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PREVALENCE AND CHARACTERIZATION OF LABIAL CERVICAL VERTICAL GROOVE IN MAXILLARY PERMANENT INCISORS: AN OBSERVATIONAL, CROSS-SECTIONAL STUDY

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ABSTRACT

Objective: To evaluate the prevalence and traits of Labial Cervical Vertical Groove in permanent maxillary incisors, its impact on accompanying gingiva, can cause periodontal, esthetic, and prosthetic concern.

Aim: The purpose of this study was to determine the frequency and attribute of LCVG in the specific tooth (central vs lateral incisor), side (unilateral vs bilateral, left vs right), and gender.

Settings and Design: An in vivo observational cross-sectional study.

Materials and Methods: An aggregate of 1800 people aged 18 and 60 were chosen at random and scrutinized for the existence of LCVG in an individual's maxillary permanent incisors. According to predetermined criteria, the deformity was categorized as mild, moderate, or severe. Normal, partial, and irregular gingival covering at the groove site were classified. The inclusion of a Palato-radicular groove was also detected.

Results: LCVG was diagnosed in 123 patients (6.83%). In 59 (47.97%) of the individuals, it was unilateral, while in 64 (52.03%), it was bilateral. There was no evidence of sexual dimorphism or side prevalence. LCVG was identified in 187 (38%) of the 492 teeth in 123 participants. Mild LCVG was detected in 72 incisors, moderate in 83 incisors, and severe in 32 incisors, with a central to lateral incisor ratio of 186:1. In 123 incisors, the gingival contour was normal, partial in 59 incisors, and in 5 incisors it's irregular. In incisors with moderate or severe LCVG, the gingival recession was noted.

ORIGINAL RESEARCH ARTICLE

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Conclusion: An LCVG is a malformation that affects the permanent central incisors of the maxilla. Increased severity of LCVG has deleterious repercussions on the periodontium, necessitating conscientious dental hygiene; accordingly, practitioners should be aware of this, and patients must be advised on the importance of maintaining good oral hygienic practices.

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INTRODUCTION

A dental anomaly located at the cervical region of maxillary permanent incisors, the labial cervical vertical groove (LCVG) originates on the cervical enamel and proceeds to the radicular surface; it resembles a furrow; notch. The enamel organ and Hertwig's epithelial root sheath infolding create a groove (Mass et al., 2005).^[1] Causative factors: trauma, disease, and nutritional deficiencies, or genetic and idiopathic.^[1] LCVG may aggravate certain clinical abnormalities, such as incisor discoloration, unaesthetic appearance, plaque deposition, and bone loss due to subsequent periodontal pocket formation, and cavities approaching pulp chamber and root canal. – Endodontic, prosthodontic, and periodontal treatment failures. The goal of this study was to inspect the prevalence of LCVG in maxillary permanent incisors in terms of various tooth types (central vs. lateral), side (unilateral vs. bilateral), and gender, as well as to characterize LCVG in terms of viz. 1). size (severity) and associated gingival tissue (contour). 2) We also assessed the presence of the palato radicular groove (PRG) in maxillary incisors and whether it is significantly relevant to LCVG.

MATERIALS AND METHODS

Over the course of six months, 1800 participants aged 18 to 60 years (mean \pm 40 years) were screened for the presence of LCVG in the outpatient division of the Department of Periodontology, Government

Dental College and Hospital, Nagpur. The institutional ethical committee accepted the research protocol. All subjects were verbally informed and signed informed consent was obtained for participation in the study after ethical approval. Dental trauma, cervical caries, or fixed prostheses in the incisor region were excluded from the study.

After retracting the gingival margin with the help of an air blow (3-way syringe), the subjects were examined in the dental chair with a fine explorer (#17, #23) by a single investigator. On the labial crown surface and subgingival section of the four maxillary permanent incisors, adjacent to the cemento-enamel junction, the LCVG distribution, severity, and gingival contour were investigated. The presence of a palato radicular groove in the maxillary permanent lateral incisors was also investigated.

As mentioned by (Mass et al. 2005) The severity of LCVG was classified into three categories: mild, moderate, and severe:

- (1) Mild - a shallow subgingival groove beneath the marginal gingiva that can only be felt by probing
- (2) Moderate - groove visible with the eyes, extending subgingivally as in (1) and supragingival on the labial crown surface, not more than 2 mm in the incisal direction from the marginal gingiva; and
- (3) Severe - a defect on the labial crown surface that extends supragingival and subgingivally for more than 2 mm from the marginal gingiva (pp 281–86).^[1]

Labial-Cervical-Vertical Groove (LCVG) in maxillary
Permanent Incisors

Date: _____

Name: _____		OPD No.: _____	
Age: _____		Gender: M / F	

LCVG:		LI	
Right	Left	Right	Left

LCVG Severity:

Mild: Felt only by probing

Moderate: detected by eyes, extending subgingivally a supragingivally not more than 2 mm from the marginal gingiva in incisal direction.

Severe: Same as above but more than 2 mm supragingivally

Periodontal Involvement		LI	
CI		LI	
Right	Left	Right	Left
PPD: _____	PPD: _____	PPD: _____	PPD: _____
GR: _____	GR: _____	GR: _____	GR: _____

**Change in gingival contour*

** Normal coverage: gingiva covers the groove with no change in the regular shape of the gingival margin*
Partial coverage: gingiva partially covers the groove with mild change in the contour
Irregular coverage: the gingiva covers the groove with a severe change in the contour

Palatoalveolar groove		LI	
CI		LI	
Right	Left	Right	Left

Additional finding, if any: _____



Image 1. Proforma was used to record LCVG & PRG in patients.

Image 2. The examination was done using instruments of a fine explorer (#17, #23) after retracting the marginal gingiva with the help of air blow (3-way syringe).



Image 3. Unilateral mild LCVG, with partial gingival contour.



Image 4. Bilateral LCVG, 11- moderate with partial gingival contour. 21- mild with a normal gingival contour.

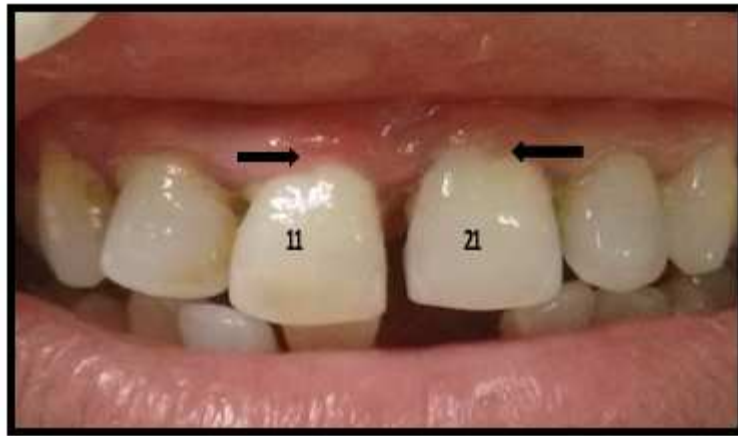


Image 5. Bilateral LCVG, 11 – moderate with a partial gingival contour. 21 – severe with irregular gingival contour.

In compliance with (Mass et al., 2005) three types of gingival contour were classified:

- (1) Normal coverage - the gingiva completely covers the groove with no alteration in the gingival margin's regular shape
- (2) Partial coverage - the gingiva partially covers the groove with a modest modification in the contour; and

- (3) Irregular coverage - the gingiva covers the groove with a significant contour distortion (pp. 281–86).^[1]

Analytical Statistics

- The data were analyzed using SPSS 16.0.
- To evaluate the parameters, the Chi-square test was performed.
- It was determined that a P-value of < 0.05 was significant.

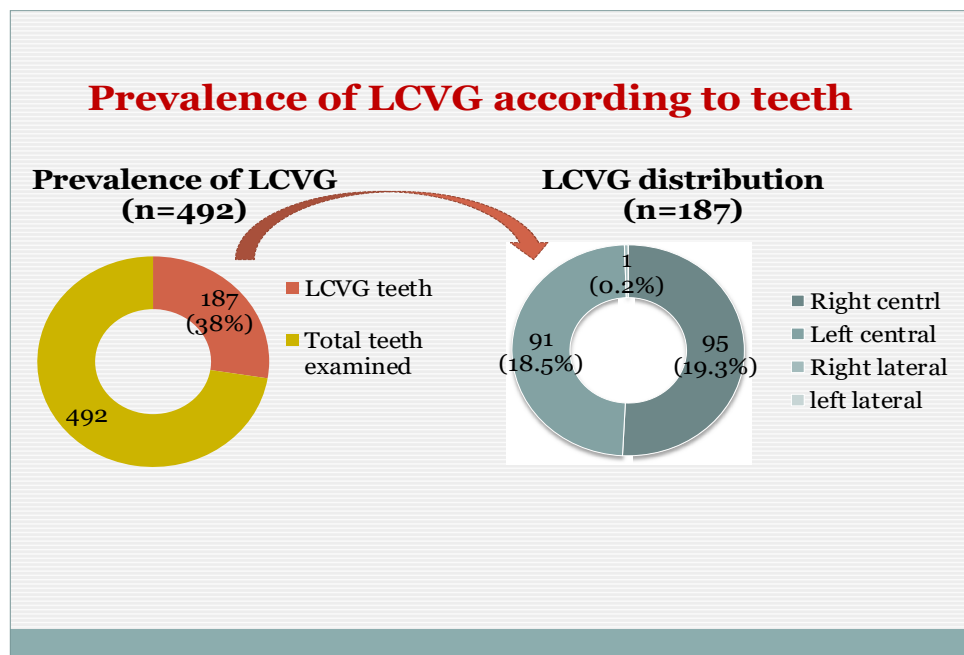


Diagram 1: Pie chart of prevalence and distribution of LCVG

OBSERVATIONS

Prevalence: LCVG was found in at least one of the four maxillary incisors in 123 of the 1800 patients studied, representing a 6.83 percent prevalence. In 59 (47.97%) of the

cases, it was unilateral, whereas, in 64 (52.03%), it was bilateral. LCVG was observed in 187 (38%) of the 492 teeth in 123 patients. There was no evidence of sexual dimorphism or side prevalence (See 1st Table)

Table 1. Prevalence of LCVG according to teeth

	LCVG		P Value
	Absent	present	
Right central	28 (5.7%)	95 (19.3%)	<0.001**
Left central	32 (6.5%)	91 (18.5%)	
Right lateral	122 (24.8%)	1 (0.2%)	
Left lateral	123 (25.0%)	0 (0.0%)*	
Total	305 (62.0%)	187 (38.0%)	n = 492

LCVG = Labial Cervical Vertical Groove

* LCVG not found

** Statistically significant

Table 2. Prevalence of LCVG in maxillary anterior teeth according to gender

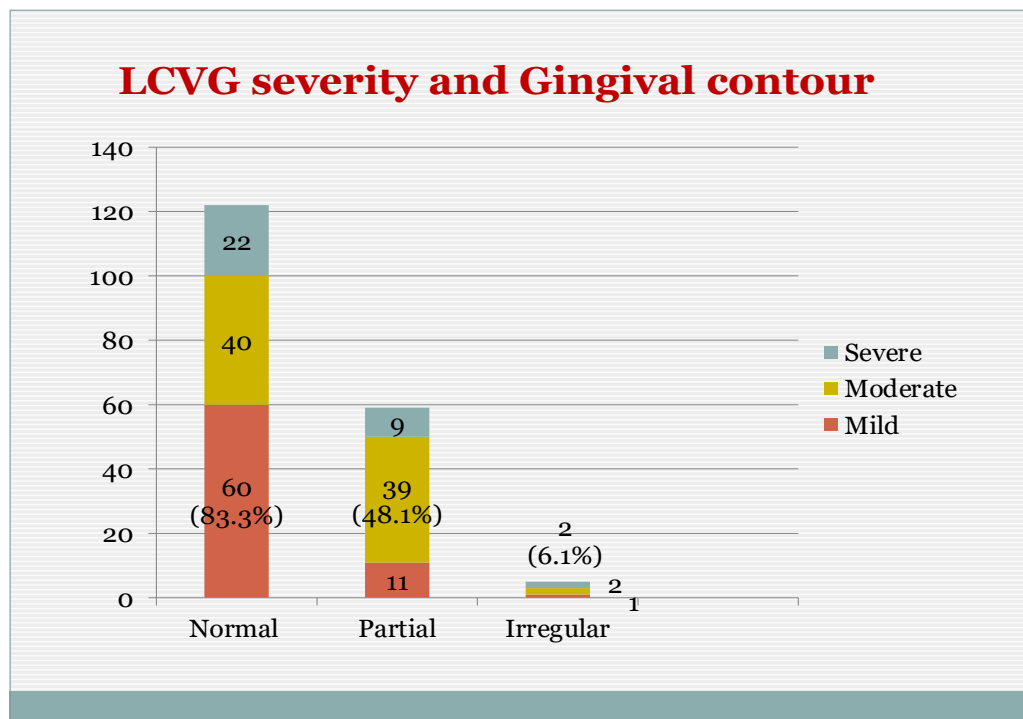
	LCVG	P Value
Male	99 (20.1%)	0.8*
Female	88 (17.9%)	
Total	187 (38.0%)	n = 492

LCVG = Labial Cervical Vertical Groove

** Statistically not significant

Table 3. Distribution of gingival contour according to LCVG severity in maxillary incisors						
		LCVG severity			Total	P Value
		mild	moderate	severe		
LCVG coverage	Normal	60 (83.3%)	40 (49.4%)	22 (66.7%)	123 (25.1%)	<0.001*
	Partial	11 (15.3%)	39 (48.1%)	9 (27.3%)	59 (12.0%)	
	Irregular	1 (1.4%)	2 (2.5%)	2 (6.1%)	5 (1.0%)	
Total		72 (100.0%)	81 (100.0%)	33 (100.0%)	n=492	

LCVG = Labial Cervical Vertical Groove * Statistically significant



Graph 1: LCVG vs Gingiva

Table 4. Periodontal status according to LCVG severity in maxillary incisors

		LCVG severity			P Value
		mild	moderate	severe	
Periodontal status	Absent	70 (14.2%)	73 (14.8%)	21 (4.3%)	<0.001*
	Present	2 (0.4%)	9 (1.8%)	12 (2.4%)	
Total		72 (14.6%)	82 (16.7%)	33 (6.7%)	n = 492

* Statistically significant

Table 5. LCVG and Palatoradicular groove (PRG)

		LCVG		Total	P Value
		Absent	present		
PRG	Absent	295 (60.0%)	185 (37.6%)	480 (97.6%)	0.12*
	Present	10 (2.0%)	2 (0.4%)	12 (2.4%)	
Total		305 (62.0%)	187 (38.0%)	492 (100.0%)	

LCVG = Labial Cervical Vertical Groove

*Statistically not significant

DISCUSSION

Changes in tooth size, quantity, and morphology have been extensively explored in the literature, however, the LCVG deformity has received little attention. Local gingival disease, cavities, and possibly aesthetic issues can all be caused by LCVG. As a result, it is crucial to document the presence and severity

of LCVG during routine dental examinations and to promote patient awareness. Central maxillary incisors (99.5%) were significantly more affected than lateral incisors ($p=0.001$), according to the current data (Table 1) These findings are quite analogous to those of Shpack et al. (2007).^[2]

Table 6: Studies showing Prevalence pattern of LCVG

Study	Number of subjects examined	Prevalence of LCVG
Present study	1800	6.83%
Brin and Ben – Bassat (1989)	1880	6.5%
Mass et al (2005)	600	4.5%
Shpack et al (2007)	1250	5.3%

LCVG was detected bilaterally in 64 (52.03%) of the individuals, indicating that the existence of LCVG on both incisors should be investigated (see Table 1). LCVG anomaly preference was not observed to be associated with gender ($p=0.8$) or mouth side in this investigation, as it was in Mass et al's (2005) study (see Table 1) (Table 2).^[1] Periodontal examination detected LCVG with #21 in a 47-year-old male patient, according to Mishal P. Shah (2016).^[3] If the incisors have an unpleasant aspect, a restoration can be inserted and the gingiva recontoured.^[4] Soft tissue grafting, connective tissue grafting, and osseous surgical flap surgery can also be performed in LCVG, depending on the severity, and associated periodontal diagnoses present in the patient. Kozlovsky et al., in 1988 published a case report in which he documented a periodontal lesion with vertical interdental bone loss in a 25-year-old female patient's maxillary central incisor labial cervical vertical groove.^[5] Recently, Ashwini et al., (2016) described how to treat an intrabony defect caused by LCVG on #21 with a bone transplant and glass ionomer cement groove reconstruction.^[6] After restoring the

groove with glass ionomer cement, the accompanying intrabony defect was restored with flap surgery and platelet-rich fibrin.

Palato – radicular groove is a developmental anomaly that has been significantly scrutinized; its prevalence ranges from 3% to 18.1 % (Shpack et al.,2007)^[2] According to Suchetha et al., the palato-gingival groove is more prevalent in the maxillary lateral incisor than the central incisor.^[7] Likewise, a significant relationship has been identified with the existence of palato-gingival groove more in lateral incisor. However, no such ratio association among LCVG and PRG frequency was discovered. PRG was identified in just 12 (2.4 percent) of the 492 maxillary anterior teeth studied in this investigation, hence no correlation between LCVG and PRG could be established (Table 5). Despite this, no subject complained or was even aware of the deformity's existence. It is quite encouraged that once LCVG is detected, the dentist informs the patient of the deformity's presence so that meticulous oral cleanliness can be maintained.

CONCLUSION

An LCVG is a malformation that affects the permanent central incisors of the maxilla. With LCVG, not all maxillary incisor teeth will have localized periodontal damage. Such grooves, on the other hand, are a significant problem that the practitioner should be aware of and advise the patients accordingly what needed either treatment or education on the importance of maintaining good oral hygiene.

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