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Prevalence of Dens Invaginatus among Three Different Ethnic Groups Indian, Chinese, Malay Patients Visiting AIMST Dental Care Centre - A Radiographic Study

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ABSTRACT

Aim: The aim of this study was to determine the prevalence of dens invaginatus among patients visiting AIMST Dental care centre.
Materials and methods: Intra oral periapical radiograph was taken on lateral incisor of 102 patients undergoing treatment in AIMST polyclinics and Oral Surgery clinics. Of the 102 patients 21 patients were Malays, 52 Chinese and 29 were of Indian ethnicity.
Results: Dens invaginatus was prevalent in 3 out of 102 patients among the three two were Chinese and was a Indian patient and all three patients exhibited Type 1 type of dens invaginatus.
Conclusion: The occurrence of dens invaginatus appears to be prevalent among Chinese and Indian population but further study with higher sample size would help in arriving at conclusive results.

Key words: Dens invaginatus, lateral incisor, IOPA

INTRODUCTION

Dens invaginatus also known as dens in dente, was first described in a human tooth by a dentist named 'Socrates' in 1856 (Schulze 1970). It is a malformation of teeth most likely resulting from an infolding of the dental papilla during tooth development or invagination of all layers of the enamel organ in dental papillae.

Etiology

The aetiology of dens invaginatus malformation is controversial and remains unclear over the last decades. Several theories have been proposed to explain the aetiology of dens invaginations: according to Euler 1939, Atkinson 1943 Growth pressure of the dental arch results in buckling of the enamel organ, (Kronfeld (1934) suggested that the invagination results from a focal failure of growth of the internal enamel epithelium while the surrounding normal epithelium continues to proliferate and engulfs the static area. according Rushton (1937) dens invagination is a result of rapid and aggressive proliferation of a part of the internal enamel epithelium invading the dental papilla. He has also regarded this a 'benign neoplasma of limited growth'. Oehlers (1957a,b) considered that distortion of the enamel organ during tooth development and subsequent protrusion of a part of the enamel organ will lead to the

formation of an enamel-lined channel ending at the cingulum or occasionally at the incisal tip. Bruszt in 1950 suggested 'twin-theorie' a fusion of two tooth-germs. According to Fischer (1936) and Sprawson (1937) Infection was considered to be responsible for the malformation.

Clinical and Radiographic appearance of dens invaginatus

Affected teeth show a deep in folding of enamel and dentine starting from the foramen coecum or even the tip of the cusps and which may extend deep into the root. Based on the type of invagination (coronally) Oehler's has classified it into 3 types:

Type I: The invagination is minimal and enamel-lined; it is confined within the crown of the tooth and does not extend beyond the level of the external amelo-cemental junction.

Type II: The invagination is enamel-lined and extends into the pulp chamber, but remains within the root canal with no communication with the periodontal ligament.

Type III A: The invagination extends through the root and communicates laterally with the periodontal ligament space through a pseudo-foramen. There is usually no communication with the pulp, which lies compressed within the root.

Type III B: The invagination extends through the root and communicates with the periodontal ligament at the apical foramen. There is usually no communication with the pulp.

In Type III lesions, any infection within the invagination can lead to an inflammatory response within the periodontal tissues giving rise to a 'peri-invagination periodontitis [5].

Clinically, Maxillary lateral incisors are the teeth most susceptible to coronal invaginations and may be associated with unusual crown morphology such as 'dilated', 'peg-shaped' or 'barrel-shaped . peg shaped lateral incisors usually exhibit pit at the tip of the conical crown [6,7,8] incisors with a deep pit at the foramen caecum on the lingual aspect are susceptible for invaginations.

Radiographically, Types I and II begin coronally with a narrow undilated fissure. This then dilates into a uniglobular mass that either ends within the coronal portion (Type I) or invades the radicular portion (Type II). As the invagination invades the coronal and radicular portion, the outline of the pulp space can change resulting in 'blunting' of the pulp horns. The defect may vary in size and shape from a loop like, pear-shaped or slightly radiolucent structure to a severe form resembling tooth within a tooth. The outline of the invagination is generally well defined with an opaque layer of enamel Type III presents as a deep fissuring of the tooth that exits on the lateral surface of the root. The root canal adjacent to the invagination may be undulating and abnormal. [5,9, 6,11]

Complications of dens invaginatus

Author	Country	Year	Teeth	Frequency of DI
Gotoh et al	Japan	1959	Maxillary lateral incisor	10% of teeth
Atkinson	Mexico	1943	500 lateral maxillary incisors	10% of teeth
Boyne	USA	1952	1000 maxillary incisors	0.3% of teeth
Kfir etal	Israel	2020	Maxillary incisors	26% of teeth
Stephens	USA	1953	150 full-mouth surveys	8%
Shafer	USA	1953	2542 full-mouth surveys	1.3% of patients
Hallet	USA	1953	586 full-mouth surveys	6.6% of maxillary lateral incisors
Amos	USA	1955	1000 full mouth surveys	6.9% (students of dentistry)
Grahnen *et al*.	Sweden	1959	3020 right maxillary incisors	2.7% of patients
Ulmansky & Hermel	Israel	1964	500 full mouth surveys	2% of patients
Poyton & Morgan	Canada	1966	5000 full mouth surveys	0.25% of patients
Miyoshi *et al*.	Japan	1971	extracted maxillary lateral	38.5% of teeth incisors
Fujiki *et al.*	Japan	1974	2126 lateral maxillary incisors	4.2% of teeth
Thomas	USA	1974	1886 full mouth surveys	7.74% of patients

Sequelae of undiagnosed and untreated coronal invaginations are abscess with facial cellulitis. Bacterial ingress down the invagination can result in a peri-invagination periodontitis. The nature of the peri-invagination is wide and present in a blunder-buss formation, [5,6,11] retention of neighboring teeth, displacement of teeth, cysts and internal resorption. There is a wide variation in the prevalence of dens invaginatus among different ethnic group as depicted in (Table 1)[12.] The differences may be attributed to ethnic background.

Hence the Objectives of the present study is to

1. To detect the prevalence of dens invaginatus among the three different ethnic groups visiting AIMST dental care centre.
2. To identify the type of invaginatus that is most common among the three different ethnic groups visiting AIMST dental care centre.

MATERIALS AND METHOD

The aim of the present study was to detect the prevalence of Dens Invaginatus among patients with three different ethnic groups (Indian, Chinese, Malay) visiting AIMST dental care centre.

Sources of Data

Patients visiting AIMST Dental Clinic for routine dental checkups at the Reception Primary Care (RPCs), Patients undergoing treatment in polyclinic, patients referred for diagnostic radiographs to Oral Radiology department from Oral Surgery clinics. Pregnant patients, Patients with lateral incisor crown and bridge, fracture; caries, restorations and peripical radiograph which were with radiographic faults were excluded from the study.

Methods of Collection

After obtaining an informed consent from 100 patients, lateral incisors intraoral Periapical radiograph IOPA was taken using long cone technique with using PROGENY intraoral radiograph machine with 60kv, 7mA and 0.200s exposure. The exposed films were processed using automatic processer. X ray film was viewed by two oral radiologists on standard illumination screen to avoid bias. The data collected was entered into the Excel spread sheet and statistical test was performed using the SPSS software.

RESULTS

Based on gender distribution 44 Males and 58 females participated.
Based on race 21 Malay, 52 Chinese and 29 Indians participated

Frequency Table: GENDER					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	male	44	43.1	43.1	43.1
	female	58	56.9	56.9	100.0
	Total	**102**	**100.0**	**100.0**	

Frequency table: RACE					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Malay	21	20.6	20.6	20.6
	Chinese	52	51.0	51.0	71.6
	Indian	29	28.4	28.4	100.0
	Total	**102**	**100.0**	**100.0**	

TYPE OF DI					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	type 1	3	2.9	2.9	2.9
	absent	99	97.1	97.1	100.0
	Total	**102**	**100.0**	**100.0**	

GENDER * TYPE OF DI Crosstabulation				
		TYPE OF DI		Total
		type 1	absent	
GENDER	male	2	42	44
	female	1	57	58
Total		**3**	**99**	**102**

Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.698[a]	1	.404		
Continuity Correction[b]	.059	1	.808		
Likelihood Ratio	.694	1	.405		
Fisher's Exact Test				.576	.397
Linear-by-Linear Association	.691	1	.406		
N of Valid Cases	102				

RACE * TYPE OF DI Crosstabulation				
		TYPE OF DI		Total
		type 1	absent	
RACE	malay	0	21	21
	chinese	2	50	52
	indian	1	28	29
Total		**3**	**99**	**102**

Chi-Square Tests			
	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.812[a]	2	.666
Likelihood Ratio	1.415	2	.493
Linear-by-Linear Association	.411	1	.522
N of Valid Cases	102		

DISCUSSION

The total number of patients participated in the present study was 102 patients, of which 44 were males and 58 were female patients and 21 belonged to Malay race, 52 Chinese and 29 patients belonged to Indian race.

Periapical radiograph was taken on lateral incisor of each patient and it has been observed that out of 102 patients, three patients lateral incisor periapical radiograph revealed dens invaginatus and all three were of Type 1 type of which two belonged to Chinese race and one belonged to Indian race.

This was in accordance with a retrospective study that was conducted by Gunduz K , Çolak H[14,15] and Cakici F et al [16] on turkish dental patients paeriapical and panoramic radiographs the author has observed that type 1 dens invaginatus was observed in 69.8%[14,15] and 81.25%[16] of patients. Hence the authors have concluded that that majority of Turkish dental population exhibited type 1 dens invaginatus.[14, 15]

Another retrospective study was conducted by M B Chandramani and P J Hetul on Indian dental patients' periapical radiograph the author has concluded that lateral incisor dens invaginatus prevalence was observed in maximum number of teeth and majority of them were of type-I 42.7% [17]. Males and females are 1:1.2, with maximum number of teeth were

A retrospective study was conducted to assess the prevalence of dens invaginatus in maxillary incisors in young Israeli population 1621 maxillary incisors from 547 patients were evaluated. Dens invaginatus was observed in 422 (26%) of teeth Maxillary lateral incisors was most affected Dens invaginatus Type I was most frequently observed, accounting for 90% of the teeth.

In our study 2 males and 1 female patient showed the prevalence of type 1 dens invaginatus this was in accordance with a retrospective study was conducted by Cakici F et al were in the author has concluded that Males and females were almost equally affected with no gender difference and the most commonly observed type of dens invaginatus was type I.[1]

CONCLUSION

The occurrence of dens invaginatus appears to be prevalent among Chinese and Indian population but further study with higher sample size would help in arriving at conclusive results. The limitations of the above study are relatively small size sample, the prevalence figures for dens invaginatus in the present study should be considered with caution as they may not be a representative for entire Malay, Chinese and Indian population. Further large-scale multicenter studies are therefore needed to assess its prevalence.

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