

Prevalence of gingival biotype in adult patients of the dentistry services of two Peruvian hospitals April-June 2018.

Prevalencia de biotipo gingival en pacientes adultos de los servicios de odontología de dos hospitales peruanos, Abril – Junio 2018.

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Abstract: Introduction: The gingival biotype of a population is important epidemiological data for the best treatment planning, while preserving periodontal health. In Peru there is a shortage of similar data published. Objective: To determine the prevalence of gingival biotype in adult patients of the Dental Service of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo, April - June 2018. Materials and Methods: This cross-sectional, descriptive and observational study included 200 patients from the Dentistry Service of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo. Using the accidental non-probabilistic selection method, the gingival biotype was evaluated through the transparency of periodontal probe technique. To determine the reliability of the method the Kappa statistic was used, finding an inter-evaluator reliability of 0.750 and intra-evaluator of 0.762. Descriptive statistics were used for the results, presenting absolute and percentage frequencies. Results: The prevalence of the thick gingival biotype was 57.5%. Males and females presented predominantly a thick biotype, 63.1% and 54.8% respectively. The groups of 18 to 29 and 30 to 39 years old presented 62.1% and 64.5% a thick biotype, respectively. On the other hand, the majority of people 40 to 50 years old presented a thin gingival biotype (52.8%). Conclusions: The thick gingival biotype was predominant in both sexes and in both hospitals. Also, gingival biotype varies with age, with the thick biotype more prevalent in younger age groups.

Keywords: Prevalence; adult; gingiva; dental care; cross-sectional studies; Peru.

Resumen: Introducción: El biotipo gingival de una población es importante como dato epidemiológico para la mejor planificación de tratamientos, preservando la salud periodontal. En Perú existe escasez de trabajos similares publicados. Objetivo: Determinar la prevalencia de biotipo gingival en pacientes adultos del Servicio de Odontología de los hospitales Víctor Lazarte Echegaray y Regional Docente de Trujillo. Abril – Junio 2018. Material y Metodos: El estudio transversal, descriptivo y observacional incluyó un total de 200 pacientes del Servicio de Odontología de los hospitales Víctor Lazarte Echegaray y Regional Docente de Trujillo. Utilizando el método de selección no probabilístico accidental, se evaluó el biotipo gingival a través del método de transparencia de la sonda. Para determinar la confiabilidad del método se empleó el estadístico Kappa, encontrando confiabilidades de 0.750 para interevaluador y 0.762 para intraevaluador. Se utilizó estadística descriptiva para los resultados, presentando frecuencias absolutas y porcentuales. Resultados: La prevalencia del biotipo gingival fue de 57.5% para el biotipo grueso. El sexo masculino y femenino presentaron predominantemente biotipo grueso, con 63.1% y 54.8% respectivamente. Los grupos de 18 a 29 y de 30 a 39 años tuvieron 62.1% y 64.5%, respectivamente de biotipo grueso. Por otra parte, de 40 a 50 años, destacó el biotipo gingival delgado con 52.8%. Conclusiones: El biotipo gingival predominante fue el grueso en ambos sexos y hospitales. Asimismo, el biotipo gingival varía con la edad, encontrando principalmente el biotipo grueso en los grupos etarios más jóvenes.

Palabras Clave: Prevalencia; adulto; encía; atención odontológica; estudios transversales; Perú.

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INTRODUCTION.

The gingival biotype is defined as the clinical variation in the thickness of the vestibular keratinized tissue of the gingiva, in the vestibule-palatine or vestibule-lingual dimension.^{1,2} Last century, Ochebein & Ross classified the gingival biotype into two main types of gingival morphology: scalloped-thin, composed of a fine gingiva of delicate and translucent appearance, and flat-thick, characterized by a bulky, dense and fibrotic gingiva.^{3,4}

Later Seibert & Lindhe introduced a broader term called "*periodontal biotype*", which refers to a component made up of gingival tissue and bone tissue, to classify biotypes in thick-flat and thin-scalloped biotypes.⁵

Agarwal *et al.*,⁶ state that Claffey & Shanley used a classification according to gingival thickness: a thin biotype (<1.5mm thick) and a thick biotype (≥ 2 mm).^{7,8}

To determine the thickness of the gingival tissue, several methods¹ have been proposed, including direct measurement, probe transparency,⁹ the use of ultrasound devices¹⁰ and more recently, cone beam computed tomography (CBCT).^{5,11}

Kan *et al.*,¹² described the simplest method: the transparency of a periodontal probe through the gingival margin.¹³ This classifies a thin biotype if the contour of the probe can be detected visually through the tissue; otherwise, it is classified as a thick biotype.¹⁴

In the thick biotype, inflammation due to plaque accumulation will lead to the formation of periodontal pockets.¹⁵ This architecture is associated with a wide area of keratinized tissue and flat gingival contour that suggests a thick bone structure that is more resistant to inflammation and trauma.⁷ In contrast, the thin gingival biotype is associated with a thin bone structure, more susceptible to inflammation due to plaque accumulation, trauma due to poor brushing technique or restorative procedures, resulting in gingival recession.^{7,15}

There are no data on the prevalence of gingival biotypes worldwide or per continent. However, the following studies were found: In 2012, Zawawi *et al.*,¹⁶ assessed 200 adult patients from the Faculty of Dentistry of King Abdulaziz University, Jeddah (Saudi Arabia), and found 55.5% prevalence of thick gingival biotype.

While, in Peru, in 2016, Arbildo *et al.*,¹⁷ conducted a study in 286 adult patients of the Dental Clinic at Unidad

de Segunda Especialización en Estomatología (USEE) of the National University of Trujillo, concluding that the prevalence of the gingival biotype thickness was 61.2%. In addition, they indicated that the gingival biotype was closely related to sex, the height of the interdental papilla, the shape of the tooth and age.

Knowledge and identification of the periodontal biotype is essential,^{9,18} since the anatomical characteristics of the periodontium, such as gingival thickness, gum width and the morphology of the alveolar bone, determine the behavior of the periodontium when subjected to physical, chemical or bacterial action¹⁹ during orthodontic²⁰ and restorative²¹⁻²³ treatments. With this in mind, this research aimed to determine the prevalence of the gingival biotype in adult patients of the Dentistry Service at the two state hospitals with the highest level of care in the La Libertad region, in Peru: the Regional Teaching Hospital, belonging to the Ministry of Health (Executive Power) and the Víctor Lazarte Echegaray Hospital, belonging to ESSALUD (Peruvian institution of social security in health).

Both hospitals have different administrative systems and target different segments of the population. The first mainly serves low-income people, due to the low cost of care and treatment; while, the second preferably receives insured workers from state and private entities. The information generated allows us to diagnose a state of situation and predict periodontal behavior regarding restorative, prosthetic and/or periodontal treatments. In addition, in Peru there is a shortage of studies of this type, with this work serving as a start point for future major studies.

MATERIALS AND METHODS.

This was study a prospective, transversal, descriptive and observational in design. It was carried out in the dentistry services of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo, in the La Libertad region of Peru, between April and June 2018. The minimum sample size was 180 patients and was calculated using the formula for frequency estimation with known sample frame.

A quarterly assistance of 1.020 patients in both hospitals was estimated, based on the average daily frequency observed during the execution of a previous pilot study, incorporating into the formula the standardized value of

Z at 2.5% of type I error ($Z_{(1-\alpha/2)}=1.96$), maximum type I error ($\alpha=0.05$), confidence level ($1-\alpha/2=0.975$), accuracy ($d=0.065$) and percentage of gross gingival biotype, according to pilot study ($p=0.400$).

The sample was selected using the non-probabilistic method for convenience. ASA I patients with a complete number of teeth in the upper anterior sector, of sound mental status, aged between 18 and 50 years, who were treated in the Hospital Dentistry Service were included in the study. Patients who refused to participate in the study were excluded, as well as pregnant and nursing mothers because of the physiological and hormonal changes that may affect the periodontium. In addition, patients with orthodontic treatment and clinical signs of periodontal disease, those with prosthetic crowns, abrasion, erosion, decay or restorations involving the cervical margin were also excluded. A test with 15 patients was performed to determine the reliability of the method by means of inter-evaluation and intra-evaluation calibration. For this, an expert university professor specialized in Periodontology, trained the researcher before conducting the pilot test.

The Kappa statistic was used to assess concordance in the gingival biotype variable. Significant reliability was obtained with interevaluator Kappa values of 0.750, and of 0.762 for intraevaluator.

This work was approved by the Faculty of Human Medicine (Resolution No.1082-2018-FMEHU-UPAO) and by the Research Bioethics Committee of the Universidad Privada Antenor Orrego (Resolution No. 199-2018-UPAO), that base their considerations on the Declaration of Helsinki of the World Medical Association, in its most recent version (Fortaleza, Brazil, 2013) and articles 15, 25 and 28 of the General Law of Health of Peru No. 26842.

Each selected patient received information about the purpose of the investigation, and their participation was requested. If they accepted, an informed consent form

was handed out for reading and signing. Subsequently, the clinical examination was carried out.

The clinical examination consisted of introducing a sterile periodontal probe (15 UNC Hu-Friedy), in the mid-dle third of the vestibular face of the teeth of the anterior sector of the upper jaw, to classify the biotype according to the probe transparency method. The biotype was classified as: thin, if the contour of the underlying probe was observed through the gum, and thick if otherwise.

The data collected were processed automatically in the statistical program SPSS Statistics 22.0 (IBM, Armonk, NY, USA), and then the results were presented in tables according to the objectives previously set. Absolute and percentage frequencies were calculated.

A descriptive analysis was performed to determine the prevalence of gingival biotype, considering within the analysis covariates such as sex, age range and hospital.

RESULTS.

Between April and June 2018, 200 adult patients from the Dentistry Service of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo were evaluated, 32.5% men and 67.5% women, aged between 18 and 50 years ($\bar{X}=34.78$; $\sigma=10.17$). It was observed that 57.5% presented a thick gingival biotype, which was predominant. (Table 1) Males presented predominantly 63.1% thick gingival biotype. A similar result was observed for females sex, with a thick gingival biotype prevalence of 54.8%. (Table 2)

The younger groups presented predominantly a thick gingival biotype: 62.1% in the group of 18 to 29 years and 64.5% in the group of 30 to 39 years. On the other hand, in the range of 40 to 50 years, the thin gingival biotype was predominant (52.8%). (Table 3)

In both hospitals, the thick gingival biotype predominated. (Table 4)

Table 1. Prevalence of gingival biotype in adult patients of the Dentistry Service of the Víctor Lazarte Echegaray and Trujillo Regional Teaching Hospitals (Trujillo, 2018).

Gingival biotype	n	%
Thin	85	42.5
Thick	115	57.5
Total	200	100.0

Table 2. Prevalence of gingival biotype, according to sex, in adult patients of the Dental Service of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo. (Trujillo, 2018)

Sex	Biotype				Total	
	Thin		Thick		n	%
	n	%	n	%		
Male	24	36.9	41	63.1	65	100.0
Female	61	45.2	74	54.8	135	100.0
Total	85	42.5	115	57.5	200	100.0

Table 3. Prevalence of gingival biotype, according to age range, in adult patients of the Dental Service of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo. (Trujillo, 2018)

Age (years)	Biotype				Total	
	Thin		Thick		n	%
	n	%	n	%		
18 to 29	25	37.9	41	62.1	66	100.0
30 to 39	22	35.5	40	64.5	62	100.0
40 or over	38	52.8	34	47.2	72	100.0
Total	85	42.5	115	57.5	200	100.0

Table 4. Prevalence of gingival biotype, according to hospital in adult patients of the Dental Service of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo. (Trujillo, 2018)

Hospital	Biotype				Total	
	Thin		Thick		n	%
	n	%	n	%		
Víctor Lazarte Echegaray	48	42.1	66	57.9	114	100.0
Regional Docente de Trujillo	37	43.0	49	57.0	86	100.0
Total	85	42.5	115	57.5	200	100.0

DISCUSSION.

The gingival biotype plays an important role in preserving periodontal health.²¹ Therefore, a correct evaluation of soft tissues is necessary during the planning stage of treatments⁷ that meet functional and aesthetic parameters, in order to identify patients at risk of gingival recession, periodontal pockets and other conditions associated with a loss of insertion.²⁴

In the present study, the thick gingival biotype predominated. These results are similar to those found by Shah *et al.*,² Zawawi *et al.*,¹⁶ Arbildo *et al.*,¹⁷ and Matarese *et al.*²⁵ In the works of the last three authors the same transparency of periodontal probe technique was used, while Shah *et al.*,² used the transgingival method.

Therefore, despite having conducted these studies in different geographical areas, the similarity of these findings may be an indication that this gingival biotype prevails in these regions. In the present work, it was found that males mostly presented a thick gingival biotype, in agreement with the results of Manjunath *et al.*,¹ Zawawi *et al.*,¹⁶ Arbildo *et al.*,¹⁷ and Bhat *et al.*,²³

It is likely that males are predisposed to have a thick gingival biotype. Likewise, regarding females, in the present study the thick gingival biotype prevailed, disagreeing with the results of Manjunath *et al.*,¹ Zawawi *et al.*,¹⁶ Arbildo *et al.*,¹⁷ and Bhat *et al.*,²³

Regarding this, Zawawi *et al.*,¹⁶ state that the masticatory mucosa is thinner in females. More multicentre studies are

required in Peru to determine more precisely the biotype prevalence in females.

The thin biotype requires special consideration during restorative, rehabilitative, periodontal and aesthetic treatment.² Patients with a thin biotype are more vulnerable to loss of connective tissue and epithelial damage; therefore, they require special treatment and proper oral hygiene habits, such as a correct brushing technique.² In the face of inflammatory conditions, traumatic or parafunctional habits, various periodontal defects are produced due to less stable, with gingival recession the most common.⁷

On the other hand, in relation to age, the thick gingival biotype predominated in the younger groups, that is, from 18 to 29 and from 30 to 39 years old. This agrees with the study of Bhat *et al.*,²³ and that of Vandana *et al.*,²⁶ who state that advanced age contributes to a decrease in keratinization, in other words, it is a predisposition for a thin biotype. Despite not including exactly the same age ranges, the same trend can be observed with respect to prevalence: regarding the 40 to 50 years group, in this work a thin gingival biotype prevailed, showing similarity with the study of Bhat *et al.*,²³ and in disagreement with the findings of Zawawi *et al.*,¹⁶ and Arbildo *et al.*,¹⁷ who indicated that the lower age ranges presented a thin gingival biotype.

It is worth mentioning that, in relation to the study by Arbildo *et al.*,¹⁷ the discrepancies may be due to, despite having been made in a population in the same region as the present one, it was carried out in a specialist training center located in a university. As such, multicentre studies are necessary and several operators need to be calibrated to be able to evaluate larger populations.

The prevalence of gingival biotypes was similar in both hospitals. There are no previous published studies from these hospitals, for comparison. Both hospitals, as mentioned above, are referents, as they receive patients from throughout the La Libertad region.

This information is considered useful for epidemiological management, as well as for administrative reasons, for budgets and acquisition of instruments and materials, as well as for the incorporation and training of healthcare personnel. The work of Arbildo *et al.*,¹⁷ was conducted in the same city, but evaluated the prevalence in a center with different characteristics.

Understanding the gingival aspect in restorative, periodontal, surgical dentistry, is important to harmonize aesthetics and biological function,⁹ so that appropriate strategies for treatment and management can be developed and thus obtain better results.⁷ This research took into account only the upper anterior sector, due to its greater relevance in aesthetical clinical practice.

Periodontal health is generally associated with the thick gingival biotype² as it presents a greater amount of keratinized tissue, being a denser and fibrous soft tissue, in addition to having a thick bone structure and, therefore, having greater resistance to inflammation and trauma.¹ The thickness of the gingival tissue is a critical factor directly related to the result of dental treatment,²⁵ probably due to the differences in blood supply to the underlying bone and the susceptibility of resorption.⁷

The concept of gingival biotype influences the diagnosis and the treatment plan.^{19,21} The dentist must be trained to identify the gingival biotype for the benefit of the patient, as it will improve the planning of surgical, restorative and rehabilitative treatments.

It is necessary to carry out studies with a larger sample size in the Peruvian and South American population, to determine prevalence according to regions of the continent, to be able in this way to implement prevention measures for vulnerable biotypes. Future research should aim to develop a new, more specific classification system, in order to analyze the existence of other gingival biotypes and preserve periodontal health.

CONCLUSION.

The prevalence of gingival biotype in adult patients of the dentistry services of the Víctor Lazarte Echegaray and Hospital Regional Docente de Trujillo was 57.5% for the thick biotype, during the April-June 2018 period. This biotype was the most prevalent in both males (63.1%) and females (54.8%).

In patients aged 40 to 50 years, the thin gingival biotype was the most prevalent (52.8%), while in younger age groups the thick biotype prevailed: 62.1% in 18 to 29 years old, and 64.5% in 30 to 39 years old. In both hospitals, Víctor Lazarte Echegaray de Trujillo and Regional Docente de Trujillo, the thick gingival biotype prevailed, 57.9% and 57.0%, respectively.

Conflict of interests: The authors declare no conflicts of interest.

Ethics approval: This work was approved by the Faculty of Human Medicine (Resolution No.1082-2018-FMEHU-UPAO) and by the Research Bioethics Committee of the Universidad Privada Antenor Orrego (Resolution No. 199-2018-UPAO)

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REFERENCES.

1. Manjunath RG, Rana A, Sarkar A. Gingival biotype assessment in a healthy periodontium: transgingival probing method. *J Clin Diagn Res.* 2015; 9(5):66-9.
2. Shah R, Sowmya NK, Mehta DS. Prevalence of gingival biotype and its relationship to clinical parameters. *Contemp Clin Dent.* 2015; 6(6):167-71.
3. Zweers J, Thomas RZ, Slot DE, Weisgold AS, Van der Weijden FG. Characteristics of periodontal biotype, its dimensions, associations and prevalence: a systematic review. *J Clin Periodontol.* 2014;41(10):958-71.
4. Amid R, Mirakhori M, Safi Y, Kakhodazadeh M, Namdari M. Assessment of gingival biotype and facial hard/soft tissue dimensions in the maxillary anterior teeth region using cone beam computed tomography. *Arch Oral Biol.* 2017; 79:1-6.
5. Nikiforidou M, Tsalikis L, Angelopoulos C, Menexes G, Vouros I, Konstantinides A. Classification of periodontal biotypes with the use of CBCT. A cross-sectional study. *Clin Oral Investig.* 2016; 20(8):2061-71.
6. Agarwal V, Sunny, Mehrotra N, Vijay V. Gingival biotype assessment: variations in gingival thickness with regard to age, gender, and arch location. *Indian J Dent Sci.* 2017; 9(1): 12-5.
7. Seba A, Deepak KT, Ambili R, Preeja C, Archana V. Gingival biotype and its clinical significance – a review. *Saudi J Dent Res.* 2014;5(1):3-7.
8. Ramírez K, García O, Murillo M, Fernández O, Boneta E. Dentogingival complex: dimension based on biotypes. *P R Health Sci J.* 2013; 32(4):182-6.
9. Rathee M, Rao P, Bhorina M. Prevalence of gingival biotypes among young dentate north indian population: a biometric approach. *Int J Clin Pediatr Dent.* 2016;9(2): 104-8.
10. Pascual A, Barallat L, Santos A, Levi P Jr, Vicario M, Nart J. Comparison of periodontal biotypes between maxillary and mandibular anterior teeth: a clinical and radiographic study. *Int J Periodontics Restorative Dent.* 2017;37(4):533-9.
11. Frumkin N, Via S, Klinger A. Evaluation of the width of the alveolar bone in subjects with different gingival biotypes: a prospective cohort study using cone beam computed tomography. *Quintessence Int.* 2017; 48(3):209-16.
12. Kan JY, Morimoto T, Rungcharassaeng K, Roe P, Smith DH. Gingival biotype assessment in the esthetic zone: visual versus direct measurement. *Int J Periodontics Restorative Dent.* 2010;30(3):237-43.
13. Fischer KR, Grill E, Jockel Y, Bechtold M, Schlagenhaut U, Fickl S. On the relationship between gingival biotypes and supracrestal gingival height, crown form and papilla. *Clin Oral Implants Res.* 2014; 25(8): 894-8.
14. Fischer KR, Richter T, Kebschull M, Petersen N, Fickl S. On the relationship between gingival biotypes and gingival thickness in young Caucasians. *Clin Oral Implants Res.* 2015;26(8):865-9.
15. Savadi A, Rangarajan V, Savadi R, Satheesh P. Biologic perspectives in restorative treatment. *J Indian Prosthodont Soc.* 2011; 11 (3):143-8.
16. Zawawi KH, Al-Harathi SM, Al-Zahrani MS. Prevalence of gingival biotype and its relationship to dental malocclusion. *Saudi Med J.* 2012; 33(6):671-5.
17. Arbildo H, Aguirre A, Chang A. Prevalência de biótipos gengivais numa população peruana. *Rev Port Estomatol Med Dent Cir Maxilofac.* 2016;57(3):158-63.
18. Arora R, Narula SC, Sharma RK, Tewari S. Supracrestal gingival tissue: assessing relation with periodontal biotypes in a healthy periodontium. *Int J Periodontics Restorative Dent.* 2013;33(6):763-71.
19. Malhotra R, Grover V, Brardwaj A, Mohindra K. Analysis of the gingival biotype based on the measurement of the dentopapillary complex. *J Indian Soc Periodontol.* 2014;18(1): 43-7.
20. Singh J, Rathod VJ, Rao PR, Patil AA, Langade DG, Singh RK. Correlation of gingival thickness with gingival width, probing depth, and papillary fill in maxillary anterior teeth in students of a dental college in Navi Mumbai. *Contemp Clin Dent.* 2016;7(4):535-8.
21. Nugala B, Santosh BB, Sahitya S, Krishna PM. Biologic width and its importance in periodontal and restorative dentistry. *J Conserv Dent.* 2012; 15(1):12-7.
22. Liu F, Pelekos G, Jin LJ. The gingival biotype in a cohort of Chinese subjects with and without history of periodontal disease. *J Periodontal Res.* 2017;52(6):1004-10.
23. Bhat V, Shetty V. Prevalence of different gingival biotypes in individuals with varying forms of maxillary central incisors: A survey. *J Dent Implant.* 2013;3(2):116-21.
24. Navarrete M, Godoya I, Melo P, Nallya J. Correlación entre biotipo gingival, ancho y grosor de encía adherida en zona estética del maxilar superior. *Rev Clin Periodoncia Implantol Rehabil Oral.* 2015;8(3):192-7
25. Matarese G, Isola G, Ramaglia L, Dalessandri D, Lucchese A, Alibrandi A. Periodontal biotype: characteristic, prevalence and dimensions related to dental malocclusion. *Minerva Stomatol.* 2016; 65(4):231-8.
26. Vandana KL, Savitha B. Thickness of gingiva in association with age, gender and dental arch location. *J Clin Periodontol.* 2005; 32(7):828-30.