Prevalence and Patterns of Supernumerary Teeth in a Peruvian Non-Syndromic Population: A Radiographic Study

Prevalencia y Patrones de Dientes Supernumerarios en una Población Peruana no Sindrómica: Estudio Radiográfico

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ABSTRACT: This study aims to evaluate the prevalence and patterns of supernumerary teeth in a Peruvian non-syndromic population. This retrospective study used 2500 panoramic radiographs from the archives of a radiology center from Tacna-Peru. Radiographs were taken in 2019 and corresponded to subjects with ages between 8 to 22 years. The patterns of the supernumerary teeth were recorded in a checklist. Descriptive statistics was used for the distribution of supernumerary teeth. The Chi-square test was used to compare the distribution between the patterns. A confidence level of 5 % was used. The prevalence of supernumerary teeth was 5.32 % (n=133), with a male: female ratio of 1.56:1. The most affected arch was the maxilla (79.7 %), single presentation was the most common (87.22 %), and no differences were observed by gender (p > 0.05). Mesiodens was the most frequent (53.38 %), followed by parapremolar (34.59 %) in both genders (p > 0.05). According to the morphology, conical presentation was presented in 46.62 % of the cases, and impacted status were seen in 69.92 %. There were significance differences when the distribution of morphology was compared by the affected arch (p < 0.05). Conical form was most common in the maxilla (53.77 %), meanwhile in the mandible was the euromorphic type (40.74 %). A prevalence of supernumerary teeth of 5.32 % was estimated. The most frequent affected arch was the maxilla. Mesiodens, conical type and impacted were the most frequent patterns.

KEY WORDS: prevalence, pattern, supernumerary teeth, non-syndromic.

INTRODUCTION

Supernumerary teeth are numerical anomalies of the dental development that affect the primary and permanent dentition (Demiriz *et al*., 2015; Laganà *et al*., 2017; Syriac *et al*., 2017). Early identification of supernumerary teeth is very important to prevent complications such lack of the eruption path of permanent teeth, crowding, diastemas, root resorption, loss of vitality of adjacent teeth, interference with tooth movement in orthodontic patients, and others complications related to rehabilitation procedures (Singhvi *et al*., 2013; Khandelwal *et al*., 2018; Tetay-Salgado *et al*., 2021).

Supernumerary teeth have been reported to be more common in men than in women, reaching a ratio of 2:1 (Alhashimi *et al*., 2016; Rao & Chidzonga, 2001).

It has been estimated that the prevalence of supernumerary teeth is 0.2-0.8 % in primary dentition and 0.5-5.3 % in permanent dentition, observing a lot of variability according to the population groups studied (Singhvi *et al*., 2013; Khandelwal *et al*., 2018).

The etiology of supernumerary teeth is associated with an excessive activity of the dental lamina, during the stage of dental germ formation. Epithelial remnants of the dental lamina can be activated by induction factors, this result in the formation of a supernumerary tooth (Amarlal & Muthu, 2013; Brook *et al*., 2014; Brinkmann *et al*., 2020). Hereditary patterns are associated with the presence of supernumerary teeth; mainly autosomal recessive gene traits are linked to sex; which explains the greater

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influence on the male sex (Lubinsky & Kantaputra, 2016; Tsuji *et al*., 2020). On the other hand, supernumerary teeth are frequently associated to several syndromes, and also have been observed in patients with cleft lip and palate (Kumar & Gopal, 2013; Bello *et al*., 2019; Möller *et al*., 2021).

In some cases, supernumerary erupted teeth can be diagnosed by a general oral examination (Finkelstein *et al*., 2019); however, radiographic examination allows the diagnosis of this condition in cases where the teeth are not erupted (Singhvi *et al*., 2013; Syriac *et al*., 2017; Tetay-Salgado *et al*., 2021).

Supernumerary teeth can be classified according to their location, being able to be identified as mesiondens, parapremolar, distomolar and paramolar. Additionally, supernumerary teeth can be classified based on their form as conical, tuberculate, supplemental or euromorphic (Brook *et al*., 2014: Möller *et al*., 2021; Rao & Chidzonga, 2021; Tetay-Salgado *et al*., 2021). The most common supernumerary teeth observed are mesiodens, which are located in the anterior region of the maxilla (Russell & Folwarczna, 2003; Jung *et al*., 2016). In the mandible, parapremolar is the most frequent location of supernumerary teeth, and commonly are of the supplemental type (Khalaf *et al*., 2018).

Although there is research related to the prevalence of supernumerary teeth in populations from different parts of the world, there are few evidence that have evaluated this condition in a Peruvian population.

Considering that the previous results are very varied according to the studied populations, the aim of this study was to evaluate the prevalence and distribution patters of supernumerary teeth in a Peruvian non-syndromic population.

MATERIAL AND METHOD

Design and ethical considerations. This descriptive cross-sectional and retrospective study was approved by the Ethics Committee of the Faculty of Health Sciences of the Private University of Tacna, Peru under register no. 021-2019-FACSA/UPT.

Radiographs from the archives of a local maxillofacial radiology center taken in 2019 with a digital panoramic equipment (Vatech series PAX-1) operated at 50-90 kVp and 4-10 mA, and with a exposure time of 13.5 seconds was used. The selection criteria were: radiographs of non-syndromic subjects aged from 8 to 22 years old, without loss of permanent or deciduous teeth according to age. Additionally, radiographs with pathological findings such as congenital defects, trauma or fracture of the jaws were not included. Finally, 2500 panoramic radiographs were selected.

Radiograph evaluation. Radiographs were assessed with the software EasyDent V4 Viewer in a soft-light environment. Brightness and contrast were adapted using the image processing tool with the software to ensure optimal viewing. The characteristics and patters of the supernumerary teeth were recorded in a checklist. Moreover, the checklist included variables related to sex, age, affected dental arch, number, location, morphology and status of the supernumerary teeth. In the case of the status, teeth were considered as impacted or erupted, according to the position, which the supernumerary tooth was obstructed or not by an adjacent tooth, bone or tissue, and has exceeded the average eruption time by at least two years, according to previous studies (Laganà *et al*., 2017; Tetay-Salgado *et al*., 2021). The evaluation of all radiographic records, and the completion of the checklist were conducted by one single examiner to avoid different interpretations.

Statistical analysis. Descriptive analysis was used to report the number and percentage of supernumerary teeth. To compare the distribution of supernumerary teeth based on sex, age, affected dental arch, location, morphology and status, the chi-squared test was used. A significant level of 5 % was adopted. The data was analyzed using SPSS software V.21 for Windows (SPSS Inc. IL, Chicago, USA).

RESULTS

The results showed that from the total of the radiographs evaluated (n = 2500), 133 patients presented supernumerary teeth, of them 81 were males (60.9 %) and 52 (39.1 %) were females, with a ratio of 1.56:1. The total prevalence of supernumerary teeth was 5.32 %, in the case of females a prevalence of 5.39 % and for males of 5.27 %. The prevalence of supernumerary teeth was not statistically significant between the sexes (p > 0.05) (Table I).

Supernumerary teeth were more frequent in patients aged 13 to 17 years old (38.3 %). Out of the

Table I. Frequency and prevalence of supernumerary teeth in the population.

Sex	Total radiographs (N)	Frequency of Supernumerary teeth	%	Prevalence	P value*
Female	964	52	39.1	5.39	0.351
Male	1536	81	60.9	5.27	
total	2500	133	100	5.32	

* chi-squared test.

133 patients with supernumerary teeth, 109 had them in the maxilla (79.7 %) and 27 (20.3 %) in the mandible. Additionally, supernumerary teeth were more frequent in a single presentation (87.22 %). Mesiodens was the most frequent location (53.38 %), followed by parapremolar with 34.59 %. On the other hand, supernumerary teeth with a conical morphology were the most seen (46,62 %), followed by 25.56 % with a Tuberculate presentation. Out of 133 supernumerary teeth, 93 (69.92 %) were impacted, meanwhile 40 (30.08 %) were erupted (Table II).

Table III shows that in both sexes the principal affected dental arch was the maxilla, with no significant difference (p > 0.05). Also, in males and females, the most frequent presentation of supernumerary teeth was single, and there was no significant difference between the groups (p > 0.05).

According to the results, the most frequent location of supernumerary teeth were mesiodens in males (59.62 %) and females (49.38 %), followed by the parapremolar presentation with 20.85 % and 38.27 %, respectively. No significant differences were observed between this variable and the sexes (p>0.05). When the status of the supernumerary teeth was evaluated, all the presentations were most often seen impacted, been mesiodens the most frequent (50.54 %). However, no significant differences were observed between the status and the location (p > 0.05) (Table IV).

Finally, supernumerary teeth were most frequent in the maxilla than in the mandible. In the maxilla supernumerary teeth with conical form were the type most observed (53.77 %), followed by the tuberculate presentation (24.53 %). Meanwhile, euromorphic type was the most frequent in the mandible (40.74 %). There was significance differences when the distribution of morphology of supernumerary teeth by affected dental arch was compared (p < 0.05) (Table V).

Table II. Comparison of the distribution between males and females by affected dental arch and number of supernumerary teeth.

Variable	n	%
Age		
8-12 years	32	24.1
13-17 years	51	38.3
18-22 years	50	37.6
Affected dental arch		
Maxilla	106	79.7
Mandible	27	20.3
Number of supernumerary		
Single	116	87.22
Doble	14	10.53
Multiple	3	2.26
Location		
Mesiodens	71	53.38
Parapremolar	46	34.59
Paramolar	12	9.02
distomolar	4	3.01
Morphology		
Conical	62	46.62
Euromorphic	19	14.29
Molariform	18	13.53
Tuberculate	34	25.56
Eruption status		
Impacted	93	69.92
Erupted	40	
Total	133	100.0

Table III. Distribution of supernumerary teeth.

Variable		Sex		Total	P value*
		Male	Female		
Affected dental arch	Maxilla	63(59.43 %)	43(40.57 %)	106 (100 %)	0.492
	Mandible	18(22.22 %)	9(17.31 %)	27(100 %)	
Number of supernumerary	Single	69(59.48 %)	47(40.52 %)	116(100 %)	0.351
	Doble	9(64.29 %)	5(35.71 %)	14(100 %)	
	Multiple	3(100 %)	0(0 %)	3(100 %)	
Total		81(60.9 %)	52(30.1 %)	133(100 %)	

* chi-squared test

Table IV. Comparison of location of supernumerary teeth by sex and status.

Variable		Location				Total	P value*
		Mesiodens	Parapremolar	Paramolar	Distomolar		
Sex	Male	31(59.62 %)	15(28.85 %)	5(9.62 %)	1(1.92 %)	81(100 %)	0.615
	Female	40(49.38 %)	31(38.27 %)	7(8.64 %)	3(3.7 %)	52(100 %)	
Status	Impacted	47(50.54 %)	34(36.56 %)	9(9.68 %)	3(3.23 %)	93(100 %)	0.798
	Erupted	24(60 %)	12(30 %)	3(7.5 %)	1(2.5 %)	40(100 %)	
Total		71(53.38 %)	46(34.59 %)	12(9.02 %)	4(3.01 %)	133(100 %)	

* chi-squared test.

Table V. Comparison of the morphology of supernumerary teeth by affected dental arch.

Affected dental arch	Morphology				Total	P value*
	Conical	Euromorphic	Molariform	Tuberculate		
Maxilla	57(53.77 %)	8(7.55 %)	15(14.15 %)	26/24.53 %)	106(100 %)	<0.001
Mandible	5(18.52 %)	11(40.74 %)	3(11.11 %)	8(29.63 %)	27(100 %)	
Total	62(46.62 %)	19(14.29 %)	18(13.53 %)	34(25.56 %)	133(100 %)	

* chi-squared test.

DISCUSSION

Supernumerary teeth are dental alterations that represent an excess in the number of teeth, and they can be found in the primary or permanent dentition, although they are most commonly seen in adults (Laganà *et al*., 2017; Tetay-Salgado *et al*., 2021). Supernumerary teeth can be diagnosed by clinical evaluation, however when teeth are impacted or not erupted, the use of radiographs become an important tool for diagnosing. Particularly, panoramic radiographs have been widely used for the study of supernumerary teeth and has been recognized as a valid method (Anthonappa *et al*., 2012, 2013; Alhashimi *et al*., 2016; Syriac *et al*., 2017; Tetay-Salgado *et al*., 2021). Consequently, the use of these radiographs was adopted in this study to evaluate the presence and patterns of distribution of supernumerary teeth in a Peruvian population.

Reports on the prevalence of supernumerary teeth are very varied, and seem to be affected by variables such as ethnicity and the geographic region where the studies were carried out. In general, it has been estimated that the prevalence ranges from 0.5 to 5.3 % in the permanent dentition; these data are consistent with the findings of the present study. However, a higher prevalence of supernumerary teeth was found by Ma *et al*. (2021) in children and adolescents from China aged from 7 to 17 years old (10.52 %). Prevalence of supernumerary teeth was lower in studies conducted in other populations. Demiriz *et al*. (2015) estimated a prevalence of 2.14 % in a Turkish population. Recently, Hajmohannadi *et al*.

(2021) found a prevalence of 1.06 % in Iran. Kumar & Gopal (2013) evaluated a sample of subjects from India, and their results shown that the prevalence of supernumerary teeth was 1.56 %; however, this study used clinical evaluation, which could affect the identification of non-erupted supernumerary teeth, and consequently the prevalence value should be considered with care. On the other hand, the results shown that the prevalence in terms of sexes was not statistically significant (p > 0.05). Similar findings were reported by Ma *et al*. (2021). In contrast, Demiriz *et al*. (2015) found that there were significant differences according to the distribution of supernumerary teeth by sex.

In this study, the male to female ratio was 1.56:1, this results agrees with those found by other reports (Singh *et al*., 2014; Finkelstein *et al*., 2019), since it is recognized that supernumerary teeth are most frequent in males; however, the male: female ratio varied from 1.1:1 to 3.25:1 in other studies (Singhvi *et al*., 2013; Alhashimi *et al*., 2016; Ma *et al*., 2021; Hajmohammadi *et al*., 2021; Rao & Chidzonga, 2021). Khandelwal *et al*. (2018) reported a ratio of 2.05:1 in q population from India. Besides, Patil & Maheshwari (2014) found a higher ratio of 7.2:1, these differences may be explained by the fact that the occurrence of supernumerary teeth has been related to an X-dependent transmission (Amarlal & Muthu, 2013; Brook *et al*., 2014).

The findings showed that supernumerary teeth were most frequent in the maxilla than in the mandible,

single presentation was the most observed in the sample, and the most common location was mesiodens, followed by parapremolar without predominance by any of the sexes. These results are in agreement with those of other studies (Meighani & Pakdaman; 2010; Alhashimi *et al*., 2016; Jung *et al*., 2016; Khandelwal *et al*., 2018) but in contrast with the findings of Hajmohammadi *et al*. (2021) where most of the supernumerary teeth were distomolar (44.1 %), followed by parapremolar (29.4 %), and only 11.8 % were mesiodens. High prevalence of mesiodens has been reported in syndromic an non-syndormic populations, and its etiology is related to a genetic susceptibility associated to environmental factors that might increase the activity of the dental lamina. (Meighani & Pakdaman, 2010; Aren *et al*., 2018) Supernumerary teeth in the premolar region are most common in the mandible, and it has been suggested that this presentation is related to a third teeth series developed from an extension of the dental lamina (Khalaf *et al*., 2018).

As in other studies (Singhvi *et al*., 2013; Finkelstein *et al*., 2019), our findings shown that supernumerary teeth with conical morphology were the most frequent, nevertheless this differ from the findings of Demiriz *et al*. (2015) where tuberculate form was the most common presentation (42.3 %). In relation to the status of supernumerary teeth, the impacted presentation was the most frequent, this pattern was observed by several authors. Sharma & Singh (2012) found that impacted supernumerary teeth were found in 65 % of the cases, also 71.7 % of the supernumerary teeth reported by Hajmohammadi *et al*. (2021) were impacted. In contrast, the results of Singh *et al*. (2014) showed that erupted supernumerary teeth were most frequent observed in a population from Nepal (56.36 %).

As commented previously, supernumerary teeth were most frequent in the maxilla, in this group the conical form was the most frequent in the sample, followed by the tuberculate form. Meanwhile, in the mandible the euromorphic type was the most common. There were significance differences when the distribution of morphology of supernumerary teeth by affected dental arch was compared.

As a limitation of this retrospective study, we can point out that our findings do not represent a sample of the total Peruvian population, since when using radiographic records, the analysis corresponds specifically to a group of subjects with dental requirements. Additionally, due to the lack of information in the radiographic records it was impossible to investigate other variables that could affect the reported association between the studied characteristics. Future prospective studies are necessary to evaluate the behavior of the occurrence of supernumerary teeth and possible causal variables in the Peruvian population, and to broaden the screening to syndromic patients.

CONCLUSIONS

In the present study, the prevalence of supernumerary teeth in a Peruvian non-syndromic population was 5.32 % with a male to female ratio of 1.56:1. The most affected arch was the maxilla, single presentation was the most observed presentation, also mesiodens, conical type and erupted status of the supernumerary teeth were the most frequent. The distribution of pattern of supernumerary teeth observed in this study is consistent with most previous reports in literature.

SÁNCHEZ-TITO, M. A. & VARGAS-GARCÍA, R. Prevalencia y patrones de dientes supernumerarios en una población peruana no sindrómica: estudio radiográfico. *Int. J. Odontostomat., 16(3)*:364-369, 2022.

RESUMEN: Los dientes supernumerarios son anomalías del desarrollo dentario y se pueden clasificar según diferentes patrones. Este estudio tiene como objetivo evaluar la prevalencia y patrones de dientes supernumerarios en una población peruana no sindrómica. Este estudio retrospectivo utilizó 2500 radiografías panorámicas de los archivos de un centro de radiología de Tacna-Perú. Las radiografías se tomaron en 2019 y correspondieron a sujetos con edades entre 8 y 22 años. Los patrones de los dientes supernumerarios se registraron en una lista de verificación. Se utilizó estadística descriptiva para describir la distribución de dientes supernumerarios. Se utilizó la prueba de Chi-cuadrado para comparar la distribución entre los patrones. Se utilizó un nivel de confianza del 5 %. La prevalencia de dientes supernumerarios fue de 5,32 % (n = 133), con una relación hombre: mujer de 1,56:1. El arco más afectado fue el maxilar (79,7 %), la presentación única fue la más común (87,22 %) y no se observaron diferencias por sexo (p > 0,05). Mesiodens fue el más frecuente (53,38 %), seguido del parapremolar (34,59 %) en ambos sexos (p > 0,05). Según la morfología, la presentación cónica se presentó en el 46,62 % de los casos y el estado impactado en el 69,92 %. Hubo diferencias significativas cuando se comparó la distribución de la morfología por arco afectado (p < 0,05). La forma cónica fue más común en el maxilar (53,77 %), mientras que en la mandíbula fue el tipo euromórfico (40,74 %). Se estimó

una prevalencia de dientes supernumerarios de 5,32 %. El arco afectado con mayor frecuencia fue el maxilar. Los mesiodens, tipo cónico e impactado fueron los patrones más frecuentes.

PALABRAS CLAVE: prevalencia, patrón, dientes supernumerarios, no sindrómico.

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