

Prevalence of Supernumerary Teeth and Its Associated Complications among School-going Children between the Ages of 6 and 15 Years of Jamshedpur, Jharkhand, India

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ABSTRACT

Background: Supernumerary teeth (ST) are those that exceed the normal dental formula. This phenomenon is also known as hyperdontia, and can occur in solitary or multiple forms, might be unilateral or bilateral, and affect one or both jaws.

Aim: To study the prevalence, gender variations in terms of frequency, characteristic, distribution, and associated complications with the presence of ST in 3,000 school-going children of age 6–15 years in Jamshedpur, Jharkhand, India.

Materials and methods: The study consisted of an examination of randomly selected 3,000 children, female (group I) and male (group II), between the age-group of 6 and 15 years, from both private and government-aided schools. Clinical examinations were carried out by a single investigator under natural daylight in a systematic manner using a mouth mirror and straight probe only. The demographic profiles and number of teeth, including the presence of any ST (site, region, eruption status, morphology, and whether it was present unilaterally or bilaterally), were ascertained. Malocclusion or any complications associated with ST were also noted.

Results: ST prevalence was found to be 1.87%, with male to female ratio of 2.29:1. Out of 56 children with ST, eight children had double ST while 48 had single, 53 ST were present in maxilla, and only three in mandible. Based on the region, 51 ST were present in the midline, four in the central incisor region, and one in the molar region. According to morphology, 38 ST were conical, 11 ST were tuberculate, and seven ST were supplementary. Twenty-two ST had associated complications, while 34 ST were asymptomatic.

Conclusion: ST prevalence is relatively less, but if left neglected, it can pose serious associated dental problems in the child.

Keywords: Jamshedpur city, Mesiodens, Prevalence, Supernumerary teeth, Supplementary teeth.

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INTRODUCTION

The development of teeth is a highly complex phenomenon controlled by various intricate and delicate mechanisms, which are dependent on both hereditary and environmental factors.¹ Mammalian dentition consists of teeth that develop as discrete organ, which starts as an epithelial bud and then it undergoes complex morphogenesis, which is again regulated by epithelial and mesenchymal tissue layer interactions.² There are many types of developmental anomalies found in the teeth that occur during the morphodifferentiation stage of development.

Supernumerary teeth are the most widely reported and significant tooth anomaly in patients, affecting primary, mixed, and permanent dentition. Aberrations in a normal number of teeth are described as developmental anomalies under the term ST or hyperdontia.³ They are seen during routine dental checkups with any other specific chief complaint. Prevalence of ST in permanent dentition was reported in 1–3%, while in primary dentition it was 0.3–0.6%.⁴ The most common ST appear in the maxilla and is called mesiodens.⁵ Single supernumeraries occur in 76–86% of cases, double supernumeraries in 12–23% of cases, and multiple supernumeraries in <1% of cases.⁶ Multiple ST are usually associated with conditions like cleidocranial dysplasia, Gardner's syndrome, Ehlers–Danlos syndrome, Ellis–Van Creveld syndrome, Anderson–Fabry disease, and cleft lip and palate.^{7,8}

Although age is an important factor while evaluating the prevalence figures of developmental disorders, it was considered

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inappropriate for ST as there is no specified time or age when ST begin to develop.⁹ According to the location, ST are classified as¹⁰ mesiodens: a conical ST, situated between the maxillary central incisors. It may be single or multiple, unilateral or bilateral, erupted or impacted, vertical, horizontal, or inverted. Paramolar: a supernumerary molar, usually small and rudimentary, situated

buccally or palatally to one of the maxillary molars or in the interproximal space buccal to the second and third molars. Distomolar: a supernumerary tooth, which is located distal to the third molar. Like the paramolar, distomolar is also rudimentary. According to the form, ST are classified as conical, tuberculate, supplemental, and odontome. Primosch also classified ST into two types according to their shape: supplemental (or eumorphic) refers to ST of normal size and shape and may also be termed incisiform. Rudimentary (or dysmorphic) defines teeth of abnormal shape and smaller size, including conical, tuberculate, and molariform types.

Various theories exist regarding the etiology of different types of ST. Atavism theory¹¹ suggests that ST are a result of phylogenetic reversion to extinct primates with three pairs of incisors. Atavism is the tendency to revert to ancestral characters. It is considered as the reappearance of lost characters or traits which had disappeared generations before or which are not observed in the parents or recent ancestors of the organism displaying the atavistic character. The dichotomy theory¹² of tooth germs states that the tooth bud splits into two equal or different-sized parts, resulting in two teeth of equal size or one normal and one dysmorphic tooth, respectively. Hyperactivity theory¹³ suggests that supernumeraries are formed as a result of local independent conditioned hyperactivity of dental lamina. However, dental lamina hyperactivity continues to be the most accepted school of thought.

Sometimes, ST presence can cause complications, including impaction of a normal tooth, delayed eruption, ectopic eruption, overcrowding, spacing, displacement, and formation of follicular cysts.¹⁴ Extraction is not always the treatment of choice for ST. They may be monitored without removal where a satisfactory eruption of related teeth has occurred; no active orthodontic treatment is envisaged; no associated pathology; or when its removal would prejudice the vitality of the related teeth.¹⁵

With this background, the present study was planned to study the prevalence, gender variations in terms of frequency, characteristic, distribution, and associated complications with the presence of ST in 3,000 school-going children of age 6–15 years in Jamshedpur, Jharkhand, India.

MATERIALS AND METHODS

The study consisted of an examination of randomly selected 3,000 school-going children, female (group I) and male (group II), between the age-group of 6 and 15 years from both private and government-aided schools of Jamshedpur city. The Institutional Ethical Committee clearance and due permissions

from respective school authorities were obtained before the commencement of the survey. The inclusion criteria consisted of (1) school-going children of 6–15 years in Jamshedpur city and (2) children who have no previous extraction or tooth loss due to trauma. The school-going children below this age-group, children diagnosed with any syndrome, and a history of medical and physical disability were excluded.

All clinical examinations were carried out by a single investigator under natural daylight in a systematic manner using a mouth mirror and straight probe only. Chemical methods of disinfection were followed, using Savlon solution by mixing one part of Savlon with three parts of water. The 10% of the children were reexamined to minimize the intra-examiner variability. An average of 25–30 children were examined per day. The written and informed consents were obtained from the children's guardians. The information regarding the patient's demographic profile (including age and sex) and the number of teeth were ascertained, noting any ST. The site, region, eruption status, morphology, and whether it was present unilaterally or bilaterally were noted. Malocclusion or any complication associated with ST, such as displacement and rotations of adjacent teeth, ectopic eruption, caries, or any cyst associated with the ST, were also recorded in a detailed pro forma.

Statistical Analysis Done

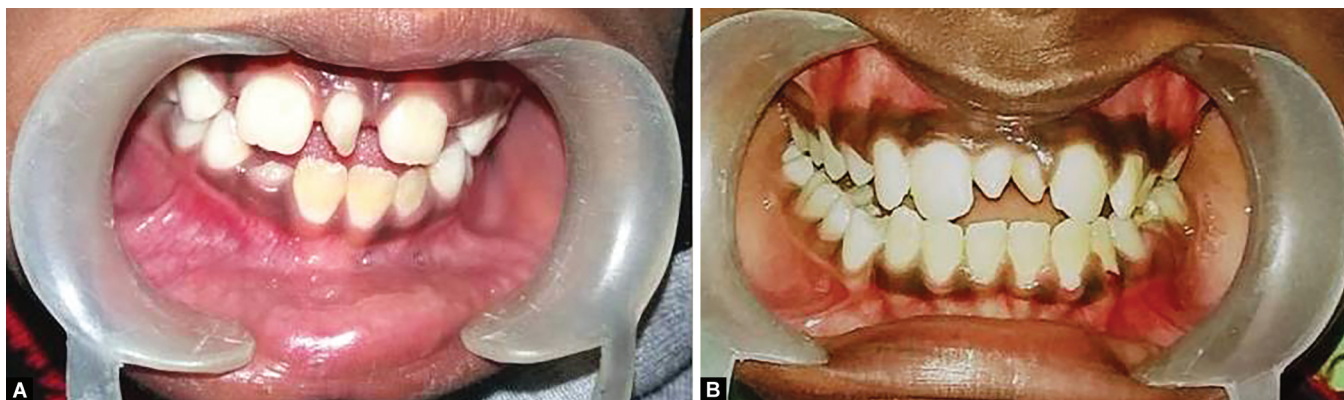
The data, thus collected, were tabulated and statistically analyzed using International Business Machines' Statistical Package for the Social Sciences software version 19.0, using the Chi-square test for the prevalence of ST, and Fisher's exact test for the association between genders for the study parameters. The p -value < 0.05 was considered statistically significant.

RESULTS

The prevalence of ST was found to be 1.87% (56 out of 3,000 children), with 1.13% (17) cases detected in group I and 2.6% (39) cases detected in group II children. The male-to-female ratio was 2.29:1, with a statistically significant association ($p < 0.03$) between gender and the prevalence of ST.

Out of 56 children with ST, eight children (group I = 2; group II = 6) had double supernumerary, while 48 (group I = 15; group II = 33) had single ST (Fig. 1). There was no significant correlation ($p = 1.00$) found between group I and group II regarding the number of ST (Table 1).

Based on the site, it was found that 53 ST (group I = 17; group II = 36) were present in the maxilla and only three



Figs 1A and B: Showing ST according to the number

(group I = 0; group II = 3) in the mandible (Fig. 2). There was no statistical correlation ($p = 0.55$) found between group I and group II, with respect to the site of ST (Table 2).

According to the region, it was found that 51 ST (group I = 17; group II = 34) were present in the midline, four ST (group I = 0; group II = 4) were present in the central incisor region, and one (group I = 0; group II = 1) was present in the molar region. There was no statistical correlation ($p = 0.51$) found between group I and group II, with respect to the region of location of ST (Table 3).

Based upon morphology, it was noted that 38 ST (group I = 14; group II = 24) were conical in form, 11 ST (group I = 1; group II = 10)

were tuberculate, and seven ST (group I = 2; group II = 5) were supplementary in morphology (Fig. 2). There was no statistical correlation ($p = 0.25$) found between group I and group II, with respect to the morphology of ST (Table 4).

Regarding the clinical complications, it was found that 22 ST (group I = 4; group II = 18) had associated complications, while 34 ST (group I = 13; group II = 21) were asymptomatic. There was no statistical correlation ($p = 0.65$) found between group I and group II, with respect to associated clinical complications of ST (Table 5).

DISCUSSION

Early detection and diagnosis of dental anomalies are essential in a child patient so that later on, associated complications can be prevented. The most frequent anomalies which manifest in children are anodontia, followed by ST and fusion of teeth.¹⁰ In the present study, the prevalence of ST among children was found to be 1.87%, which is almost similar to the results by Clayton et al.⁹ (1.9%) and

Table 1: Prevalence of ST according to the number

No. of supernumerary teeth (ST)	Gender		Total
	F	M	
Double	2 (11.8%)	6 (15.4%)	8 (14.3%)
Single	15 (88.2%)	33 (84.6%)	48 (85.7%)
Total	17	39	56

Fisher's exact test, $p = 1.00$ (NS)*

* $p > 0.05$; NS, Nonsignificant

Table 2: Prevalence of ST according to site

Site of ST	Gender		Total
	F	M	
Mandible	0	3 (7.7%)	3 (5.4%)
Maxilla	17 (100.0%)	36 (92.3%)	53 (94.6%)
Total	17	39	56

Fisher's exact test, $p = 0.55$ (NS)*

* $p > 0.05$; NS, Nonsignificant

Table 3: Prevalence of ST according to region

Region of ST	Gender		Total
	F	M	
Central incisor	0	4 (10.3%)	4 (7.1%)
Midline	17 (100.0%)	34 (87.2%)	51 (91.1%)
Molar	0	1 (2.6%)	1 (1.8%)
Total	17	39	56

Fisher's exact test, $p = 0.51$ (NS)*

* $p > 0.05$; NS, Nonsignificant

Table 4: Prevalence of ST according to morphology

Type of ST	Gender		Total
	F	M	
Conical	14 (82.4%)	24 (61.5%)	38 (67.9%)
Supplemental	2 (11.8%)	5 (12.8%)	7 (12.5%)
Tuberculate	1 (5.9%)	10 (25.6%)	11 (19.6%)
Total	17	39	56

Fisher's exact test, $p = 0.25$ (NS)*

* $p > 0.05$; NS, Nonsignificant

Table 5: Distribution of ST according to clinical complications

Complication of ST	Gender		Total
	F	M	
Axial rotation	3 (17.6%)	6 (15.4%)	9 (16.1%)
Delayed eruption	0	3 (7.7%)	3 (5.4%)
Displacement	0	2 (5.1%)	2 (3.6%)
Midline diastema	0	3 (7.7%)	3 (5.4%)
Normal	13 (76.5%)	21 (53.8%)	34 (60.7%)
Others	1 (5.9%)	4 (10.3%)	5 (8.9%)
Total	17	39	56

Fisher's exact test, $p = 0.65$ (NS)*

* $p > 0.05$; NS, Nonsignificant



Figs 2A and B: Showing ST according to the site

Hansen L et al.¹⁶ (1.9%). On the contrary, the present study on ST prevalence was found to be higher than values reported by Miyoshi et al.¹⁷ (1.5%), Segura and Jiménez-Rubio¹⁸ (0.4%), and by Almeida JD et al.¹⁹ (1.28%). These differences could be due to social variations, difference in ages of the subjects, and examination methods used for conducting the studies. Moreover, the present survey was conducted without the use of radiographs for each child; hence, it may have underestimated the prevalence as unerupted ST escape detection.

Sexual dimorphism has been reported in the present study for the occurrence of ST favoring males, 2.29:1. Similar results were obtained by Miyoshi et al.¹⁷ (2.5:1) and Sharma A et al.²⁰ This was explained by Humerfelt et al.²¹ by the fact that hyperdontia trait follows a sex-linked inheritance, and ST are associated with an autosomal recessive gene with lesser penetrance in females, explaining the existence of a sex predominance of males over females.

Supernumerary teeth have been reported in both primary and permanent dentition; however, a higher incidence of the anomaly is noted in permanent dentition.²² In the primary dentition, ST occur most commonly in the lateral incisor region as opposed to permanent, where ST are most commonly seen in the central incisor region.⁷ In our study, the primary teeth were not involved, as all 56 supernumeraries among 3,000 school-going children were in permanent dentition. This could be explained by the fact that hyperdontia in primary dentition is often overlooked because ST are of normal shape, erupt in proper alignment occupying the interdental spaces, and often can be mistaken for gemination or fusion anomalies.

In our study, 94.64% of ST were present in the maxilla, out of which 40% were located in the premaxilla and only 5.36% of ST were present in the mandible. The findings were in accordance with past studies. The embryological development of the premaxilla is different from the remaining maxilla. The premaxilla and the teeth in the anterior region are formed by the interaction of the migrated neural crest cells with the local ectoderm. It is suggested that the presence of ST in the premaxilla may be caused by deviations in the premigratory population of neural crest cells, as well as disturbances in their normal migration, proliferation, and differentiation.²³

In our study, out of 56 teeth, 38 were conical in shape; this was in accordance with other studies by Tay et al.,²⁴ Liu,¹² and Roychoudhury et al.,²⁵ who also reported that mesiodens occurring along the midline are usually conical in shape. According to the study by Proff et al.,²⁶ 25.80% of teeth were found to be mesiodens, 24.10% of teeth to be paramolars, 12.50% to be distomolars, and 37.50% to be supplementary teeth.

In the present study, the most common complication associated with ST was the axial rotation of incisors (40.90%), spacing and occurrence of diastemas in 13.64% of cases, followed by delayed eruption of permanent teeth in 13.64% of cases. Displacement of permanent teeth was seen in 9.09% of cases, and in 60.71% of cases it existed without posing any problems. Batra P et al.²² had stated that tuberculate types of ST are more commonly responsible for delayed eruption of permanent teeth, followed by conical-shaped ST. They have recommended surgical intervention to remove these supernumeraries around the age of 8–10 years after adequate apical maturation has taken place in order to prevent any damage to developing roots.

CONCLUSION

Supernumerary teeth are more frequent among males than females, more frequent in the upper premaxillary region,

and more prevalent in permanent dentition. Complications associated with ST include impaction, delayed eruption, ectopic eruption, dental overcrowding, teeth spatial disorders, and formation of follicular cysts. The treatment of ST depends on their type, position, and possible complications detected in clinical examination. This study also emphasized on the role of the dentist to carry out a thorough clinical diagnosis of children as ST are unusual but they cannot be considered rare and innocuous entities.

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