

## Sexual Dimorphism in the Tooth Dimensions of Spanish and Chilean Peoples

Dimorfismo Sexual en las Dimensiones Dentales de Individuos Españoles y Chilenos

Claudia Astete jofré<sup>\*</sup>; Jaime San Pedro Valenzuela<sup>\*\*</sup> & Iván Suazo Galdames<sup>\*\*\*</sup>

---

ASTETE, J. C.; SAN PEDRO, V. J. & SUAZO, G. I. Sexual Dimorphism in the Tooth Dimensions of Spanish and Chilean peoples. *Int. J. Odontostomat.*, 3(1):47-50, 2009.

**SUMMARY:** The presence of sexual dimorphism in the size of the teeth is important in the medicolegal identification process. The purpose of this study was to analyze the presence of sexual dimorphism in the mesiodistal (MD) and bucolingual (BL) diameter of permanent teeth in a sample of Spanish and Chilean young subjects, and analyze possible differences in dimorphic expression among these groups. Participated 60 individuals from the Universidad del País Vasco, Spain and 60 from the Universidad de Talca, Chile, of both sexes aged between 18 and 30 years olds. Were measured MD and BL dimensions and means were compared using t test ( $p < 0.05$  and  $p < 0.01$ ), then analyzed the differences between the groups. Most of the teeth examined had larger in men in both groups, with the exception of the upper incisors and first mandibular molar. The group of Spanish individuals showed higher sexual dimorphism than the Chilean group, which suggests the population-specific behavioral differences.

**KEY WORDS:** sexual dimorphism, dental dimensions, forensic anthropology, odontometry.

---

### INTRODUCTION

In the process of identification of skeletal human remains subjected to deterioration by chemical or physical agents teeth have a fundamental role.

In cases of mass disasters, where there are not personal items of the victims or the circumstances of the accident destroys soft tissue that will help us to identify, you can use techniques such as facial reconstruction, use of laboratory procedures and identification from DNA study and bones, etc. But of all morphological structures and human skeleton there is only one that does not change the size or shape after the initial development: the teeth (Rösing, 1982).

The study of teeth has been a subject of interest to anthropologists, biologists, paleontologists and orthodontists (Ling & Wong, 2007). This is because teeth are generally preserved even when the bone structures have been destroyed.

The teeth are mineralized tissues that are characterized by structures of extraordinary resistance

to putrefaction and the effect of external agents (physical, trauma, heat, chemical or biological), that caused the destruction of the soft parts of the body structure.

The variety of teeth, number and morphology in each individual, is a fact which increases its importance as an identifying element. Different moments in the life of man in which the teeth erupt and make their evolution, the color, wear, abrasions, special traits, alterations of the enamel and various dental positions, help determine cultural, professional or individual practices and allow precise, with quite accurately, the age of the subject to identify. The difference in size and shape, we can distinguish the sex, age and their relative size. Hereditary factors, which are reflected in the teeth is another element to consider in the individualization of identity.

Tooth dimensions have been studied both in anthropometric and dentist terms. In anthropology, the determination of the dimensions and anatomical

<sup>\*</sup> Dentist, private practice.

<sup>\*\*</sup> Department of Stomatology. Faculty of Health Science, Universidad de Talca, Chile.

<sup>\*\*\*</sup> Morfología, Universidad de Talca, Chile.

features of the teeth shows differences between individuals of the same population or to compare different populations. In the dental knowledge of tooth size is an important diagnostic and therapeutic value. As a general rule, indicate sexual differences between the diameters of the teeth showing higher in males than females (Grand *et al.*, 1966) This sexual dimorphism is more pronounced in the permanent dentition than in the deciduous teeth. The magnitude and pattern of sexual dimorphism in the size of permanent teeth also differ from one to other population (Garn *et al.*, 1967).

The size of teeth not only varies between sexes, races and populations, so does between generations. Ebeling *et al.* (1973) suggest that there is an upward trend in the mesiodistal size of the teeth. Even increase in size occurs between successive generations, in both the mesiodistal (Grand *et al.*, 1968) and in the vestibulo-lingual diameter (Harris *et al.*, 2001). This positive attribute to the increase in growth rate, while health and nutrition improvement (Grand *et al.*, 1968, Harris *et al.*).

Against this background, the purpose of this study is to determine the presence of sexual dimorphism in mesiodistal and bucolinguales diameters of permanent teeth in a sample of Spanish and Chilean young subjects and analyze possible differences in dimorphic expression among these groups.

## MATERIAL AND METHOD

**Subjects.** Involving 120 subjects of both sexes between 18 and 30 years of age, who were informed of the nature of the study and agreed to participate in it, leaving a written record of their agreement, they were classified into two groups according to their source:

**Spanish individuals:** 60 students at the Universidad del País Vasco, Spain, of whom 24 were men with a mean age of 21.8 years (SD 4.9) and 36 women with a mean age of 22.3 years (SD 2.7 ).

**Chilean individuals:** 60 students from the Universidad de Talca, Chile, of which 29 were males with a mean age of 22.34 years (SD 3.7) and 31 women with a mean age of 22.5 years (SD 4.6)

Were made of plaster models of the maxilla and the mandible of all participating individuals in the study, from an alginate impression obtained according to the conventional technique.

**Measurement.** On the model were measurements bucolinguales and mesiodistal diameters of teeth present, excluding the parts that showed loss extensive coronary substance, extensives restorations, tooth malpositions that difficult the measure and the third molars.

The measurements were made using an electronic digital caliper Stainless Hardened, which has an accuracy  $\pm 0.02$  mm according to the method of measurement recommended by Moorrees *et al.* (1957). Mesiodistal diameter measurement was performed in parallel to the occlusal and buccal surface of the tooth. We measured the maximum distance between the mesial and distal points of contact, with the gauge axis parallel to incisal or occlusal surfaces. To determine the vestibulo-lingual diameters a line was drawn between the most prominent points in vestibular and lingual side, perpendicular to the mesiodistal diameter.

**Statistical Analysis.** Using statistical program SPSS 15.0 for Windows descriptive statistics were calculated for each group independently, means were compared by sex of the mesiodistal and bucolingual dimensions of the pieces analyzed so intragrupal (Group of Chilean individuals and groups of Spanish individuals), significance in the mean differences were analyzed by t test for independent samples with  $p < 0.01$  and  $p < 0.05$ .

## RESULTS

Most of the teeth examined had larger in men in both groups, with the exception of the upper incisors and first mandibular molar. In general the group of Spanish individuals showed higher sexual dimorphism than the Chilean group of individuals, both in the number of teeth that have significant differences, such the statistical significance of these differences (greater number of significant differences with  $p < 0.01$ ).

A breakdown of the average size of the mesiodistal and bucolinguals diameters of all analyzed pieces of Spanish and Chileans subjects groups in Table I.

## DISCUSSION

The results of this study indicate that there are significant differences between sexes for dimorphic some teeth, in most of the pieces that have significant

Table I. Comparison of the averages of in mesiodistal and bucolingual diameters of teeth in men and women in the total sample, Chilean and Spanish.

		Spanish			Chilean			All sample		
		N	Mean	SD	N	Mean	SD	Mean	SD	
1.6MD	Males	24	11.26**	.503	26	11.45**	.523	50	11.36**	.517
	Females	36	10.73	.520	30	11.05	.462	66	10.88	.516
1.6VL	Males	24	11.56*	.651	26	11.70	.753	50	11.63*	.702
	Females	36	11.23	.512	30	11.42	.492	66	11.31	.508
2.6MD	Males	24	11.01**	.531	28	11.32	.703	52	11.18**	.644
	Females	36	10.58	.449	30	11.13	.646	66	10.83	.608
2.6VL	Males	24	11.55**	.426	28	11.81*	.642	52	11.69**	.563
	Females	36	11.10	.576	30	11.42	.462	66	11.24	.548
1.5MD	Males	24	7.225	.4605	28	7.423	.5670	52	7.331	.5251
	Females	36	6.992	.4913	28	7.620	.3995	64	7.267	.5486
1.5VL	Males	24	9.484*	.7419	28	9.622	.6968	52	9.558*	.7142
	Females	36	9.110	.5128	28	9.583	.3893	64	9.317	.5165
2.5MD	Males	24	7.093	.5672	27	7.516	.4523	51	7.317	.5475
	Females	36	7.045	.5407	28	7.719	.4715	64	7.340	.6093
2.5VL	Males	24	9.446	.8101	27	9.697	.7702	51	9.579	.7915
	Females	36	9.172	.4835	28	9.621	.3716	64	9.368	.4894
1.4MD	Males	24	7.920**	.8111	29	7.825	.5453	53	7.868*	.6733
	Females	36	7.362	.5033	30	7.955	.4584	66	7.631	.5644
1.4VL	Males	24	9.32	.911	29	9.64	.653	53	9.49	.789
	Females	36	9.09	.429	30	9.55	.419	66	9.30	.482
2.4MD	Males	24	7.688	.6521	28	8.054	.6223	52	7.885	.6563
	Females	36	7.529	.4315	30	8.070	.4436	66	7.775	.5116
2.4VL	Males	24	9.51	.744	28	9.68	.631	52	9.60	.684
	Females	36	9.10	.344	30	9.52	.392	66	9.29	.421
1.3MD	Males	24	8.487*	.5660	29	8.008	.4720	53	8.225	.5654
	Females	36	8.178	.4977	31	8.643* <sup>a</sup>	.4695	67	8.393	.5351
1.3VL	Males	24	8.530**	.5798	29	8.669** <sup>a</sup>	.6018	53	8.606**	.5904
	Females	36	7.843	.5717	31	7.964	.5784	67	7.899	.5736
2.3MD	Males	24	8.605**	.4772	29	7.919	.6192	53	8.230	.6527
	Females	36	8.138	.5436	31	8.654** <sup>a</sup>	.5954	67	8.377	.6203
2.3VL	Males	24	8.435**	.7684	29	8.522**	.4814	53	8.483**	.6228
	Females	36	7.844	.6422	31	7.944	.4740	67	7.890	.5687
1.2MD	Males	24	6.890	.3592	29	7.521	.7315	53	7.235	.6676
	Females	36	7.113	.6159	31	7.536	.5363	67	7.309	.6141
1.2VL	Males	24	7.35**	.639	29	6.94*	.727	53	7.13**	.712
	Females	36	6.07	.690	31	6.41	.740	67	6.22	.728
2.2MD	Males	24	6.825	.7134	29	7.583	.6298	53	7.240	.7642
	Females	36	7.048	.4989	31	7.537	.5467	67	7.274	.5729
2.2VL	Males	24	7.400**	.9628	29	6.883*	.7925	53	7.117**	.9032
	Females	36	6.176	.6694	31	6.453	.5530	67	6.304	.6293
1.1MD	Males	24	7.461	.7962	29	9.354	.7661	53	8.497	1.2256
	Females	36	8.868** <sup>a</sup>	.6011	31	9.214	.5956	67	9.028** <sup>a</sup>	.6190
1.1VL	Males	24	8.580**	1.3780	29	7.683	.7478	53	8.089**	1.1592
	Females	36	6.899	.7570	31	7.393	.5189	67	7.127	.6985
2.1MD	Males	24	7.541	.5309	29	9.416	.8940	53	8.567	1.2012
	Females	36	8.901** <sup>a</sup>	.5804	31	9.267	.5842	67	9.071** <sup>a</sup>	.6063
2.1VL	Males	24	8.898**	.8509	29	7.567	.7151	53	8.169**	1.0213
	Females	36	6.915	.5816	31	7.396	.4769	67	7.137	.5841
3.6MD	Males	24	10.808	.5250	28	12.469**	.7271	52	11.702	1.0501
	Females	36	11.435** <sup>a</sup>	.6882	31	11.931	.6236	67	11.664	.7000
3.6VL	Males	24	11.787**	.4042	28	11.121	.7467	52	11.429**	.6936
	Females	36	10.686	.5053	31	10.795	.5795	67	10.736	.5395
4.6MD	Males	24	10.905	.5723	28	12.022	2.1615	52	11.506	1.7139
	Females	36	11.348** <sup>a</sup>	.6614	31	11.985	.5976	67	11.643** <sup>a</sup>	.7047
4.6VL	Males	24	11.666**	.4128	28	11.173*	.6587	52	11.401	.6067
	Females	36	10.576	.4278	31	10.837	.5505	67	10.697	.5020

=p<0.05; \*\*p<0.01; a= results that were significantly higher in women.

differences, the dimensions were greater in men. This is consistent with Garn et al. who indicated that the teeth of males are larger than those of women, reported similar results Ling et al. who observed sexual dimorphism in various permanent teeth. Also, from the anthropological point of view, to Schwartz & Dean, males have larger teeth than women in contemporary human populations. The exception is the incisive

maxillary teeth and mandibular first molar, but only in the mesiodistal dimensions.

In our study we found a greater dimorphism in teeth from Spanish individuals than Chilean individuals, both in the mesiodistal and bucolingual dimensions. These results are interesting because the apparent relationship between the Chilean and Spanish

populations were expected to obtain similar levels of sexual dimorphism. Our results suggest that there is a strong population-specific behavior in dimorphic dimensions of the teeth, which agrees with what was reported by Major et al.

Our results are consistent with those reported for a sample of the Chilean population by Suazo et al.

(2008) and suggest that the use of dental dimensions to construct discriminant functions and to classify human skeletal remains as men and women requires the presence of specific data of the population, they are probably remains that are to be identified. The use of foreign databases does not seem advisable, even though they come from genetically, historically or geographically related people.

---

**ASTETE, J. C.; SAN PEDRO, V. J. & SUAZO, G. I.** Dimorfismo Sexual en las Dimensiones Dentales de Individuos Españoles y Chilenos. *Int. J. Odontostomat.*, 3(1):47-50, 2009.

**RESUMEN:** La presencia de dimorfismo sexual en las dimensiones de las piezas dentarias tiene importancia en el proceso de identificación medicolegal. El propósito de este estudio fue analizar la presencia de dimorfismo sexual en los diámetros mesiodistales (MD) y bucolinguales (BL) de piezas dentarias permanentes en una muestra de sujetos jóvenes Españoles y Chilenos y analizar las posibles diferencias en la expresión dimórfica entre estos grupos. Participaron 60 individuos de la Universidad del País Vasco, España y 60 de la Universidad de Talca, Chile, de ambos sexos con edades de entre 18 y 30 años. Se midieron las dimensiones MD y BL y se compararon las medias intragrupos mediante t test ( $p < 0,05$  y  $p < 0,01$ ), luego se analizaron las diferencias entre los grupos. La mayor parte de las piezas dentarias analizadas presentaron mayores dimensiones en los hombres en ambos grupos, con excepción de los incisivos superiores y el primer molar mandibular. El grupo de individuos españoles presentó mayor dimorfismo sexual que el grupo de individuos chilenos, por lo que se sugiere el comportamiento población específico de estas diferencias.

---

**PALABRAS CLAVE:** dimorfismo Sexual, dimensiones dentales, antropología forense, odontometría.

---

## REFERENCES

- Ebeling, C. F.; Ingervall, B.; Hedegard, B. & Lewin, T. Secular changes in tooth size in Swedish men. *Acta Odontol. Scand.*, 31(3):141-7, 1973.
- Garn, S. M.; Lewis, A. B. & Kerewsky, R. S. Sexual dimorphism in the buccolingual tooth diameter. *J. Dent. Res.*, 45(6):1819, 1966.
- Garn, S. M.; Lewis, A. B.; Swindler, D. R. & Kerewsky, R. S. Genetic control of sexual dimorphism in tooth size. *J. Dent. Res.*, 46(5):963-72, 1967.
- Garn, S. M.; Lewis, A. B. & Walenga, A. Evidence for a secular trend in tooth size over two generations. *J. Dent. Res.*, 47(3):503, 1968.
- Harris, E. F.; Potter, R. H. & Lin, J. Secular trend in tooth size in urban Chinese assessed from two-generation family data. *Am. J. Phys. Anthropol.*, 115(4):312-8, 2001.
- Ling, J. Y. K. & Wong, R. W. K. Tooth dimensions of Southern Chinese. *Homo*, 58(1):67-73, 2007.
- Moorrees, C. F. & Reed, R. B. Correlations among crown diameters of human teeth. *Arch. Oral Biol.*, 115:685-97, 1964.
- Rösing, F. W. Sexing immature human skeletons. *J. Hum. Evol.*, 12:149-55, 1983.
- Suazo, G. I.; Cantín, L. M.; López, F. B.; Sandoval, M. C.; Torres, M. S.; Gajardo, R. P. & Gajardo, R. M. Sexual dimorphism in mesiodistal and buccolingual tooth dimensions in Chilean people. *Int. J. Morphol.*, 26(4):609-14, 2008.

Correspondence to:  
Prof. Dr. Iván Suazo Galdames  
Department of Normal Anatomy  
Universidad de Talca  
Avenida Lircay s/n  
Oficina N°104  
Talca - CHILE.

Phone: 56-71-201576  
Fax : 56-71-201576

Email: isuazo@utalca.cl

Received: 20-04-2009  
Accepted: 18-05-2009