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Assessment of prevalence of hyperdontia in non-Syndromic Bihar population

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Abstract
The prevalence of hyperdontia has been reported in several studies with variations between different ethnic groups. These variations could be attributed to racial differences as well as differences related to methodologies adopted; diagnostic criteria, analyses employed, and sample sizes. Therefore, the current study was aimed at studying and reporting the prevalence of supernumerary teeth in non-syndromic in bihar population.
The study was planned on the 50 patients visited to Department of Dentistry in Sri Krishna Medical College and Hospital, Muzaffarpur .Panoramic radiographs and clinical records of patients above the age of 18 years and without any syndromic features were selected for the study.
The results of the present study underline the requisite for primary detection and appropriate treatment of these teeth. It should be prudent to adopt a routine radiographic screening of maxillary anterior region at early mixed dentition stage. Knowledge about the supernumerary teeth is important for dental clinicians as they are relatively common but are detected as an incidental finding in a radiograph.

Keywords: hyperdontia, orthodontic patients, prevalence

Introduction
Hyperdontia is the condition of having supernumerary teeth, or teeth that appear in addition to the regular number of teeth. They can appear in any area of the dental arch and can affect any dental organ. The opposite of hyperdontia is hypodontia, where there is a congenital lack of teeth, a condition which is seen more commonly than hyperdontia [1]. The scientific definition of hyperdontia is "any tooth or odontogenic structure that is formed from tooth germ in excess of usual number for any given region of the dental arch [2]. The additional teeth, which may be small in number, or many, can occur on any place in the dental arch. Their arrangement may be symmetrical or non-symmetrical.
The presence of a supernumerary tooth, particularly when seen in young children, is associated with a disturbance of the maxillary incisor region. This commonly results in the impaction of the incisors during the mixed dentition stage. The study debating this also considered many other factors such as: the patient's age, number, morphology, growth orientation and position of the supernumerary tooth. Alongside this issue, the presence of an extra tooth can impede the eruption of adjacent additional or normal teeth. Therefore, the presence of a supernumerary tooth when found must be approached with the appropriate treatment plan, incorporating the likelihood of incisal crowding [3]. In some individuals, the additional teeth can erupt far from the dental arch, within the maxillary sinus. The extra teeth may also migrate to a different location after development [4]. In some cases, supernumerary teeth can lead to the formation of cysts. Crowding is also frequently seen in people with hyperdontia [2].
There is evidence of hereditary factors along with some evidence of environmental factors leading to this condition. While a single excess tooth is relatively common, multiple hyperdontia is rare in people with no other associated diseases or syndromes [5]. Many supernumerary teeth never erupt, but they may delay eruption of nearby teeth or cause other dental or orthodontic problems [6, 7]. Molar-type extra teeth are the rarest form. Dental X-rays are often used to diagnose hyperdontia. It is suggested that supernumerary teeth develop from a third tooth bud arising from the dental lamina near the regular tooth bud or possibly from splitting the regular tooth bud itself. Supernumerary teeth in deciduous (baby) teeth are less common than in permanent teeth. Hyperdontia may be seen in a multitude of syndromic conditions such as: Cleft lip/palate, Craniofacial Dysplasia, Gardner Syndrome and Sturge-Weber Syndrome [8].
Supernumerary teeth may be detected by taking two different dental X-rays at different angles. Examples of this may be an intra-oral X-ray (one that is taken inside the mouth) and a panoramic radiograph. However, these X-rays are 2D and therefore do not accurately portray the 3D view of the teeth [2].
Supernumerary teeth can be classified by shape and by position. The shapes include the following:
1. Supplemental (where the tooth has a normal shape for the teeth in that series);
2. Tuberculate (also called barrel shaped);
3. Conical (also called peg shaped);
4. Compound odontoma (multiple small tooth-like forms);
5. Complex odontoma (a disorganized mass of dental tissue) [9]

When classified by position, a supernumerary tooth may be referred to as a mesiodens, a parameter, or a distomolar [9]. Occasionally, these teeth do not erupt into the oral cavity but manifest as a malocclusion [10]. The most common supernumerary tooth is a mesiodens, which is a malformed, peg-like tooth that occurs between the maxillary central incisors. Fourth and fifth molars that form behind the third molars are another kind of supernumerary teeth [11].

Although these teeth are usually asymptomatic and pose no threat to the individual, they are often extracted for aesthetic reasons, to allow the eruption of other teeth, orthodontic reasons and/or suspected pathology. This is done particularly if the mesiodens is positioned in the maxillary central incisor region. The traditional method of removal is done by using bone chisels, although a more advanced technique has been found to be more beneficial, especially if surgery is required. Through the use of piezoelectricity, piezoelectric ultrasonic bone surgery may be more time consuming than the traditional method but it seems to reduce the post-operative bleeding and associated complications quite significantly [12].

It is evident that hyperdontia is more common in the permanent dentition than in the primary. There is a considerable difference between males and females in the prevalence of these teeth in permanent dentition; hyperdontia is twice as common in males as in females. However, this approximation varies in terms of location, other associating syndromes that may be present, and the ethnicity of the individual. In terms of ethnicity, it can be seen that hyperdontia is in fact less common in Caucasian than in Asian populations. There is evidence to show that an individual is more likely to have hyperdontia if other members of their family also have the condition [2].

The prevalence of hyperdontia has been reported in several studies with variations between different ethnic groups. These variations could be attributed to racial differences as well as differences related to methodologies adopted; diagnostic criteria, analyses employed, and sample sizes. Therefore, the current study was aimed at studying and reporting the prevalence of supernumerary teeth in non-syndromic in north Indian paediatric population.

Methodology

The study was planned on the 50 patients visited to Department of Dentistry in Sri Krishna Medical College and Hospital, Muzaffarpur. Panoramic radiographs and clinical records of patients above the age of 18 years and without any syndromic features were selected for the study.

The study protocol was reviewed and approved by Institutional Ethical committee. Informed consent was taken from the parents of the patients. Diagnosis of supernumerary teeth was based on detailed dental history, intraoral examination, pre-treatment records, panoramic and intraoral radiographs. All the patients were examined clinically and radiographically in the orthodontic clinic by two examiners for the presence of any supernumerary and all radiographs had diagnostic clarity.

Exclusion Criteria: patients having syndrome or congenital anomalies such as cleft lip/palate.

Results & Discussion

The data from the 50 patients evaluated in the Department of Dentistry were collected and presented as below. The data generated showed the distribution of cases as per gender, type, frequency, jaw and eruption status.

Table 1: Distribution of cases as per gender

Gender	Total Cases	Patients with hyperdontia
Male	33	8
Females	17	5
Total	50	13

Table 2: Type of hyperdontia

Distribution	No. of Cases
Supplemental	9
Conical	2
Tuberculate	1
Odontoma	1
Total	13

Table 3: Frequency of supernumerary teeth

Frequency	No. of Cases
Mandibular incisor	5
Premolar	2
Maxillary lateral incisor	1
Maxillary canine	1
Total	9

Table 4: Distribution of hyperdontia and Eruption Status by jaw

Jaw	No. of Cases
Maxilla	7
Mandible	6
Total	13
Eruption status	No. of Cases
Impacted	8
Non Impacted	5
Total	13

Several studies have addressed the prevalence of hyperdontia; however, the results of these studies were inconsistent between and within populations. This variation may be attributed to varying sampling techniques, ethnic, genetic, and environmental differences. Comparatively, hyperdontia is more frequently encountered in orthodontic patients than in general population. Whereas several studies have investigated the prevalence of hyperdontia, only a few have accomplished in orthodontic patients [13].

Nonsyndromic hyperdontia is usually is diagnosed as an unintended radiographic finding in the course of routine examination rather than as the result of a related disease. Multiple hyperdontia usually occurs in syndromic patients with developmental disorders such as cleft lip and palate, [14-15] cleidocranial dysplasia [16], Ehlers-Danlos syndrome [17], and familial adenomatous polyposis (Gardner's syndrome), [18] and rarely occurs without associated syndromes or systemic conditions [17]. Even though radiographic examination is fundamental for differentiating hyperdontia, image particularity evidently depends on the radiograph type. This implicates that picking the convenient diagnostic tool is extremely important for precisely distinguishing hyperdontia. Consequently, in advent studies the routine use of three-dimensional images acquired by cone beam computed tomography is recommended as it is distinctly characterized the orientation of hyperdontia [19].

Townsend *et al.* [20] also speculated that supernumerary teeth, notably the addition of eumorphic teeth, showed appreciable ethnic variation and they tended to cluster in families. Garn *et al.* [21] suggested that dental development may also be influenced by maternal environment. Hence, maternal age and birth order of the child were taken as indirect measures

of intrauterine conditions, as in a study by Bailit and Sung [22].

Environmental factors, including maternal influences such as hypothyroidism, diabetes, hypertension, and smoking may affect the teeth [23]. Irradiation [24] and drugs such as thalidomide [25] during pregnancy have been reported to be the major environmental factors associated with anomalies of tooth number and size. Similarly, dental defects may also be caused by complications of pregnancy such as traumatic delivery, cesarean section, birth asphyxia, and cerebral injuries [26].

The etiological basis of extra teeth is poorly understood in human populations; however, the mouse provides a useful model system to investigate the complex genetics of tooth development. Indeed, many of the molecular signaling pathways known to be involved in normal development of the tooth germ can also give rise to additional teeth if inappropriately regulated. These include components of the Hedgehog, fibroblast growth factor, Wnt, tumor necrosis factor, and bone morphogenetic protein families, which provide a useful resource of candidate genes that may potentially play a role in human supernumerary tooth formation [27]. A more detailed investigation of the genetic pattern of individuals with supernumerary teeth in comparison to those with normal complement of teeth can be carried out. This could help in understanding the underlying genetic mechanisms. In addition, a larger sample size would probably shed more light on the role of possible environmental factors.

Supernumerary teeth may erupt in the oral cavity, or remain impacted. Supernumerary teeth, impacted or erupted may remain in position for years together, without causing any disturbances and clinical manifestations. However, in some cases, they may cause complications like impaction of permanent teeth, delayed or ectopic eruption of adjacent teeth, malocclusions like midline diastema or crowding and formation of cysts with bone destruction and root resorption of adjacent teeth [27]. These can cause potential harm to the developing occlusion in a patient, which can be difficult to intervene or may require aggressive treatment at a later stage. If more than one supernumerary tooth is present, then one of them may be erupted, while the other impacted.

Conclusion

The results of the present study underline the requisite for primary detection and appropriate treatment of these teeth. It should be prudent to adopt a routine radiographic screening of maxillary anterior region at early mixed dentition stage. Knowledge about the supernumerary teeth is important for dental clinicians as they are relatively common but are detected as an incidental finding in a radiograph.

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