

Comparison of Frequency of Congenitally Missing Upper Lateral Incisors among Skeletal Class I, II and III Malocclusions

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ABSTRACT

Aim: The present investigation aims to find out the frequency of congenitally missing upper lateral incisors among skeletal class I, II, and III malocclusions and to find out its variability among different genders.

Materials and methods: The study sample included orthopantomograms (OPGs) and a lateral cephalogram of 1,000 patients retrieved from previous records. Of the selected samples, 290 were males and 710 were females. Orthopantomograms helped diagnose the presence of unilateral/bilateral maxillary lateral incisors.

Results and statistics: Of the 1,000 samples, 710 (71%) were female and 290 (29%) were male patients. An estimated 37 (3.77%) patients were found to have missing maxillary lateral incisors. Of the female patients, 4.04% were having missing laterals, whereas 3.10% of the male patients were having agenesis of maxillary incisors. Totally, 0.9% of missing upper laterals were recorded in males, whereas 2.8% of missing lateral incisors in upper arch were found in females. A total of 54.16% of skeletal class I, 33.33% of skeletal class II, and 12.5% of skeletal class III cases were found to have missing upper lateral incisors.

Conclusion: The prevalence rate for congenitally missing upper lateral incisors in orthodontic adolescent Odia population in Bhubaneswar is 3.77%. The females had a greater percentage of agenesis of the upper lateral incisor when compared to males. An estimated 54.16% of skeletal class I, 33.33% of skeletal class II, and 12.5% of skeletal class III cases were found to have missing upper lateral incisors. This difference might be due to genetic variations or different environmental conditions. A multidisciplinary treatment protocol must be planned to manage the missing maxillary lateral incisor and to restore the impaired esthetics and function.

Keywords: Lateral incisors, Space management, Tooth agenesis.

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INTRODUCTION

Anodontia is the absence of teeth. Hypodontia means absence of less than six teeth. Agenesis is defined as teeth that were unsuccessful in developing at birth. Absence of the tooth causes alignment problems, arch length discrepancies, and dental asymmetry.^{1,2}

That the formation and maturation of the teeth are strictly governed by factors such as genetics is a well-established theory. Few missing teeth in an individual are identified to be associated with several genetic and syndromic conditions.³⁻⁶ Mutations in *MSX1*, *PAX9*, and *AXIN2* in families with multiple missing tooth⁷⁻⁹ have been proved by several studies in molecular genetics.

Moyers stated that there are five major recognized reasons for agenesis of teeth. He stated that heredity, syphilis, and rickets might predispose to agenesis. Some mutational and evolutionary changes in the dentition also lead to disturbances in formation of the tooth.¹⁰

Missing upper lateral incisors represents a clinical problem impairing dental esthetics as well as function from a very young age. The lateral incisors act as a guide in the normal eruption of the permanent canine and absence of upper lateral incisors may lead to canine impaction. The persistence of a primary lateral incisor in the arch beyond the expected time of eruption of its successor often suggests agenesis.

Bilateral missing upper lateral incisors are more common than unilateral ones. Unilateral agenesis is often associated with the microdontia of the corresponding contralateral tooth, which in turn requires higher biomechanical claims in orthodontic therapy

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or often leads to extraction of the hypoplastic tooth to prevent any asymmetric effects as well as a midline shift.⁶⁻⁸

The definitive diagnosis requires a mandatory X-ray examination in order to confirm the assumed diagnosis. After clinical and radiological proof, a decision regarding the treatment options must be made, whether it should be treated by orthodontic space closure or by space opening and implantation. Individual evaluation of the treatment choices requires a multidisciplinary approach to achieve the best possible result for the patient. The treatment depends on a number of factors such as facial, occlusal, functional, and periodontal features, as well as individual long-term stability.⁷⁻¹⁰

The demand for orthodontic treatment in cases of missing upper lateral incisors is high because of the obvious impact that this condition has on both dental and facial esthetics. This is a challenging situation that every orthodontist will encounter on a regular basis.

The aim of the present investigation was to determine the frequency of congenitally missing upper lateral incisors among skeletal class I, II, and III malocclusions and to find out its variability among different genders.

MATERIALS AND METHODS

A retrospective study was carried out between January 2017 and December 2017. Orthopantomograms (OPGs) and a lateral cephalogram record search of all of the orthodontic Odia patients aged 12–18 years were taken, which were available in the Kalinga Institute of Dental Sciences, KIIT, Bhubaneswar, Odisha. This retrospective study excluded ambiguous OPGs and a lateral cephalogram of subjects with no proper birth record and distorted images. Ethical Clearance was obtained from institutional ethics committee (IEC approval no. KIMS/KIIT/IEC/135/2017).

Inclusion Criteria

Were set as per the following criteria:

- Odia ancestry.
- No past record of maxillary lateral incisor extraction.
- No enameloplasty or prosthesis of the maxillary lateral incisors.
- No history of previous orthodontic treatment.

Exclusion Criteria

- Cleft lip and palate patients.
- Any other craniofacial syndromic patients.

On the basis of the inclusion and exclusion criteria, 1,000 OPGs and a lateral cephalogram were selected. Demographic variables such as gender and age were determined, as shown in Figures 1 to 3.

Of the selected samples, 290 were males and 710 were females. Orthopantomograms helped diagnose the presence of unilateral/bilateral maxillary lateral incisors. ANB angle was calculated from the lateral cephalogram in order to divide the subjects into various skeletal malocclusions. Cranio-facial syndromic patients were



Fig. 1: A lateral cephalogram showing the missing upper left lateral incisor

excluded from the study. The OPGs with evidence of impacted maxillary lateral incisors were also not included in the present investigation.

RESULTS AND STATISTICS

In the sample of 1,000 patients that were chosen from the retrospective survey, 710 (71%) were female and 290 (29%) were male patients, as shown in Table 1. A total of 37 (3.77%) patients were found to have missing maxillary lateral incisors. Of the 37 patients with missing lateral incisors, 28 were females and 9 were males, as shown in Table 2. Totally, 4.04% of the female patients and 3.10% of the male patients were having missing upper lateral incisors in relation to the upper jaw. The frequency of missing upper laterals among male subjects was 0.9%. Totally, 2.8% of the female patients were having missing maxillary lateral incisors.

On the basis of the gender, 62.16% had a bilateral expression of missing upper laterals, where 78.26% were females and 21.73% were males. An estimated 16.21% had a left unilateral expression, where 83.33% were females and 16.66% were males. A total of 21.62% had a right unilateral expression, where 62.5% were females and 37.5% were males, as given in Table 3.

Skeletal class I malocclusion has a prevalence of 54.16% of bilaterally missing lateral incisors in the upper arch when compared to 40% of the left unilateral expression and 37.5% of the right unilateral expression. In contrast, in skeletal class II malocclusion, the incidence of the right unilateral expression was 37.5% when compared to the bilateral expression which was 33.33%. The left unilateral expression in skeletal class II malocclusion was only 20%. The highest prevalence of missing laterals in skeletal class III malocclusion was a left unilateral expression, which was around 40%. The incidence of a right unilateral expression was 25%, whereas bilateral absence of upper laterals in skeletal class III malocclusion was 12.5%, as shown in Table 4.

The inference of the present study indicates that the frequency of missing upper lateral incisor (bilateral) in skeletal class I was found

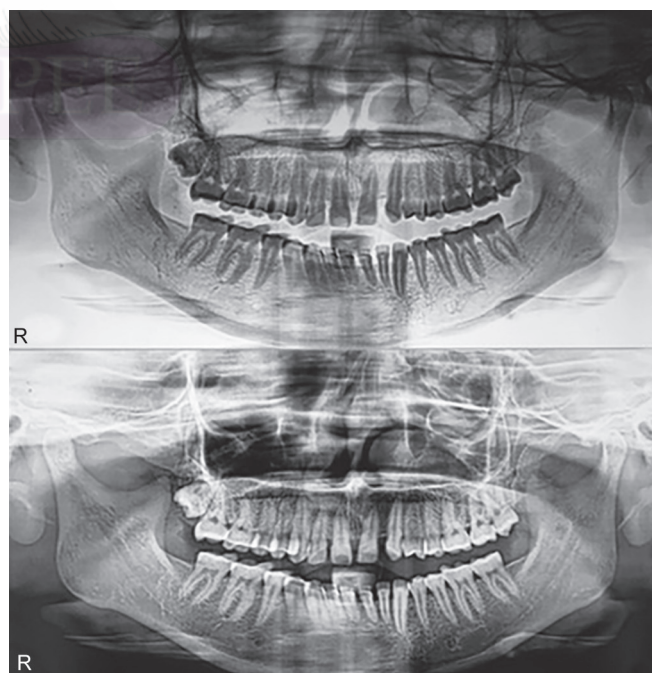


Fig. 2: OPG showing the missing upper left lateral incisor

to be 54.16%, 33.33% in skeletal class II and 12.5% in skeletal class III. Though the results were not of statistical significance, it holds paramount importance in the clinical scenario.

DISCUSSION

Retrospective data reveal no study being carried out to compare the frequency of congenitally missing upper lateral incisors among Skeletal class I, II, and III malocclusions in an Odia adolescent population. In the present study, the sample size was large in a sequence to acquire epidemiological and clinical information correlated to the non-existence of lateral incisors in upper arch. The utilization of OPGs permitted entry to a supply of dependable, widespread, and effortlessly available data.

The prevalence of congenital missing permanent lateral incisors in the upper arch varies significantly amongst studies.¹¹⁻¹⁶ It is essential to have significant epidemiological data on various classes of malocclusion, sequentially to calculate approximately the overall time requirement for correction and management.

The samples that were considered in the present study were selected to achieve a comprehensible and suitable representation of the prevalence pattern of agenesis of the upper permanent maxillary lateral incisor in the orthodontic Odia adolescent population in Bhubaneswar, Odisha, India.

Researchers of other populations also reported a different prevalence pattern of agenesis of maxillary lateral incisors, leading to a conclusion that variations are present between different races. The reasoning to the above differences might be attributed to a racial and ethnic origin.

An investigation was done by Sofaer et al.¹⁷ in 1971 on a sample of 17,000 high school students from Hawaii. The sample ranged from a full complement of teeth to a congenitally missing maxillary upper lateral incisor. The clinical examination of the patient was done and it was cross checked with radiographs. Generally it was observed

Fig. 3: Image of anteriors in occlusion showing the missing upper left lateral incisor

Table 1: Gender distribution (number of patients treated)

Gender	Male	Female
Number of patients	290/1,000	710/1,000
Frequency	29%	71%

Table 2: Prevalence of missing upper lateral incisor among orthodontic Odia adolescent population

Gender	Male	Female
No. of patients with missing lateral incisor	9/1,000	28/1,000
Frequency	0.9%	2.8%

Table 3: Prevalence and statistical significance of missing upper laterals in both genders

Gender	Both		Left		Right		Total	
	n	%	n	%	n	%	n	%
Female	18	78.26	5	83.33	5	62.5	28	100
p value	(0.02)		(0.05)		(0.18)		(0.00)	
Male	5	21.73	1	16.66	3	37.5	9	100
p value	(0.06)		(0.14)		(0.57)		(0.00)	
Total	23	62.16	6	16.21	8	21.62	37	100

p < 0.05 statistical significance

Table 4: Prevalence and statistical significance of missing upper laterals in different skeletal malocclusions

Skeletal class	Both		Left		Right		Total	
	n	%	n	%	n	%	n	%
I	13	54.16	2	40	3	37.5	18	100
p value	(0.15)		(0.08)		(0.20)		(0.00)	
II	8	33.33	1	20	3	37.5	12	100
p value	(0.01)		(0.24)		(0.06)		(0.00)	
III	3	12.5	2	40	2	25	7	100
p value	(0.52)		(1.17)		(0.16)		(0.00)	
Total	24	64.86	5	13.51	8	21.62	37	100

p < 0.05 statistical significance

The females had a greater percentage of agenesis of the upper lateral incisor (2.8%) when compared to males (0.9%). This difference might be due to genetic variations or different environmental conditions. A multidisciplinary treatment protocol must be planned to manage missing maxillary lateral incisors and to restore the impaired esthetics and function.

CLINICAL SIGNIFICANCE

The comparison of frequency of congenitally missing upper lateral incisors among skeletal class I, II, and III malocclusions is vital for diagnosis and treatment planning. A multidisciplinary treatment protocol must be planned to manage missing the maxillary lateral incisor and to restore the impaired esthetics and function.

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