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ORIGINAL RESEARCH

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Prevalence, characteristics, and complications of mesiodentes among Saudi children: a retrospective radiographic study

Basim Almulhim[1,*]

[1]Department of Orthodontics and Pediatric Dentistry, College of Dentistry, Qassim University, 52571 Buraydah, Saudi Arabia

***Correspondence**
B.almulhim@qu.edu.sa
(Basim Almulhim)

Abstract

Background: Mesiodentes may negatively impact both child facial aesthetics and occlusion. With early diagnosis and proper planning, however, healthcare providers can often prevent, or at least reduce ongoing dental complications, achieving various favourable outcomes. This study guides healthcare providers, particularly paediatric dentists, with respect to understanding the prevalence, characteristics, and related complications of mesiodentes among Saudi children. **Methods**: A retrospective radiographic study was conducted on patients visiting the Department of Orthodontics and Paediatric Dentistry at Qassim University and other private dental clinics in the Qassim region. The extracted data were prepared for final analysis. The analysis was performed by using IBM SPSS. The chi-square test and Fisher's exact test were used to measure the level of significance. **Results**: In total, 1416 children were eligible, including 51.2% boys and 48.8% girls, with a mean age of 7.93 $\pm$ 2.10 years. Only 29 children were diagnosed with 33 mesiodens. The prevalence of mesiodentes was 2% (95% confidence interval (95% CI): 1.3–2.8), with a sex-exhibiting ratio of 2.63:1, showing a male predilection (effect size: 2.5). A significant difference was observed in the prevalence of mesiodentes among both genders. Most mesiodentes occurred in the maxillary arch (96.6%, n = 28), and the conical shape was the most observed type (79.3%, n = 23). Furthermore, the majority of children showed an isolated mesiodens (86.2%, n = 25) with a vertical orientation (82.8%, n = 24). The most exhibited complication with these mesiodentes was incisor misalignment (44.8%, n = 13). **Conclusions**: In the current study, mesiodentes exhibit various dental characteristics, with a prevalence of 2% among Saudi Arabian children. Healthcare providers should assess the right timing for successful mesiodens intervention along with early diagnosis and effective treatment planning, which may enhance the likelihood of successful outcomes and avert further associated dental complications.

Keywords

Mesiodentes; Extra tooth; Prevalence; Characteristics; Complications

1. Introduction

Mesiodens is one of the most common dental developmental abnormalities; in particular, it is the most common type of supernumerary tooth, being located within the anterior part of one of the dental arches. Such supernumerary teeth may occur in either the primary or permanent dentition, though they are five times less prevalent in the primary dentition [1–3]. Approximately 80% of all cases of supernumerary teeth occur in the maxillary arch, with the vast majority of these being located in the anterior region; hence, these have been labeled as mesiodentes [4]. The occurrence rate of a mesiodens, according to the dental literature, varies from 0.15% to 1.9% [2, 3, 5]. However, some researchers have also reported mesiodentes occurring in the mandibular arch less commonly [6–12]. Mesiodentes may appear as isolated structures or in multiples; they can also manifest unilaterally or bilaterally and frequently remain unerupted [5]. Overall, mesiodentes can dramatically impact occlusion and aesthetics in children by disrupting the normal eruption process of anterior teeth, potentially leading to misalignment of the permanent incisors within the dental arch [5, 13, 14].

Through the dental literature, the exact aetiology of mesiodentes remains unknown; there are several theories that have been suggested, including dichotomy, hyperactivity of the dental lamina, and genetic factors [2, 5, 14, 15]. Based on mesiodentes morphology, mesiodentes can be divided into two categories: supplemental and rudimentary (conical, tuberculate, or molariform), either of which may cause aesthetic issues or malocclusion [5, 16, 17]. Conical mesiodentes frequently

emerge from the patient's jaw. However, if located in an inverted position, a conical mesiodens may emerge towards the nasal cavity [5, 18–20]. Furthermore, mesiodentes may appear laterally, whether unilateral or bilateral, which may be observed alongside the presence of other extra teeth [17]. Tuberculate mesiodentes tend to emerge in the oral cavity later than conical mesiodentes, typically developing in a more palatal position [21].

Both clinical dental examinations and dental radiographic interpretation should be used to help healthcare providers reach a dental diagnosis; a clinical exam alone is commonly insufficient for accurate diagnosis and final decision making. Dental radiographs used as diagnostic tools are thus supportive of a mesiodens diagnosis. The use of different types of dental radiographs, such as panoramic, occlusal, and periapical X-rays, can also help the healthcare provider to arrive at an accurate diagnosis. A panoramic X-ray, for example, aids in diagnosis and provides additional details in the presence of extra or missing teeth or similar abnormalities. However, this type of imaging often fails to provide sufficient details of a mesiodens morphology due to the fact that the midline typically remains obscured. The most commonly used dental radiographs in such situations thus involve two different angles of periapical or occlusal images in order to identify and determine the location of any mesiodens in the dental arch [22]. The "same-lingual, opposite buccal" rule also offers a diagnostic tool for the gathering of details regarding the positioning of any mesiodens [23]. To arrive at a more accurate diagnosis, three-dimensional (3D) imagery, specifically cone beam computed tomography (CBCT), can also be used to illustrate a mesiodens' location, shape, and connections to nearby structures [24, 25].

Mesiodentes often disrupt the eruption path of permanent teeth, causing misalignment of the upper incisors [1, 13, 14, 26–29]. They may, thus, also intermittently lead to certain complications with unerupted permanent incisors, including the root being dilacerated, the root possibly being resorbed, or loss of tooth vitality. Less common consequences associated with mesiodentes include eruption into the nasal cavity and the development of a dentigerous cyst, as reported in 4 to 9% of instances [14, 18–20, 30–33]. In 75% of recorded cases of mesiodentes, according to prior studies, extracting the supernumerary tooth leads to the spontaneous eruption of the affected permanent incisor into the oral cavity [19, 28]. Removing mesiodentes in primary dentition is, however, generally not advisable, as it can cause complications with the permanent successors; further, such mesiodentes typically erupt naturally into the oral cavity. Surgically removing non-erupted mesiodentes may also cause injury to nearby permanent incisors, leading to their misalignment, or it may damage the underlying tooth roots, thereby arresting root development [34–36]. In contrast, extraction during the early mixed dentition phase facilitates and allows for the normal eruption process of the permanent central incisors, thereby encouraging them to spontaneously erupt [31, 35, 37]. Any delay in intervention at this stage may, thus, increase the likelihood of an underlying permanent tooth failing to erupt in the correct place in the dental arch, thereby emerging in a misaligned position. By this point, the factors that support the incisors erupting normally in position will have been weakened over time, and surgery may be needed alongside orthodontic treatment [31, 37]. If the teeth do not erupt normally within six to twelve months after the removal of any mesiodens, and there is enough space available in the dental arch, surgery must thus be performed to expose the unerupted permanent incisors, which should be followed by orthodontic traction of these teeth [37, 38].

In the Saudi Arabian context, the prevalence, characteristics, and complications of mesiodentes have not been reported individually within separate papers. However, previous Saudi studies have reported a prevalence ranging from 2 to 5.2% across all different types of supernumerary teeth more generally [39, 40]. Furthermore, one Saudi study showed that mesiodentes account for 87% of all detected supernumerary teeth [39]. Another Saudi study found that mesiodentes account for 4.6% of the total number of supernumerary teeth in boys, while showing a prevalence of only 2.5% in girls [40]. Similar reports also indicate the mesiodentes are the most prevalent distinct type of supernumerary tooth [39, 40]. None of the previously reported Saudi studies has discussed the prevalence of mesiodentes individually, however, leading to a lack of discussion of their characteristics and associated complications. This study, thus, aims to guide healthcare providers, particularly paediatric dentists, in developing their understanding of the prevalence, characteristics, and related complications associated with mesiodentes among Saudi children.

2. Materials and methods

2.1 Research objectives

To assess the prevalence and describe the characteristics of mesiodentes and associated complications in Saudi Arabian children.

2.2 Study design and sample selection

A retrospective radiographic study was performed on patients attending the Department of Orthodontics and Paediatric Dentistry at Qassim University, along with other several private dental clinics in the Qassim region; reasons for attending included routine examinations and various forms of dental or orthodontic treatment. Data were extracted for the period of from January 2020 to January 2025, and included the following information: patient age, gender, medical condition, one or more dental radiographs, and any progress notes. The types of dental radiographs that were extracted included orthopantomograms, anterior periapical radiographs, and occlusal radiographs. The entire archive was screened for eligible radiographs, and a total of 1416 radiographs were found to be suitable for investigating mesiodentes prevalence and complications. A retrospective power analysis was then conducted for the obtained records. MedCalc version 23.1.3 (MedCalc Software, Ostend, Belgium) was used to achieve this, with the following parameters: Type-I error, 0.05; power, 0.80; proportion, 0.02; and null hypothesis, 0.50. The results indicated a required sample of 979 radiographs; as this study included 1416 radiographs, it thus achieved a power rating of over 95%. All included dental radiographs met strict quality criteria that included no

significant distortion, adequate contrast and density, and no artifacts such as positioning errors or ghost images that might obscure the region of interest.

The inclusion criteria were:

- Healthy children with no systematic disease or ongoing syndromes.
- Saudi nationality.
- Age between 4 and 15 years.
- Good quality dental radiographs.

Exclusion criteria were thus:

- Non-Saudi nationality.
- Incomplete patient records or dental radiographs.
- Dental radiographs with artifacts, distortion, or incomplete coverage of the anterior region.
- Any reports of anterior trauma or losing an anterior tooth for any reason being documented.
- The child having a history of a systemic disease, genetic disease, or a syndrome such as Down syndrome, cleidocranial dysplasia, or cleft lip and palate.

2.3 Data collection

All data included in the current study were extracted from the relevant clinical systems' medical records, including all patient details. The examiner reviewed the child's medical records to extract the following details, including the child's age, gender, medical conditions, and any available details about mesiodentes from any progress notes. At the same time, we reviewed all dental radiographs to determine the presence or absence of a mesiodens. Once the reviewer detected a mesiodens, they record the following details: the type of dentition, the arch involved (maxillary or mandibular arch), eruption status (erupted or unerupted), number (single tooth, double teeth), dental morphology (conical, supplemental, tuberculate, molariform), orientation (vertical, inverted, horizontal), root status (complete root, incomplete root), and complications associated with the mesiodens, including misalignment of incisors, diastema, impaction of incisors, root resorption in neighboring teeth, and dentigerous cysts. An experienced paedodontist independently reviewed all extracted data using a standard checklist developed by the reviewer. The reviewer evaluated each dental radiograph at two different periodic times (four-week interval). Intra-observer reliability was utilized to evaluate the interpretation and ensure the consistency among these assessments. The Cohen's kappa score was given as 0.97 with a p-value < 0.001. The discrepancies between two interval assessments were resolved by getting an opinion from another experienced paedodontist.

2.4 Data analysis

The data obtained from the patient records were coded to prepare for final analysis. All coded data was analysed by IBM SPSS version 20.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were utilised to summarise the prevalence, characteristics, and complications of mesiodentes using appropriate statistical tests (chi-square test and Fisher's exact test). A p-value of < 0.05 was considered statistically significant.

3. Results

Records for a total of 1416 healthy children aged 4 to 15 years were used in this study. All participants had visited the Department of Orthodontics and Paediatric Dentistry at Qassim University or other various private dental clinics in the Qassim region. Mesiodentes were diagnosed and identified using orthopantomogram radiographs (n = 12), anterior radiographs (either occlusal or periapical) (n = 8), and combined orthopantomogram and anterior radiographs (n = 9). Most of the children examined exhibited mixed dentition (71.1%), with a significant minority displaying primary dentition (26.6%) and just a few showing permanent dentition (2.3%). Of the total sample, 51.2% were male (n = 725) and 48.8% were female (n = 691), and the mean age was 7.93 $\pm$ 2.10 years (Table 1). Figs. 1,2,3,4,5,6 show the different types of dental radiographs across patients with mesiodentes with different characteristics.

A total of 29 children were diagnosed with 33 mesiodentes, corresponding to an overall prevalence of 2% (95% CI: 1.3–2.8). Among these, 21 cases occurred in males (2.9%; 95% CI: 1.7–4.1, or 1.5% of the overall sample) and eight in females (1.2%; 95% CI: 0.4–2.0, or 0.5% of the overall sample), yielding a male-to-female ratio of 2.63:1 (effect size: 2.5), indicating an apparent male predilection such that males are two and half times more likely to have mesiodentes than females (Table 2). More than half of the mesiodentes were found in the age group $\geq$8 years old, causing a lower prevalence in the age group $<$8 years old (58.6% as compared with 41.4%), with no significant differences between males and females across age (p = 1.000; Fisher's Exact Test) (Fig. 7). The majority of mesiodentes were located in the maxillary arch (96.6%, n = 28), while only one case (3.4%) was found in the mandibular arch (Fig. 8). When analysed by gender, the prevalence of mesiodentes in the maxillary arch was 95.2% for males and 100% for females, while only a single mandibular case observed in a male participant (4.8%). However, the difference between both genders in which the arch was involved was not statistically significant (p = 1.000; Fisher's Exact Test). With respect to root maturation, 17 mesiodentes (58.6%) showed complete root formation, whereas 12 (41.4%) exhibited incomplete roots. No significant difference was observed between genders (p = 1.000; Fisher's Exact Test) (Fig. 9).

Regarding mesiodens eruption status, 16 cases (55.2%) were unerupted, while 13 (44.8%) had erupted into the oral cavity. A gender comparison showed that 57.1% of mesiodentes in males were unerupted and 42.9% were erupted, whereas in females, the distribution was exactly equal (50% erupted and 50% unerupted); however, there was no statistically significant difference between the genders (p = 1.000; Fisher's Exact Test) (Fig. 10). Isolated single mesiodentes occurred in 25 cases (86.2%), while double mesiodentes were observed in four cases (13.8%), with no statistically significant differences observed between males and females (Fig. 11). With regard to morphology, the conical shape was the most common form, accounting for 23 cases (79.3%); this was followed by the tuberculate (6.9%), supplemental (6.9%), and molariform (6.9%) types, each observed in two separate cases. On comparing morphology by gender, conical mesiodentes were seen to be

TABLE 1. Distribution of subjects by gender and dentition types.

Parameters	Distribution (n = 1416)	Percentage (%)	Age, yr (Mean ± SD)
Gender			
Female	691	48.8	7.93 ± 2.10
Male	725	51.2	
Types of dentition			
Primary	377	26.6	
Mixed	1007	71.1	
Permanent	32	2.3	

SD: Standard deviation.

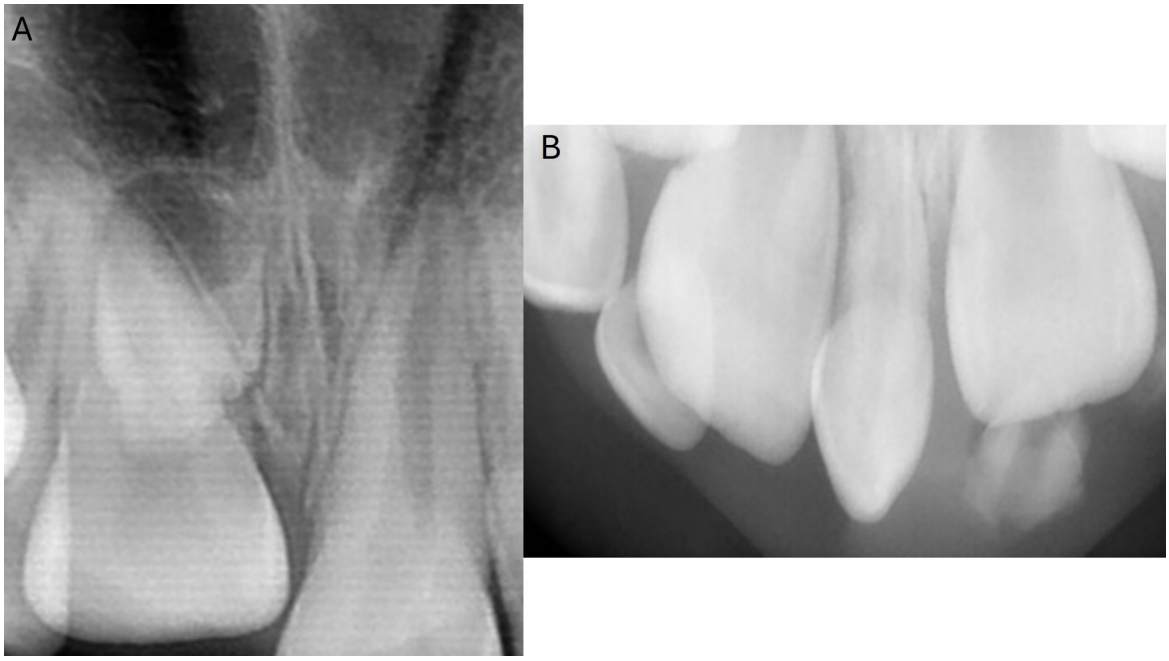

FIGURE 1. Different types of dental radiographs for the maxillary anterior teeth, illustrating different forms of conical mesiodentes. (A) an unerupted conical mesiodens with incomplete root formation, which caused malposition of permanent incisors. (B) an erupted conical mesiodens with complete root formation, which caused malposition of permanent incisors and diastema.

FIGURE 2. Different types of dental radiographs of the anterior maxillary teeth, illustrating different forms of conical mesiodentes. (A) an unerupted inverted conical mesiodens with incomplete root formation. (B) an unerupted inverted conical mesiodens with complete root formation. (C) an unerupted horizontal conical mesiodens with complete root formation.

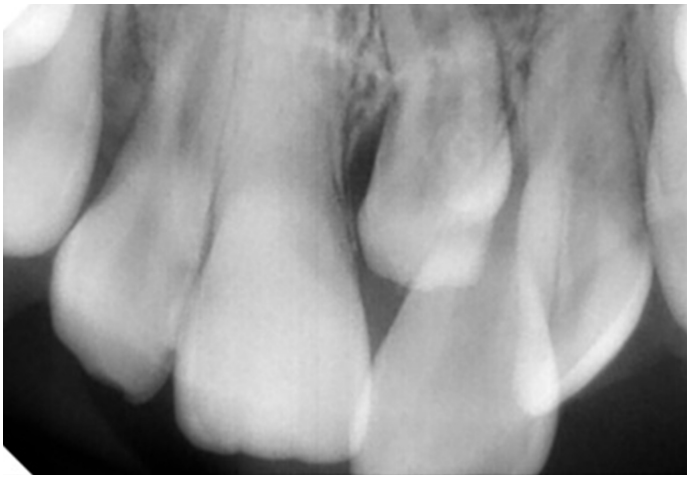

FIGURE 3. An anterior maxillary dental radiograph illustrating a supplemental, an unerupted mesiodens with complete root formation.

FIGURE 4. Different types of dental radiographs of anterior maxillary teeth, illustrating different forms of mesiodens. (A) an erupted tuberculate mesiodens with no evidence of root formation. (B) an unerupted horizontal molariform mesiodens with no evidence of root formation.

FIGURE 5. An anterior mandibular radiograph illustrating an erupted conical mesiodens with complete root formation.

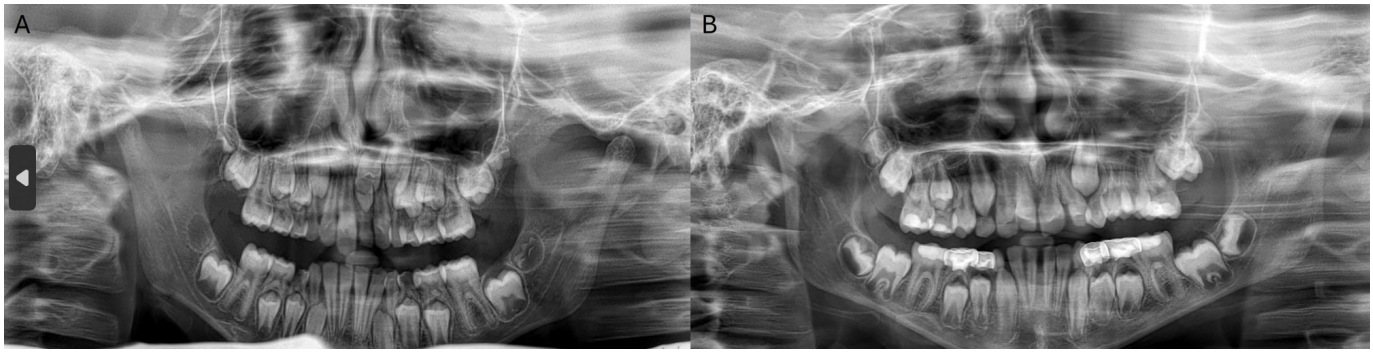

FIGURE 6. Different orthopantomograms for the patients illustrating different forms of conical mesiodens. (A) shows an unerupted conical mesiodens with incomplete root formation and causing an impaction of the maxillary left permanent incisor with over-retention of the maxillary left primary central incisor. (B) shows an unerupted inverted conical mesiodens with complete root formation.

TABLE 2. Distribution of mesiodens prevalence by gender.

Gender	Frequency (n), Prevalence (%)		*p*-value
	No	Yes	
Male (n = 725)	704 (97.1)	21 (2.9)	
Female (n = 691)	683 (98.8)	8 (1.2)	0.024*
Total (n = 1416)	1387 (98.0)	29 (2.0)	

**p-value < 0.05 is significant.*

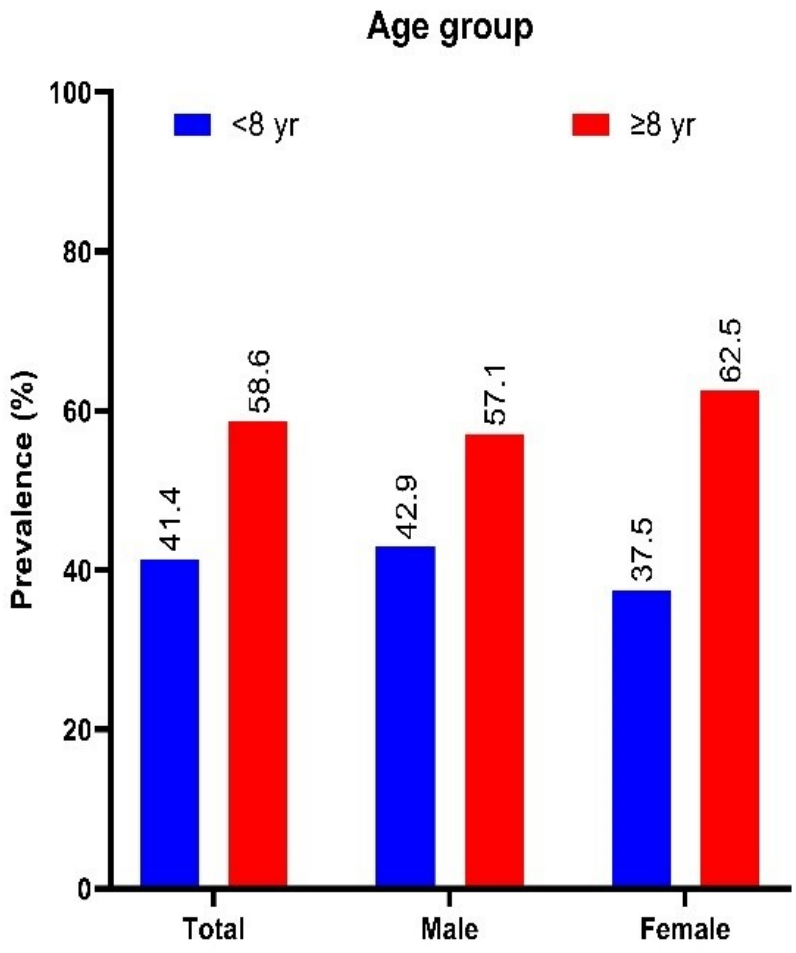

FIGURE 7. Distribution of mesiodens prevalence among the child age group, shown in a percentage.

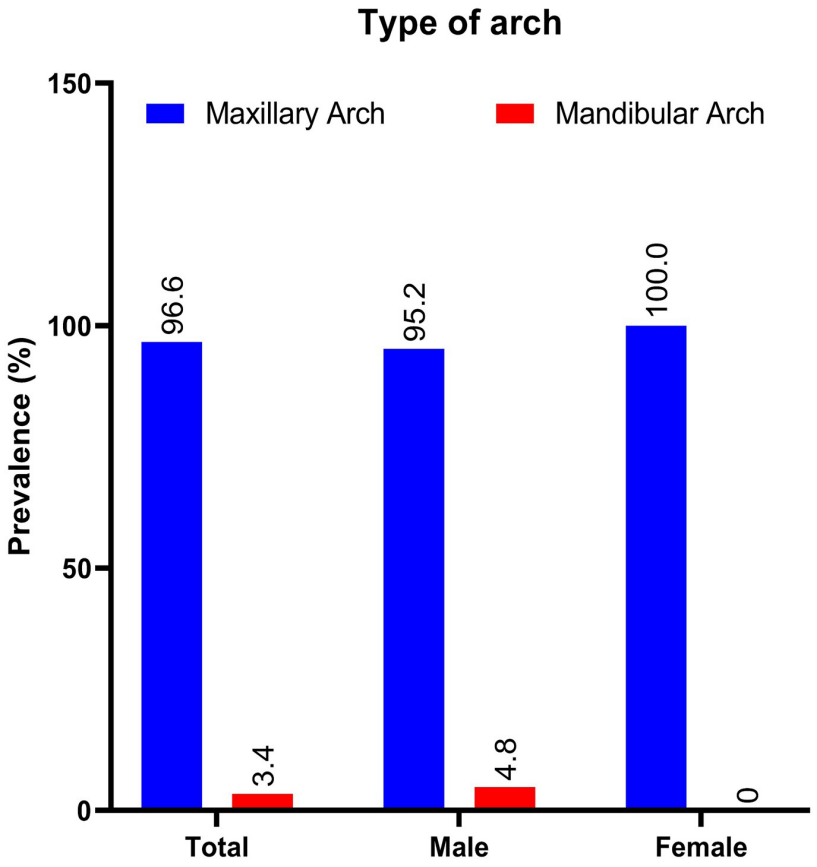

FIGURE 8. Distribution of mesiodens prevalence based on which dental arches were involved, shown in percentage.

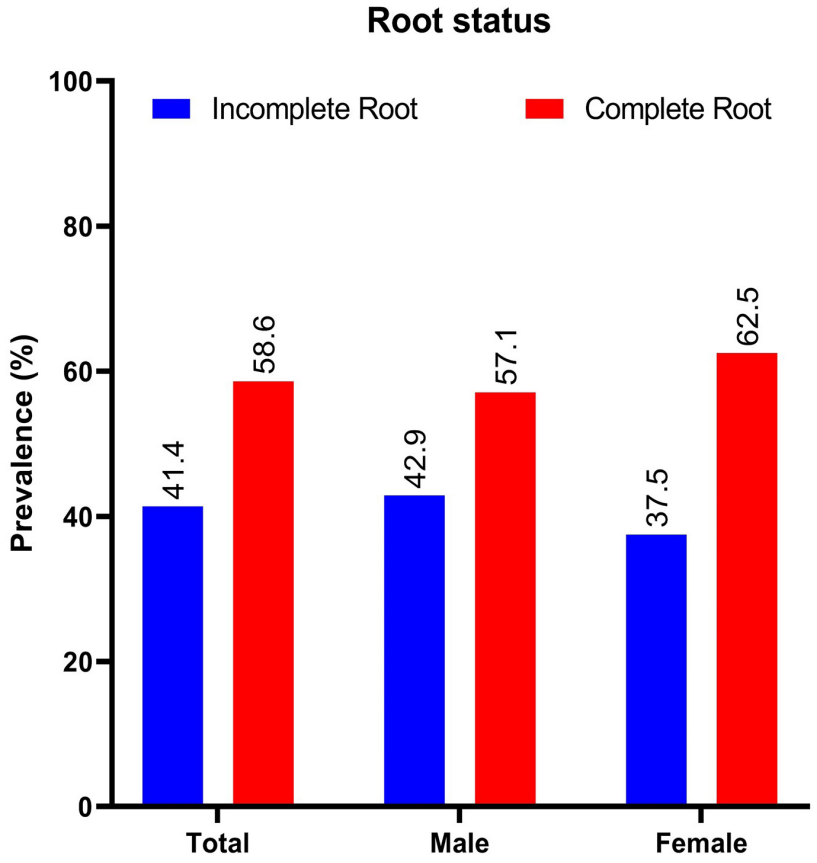

FIGURE 9. Distribution of mesiodens prevalence based on the current root status, shown in percentage.

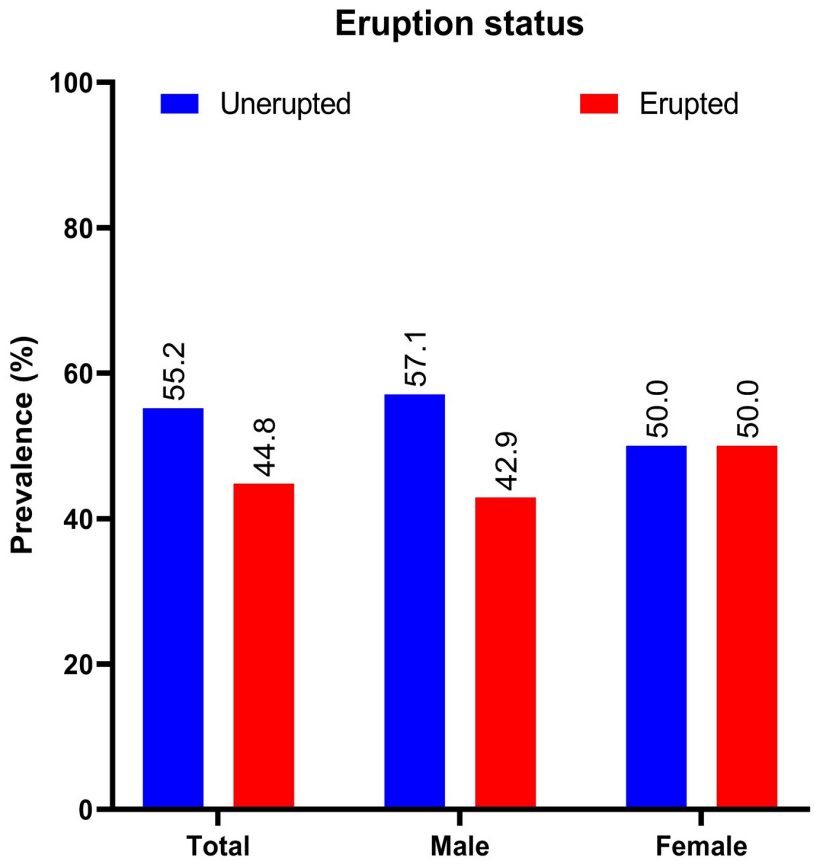

FIGURE 10. Distribution of mesiodens prevalence based on the eruption status, shown in percentage.

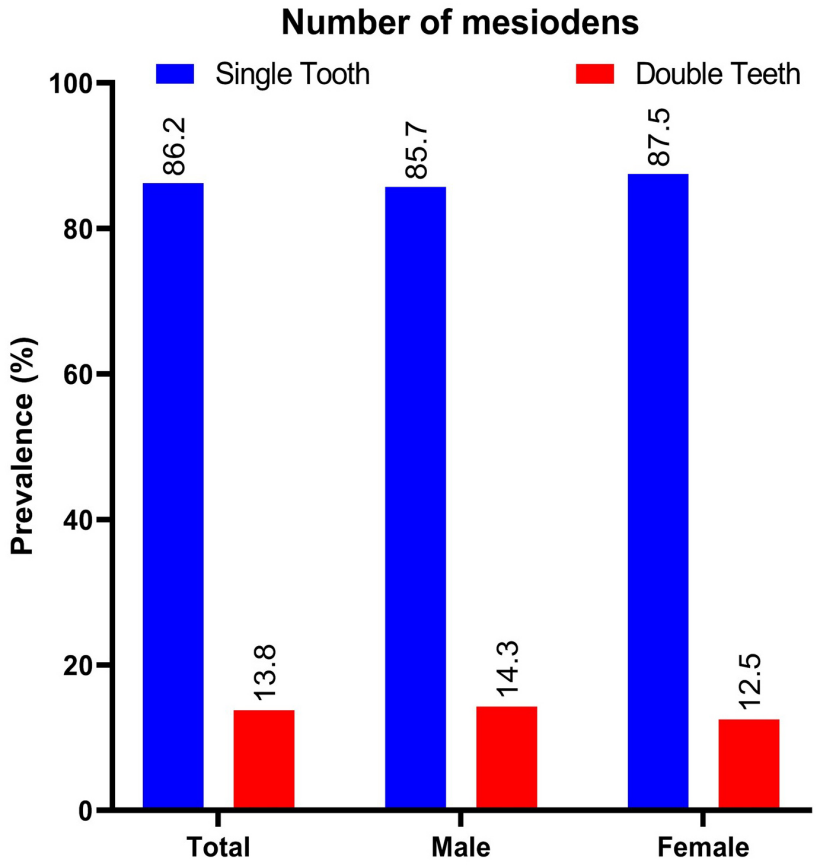

FIGURE 11. Distribution of mesiodens prevalence based on the number of occurrences, shown as a percentage.

more frequent among males (85.7%) than females (62.5%). The distribution of tuberculate, supplemental, and molariform types was equal between genders (giving 4.8% prevalence for males and 12.5% for females), with no statistically significant difference in morphology determined between the two groups ($p = 0.593$) (Table 3).

Regarding the mesiodens orientation, the vertical form was predominant (82.8%, n = 24), followed by the inverted (10.3%, n = 3) and horizontal (6.9%, n = 2). Vertical orientation was the most frequent in both males (81.0%) and females (87.5%), and the horizontal form was the least observed in both genders (males, 4.8%; females, 12.5%). However, the inverted form was observed only in males (14.3%). There are no statistically significant differences in mesiodens orientation between males and females ($p = 0.433$), as shown in Table 3. Analysis of the complications associated with mesiodentes revealed that incisor misalignment was the most frequent finding, being observed in 13 cases (44.8%), followed by midline diastema, seen in nine cases (31.1%), and impaction of incisors, observed in seven cases (24.1%). Comparison between genders demonstrated that incisor misalignment was more common in females (62.5%) than in males (38.1%). Midline diastema was observed in 38.1% of males and 12.5% of females, while impaction of incisors occurred in 23.8% of males and 25% of females. However, these gender-based differences in complications were not statistically significant ($p = 0.369$) (Table 3). Notably, no cases of root resorption in adjacent teeth or dentigerous cyst formation were identified in this study.

4. Discussion

A definitive diagnosis of a mesiodens cannot be established through clinical examination alone, though clinical examination in conjunction with a radiographic interpretation can allow healthcare professionals to achieve accurate diagnoses. Many different types of dental radiographic images, such as orthopantomograms and occlusal or anterior periapical X-rays, can be used to support a diagnosis of mesiodentes where only two-dimensional (2D) images are available [22]. However, cone beam computed tomography (CBCT) can offer 3D images that may help to more accurately identify where mesiodentes are located, as well as defining their shapes and how they relate to nearby structures [24, 25].

The radiographic evaluation in the current study utilised orthopantomograms (n = 12) and anterior intraoral radiographs (n = 8), as well as combined orthopantomograms with anterior radiographs (n = 9). Using a combined method enhances the ability to identify mesiodentes, especially small or awkwardly placed ones, which may not be susceptible to other imaging methods. Orthopantomogram radiography, while excellent for screening, is susceptible to superimposition and distortion in the anterior region when used in isolation. In contrast, intraoral radiography (occlusal or periapical) provides clearer images, and this is thus usually considered the best way to confirm a suspected mesiodens. The variety of methods used in these cases is, thus, representative of common diagnostic pathways; however, it underscores a potential source of variability.

In the current study, the prevalence of mesiodentes was 2% among Saudi Arabian children, regardless of varying den-

TABLE 3. Distribution of mesiodens by type of dentition, dental morphology, orientation, and complications among genders.

Characteristics	Frequency (n), Prevalence (%)			*p*-value
	Total	Male	Female	
Type of dentition				
Primary Dentition	6 (20.7)	5 (23.8)	1 (12.5)	
Mixed Dentition	17 (58.6)	13 (61.9)	4 (50.0)	0.367$^{\beta}$
Permanent Dentition	6 (20.7)	3 (14.3)	3 (37.5)	
Morphology				
Conical	23 (79.3)	18 (85.7)	5 (62.5)	
Molariform	2 (6.9)	1 (4.8)	1 (12.5)	0.593$^{\beta}$
Supplemental	2 (6.9)	1 (4.8)	1 (12.5)	
Tuberculate	2 (6.9)	1 (4.8)	1 (12.5)	
Orientation				
Horizontal	2 (6.9)	1 (4.8)	1 (12.5)	
Inverted	3 (10.3)	3 (14.3)	0 (0.0)	0.433$^{\beta}$
Vertical	24 (82.8)	17 (81.0)	7 (87.5)	
Complication				
Diastema	9 (31.1)	8 (38.1)	1 (12.5)	
Misalignment of incisors	13 (44.8)	8 (38.1)	5 (62.5)	0.369$^{\beta}$
Impaction of incisors	7 (24.1)	5 (23.8)	2 (25.0)	

$^{\beta}$*Chi-Squared test was used.*

tal characteristics. All the Saudi studies reported in dental literature previously discussed all different types of supernumerary teeth [39, 40], however, which means there are no previous studies in Saudi Arabia assessing the prevalence of mesiodentes individually. Such studies have generally reported prevalences for all different types of supernumerary teeth ranging from 2% to 5.2% [39, 40], though some reports have further indicated that mesiodentes account for 87% of the total of supernumerary teeth [39]. Another Saudi study has suggested that the prevalence of mesiodentes is 4.6% in boys and 2.5% in girls, based on prevalence within all supernumerary teeth [40]. The prevalence of mesiodentes in the current study was 2%, however, well within the normal range offered by previous global studies of 0.027 to 11.6% [41–64].

Within the previous dental literature, mesiodentes are seen to occur more commonly in males than females [41–48, 50, 51, 53–60, 63, 64]. Similarly, the present study showed that mesiodentes occur more often in Saudi males, with a sex ratio of 2.63:1 indicating a male predilection of about 2.9%. Only one prior study has reported a higher incidence of mesiodentes in females than in males [52].

In the current study, mesiodentes were found to be most common in the maxillary arch, with a 96.6% prevalence. The study found only one case in the mandibular arch, which thus accounted for 3.4% of incidence. This result agrees with previous studies that suggest that mesiodentes generally occur in the maxillary arch [41–64]. However, some studies have reported additional occurrences in the mandibular arch [47, 57, 63].

Mesiodentes typically exhibit various dental characteristics, including differences in morphologies and orientations, being erupted or unerupted, varying maturity of roots, and whether they present singly or in multiples. In this study, 55.2% of mesiodentes remained unerupted, while 44.8% had erupted into the oral cavity. In previous studies, researchers have similarly found most mesiodentes to remain unerupted [44, 48, 52, 55, 56, 58, 59, 64], consistent with the present study. Nevertheless, some researchers have noted that many mesiodens erupt into the oral cavity [41, 42, 46, 47, 50, 53, 57].

More than half of all mesiodentes inspected showed mature roots (58.6%), with the rest having immature roots (41.4%). This finding is aligned with Singhal *et al*. [46], who reported that most mesiodentes show mature roots. However, some studies [59–63], such as those by Mighani *et al*. [59], have reported higher prevalences of mesiodentes with immature roots, though only one study, Patil *et al*. [45], found an equal distribution between mature and immature mesiodens roots. The current study also revealed that the majority of mesiodentes were single (86.2%) in number, with a minority being double (13.8%). This result aligns with most previous studies [42–44, 46–48, 50, 53, 55, 56, 58–60, 63, 64].

Mesiodentes may present with various different dental characteristics, including variations in morphology and orientation. The classification of supernumerary teeth based on morphology, including mesiodentes, divides them into four types: conical, tuberculate, supplemental, and molariform [5]. In this study, most of the mesiodentes were conical in shape (79.3%), with a smaller though equal distribution of other forms (6.9%). This is consistent with the previous studies that reported the conical form as the most prevalent type [41–51, 53–58, 60, 64]. However, one study by Colak *et al*. [52] stated that the canine-like shape is also a common dental morphology. Moreover, mesiodentes can be further classified according to their orientation, whether vertical, inverted, or horizontal. Many studies have reported that the vertical orientation is the typical [42, 44–46, 48, 50, 52, 53, 55–58, 60, 63, 64], and the present study similarly revealed the vertical orientation as the most prominent type, accounting for 82.8% of all cases. In contrast, Watanabe *et al*. [43] and Henna *et al*. [47] reported in two different studies that they found the inverted orientation to be the most frequent type.

The presence of mesiodentes can have varying clinical implications, including delayed tooth eruption, prevention of underlying tooth eruption, malocclusion, cyst formation, root resorption, and a risk of a nasal eruption path. Many studies have, thus, reported mesiodentes as being associated with various dental complications. In this study, the complications associated with the presence of mesiodentes varied according to the latter's characteristics. The misalignment of incisors was the most common complication found in the present study, at 44.8%, followed by midline diastema at 31.1% and impaction of incisors at 24.1%. Previous studies [41, 42, 46, 51, 56] have also consistently demonstrated incisor misalignment to be a common complication associated with mesiodentes. However, some researchers have suggested that midline diastema is the most common complication [44, 45, 49, 52, 53, 57, 63], while other studies found the most common complications to be either delay in the eruption of incisors or incisors remaining unerupted [48, 55, 58, 60]. The findings of this study may differ from those of previous studies due to variations in study strategies, target age groups, participant races, or sample sizes.

The current study presents several limitations, including selection bias due to its retrospective nature, its focus on only specific clinics in a single region of Saudi Arabia, and the sample not necessarily representing the general population. Furthermore, the variability in the quality of dental radiographic images can not be overlooked. This meant that pinpointing the precise state of eruption of mesiodentes within the dental arch proved challenging, and some progress notes were not clearly documented in patient medical records. The reviewer also encountered some difficulty while recording their findings. As the present study utilised dental images based on 2D X-rays, which only offer full usefulness when combined with an additional angulation, CBCT images would more accurately determine the state of eruption of teeth through dental radiographs, and this is suggested for further studies in this area. Furthermore, it is important to understand that the timing of clinical observation may influence the prevalence, eruption, root maturation, and related complications of mesiodentes across different arches. The observed lack of clinical significance in the current study must, thus, be interpreted with caution when developing future studies, as this is likely to be heavily confounded by patient age and the timing of supernumerary tooth detection. Future studies are needed to discuss the clinical implications of mesiodentes, specifically to determine the appropriate time for surgical intervention along with assessing the eruption state of underlying permanent teeth

following the mesiodens removal.

5. Conclusions

This study confirms mesiodentes are a significant clinical entity in paediatric dentistry, exhibiting varying characteristics with a prevalence of 2% among Saudi children. The complications associated with mesiodentes include misalignment of incisors, diastema, and the impaction of incisors. It emphasizes the importance of early diagnosis through clinical and radiographic examinations to identify suitable times for interventions, which are essential for preventing complex dental treatment, simplifying future treatment needs, and minimizing related dental complications.

ABBREVIATIONS

CBCT, cone beam computed tomography; 2D Image, two-dimensional image; 3D Image, three-dimensional image; 95% CI, 95% confidence interval.

AVAILABILITY OF DATA AND MATERIALS

The data used to support the findings for this study are available upon request to the corresponding author.

AUTHOR CONTRIBUTIONS

BA—designed the study, collected the data, analysed the data, and wrote the manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study follows the ethical protocols of the World Medical Association's Declaration of Helsinki. As the study was retrospective in nature, informed consent from the patients was waived by the ethics committee of Qassim University. The patient confidentiality was kept throughout the study, with anonymising all data prior to analysis. The research project was approved by the institutional review board of Qassim University in Buraydah, Saudi Arabia, under reference number 25-36-08.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

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