Prevalence and Characteristics of Mesiodens among 4–12-year-old Children of North Indian Subpopulation

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ABSTRACT

Aim: The objective of the study was to determine the prevalence of mesiodens along with other epidemiological characteristics.

Materials and methods: A retrospective evaluation of data of patients was done to calculate the prevalence of mesiodens in 60,590 children (33,038 boys and 27,552 girls) in age range from 4 to 12 years. In addition to the prevalence, age, gender, number, morphology, orientation, and complications associated with it was also recorded.

Results: The prevalence of mesiodens was estimated to be 1.12% (680 cases) with male–female ratio of 3.22:1. The dentition-wise prevalence was 5.88% in primary dentition stage, 83.53% in mixed dentition stage, and 10.59% were in permanent dentition stage. Out of the 680 patients, 149 (21.91%) had two mesiodens, whereas 531 (78.09%) cases had 1 mesiodens. Conical shape was the most common type (92.76%), followed by supplemental (4.7%), odontome (1.33%), and tuberculate (1.21%). In all, 67.67% mesiodens were in a vertical position, 28.35% were in an inverted position, and 3.98% were in a transverse position, and 689 mesiodens (83.11%) were erupted and the remaining 140 (16.89%) of the cases were unerupted. In all, 46.56% of the mesiodens were palatally positioned, and root formation was complete in 65.86% cases, and 34.14% had incomplete root formation. Complications caused by mesiodens were malalignment of maxillary centrals (53.09%), noneruption of incisors (17.94%), and diastema (28.97%).

Conclusion: Mesiodens is the most common form of supernumerary teeth in permanent dentition. Early detection and management of all supernumerary teeth is a necessary part of preventive dentistry.

Keywords: Mesiodens, Pediatric population, Prevalence, Supernumerary teeth.

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INTRODUCTION

The developmental anomaly of teeth where a tooth in addition to the normal series is present is called a supernumerary tooth.¹ Eighty to ninety percent of all supernumerary teeth occur in the maxilla, and the maxillary anterior region is the most affected area.^{2,3} Supernumerary tooth present in-between the two central incisors was coined as mesiodens by Balk (1917).³ The prevalence ranges from 0.15 to 3.8% (in permanent dentition) and 0 to 1.9% (in primary dentition).^{1,2} The frequency is more in boys in permanent dentition, while no significant sex distribution is noted in primary dentition. Mesiodens are divided into four subtypes based on morphology: conical, supplemental, odontome, and tuberculate. They may be unilateral or bilateral, single or multiple, and erupted or unerupted.² Supernumerary teeth may be associated with syndromes, such as cleft lip and palate, Cleidocranial dysplasia, Down's syndromes, etc.^{1,4} Various hypotheses have been suggested for their etiology, which include dental lamina hyperactivity, tooth bud dichotomy, and a combination of genetic and environmental factors.¹ Mesiodens may erupt normally, follow an abnormal path of eruption, or stay impacted. Complications associated with mesiodens include delayed eruption or altered position of the permanent central incisors, median diastema, and dentigerous cyst formation.^{2,5–7}

The present study was conducted to determine the prevalence of mesiodens along with other associated epidemiological characteristics.

MATERIALS AND METHODS

A retrospective evaluation of data of patients who visited the Department of Pedodontics and Preventive Dentistry from January

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2010 to January 2020 was done to calculate the prevalence of mesiodens. Informed consent was not obtained, as this study was retrospective in nature. In all, 60,590 children (33,038 boys and 27,552 girls), in age range from 4 to 12 years, who visited for treatment of gingival disease, caries, tooth fracture, malocclusion, or routine checkup were included. Patients with history of anterior tooth loss or extraction, any underlying systemic illness, syndromes such as cleidocranial dysplasia, Down's syndromes, and cleft lip and palate were excluded from the study. Radiographs of only those patients who complained about median diastema, a delay of eruption of the permanent central incisors, alteration in the position of the permanent incisors, any other problem related to maxillary anterior region, or who reported with an erupted mesiodens was taken. Radiographic examinations include periapical radiograph of the premaxillary area, occlusal radiograph, orthopantomogram, and CBCT (as required according to the case). Figures 1 to 3 show radiograph of few patients in who mesiodens were present.

Fig. 1: IOPA showing 2 mesiodens

Fig. 2: Occlusal radiograph showing mesiodens

Fig. 3: OPG showing mesiodens

Other variables recorded were age, gender, morphology, number, orientation, and any associated complications. Data were collected and put to statistical analysis.

RESULTS

The prevalence of mesiodens was 1.12% (680 cases), and boys were more affected than girls, with the ratio being 3.22:1 (Table 1). The dentition-wise prevalence was 40 (5.88%) patients in primary dentition stage, 568 (83.53%) patients in mixed dentition stage, and 72 (10.59%) patients were in permanent dentition stage. Out of the 680 patients, 149 patients had 2 (21.91%) mesiodens, whereas 531 cases had 1 (78.09%) mesiodens accounting a total of 829 mesiodens in 680 patients (Table 2). The majority of the cases were detected between 8 years and 10 years of age (Fig. 4). Conical shape was the most common type (92.76%) in the total sample (Table 3). The other types were supplemental (4.7%), odontome (1.33%), and tuberculate (1.21%). The most prevalent form of mesiodens in primary dentition was supplemental and in mixed and permanent dentition was conical in shape. Vertical position of mesiodens was noted in 67.67%, inverted position in 28.35%, and transverse position in 3.98% (Table 4). One hundred forty mesiodens (16.89%) were unerupted, and the remaining 689 mesiodens (83.11%) were erupted (Table 5). Three hundred eighty-six (46.56%) of the mesiodens were palatally positioned, 82 (9.89%) were labially placed, and 361 (43.55%) were within the arch (Table 6). Root formation was complete in 546 (65.86%) mesiodens; however, 283 (34.14%) had incomplete root formation (Table 7). Complications caused by mesiodens were malalignment

Fig. 4: Distribution of patients with mesiodens according to age group

Table 1: Prevalence of mesiodens

Sex	Number of patients	Percentage	p value
Male	519	76.32	<0.001 (HS)
Female	161	23.68	
Total	680	100	

Table 2: Number of mesiodens

Number of mesiodens	Number of patients	Percentage
Single	531	78.09
Two	149	21.91
Three or more	0	0
Total	680	100

of maxillary centrals (53.09%), noneruption of incisors (17.94%), and diastema (28.97%) (Table 8) (Figs 5 and 6). Distribution of mesiodens according to different variables is depicted in Table 9.

DISCUSSION

Mesiodens is the most common supernumerary teeth present between central incisors, usually peg shaped, in either normal or

Table 3: Type of mesiodens

Type	Number of mesiodens	Percentage
Conical	769	92.76
Supplemental	39	4.70
Odontome	11	1.33
Tuberculate	10	1.21
Total	829	100

Table 4: Position of mesiodens

Position	Number of mesiodens	Percentage
Vertical	561	67.67
Inverted	235	28.35
Transverse	33	3.98
Total	829	100
1 vs 2	$p < 0.001$	HS
1 vs 3	$p < 0.001$	HS
2 vs 3	$p < 0.001$	HS

Table 5: Eruption status of mesiodens

Type	Number of mesiodens	Percentage	p value
Erupted	689	83.11	<0.001 (HS)
Unrupted	140	16.89	
Total	829	100	

Table 6: Location of mesiodens

Position	Number of mesiodens	Percentage
Palatal	386	46.56
Within arch	361	43.55
Labial	82	9.89
Total	829	100
1 vs 2	$p < 0.05$	NS
1 vs 3	$p < 0.001$	HS
2 vs 3	$p < 0.001$	HS

Table 7: Root status of mesiodens

Root status	Number of mesiodens	Percentage	p value
Complete	546	65.86	<0.001 (HS)
Incomplete	283	34.14	
Total	829	100	

Table 8: Complications associated with mesiodens

Complications	Number of patients	Percentage
Mal-alignment of incisors	361	53.09
Noneruption of incisors	122	17.94
Diastema	197	28.97
Total	680	100

Fig. 5: Clinical picture showing mesiodens **Fig. 6:** Clinical picture showing mesiodens in maxilla**Table 9:** Distribution of mesiodens according to different variables

Shape	Position			Root maturation status		Eruption status	
	Vertical (561)	Inverted (235)	Transverse (33)	Incomplete (283)	Complete (546)	Erupted (689)	Unrupted (140)
Conical (769)	515	226	28	255	514	635	134
Supplemental (39)	38	1	0	8	31	38	1
Odontome (11)	2	6	3	10	1	8	3
Tuberculate (10)	6	2	2	10	0	8	2
Total (829)	561	235	33	283	546	689	140

inverted position (Balk, 1917).³ These are discovered on a complaint by patient or when the patient seeks treatment for malocclusion and sometimes during routine radiographic examination. The etiology is not completely understood, and various theories were proposed. The theories of phylogenetic relic of ancestors who had three central incisors and dichotomy of the tooth bud are no longer applicable. The theory suggesting hyperactivity of the dental lamina is the most widely supported.^{2,8} The dental lamina remnants or their palatal offshoots result in a supernumerary tooth. Genetic predilection together with environmental factors may be the reason behind higher frequency among family members; however, simple Mendelian pattern is not followed.²

The prevalence of mesiodens in the present study was 1.12% (680 cases) (Table 1). The global prevalence of mesiodens according to various studies ranges between 0.15 and 3.8%.^{2,7} The prevalence of mesiodens in Indian subcontinent varies from 0.69 to 3.18%.^{1,3,9,10} The predilection ratio of occurrence of supernumerary between permanent and primary dentition is 5:1.^{2,3,8,9,11,12}

The number of supernumerary teeth was 1 (78.09%) in 531 cases and 2 (21.91%) in 149 cases. Three or more mesiodens were not found in any subject (Table 2). These findings were supported by other studies also.^{1,7} Of the 680 patients with mesiodens in the present study, the ratio of males (519 cases) to females (161 cases) was 3.22:1 (Table 1). The values were in accordance with most studies.^{1,2,8,11–13}

In the present study, maximum incidence was reported between 8 years and 10 years of age (Fig. 4). The maxillary incisors usually erupt during this period, and radiographic examination is routinely performed when delay of eruption and malposition of incisors was seen. It might be the logical reason behind most mesiodens reported during this period.^{1,14}

Mesiodens can be classified according to their shape and size as eumorphic and dysmorphic.² Mesiodens similar to a normal-sized central incisor belongs to eumorphic or supplemental subclass, whereas teeth having different shapes and sizes are dysmorphic and subcategorized into conical, tuberculate, and odontomes. In general, supplemental or conical morphology of mesiodens is common in primary dentition and the conical shape in permanent dentition in various studies.^{1,4,7,9,15} In the present study, conical shape was found in majority of the cases (92.76%) with highest prevalence of supplemental in primary dentition.

With regard to the direction of the crown of the mesiodens, 67.67% was in a vertical position, 28.35% was in an inverted position, and 3.98% was in a transverse position (Table 4). Majority of studies reported vertical position of the supernumerary teeth to be most prevalent.^{1,3,7,13,14}

Our study findings showed that 83.11% mesiodens were clinically erupted, whereas 16.89% were impacted (Table 5). The study also evaluates interrelation among various variables and characteristics of supernumerary teeth. Eruption status of supernumerary teeth may be influenced by its morphology, orientation, sagittal position, and root completion.⁷ Vertical orientation, conical morphology, palatal, or within arch position and complete root favored the eruption of supernumerary teeth. The shape of supernumerary teeth seems to play a role in eruption as tuberculate form has an inclination to be impacted but in present study most of tuberculate mesiodens were erupted may be because of their vertical position.⁸ In contrast, conical form favors eruption and usually have complete root formation.⁸ According to a study, root development was completed at a rate of 81.69%.⁷ However,

they could not trace out any direct relationship between root development and tooth eruption. In our study, 65.86% mesiodens had complete root development.

Various studies claimed delay or non-eruption of central incisors in 26 to 52% cases and rotation or displacement of the adjacent teeth in 28 to 63% cases.^{1,2,5,6} According to Tashima, the prevalence of interincisal diastema is seven times higher in the presence of mesiodens. In the present series, complications caused by mesiodens were malalignment of maxillary centrals (53.09%), noneruption of incisors (17.94%), and diastema (28.97%) (Table 8). Dentigerous cyst or radicular resorption of adjacent teeth was not observed in the present study probably because these complications occur in long-standing cases, whereas the present study involved only the pediatric population. Some authors had reported cases, where the mesiodens was considered as a risk factor for causing as well as complicating dental trauma.³

A thorough clinical and radiological examination is required for management of mesiodens. Removal of supernumerary is indicated when eruption problems, malalignment of the adjacent teeth, associated pathology, and any interference with orthodontic movement is noticed. There is a controversy in the literature regarding the time of removal of any unerupted mesiodens. Russel and others recommended extraction of mesiodens in the early mixed dentition stage for better alignment of teeth and minimizing the need for orthodontic treatment.¹⁶ Eight to 9 years of age is believed to be the best time for removal of mesiodens because the normal eruptive forces promote spontaneous eruption of the permanent central incisors after the extraction, moreover behavior management of a child is much easier at this age, and the type of anesthesia required can be less invasive.⁶ However, surgery should be avoided if the mesiodens remains asymptomatic, or there is potential risk of damaging the developing permanent incisors.^{2,7} Such patients should be kept on longer periodic follow-ups because such mesiodens can show movement in future or can cause problems with developing dentition. The pedodontist can play important role in such cases because the earlier the detection, the better the prognosis, and future complications would be minimal.

There were some shortcomings of the study. As radiographs were not taken of all the patients reported, some patients with inverted and impacted mesiodens who were asymptomatic might have been missed in this study.

CONCLUSION

Mesiodens is the most common form of supernumerary teeth with reported prevalence of 1.12% in present study. Eruption status of supernumerary teeth may be influenced by its morphology, orientation, sagittal position and root completion. They may cause problems in eruption and alignment of permanent teeth. A clinician should be knowledgeable about the signs and symptoms of mesiodens and should render appropriate treatment to avoid future complications.

REFERENCES

1. Mukhopadhyay S. Mesiodens: a clinical and radiographic study in children. *J Indian Soc Pedod Prev Dent* 2011;29(1):34–38. DOI: 10.4103/0970-4388.79928.
2. Meighani G, Pakdaman A. Diagnosis and management of supernumerary (mesiodens): a review of the literature. *J Dent (Tehran)* 2010;7(1):41–49.

3. Khandelwal V, Nayak AU, Naveen RB, et al. Prevalence of mesiodens among six- to seventeen-year-old school going children of Indore. *J Indian Soc Pedod Prev Dent* 2011;29(4):288–293. DOI: 10.4103/0970-4388.86369.
4. Verma L, Gauba K, Passi S, et al. Mesiodens with an unusual morphology - a case report. *J Oral Health Comm Dent* 2009;3(2): 42–44.
5. Bartolo A, Camilleri A, Camilleri S. Unerupted incisors - characteristic features and associated anomalies. *Eur J Orthod* 2010;32(3):297–301. DOI: 10.1093/ejo/cjp094.
6. Leyland L, Batra P, Wong F, et al. Permanent incisors after extraction of supernumerary teeth. *J Clin Pediatr Dent* 2006;30(3):225–232.
7. Altan H, Akkoc S, Altan A. Radiographic characteristics of mesiodens in a non-syndromic pediatric population in the black sea region. *J Investig Clin Dent* 2019;10(1):e12377. DOI: 10.1111/jicd.12377.
8. Rajab LD, Hamdan MAM. Supernumerary teeth: review of the literature and a survey of 152 cases. *Int J Paediatr Dent* 2002;12(4): 244–254. DOI: 10.1046/j.1365-263X.2002.00366.x.
9. Pal S, Galui S, Biswas R, et al. Prevalence and type of mesiodens among 3-14-year-old children in West Bengal: an institutional study. *Int J Pedod Rehabil* 2019;4(1):9–12. DOI: 10.4103/ijpr.ijpr_33_18.
10. Dharmani CKK, Singh N, Devi WB, et al. Prevalence and characteristics of supernumerary teeth in pediatric population of North East India. *J South Asian Assoc Pediatr Dent* 2018;1(2):54–57. DOI: 10.5005/jp-journals-10077-3013.
11. Hypodontia Davis P. And hyperdontia of permanent teeth in Korean schoolchildren. *Korean J Cleft Lip Palate* 2001;4(2):19–27. http://astp.jst.go.jp/modules/search/DocumentDetail/1229-0734%2B%2540%2B_4_2_Hypodontia%2Band%2BHyperdontia%2Bof%2BPermanent%2BTeeth%2Bin%2BKorean%2BSchoolchildren_N%252FA.
12. Miyoshi S, Tanaka S, Kunimatsu H, et al. An epidemiological study of supernumerary primary teeth in Japanese children: a review of racial differences in the prevalence. *Oral Dis* 2008;6(2):99–102. DOI: 10.1111/j.1601-0825.2000.tb00108.x.
13. Goksel S, Agirgol E, Karabas HC, et al. Evaluation of prevalence and positions of mesiodens using cone-beam computed tomography. *J Oral Maxillofac Res* 2018;9(4):1–7. DOI: 10.5037/jomr.2018.9401.
14. Asaumi J, Shibata Y, Yanagi Y, et al. Radiographic examination of mesiodens and their associated complications. *Dentomaxillofac Radiol* 2004;33(2):125–127. DOI: 10.1259/dmfr/68039278.
15. Ramesh K, Venkataraghavan K, Kunjappan S, et al. Mesiodens: a clinical and radiographic study of 82 teeth in 55 children below 14 years. *J Pharm Bioallied Sci* 2013;5(Suppl. 1):S60–S62. DOI: 10.4103/0975-7406.113298.
16. Russel KA, Folwarczna MA. Mesiodens-diagnosis and management of a common supernumerary tooth. *J can dent Assoc* 2003;69:362–366.