

The Prevalence of Peg Shaped and Missing Permanent Maxillary Lateral Incisors in Non-Syndromic Orthodontic Patients

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Abstract

Maxillary lateral incisors are only second to third molars, when it comes to variation in the form or morphology. Since the upper lateral incisors play an important role in the appearance of smile, any abnormality in their appearance or their complete absence, always attracts a great deal of attention. The prime objective of this study was to determine the prevalence of peg shaped and missing permanent maxillary lateral incisors in a Pakistani population. The total sample size for this study comprised of 650 patients ($N = 650$) belonging to both genders (Males: 350; Females: 300) and the age range of the participants was 18-25 years. The routine pre-orthodontic records were obtained. The intra oral clinical and radiographic examination was performed for peg and missing maxillary lateral incisors. Data were collected and analyzed statistically using chi-square test. The male participants had greater percentage of missing maxillary lateral incisors as compared to the females, but the difference was not statistically significant (p -value = 0.398). Females had greater prevalence of peg lateral incisors as compared to their male counterparts, but the difference was not statistically significant (p -value = 0.274). Maxillary lateral incisors are one of the forward-facing important tooth to achieve the pleasant smile and ideal occlusion. The peg shaped and missing maxillary lateral incisors leads to tooth size discrepancies, therefore they must be considered in orthodontic diagnosis and treatment planning.

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Introduction

The development of the human dentition is regulated by tissue interactions and genetic networks, similar to those of the other ectodermal organs and involves interactive and self-organizing mechanisms which are crucial for the serial organization of teeth and their morphological profile and renewal.^{1,2} Various types of developmental aberrations are common in teeth, including abnormalities in the structure of enamel and dentine and in the shape, size, and number of teeth.³ Congenitally missing teeth

are defined as the teeth whose germ did not develop sufficiently to allow differentiation of dental tissues.⁴ Aberrations in the tooth morphology resulting from late disturbances during the differentiation process most commonly result in the size variation among teeth.⁵

Maxillary lateral incisors vary in form more than any other tooth in the mouth except the third molars. If the variation is too great, it is a developmental anomaly. A common scenario is to find maxillary lateral incisors with nondescript, pointed form; such teeth are called peg-shaped laterals.⁶ When the mesiodistal width of lateral incisors is much smaller as compared to the average width, it is not a typical pointed peg form, and is then called small lateral incisor. The small lateral incisors pose an esthetic problem, just like peg laterals.⁷ Since the upper lateral incisors play such an important role in the appearance of smile, peg lateral incisors should also receive a great deal of attention. A dentist is the best person to

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determine the best treatment for any abnormal tooth and usually the peg laterals are treated using composite resins, porcelain veneers, or crowns.⁸

The prevalence of peg-shaped maxillary permanent lateral incisors varies by race, population type, and gender. The prevalence rates are higher among Mongoloid people, orthodontic patients, and women. Although the prevalence of unilateral and bilateral lateral incisors is the same in most cases, the left side is twice as common as the right side.⁹ Subjects with unilateral peg-shaped maxillary permanent lateral incisor have a 55% chance of having lateral incisor hypodontia on the contralateral side.⁹

Throughout human evolution, variations in the number of teeth and size of the jaws have occurred, along with a decrease in the surface area needed for mastication. It is believed that evolution with regards to reduction in the tooth numbers will continue.¹⁰ The type of teeth reported missing vary in different ethnic groups. In American children, mandibular second premolars are commonly missing¹¹; in Saudi Arabian children, it is the maxillary lateral incisor¹⁰; in European children, it is the maxillary second premolar in the Turkish population¹², the maxillary lateral incisor is the most frequently missing, followed by premolars.

Limited data from Pakistan and none from the region of Peshawar is present in the literature regarding the prevalence of peg laterals and missing lateral incisors. Therefore, this study was carried out to determine and report the prevalence of peg shaped and missing permanent maxillary lateral incisors in the patients from Peshawar, Pakistan.

Methodology

This descriptive study was carried out in the outpatient department of the Khyber College of Dentistry (KCD), Peshawar, Pakistan. -A convenience sampling technique was utilized for the sample collection of 650 patients. Approval of the hospital's ethical committee was taken before initiating the study and all the ethical protocols were strictly followed. The subjects fulfilling the inclusion and exclusion criteria were invited to take part in the study. The purpose, procedures, risks, and benefits of the study were explained to them and a written informed consent was also taken from the participants. The inclusion criteria

was as following; age range between 18-25 years, having permanent dentition, and being Pakistani Pashtuns in ethnic origin. The exclusion criteria consisted of the following; having undergone an orthodontic treatment, having undergone a restorative procedure for maxillary permanent lateral incisor, having sign and symptoms of any congenital facial deformity, history of an extraction of a permanent tooth, and history of any trauma to the anterior maxilla. Oral examination of the participants was performed by seating them in a dental chair with their head supported. The clinical examination included visual inspection under adequate light looking for the presence of missing or peg shaped permanent maxillary lateral incisors. In case of a missing tooth, further confirmation was obtained from an orthopantomogram (Figure 1).

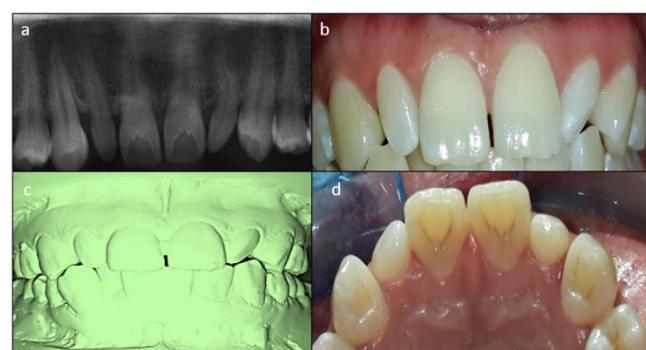


Figure 1. Peg-shaped Lateral Incisors Investigation via (a) OPG, (b,d) Clinical Photographs (c) Dental Cast.

Statistical analysis

The collected data were analyzed using Statistical Package for the Social Sciences (SPSS) software (version 17.0; SPSS Inc., Chicago, IL, USA) and simple descriptive statistics such as frequencies and percentages were calculated for the prevalence of missing and peg lateral incisors. Chi square test was also applied to determine any significant differences between the two genders. P-value < 0.005 was considered statistically significant.

Results

Among the 650 participants (Table 1), the males had more missing maxillary lateral incisors as compared to the females but the difference

was not statistically significant (*p*-value = 0.398) (Table 2). Regarding the prevalence of peg lateral incisors, females had more peg laterals than the males but the difference was not statistically significant (*p*-value = 0.274) (Table 3).

Gender	N	%
Female	300	46.16
Male	350	53.84
Total	650	100

N, Number of subjects; %, percentage.

Table 1. Distribution of Study Sample.

Gender	N*	n**	%age	p-value	X ²	Df
Male	350	6	1.71			
Female	300	4	1.33	0.398	11.563	2
Total	650	10.0	1.53			

N, number of patients examined; n*, No of patients having maxillary missing lateral incisors; X², chi square value; Df, degree of freedom.

Table 2. Distribution of Maxillary Missing Lateral Incisor According to Genders.

Gender	N*	n**	%age	p-value	X ²	Df
Male	350	8	2.28			
Female	300	10	3.33	0.274	10.752	2
Total	650	18.0	2.76			

N, number of patients examined; n*, No of patients having maxillary missing lateral incisors; X², chi square value; Df, degree of freedom.

Table 3. Distribution of Maxillary Peg Lateral Incisor.

Discussion

The number of patients seeking dental treatment in Pakistan has increased markedly during the recent years. Therefore, it is important to have a relevant epidemiological data on different types of dental abnormalities, in order to estimate the total need for treatment.¹³ In the present study, the analysis of a sample was performed to obtain a clear and valid picture of the distribution pattern of congenital absence (agenesis) and malformation (peg-shape) of maxillary lateral incisors in the targeted population.

Maxillary lateral incisors are often missing, mis-shaped, or small. Particular shapes that recur have been identified (e.g. peg and barrel), and systems have been established so that dental anthropologists can nominally categorize mis-shaped or anomalous teeth. Dental anomalies can result from many factors, both

genetic and environment. Although the defects in certain genes are the most influential etiological events in the prenatal period, postnatal periods have also been blamed for the anomalies in tooth dimensions, position, and number. Peg shaped laterals are dental anomalies that are likely to be connected to various defects in certain genes. There is probably a strong component of heredity and peg shaped lateral incisors have been linked genetically with tooth agenesis.¹¹

Previously, a study by Al-Hummayani¹⁰ was carried out to determine the prevalence of congenital absence (agenesis) and malformation of maxillary lateral incisors in Saudi Arabian female students. A group of one thousand five hundred (1,500) Saudi female school students, with an age range of 11-19 years were randomly selected from governmental and private schools in different districts of Jeddah city. Clinical and radiographic examinations were also performed. The results indicated that agenesis of maxillary upper lateral incisors were present in 0.7% and tooth malformations (mainly peg shaped lateral incisors) were observed in about 2% of the sample. These results are close to the present results, but the present study involves both genders and was conducted in a hospital setting.

Al-Emran¹³ carried out a study to determine the prevalence of hypodontia and congenital malformations in permanent teeth of Saudi Arabian male children. Five-hundred school children were investigated which were selected randomly from Riyadh city. The age group of the examined sample ranged from 13 years and 6 months to 14 years and 6 months. Clinical and radiographic examinations were also performed. The findings of that study indicated that hypodontia was present in about 4% of the children; most frequently affected was the mandibular second premolars, maxillary laterals, and maxillary second premolars. Tooth malformations, mainly peg-shaped upper lateral incisors were also observed in about 4 % of the sample. The prevalence of peg laterals reported in that study is greater than the one reported in our study. Various genetic and environmental factors could have played a role in this variation.

Salama et al.,¹⁴ reported that hypodontia, congenitally missing teeth is more common in permanent than primary dentition. They reported the prevalence and pattern of hypodontia in the primary and permanent dentitions, excluding third

molars in a sample of Saudi children. The sample consisted of 1,300 children, aged 5 to 10 years. Clinical and radiographic examination was also performed. The prevalence of children with hypodontia was found 2.6%. The mandibular second premolar was the tooth most frequently absent tooth and accounted for 45 % of the total missing teeth. In primary dentition, the maxillary lateral incisor was the tooth most frequently absent tooth (9%). A peg-shaped permanent maxillary lateral incisor was present in 0.7 % of the sample. Congenitally missing teeth were almost equally distributed between maxillary (52%) and mandibular (48%) arches. In the current study only permanent dentition were studied. The prevalence of hypodontia reported in this study are in accordance with our results for maxillary lateral incisor.

Farhat Aminal et al.,¹⁵ determined the prevalence of peg laterals and small lateral incisors in orthodontic patients, visiting the orthodontic department of the faculty of dentistry, University of Lahore, Pakistan. A sample size of 230 patients were randomly selected from orthodontic patient's record. The prevalence of small sized lateral incisors was 5.6% and the prevalence of peg laterals was 1.3%. The variation in the results of this study and our results may have occurred due to the difference in sample size and ethnic variations.

Ucheonye and Tokunbo¹⁶ determined the prevalence of peg-shaped laterals in the south western region of Nigeria, using one thousand and seventy individuals. They were assessed by intra-oral examination and case files respectively for the presence of peg-shaped laterals and other dental anomalies. The prevalence of peg-shaped laterals was found to be 1% and 2.3% in field and clinic samples respectively.

The prevalence and pattern of agenesis and peg-shaped maxillary lateral incisors in this study indicates that agenesis of maxillary laterals were less common than the peg-shaped maxillary lateral incisors. The same prevalence and pattern was observed by Al-Emran et al¹³. However, a different prevalence pattern was reported by Salama et al.¹⁴ However, the current study didn't observe any significant differences. The ideal treatment of maxillary lateral incisors incisor agenesis is a challenge. However, in some cases need to replace with the protraction of maxillary cupids or prosthetic intervention.¹⁵⁻¹⁷ Therefore, to recognize the prevalence of

maxillary lateral incisors (agenesis/ peg shaped) is of utmost importance in dentistry.

Conclusion

Maxillary lateral incisors are one of the forward-facing important tooth to achieve the ideal smile. The current study explored the prevalence of missing maxillary lateral incisor which were slight greater in males. Conversely, the occurrence of the peg shape lateral incisors was observed more in female than male. The peg shaped and missing maxillary lateral incisors leads to tooth size discrepancies, therefore must be considered in orthodontic diagnosis and treatment planning.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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