








## Prevalence of Peg-Shaped Lateral Incisors in Non-Syndromic Subjects: A Multi-Population Study

Silham Alhabib<sup>1</sup>, Abdullatif Alruwaili<sup>1</sup>, Srinivas Munisekhar Manay<sup>2</sup>, Kiran Kumar Ganji<sup>3</sup>, Ravi Kumar Gudipani<sup>3</sup>, Saif Faruqi<sup>2</sup>, Santosh Patil<sup>4</sup>, Mohammad Khursheed Alam<sup>5</sup>

<sup>1</sup>College of Dentistry, Jouf University, Aljouf, Kingdom of Saudi Arabia.

<sup>2</sup>Department of Preventive Dentistry, College of Dentistry, Jouf University, Aljouf, Kingdom of Saudi Arabia.

<sup>3</sup>Periodontics Section, Department of Preventive Dentistry, College of Dentistry, Jouf University, Aljouf, Kingdom of Saudi Arabia.

<sup>4</sup>New Horizon Dental College and Research Institute, Chhattisgarh, India.

<sup>5</sup>Orthodontics Section, Department of Preventive Dentistry, College of Dentistry, Jouf University, Aljouf, Kingdom of Saudi Arabia.

Author to whom correspondence should be addressed: Dr. Mohammad Khursheed Alam, Associate Professor, Orthodontics Section, Department of Preventive Dentistry, College of Dentistry, Jouf University, Aljouf, Kingdom of Saudi Arabia. Phone: +966535602339. E-mail: [dralam@gmail.com](mailto:dralam@gmail.com)

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### Abstract

**Objective:** To evaluate the prevalence and gender-wise distribution of peg-shaped maxillary permanent lateral incisors among populations in Saudi Arabia representing different geographical locations (Saudi, Jordan, Egypt, Syria, Philippine, Pakistan, India and Bangladesh). **Material and Methods:** Panoramic radiographs of 9945 patients attending outpatient university dental clinics of College of Dentistry, Jouf University, Saudi Arabia between February 2014 and January 2018 were collected from the archives randomly. Two calibrated investigators examined the data, which were collected from the dental radiology department archives with prior permission from the authorities. The anomalies of maxillary lateral incisors (right and left) were investigated. **Results:** Among all geographic locations, the prevalence of peg laterals was more in males in comparison to females except in Pakistani and Philippine populations. Among the Saudi population, peg laterals' prevalence was more in case of right lateral incisor than the left incisor. **Conclusion:** A higher prevalence of peg laterals was found in Saudi region, followed by Egypt. Among all geographic locations, the prevalence of peg laterals was higher in males than females except for Pakistan and Philippines populations. Among Saudi population prevalence of peg laterals was found to be higher in case of right lateral incisor when compared to the left.

**Keywords:** Tooth Abnormalities; Epidemiology; Radiography, Dental; Radiography, Panoramic.

## Introduction

A peg-shaped tooth, by definition, is a tooth with incisal and mesiodistal width of the crown shorter than the cervical width [1]. In general, all teeth belonging to the deciduous and permanent dentitions have fairly consistent and definite morphological features with a little variation. However, the permanent third molar has been considered the tooth that shows a great variation in its form, followed by the maxillary permanent lateral incisor [2].

Peg laterals' occurrence is multifactorial, with the main emphasis on the presence of an underlying genetic factor. The significance of such mechanism that determines the tooth size and morphological features have been shown by various studies [3-7]. The underlying genetic mechanism that results in agenesis of the maxillary permanent lateral incisors is also said to result in the formation of peg-shaped laterals [8,9]. Previous authors have strongly expressed that microdontia is a variable expression of the same developmental disturbance that results in tooth agenesis [10]. In addition to the genetic factor, studies also indicated the possible environmental factors for microdontia occurrence [11,12]. In a study carried out in Gizan province of Saudi Arabia, the prevalence of peg-shaped lateral incisors was reported to be 0.37% [13], in Pakistan it was reported to be 1.3% [14], 2.58% in Indian population [15], and 2.3% in Jordanian population [16]. The prevalence rates of peg laterals ranges between 0.6% to 9.9% [17,18]. However, the prevalence rates have varied in different geographic locations, races and genders.

Hence, the present study was undertaken to evaluate the prevalence and gender-wise distribution of peg-shaped maxillary permanent lateral incisors among populations in different geographical locations.

## Material and Methods

### Study Design and Participants

This study was designed and conducted according to the *Strengthening the Reporting of Observational Studies in Epidemiology* (STROBE) guidelines [19].

The present study retrospectively examined panoramic radiographs with age groups ranging from 15 to 50 years. Data were randomly collected from the archives of Outpatient Department of University Dental Clinics, College of Dentistry, Jouf University, Saudi Arabia. The duration of the study period was from February 2014 to January 2018.

In order to be eligible to participate in this study, an individual must meet all of the following inclusion criteria: 1) Patients who have not undergone surgical removal or extraction of any tooth; 2) Only vivid radiographs were included. A patient was not eligible for the study if any one of the following exclusion criteria was present: 1) Patients with congenital disorders; 2) Patients with facial clefts or other craniofacial deformities; 3) Radiograph which shows pathologies like - tumors, cysts, etc.; and 4) Poor quality radiographs.

Based on inclusion and exclusion criteria, finally 9945 patients radiographs were found suitable to be recruited in the study.

### Data Collection

All the radiographs were obtained by Cranex D (Soredex, Tuusula, Finland) and two calibre investigators examined the radiographs. Dental Radiology Department archives with prior permission from

the authorities for research purposes only. All radiographs were re-evaluated by the same examiners after 14 days to check intra-observer variations and the reliability of measurements was evaluated by Kappa statistics. The reliability was very good, with Kappa values of 0.91 for observer 1 and 0.81 for observer 2.

### Data Analysis

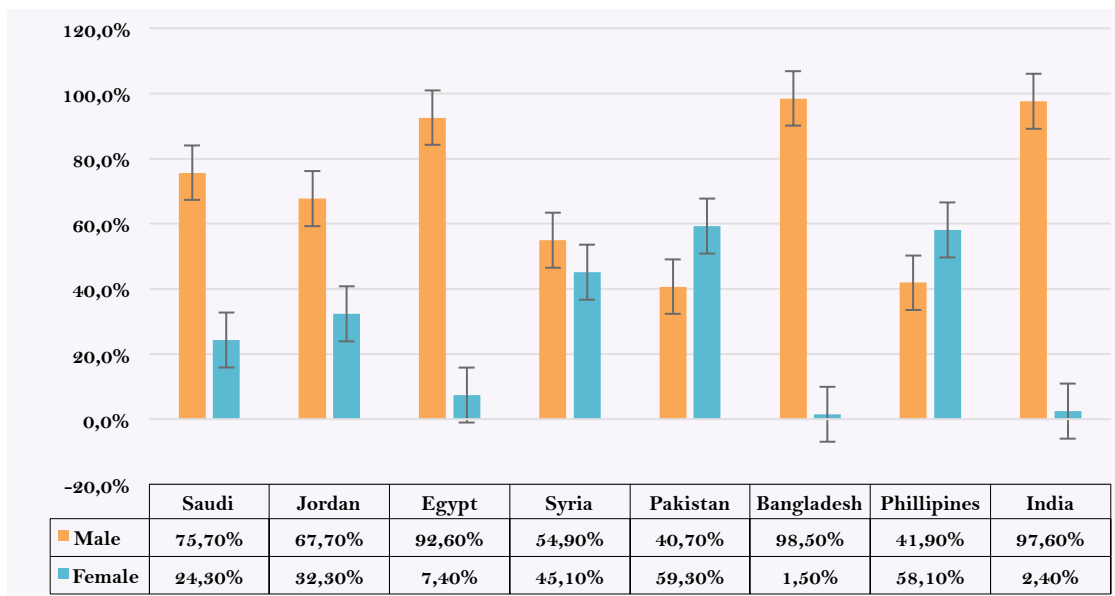
Data were analyzed using IBM SPSS Statistics for Windows Software, version 20 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to calculate the absolute and relative frequencies.

### Ethical Aspects

This study was approved by the Ethical Committee of the College of Dentistry (Protocol No. LCBE 9-16-8/39), which complies with the Declaration of Helsinki. Patient records/information were anonymized and de-identified prior to analysis and kept confidential.

### Results

Out of 9945 panoramic radiographs evaluated, 6543 were males and 3402 females with the mean age  $\pm$  32 years. All patients were examined for tooth morphology variation concerning peg lateral, normal and missing. Gender-wise comparison for the prevalence of peg laterals among different geographic locations is presented in Figure 1. Among all geographic locations, the prevalence of peg laterals was higher in males than females except for Pakistan and Philippines populations.



**Figure 1. Gender wise distribution of peg-laterals among different geographic locations.**

Prevalence of right peg laterals and left peg laterals in different geographic locations are presented in Table 1. Among Saudi population prevalence of peg laterals was found to be higher in case of right lateral incisor when compared to the left.

**Table 1. Comparison of peg-laterals among different geographic locations.**

Tooth Morphology		Geographical Location								Total
		Saudi	Jordan	Egypt	Syria	Philippine	Pakistan	India	Bangladesh	
Right Lateral										
Peg	N	661	0	0	0	0	4	0	3	668
	% within RL	99.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.4%	100.0%
	% within Race	10.1%	0.0%	0.0%	0.0%	0.0%	1.0%	0.0%	0.5%	6.7%
Normal	N	5752	818	664	566	86	416	327	543	9172
	% within RL	62.7%	8.9%	7.2%	6.2%	.9%	4.5%	3.6%	5.9%	100.0%
	% within Race	88.3%	100.0%	100.0%	100.0%	100.0%	99.0%	100.0%	99.5%	92.2%
Missing	N	103	0	0	0	0	0	0	0	103
	% within RL	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Race	1.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.0%
Left Lateral										
Peg	N	106	0	10	3	0	3	0	0	122
	% within LL	86.9%	0.0%	8.2%	2.5%	0.0%	2.5%	0.0%	0.0%	100.0%
	% within Race	1.6%	0.0%	1.5%	0.5%	0.0%	0.7%	0.0%	0.0%	1.2%
Normal	N	6406	818	651	563	86	417	327	546	9814
	% within LL	65.3%	8.3%	6.6%	5.7%	0.9%	4.2%	3.3%	5.6%	100.0%
	% within Race	98.3%	100.0%	98.0%	99.5%	100.0%	99.3%	100.0%	100.0%	98.7%
Missing	N	4	0	3	0	0	0	0	0	7
	% within LL	57.1%	0.0%	42.9%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	% within Race	0.1%	0.0%	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	.1%

RL: Right Lateral; LL: Left Lateral.

## Discussion

The prevalence of peg-shaped lateral incisors is considerably different for different races/ethnic groups, strengthening the view that genetic factors play an important role in its etiology. The prevalence of peg-shaped lateral incisors was found to be 7.5% and 1.6% in Asians and other races, respectively, in a study carried out in Minnesota [20]. In another study in Hawaii, the prevalence rates were significantly high in the Philippine descendants (3.1%) as compared to whites (1.7%), Chinese (1.6%) and Japanese populations (1.9%) [21]. These findings are in accordance with the current study as peg lateral prevalence rate was higher in Saudi population (1.6%). A previous study showed that prevalence was significantly higher in Mongoloids (3.1%) as compared to blacks (1.5%) and whites (1.3%). However, between the Mongoloids and North American people only, Mongoloids (2.0%) had significantly higher prevalence as compared to whites (0.9%) [22].

Various studies have supported the view that environmental factors also play an important role in causing microdontia along with an underlying genetic mechanism. Studies have shown the prevalence of peg-lateral to be lower in North American white population as compared to those of Europe and Australia, strongly suggesting that the geographic location by itself can act as a decisive environmental factor [23]. Previous authors have shown that the prevalence of peg-laterals was higher in Europe as compared to North America with prevalence rates of 1.2% and 0.9%, respectively. Similarly, the prevalence in Mongoloids (Asians) was higher than in North American population, with prevalence rates of 3.2% and 2.0%, respectively. However, it was reported that the prevalence of peg-laterals in North American whites and blacks were similar at 1.3% and 1.5%, respectively [22]. These findings are in accordance with the present study's findings, where a higher prevalence of peg laterals was found in Saudi region followed by Egypt. A study in the South Western region of Nigeria showed that the prevalence was 1% in the field sample as compared to 2.3% in their clinic-based sample. Such differences in the prevalence rates in different samples were attributed to the larger clinic-based sample compared to a smaller field sample [24]. According to a study by Farhana et al., the prevalence was relatively higher (5.3%) in the Pakistani population compared to the other studies carried out in different geographic locations of the world [25].

Though these studies have shown a variation in the prevalence rates of peg-laterals in populations belonging to different geographic locations of the world, it was not significant indicating that such a small difference/variation could be due to some environmental differences prevailing at these locations.









Though the dental anomaly, the peg-shaped lateral is inherited as an autosomal dominant trait, various studies have yielded quite variable and controversial findings. According to previous findings, women are more likely to have peg-laterals as compared to men at a ratio of 1.35:1 [22]. However, contrary to this study, previous research showed that the frequency of peg laterals was more in males than in females [25]. The present study's findings also support that the prevalence of peg laterals is higher in males than females. Furthermore, there is no significant difference between the prevalence of peg laterals between males and females [8].

Since these studies were from different geographic locations, such contrasting results could again be attributed to some unsuspected, presumably environmental factors causing peg-laterals in such geographic locations.

## Conclusion

A higher prevalence of peg laterals was found in Saudi region followed by Egypt. Among all geographic locations, the prevalence of peg laterals was higher in males than females except for Pakistan and Philippines populations. Among Saudi population prevalence of peg laterals was found to be higher in case of right lateral incisor when compared to the left.

## Authors' Contributions

SAH		---	Conceptualization, Methodology, Validation, Formal Analysis and Data Curation.
AA		0000-0003-0909-8713	Methodology, Validation, Formal Analysis, Resources, Data Curation and Project Administration.
SMM		0000-0001-9082-705X	Resources, Writing - Original Draft, Writing - Review and Editing and Supervision.
KKG		0000-0002-3178-9513	Validation, Data Curation, Writing - Original Draft Preparation, Writing - Review and Editing and Visualization.
RKG		0000-0003-3616-4042	Validation, Writing - Original Draft Preparation, Writing - Review and Editing and Visualization.
SF		0000-0001-7365-293X	Methodology, Data Curation, Supervision and Funding Acquisition.
SP		0000-0003-0715-497X	Validation, Writing - Original Draft Preparation, Writing - Review and Editing, Visualization and Funding Acquisition.
MKA		0000-0001-7131-1752	Conceptualization, Methodology, Data Curation, Writing - Original Draft Preparation and Project Administration.

All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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None.

## Conflict of Interest

The authors declare no conflicts of interest.

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