usnica mogu razlikovati pojedinci, te da postoji statistički značajna razlika u učestalosti pojavljivanja pojedinih tipova ragada između muškaraca i žena. Osim toga, potvrđeno je da svaka osoba ima jedinstven usni crtež.

Sukob interesa

Nije ga bilo.

tion tools available to the forensic expert. Although cheiloscopy can provide useful evidence in forensic cases, limitations still exist in the use of lip prints. A method of standardization need to be developed for assessment of lip prints (7). Lip prints can be detected as stratified surface traces with visible elements of lines (grooves). In such a case, the traces have the form of a print. Their features allow identification of specific individuals. If the lines are not clear (only a lip shape is printed) individual identification based on the lip print is very difficult, unless the trace contains other individual characteristics such as scars. In such cases, it is possible to examine the substance that makes a trace such as saliva in which it is possible to search for DNA. If the lips are covered with the remains of food or cosmetics and the lines are printed, an unclear trace will take the form of stains and can be subjected to chemical testing to determine which substance is covering the lip print. The value of the trace will depend on its type. Traces with clean lines and individual components are used to enable subsequent analysis and identification of human beings. It is not difficult to find the clue. Techniques used in fingerprints analysis can be employed for this purpose. By far the best way to detect traces is to use a powder and gently apply it to the foil. In order to fully utilize the potential role of cheiloscopy in forensic investigations, more research is needed on different population groups. In addition to this, variations need to be analyzed and a database should be set up. There is a great need to standardize protocols (8).

Randhawa, Narang and Arora reported that women belonging to Type 1 (59.48 %) are predominant in population living in north India, followed by those belonging to Type 2 (12.54%) and Type 3 (11.89%). In men, Type 3 (41.52%) is predominant, followed by Type 1 (37.71%) and Type 4 (9.68%). The chi square test was applied when testing lip drawings. The results showed that there were significant differences between men and women with regard to the types of grooves(7).

The results of this study showed that most women in Croatia belong to Type 2 (40%), followed by Type 1 (34%). Most men belong to Type 3 (35%) and Type 2 (25%). The statistical analysis of the data showed that there is a statistically significant difference between men and women with regard to the types of grooves.

Conclusion

The results of this study provide insight into patterns of lip prints in the Croatian population. The fact that lip prints can positively distinguish individuals and hence have potential use in human identification was confirmed. The results of our study show that there is a statistically significant difference in incidence of certain types of lip grooves between men and women. In addition, the fact that lip prints are unique to each individual was confirmed.

Conflict of interest

None declared

Abstract

Purpose: Cheiloscropy deals with the study of elevations and depressions which form a characteristic pattern on the external surface of the lips. Lip grooves are considered to be unique and analogous to the fingerprint. The aim of the research was to determine the type of grooves on healthy lips of men and women using lip prints in a sample of Croatian population, to determine whether there is a statistically significant difference between men and women in the types of grooves and to determine whether there are any differences between male and female lip prints. **Material and methods:** A randomly selected sample of Croatian population consisted of 40 male and 50 female subjects. The samples of lip grooves were classified according to Tsuchihashi classification. **Results:** The research has shown that most women in Croatia belong to Type 2 (40.0%), followed by Type 1 (34.0%), Type 3 (12.0%), Type 4 (8.0%), and Type 5 (6.0%) which is of less importance. Most Croatian men belong to Type 3 (35.0%) and Type 2 (25.0%). A small number of men belong to Type 4 (15.0%), Type 5 (12.5%) and Type 1 (12.5%). **Conclusion:** There was a statistically significant difference between men and women regarding the types of lip grooves.

Received: April 25, 2016

Accepted: June, 1 2016

Address for correspondence

Marin Vodanović
University of Zagreb School of Dental
Medicine
Department of Dental Anthropology
University Hospital Centre Zagreb
Gundulićeva 5, HR-10000 Zagreb,
Croatia
phone: +385 1 4899 214
vodanovic@sfzg.hr

Key words

Lip Prints; cheiloscropy; Tsuchihashi
classification; Forensic Dentistry; Cro-
atia

References

1. Stimson PG, Mertz CA. Forensic dentistry. 1 st ed. Boca Raton: CRC Press; 1997. xvi, 301 p. p.
2. Brkić H. Forensic Science: 20 Years of Forensic Dentistry at the University of Zagreb, 1994 - 2014. *Acta Stomatol Croat.* 2014;48(2):96-8.
3. Ambarkova V, Galic I, Vodanovic M, Biocina-Lukenda D, Brkić H. Dental age estimation using Demirjian and Willems methods: Cross sectional study on children from the Former Yugoslav Republic of Macedonia. *Forensic Science International.* 2014;234.
4. Ferreira S, Franco A, Fortes P, Gomes N, Estrela C. Dental Identification Through Endodontic Radiographic Records: a Case Report. *Acta Stomatol Croat.* 2014;48(2):147-50. NIJE U PUBMEDU
5. Brkić H, Strinović D, Kubat M. The Incidence of Dental Identifications from Mass Graves in Croatia. *Acta Stomatol Croat.* 1998;32(3):409-17.
6. Costa VA, Caldas IM. Morphologic patterns of lip prints in a Portuguese population: a preliminary analysis. *J Forensic Sci.* 2012 Sep;57(5):1318-22.
7. Randhawa K, Narang RS, Arora PC. Study of the effect of age changes on lip print pattern and its reliability in sex determination. *J Forensic Odontostomatol.* 2011 Dec 1;29(2):45-51.
8. Vats Y, Dhall JK, Kapoor A. Gender variation in morphological patterns of lip prints among some north Indian populations. *J Forensic Dent Sci.* 2012 Jan;4(1):19-23.
9. El Domiaty MA, Al-gaidi SA, Elayat AA, Safwat MD, Galal SA. Morphological patterns of lip prints in Saudi Arabia at Almadinah Al-monawarah province. *Forensic Sci Int.* 2010 Jul 15;200(1-3):179.e1-9.
10. Rajendran R SB. Shafer's Textbook of Oral Pathology. 5 ed. New Delhi: Elsevier; 2006.
11. Sivapathasundharam B, Prakash PA, Sivakumar G. Lip prints (cheiloscropy). *Indian J Dent Res.* 2001 Oct-Dec;12(4):234-7.
12. Whittaker DK MD. A Colour Atlas of Forensic Dentistry. 1 st ed. London: Wolfe Medical Publications; 1989.
13. Leveque JL, Goubanova E. Influence of age on the lips and perioral skin. *Dermatology.* 2004;208(4):307-13.
14. Ragab AR, El-Dakroory SA, Rahman RH. Characteristic patterns of lip prints in Egyptian population sample at Dakahlia Governorate. *Int J Legal Med.* 2013 Mar;127(2):521-7.
15. LVK R. Lip prints: An Overview in Forensic Dentistry. *J Adv Dental Research.* 2011;2(1):17-20.
16. Kasprzak J. Possibilities of cheiloscropy. *Forensic Sci Int.* 1990;46(1-2):145-51.
17. Caldas IM, Magalhaes T, Afonso A. Establishing identity using cheiloscropy and palatoscopy. *Forensic Sci Int.* 2007 Jan 5;165(1):1-9.
18. O'Shaughnessy PE. Introduction to forensic science. *Dent Clin North Am.* 2001 Apr;45(2):217-27, vii.
19. Tsuchihashi Y. Studies on personal identification by means of lip prints. *Forensic Sci.* 1974 Jun;3(3):233-48.
20. Prasad P, Vanishree. A comparison of lip prints between Aryans-Dravidians and Mongols. *Indian J Dent Res.* 2011 Sep-Oct;22(5):664-8.
21. Prabhu RV, Dinkar AD, Prabhu VD, Rao PK. Cheiloscropy: revisited. *J Forensic Dent Sci.* 2012 Jan;4(1):47-52.
22. Saraswathi TR MG, Ranganathan K. Study of lip prints. *J Forensic Dent Sci.* 2009;1(1):28-31.