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Original communication

Analysis of palatal rugae in males and females of an average age of 35 in a population from Bosnia and Herzegovina (Sarajevo Canton)

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ABSTRACT

The goal of this study is to identify and compare palatal rugae patterns in males and females of an average age of 35 in a sample population from Bosnia and Herzegovina (Sarajevo Canton), as an additional method for sex differentiation in various situations. The research did not determine any statistically significant difference in the total number of palatal rugae between the sexes, which is in line with previous research. However, in the case of the number of secondary palatal rugae where the probability of an equal average is slightly higher than the tolerance of 5%, the difference being 7.6% which may indicate that secondary palatal rugae are more common in women. However, logistic regression analysis LRA is still more successful in classifying males, 69% of them, while for women the success rate is significantly lower with only 41%. In total, 55% of subjects were correctly classified. It may be concluded that using LRA in palatal rugae could be used as an additional sex differentiation method for the population of Bosnia and Herzegovina.

1. Introduction

In situations of mass deaths any help in forensic methods is welcome. Forensic odontology attempts to help in identifying victims by introducing new and improved old methods. The idea is to overcome shortcomings of comparative identification which is basically identification of a deceased person using dental records which are often not up to date.[1–4]

characteristics of palatal rugae such as uniqueness and stability make them convenient for forensic identification of victims.[2,5]

At birth, palatal rugae have typical orientation and location which remain the same over the entire lifetime. The growth process only changes the length of the rugae.[6]

The special feature of the palatal rugae, being the soft tissue, is their specific anatomic position within the oral cavity where they remain protected from high temperatures or severe physical trauma.[7] They are, therefore, known as the most protected morphologically individual soft tissue that remains preserved longer after death, and is easily accessible over the entire lifetime.[7] These are the reasons why attempts are being made to use this particular characteristic of palatal rugae in forensics.[8]

Palatal rugae are particularly useful in identification of a toothless person. There are some indications on sex-related and regional variation in palatal rugae patterns.[9] These were the facts that led us engage in this research, in order to examine the role of palatal rugae in differentiation between sexes in a B&H population from the Sarajevo Canton noting that this type of research had not been performed in Bosnia and Herzegovina before.

2. Materials and methods

This prospective research included 250 patients of which 127 were men and 123 women aged between 20 and 40. All the patients were citizens of Bosnia and Herzegovina residing in the Sarajevo Canton who met the following inclusion criteria:

- Patients with various forms of dentition
- Patients with a permanent dentition
- Patients with mobile prosthesis

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The study did not process any patients with severe congenital anomalies or systemic diseases.

Before joining the study, each patient had to sign a consent form expressing their voluntary participation in the research. After basic anamnesis information on the patients were recorded, an imprint of the upper jaw was taken from each patient (using the impression material - alginate "Hydrogum" manufactured by Zhermack Clinical) and then casted in gypsum ("Elite model" manufactured by Zhermack Technical). The prominent palatal rugae, median palatal suture and papillae incisiva cast were marked with a pencil on the gypsum model and then photographed using an Olympus FE-130 camera (Fig. 1).

The length of the palatal rugae, width of palatal rugae, the distance between the palatal rugae and the median palatal suture and distance between the palatal rugae and the papilla incisiva were measured using VistaMetrix® 1.38 computer programme (Fig. 2.). Categorisation of rugae according to Lysel and Lima was performed.[10] All the measures were taken by the same person, however, 20 randomly chosen models were evaluated by a different person (*intra-observer variation*) without showing any significant differences in interpretation.

2.1. Statistical analysis

The data read were organised in a form suitable for statistical analysis. The association between the number of palatal rugae according to their location (left or right), and the number of those categorised using Lysell and Lima criteria was tested using Mann–Whitney test. Logistic regression analysis (LRA) was used to test the possibility of prediction of sex according to the number of palatal rugae and their location, and the number of those according to Lysell and Lima categories as predictors. Analyses were made using software pack for data analysis PASW Statistics 18 software pack for data analysis.

3. Results

3.1. Total number of palatal rugae in males and females

Total number of tested subjects with average values of their age and total number of palatal rugae, divided according to the sex showed that men and women were on average 35 years old with almost the same number of palatal rugae (Table 1).

3.2. Distribution of the number of right and left palatal rugae in subjects categorised according to their sex

Mann–Whitney test analysis showed no statistically significant difference in the distribution of the number of right and left rugae in male and female patients (Table 2).

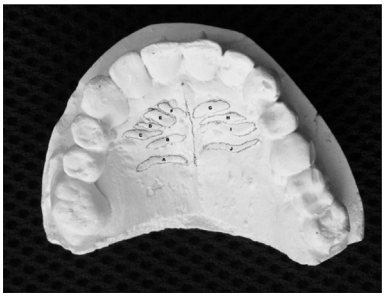

Fig. 1. Palatal rugae tracing and marking.

Fig. 2. Palatal rugae measuring.

Table 1
Total number of subjects and total number of rugae in males and females.

Sex	Number of subjects	Age		Number of rugae
		Mean	St. dev.	
Males	127	35.06	15.01	737
Females	123	34.95	14.96	724
Total	250	35.01	14.95	1461

Table 2
Descriptive statistics numbers of rugae per subject categorized by sex.

Rugae	Sex	Number of subjects	Mean	St. dev.	Median	p-value[a]
Right	Males	127	2.85	0.93	3	0.831
	Females	123	2.89	0.88	3	
	Total	250	2.87	0.90	3	
Left	Males	127	2.95	1.02	3	0.797
	Females	123	3.00	1.02	3	
	Total	250	2.98	1.02	3	
Right and left	Males	127	5.80	1.72	6	0.929
	Females	123	5.89	1.77	6	
	Total	250	5.84	1.74	6	

[a] Mann–Whitney Test.

3.3. Analysis of the palatal rugae number according to Lysell

Mann–Whitney test analysed the number of palatal rugae according to Lysell and showed no statistically significant differences between males and females (Table 3).

3.4. Analysis of the number of palatal rugae according to Lima

Mann–Whitney test analysis of the number of palatal rugae according to Lima has shown no statistically significant difference between sexes (Table 4).

Table 3
Descriptive statistics numbers of rugae per subjects categorized by Lysell by sex.

Type of rugae by Lysell	Sex	Number of subject	Mean	St.dev.	Median	p-value[a]
Primary (5 mm and more)	Males	127	5.31	1.60	5	0.333
	Females	123	5.13	1.58	5	
	Total	250	5.22	1.59	5	
Secondary (3–5 mm)	Males	127	0.47	0.91	0	0.076
	Females	123	0.73	1.21	0	
	Total	250	0.60	1.07	0	
Fragmented (2–3 mm)	Males	127	0.02	0.12	0	0.626
	Females	123	0.02	0.15	0	
	Total	250	0.02	0.14	0	

[a] Mann–Whitney Test.