

Original Article

# Prevalence of Supernumerary Teeth in Maxillary and Mandibular Anterior Region in A Group of Egyptian Children: A Retrospective Study

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## Abstract

**Introduction:** One of the most common causes of impacted permanent anterior teeth is the presence of Supernumerary teeth (ST) which has an impact on developing teeth, and dental arches as well. **Aim/Objective:** To evaluate the prevalence, distribution, characteristics, and complications of ST in maxillary and mandibular anterior region in a sample of Egyptian children. **Methods:** Clinical and radiographic examination of 189 non-syndromic Egyptian children who were diagnosed with ST. Two pediatric dentists with over 10 years of experience performed data analysis. The Age, sex, number, morphology, orientation, and position of ST were recorded, as well as complications. **Results:** A total of 248 ST were diagnosed in 189 children with ages ranging from 6-14 years. Males were more frequently affected than females in the ratio of 1.7:1. Out of the 284 ST, 53% were conical, 32% were tuberculate and 15% were supplemental, 14% were inverted, and 95% were fully impacted. The number of ST was one in 65%, two in 31%, and three in 4%. The main complication was delayed eruption in 80%, diastema in 11%, and crowding in 6%. **Conclusion:** Prevalence of ST in a sample of Egyptian children was 0.3%. Most of the ST were diagnosed at age 6 -11 years. Most of them were single, vertically impacted in the palatal maxillary region, both conical and tuberculated in shape. Males: female ratio is 1.7:1 accuracy.

**Keywords:** Hyperdontia, Mesiodens, Supernumerary teeth

## I. INTRODUCTION

Supernumerary teeth (ST) are teeth or toothlike structures that develop in both primary and permanent dentitions. ST either erupt or may be revealed in the routine radiographic examination. A series of clinical complications can be caused by ST, including malalignment, crowding of teeth, delayed eruption, midline diastema, and cyst formation (Syriac et al., 2017).

ST also known as hyperdontia; is the presence of a greater number of teeth than the normal set of teeth (32 in permanent dentition and 20 in deciduous dentition). The most

common ST type occurs in the upper jaw's central region. When ST occur between the two maxillary central incisors, they are called mesiodens. ST are twice as prevalent in males than females. As well as it is quite rare in primary dentition, but it is the most common dental anomaly in permanent dentition (Ray et al., 2005).

The prevalence of ST ranges from 0.2 to 0.8% in deciduous dentition. In permanent dentition 0.5 to 5.3%, and 0.9% in mixed dentition (Wang & Fan, 2011), (Lu et al., 2017). ST have different distribution, it can be single, multiple, unilateral, or bilateral. Also, ST can be found in different locations; maxilla,

mandible “very rare”, buccal, palatal, or interfering with the existing dentition (He et al., 2017).

The etiology of ST remains unclear. Many theories were proposed as an explanation of ST formation; atavism (evolutionary throwback), dichotomy, hyperactivity of the dental lamina, and genetic and environmental factors. The hyperactivity of the dental lamina theory is the one most accepted, and it suggests that due to genetic factors a localized, independent and conditional hyperactivity of the remaining epithelial cells of the dental lamina occurs (Fleming et al., 2010).

Previous studies have shown that several genes are associated with ST; Pax6 mutant, Fam20B, and USAG-1ST. Heritability of ST is complex and polygenic, involving many regulatory signals from several key molecules’ activators and inhibitors. (Kriangkrai et al., 2006; Munne et al., 2009; Tian et al., 2016).

Although ST are one of the most common dental anomalies, there are no published studies about the prevalence of ST in Egypt. So, this study was conducted to study the prevalence, distribution, characteristics, and complications caused by supernumerary teeth in non-syndromic Egyptian pediatric population.

## II. MATERIALS AND METHODS

The data for the study was collected from patients who attended the outpatient clinic of Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Cairo University. From the first of March 2019 to the first of March 2022. All the patients were examined clinically using a dental mirror and probe under adequate lighting. Data about patient age, sex, teeth erupted was recorded.

Suspected cases were examined radiographically using periapical films. Cone beam CT and occlusal view were done to some cases for better characterization and localization of ST. Exclusion criteria were patients with one or more of the following pathological situations: patients with systemic

disease, History of dental trauma, patients with cleft lip and palate, and patients with hereditary diseases, or syndromes.

ST were found in 189 cases. Data analysis for these cases was performed by two pediatric dentists with over 10 years of experience. Data collected was as follow; number of ST and eruption status (erupted, impacted). Sagittal position (buccal or palatal) and morphology (conical, tuberculate, supplemental). Amount of tooth formed (only crown, crown and part of the root, whole tooth). Direction of the crown (vertical, inverted, horizontal). As well as complications (displacement, impossibility of eruption, resorptions of adjacent tooth, and presence of follicular cysts).

ST were considered impacted in case of presence of a physical barrier, nonvertical orientation of the teeth, or remaining in the jaw for more than 2 years after its mean age of eruption (Syriac et al., 2017).

The data collected were statistically analyzed. Qualitative data were expressed as numbers and percentages. Microsoft Excel was used for generation of representative figures.

## III. RESULTS

Results are summarized in Table (1) and figures (1- 11)

The study included 189 patients, 62% males and 38% females. Most of the patients (96%) were 6 to 11 years old, while only 4% were over 12 years old. All cases were permanent dentition.

The prevalence of ST in the studied sample was 0.3%. Out of 51421 patients who visited the outpatient clinic, in Pediatric Dentistry Department, Cairo University, 189 patients were diagnosed with ST.

The number of ST per patient was single in 65% of the 189 patients, double in 31% and triple in 4% of the patients. The total number of ST was 248; of these 247 were in the maxilla (99.6%) and one case was in the mandible (0.4%)

Regarding the Sagittal position, 230 (93%) of the ST occurred palatal and 18 (7%) were buccal. While the shape of the ST was conical in (53%) of the cases, tuberculate in (32%) and supplemental in (15%).

The direction of the crown was vertical in (74%) of the cases, inverted in (14%) and horizontal in (12%).

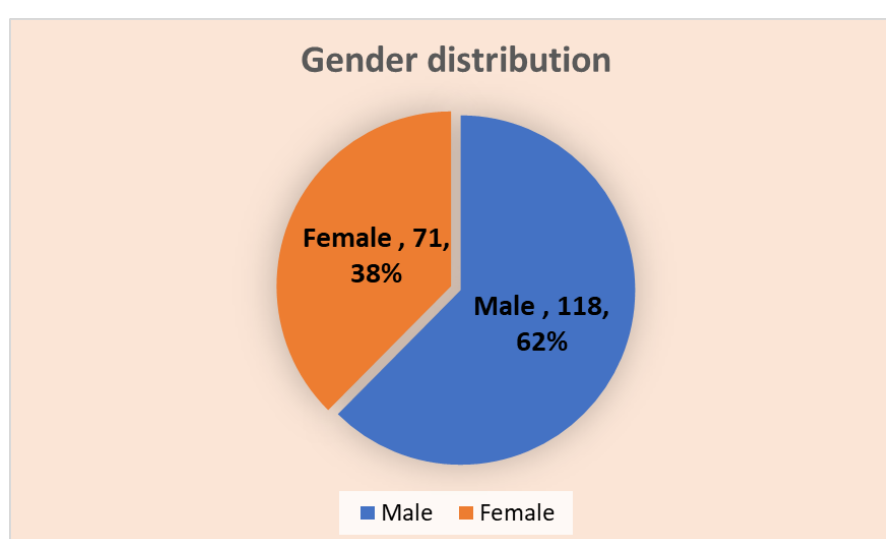
Only crown was formed in (55%) of the cases, while (35%) had partial root and (10%) had entire tooth.

Delayed eruption was the most common complication (80%), while diastema and crowding were observed in (11%) and (6%) of the cases respectively. Three percent of the cases were asymptomatic.

Most of the cases (95%) were treated by surgical extraction, while only 5% were treated by simple extraction

**Table (1) Descriptive statistics of cases included in the study**

	Number of patients= 189	Number of ST=248	
Gender	Male: 118 (62%)	Female: 71 (38%)	
Age group	0-5 (zero)	6-11years: 238 (96%)	>12 years: 10 (4%)
Dentition	Primary (zero)	Permanent: 248 (100%)	
Number of odontomes per patient	Single: 115 (65%)	Double: 56 (31%)	Triple: 7 (4%)
Location	Maxilla: 247 (99.6%)	Mandible: 1 (0.4%)	
Sagittal position	Palatal: 230 (93%)	Buccal: 18 (7%)	
Eruption position	Impacted: 236 (95%)	Erupted: 12 (5%)	
Morphological /Shape	Conical: 132 (53%)	Tuberculate: 78 (32%)	Supplemental: 38 (15%)
Direction of the crown	Vertical: 185 (74%)	Inverted: 34 (14%)	Horizontal: 29 (12%)
Formation of the tooth	Only crown: 136 (55%)	Partial Root: 86 (35%)	Entire tooth: 26 (10%)
Complications	Delayed eruption: 198 (80%)	Diastema: 26 (11%)	Crowding: 16 (6%) Asymptomatic: 8 (3%)
Treatment	Surgical Extraction: 236 (95%)	Simple extraction 12: (5%)	



**Figure (1): Pie chart representing gender distribution of patients**

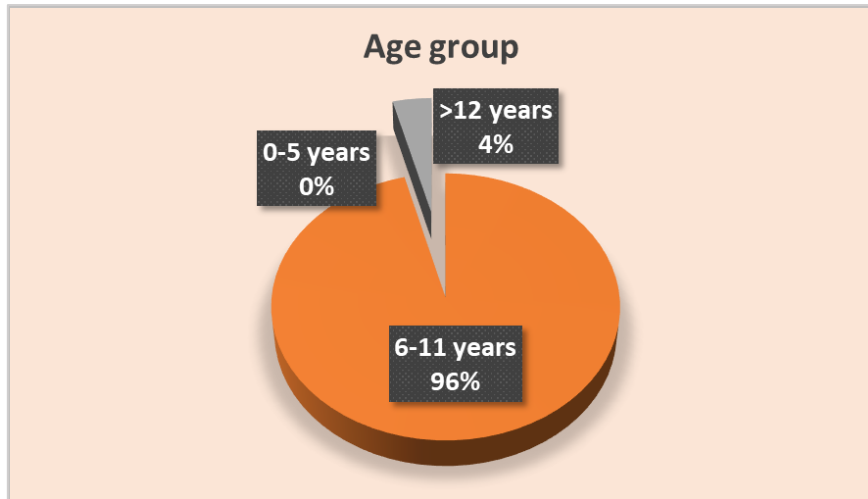


Figure (2): Pie chart representing patients' age groups

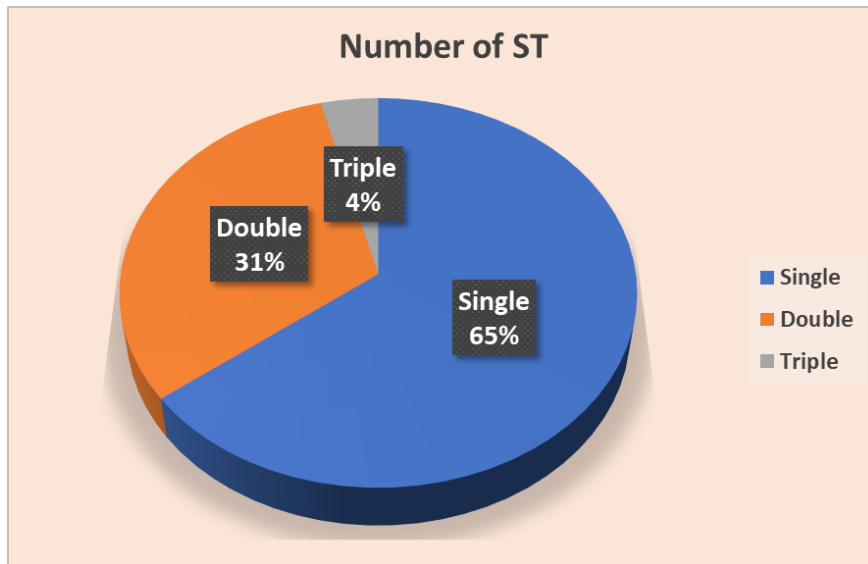


Figure (3): Pie chart illustrating the number of ST per patient

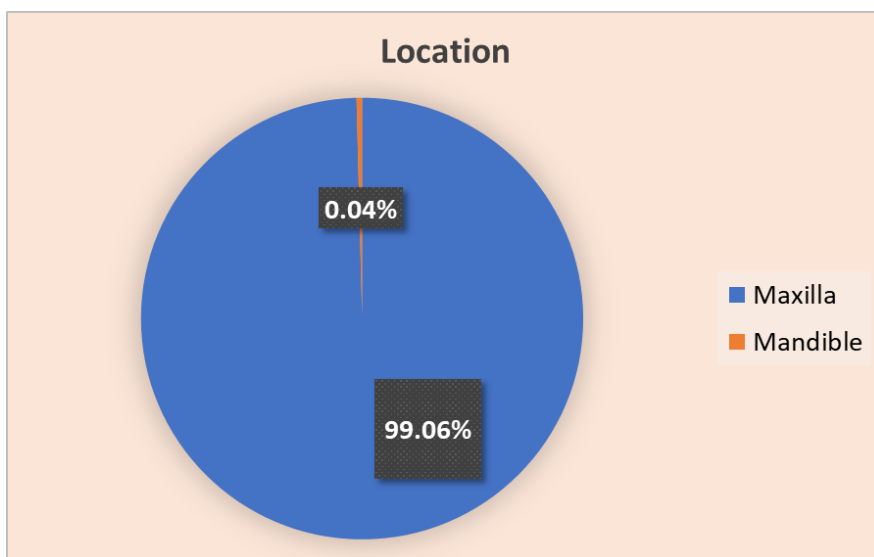


Figure (4): Pie chart illustrating location of ST

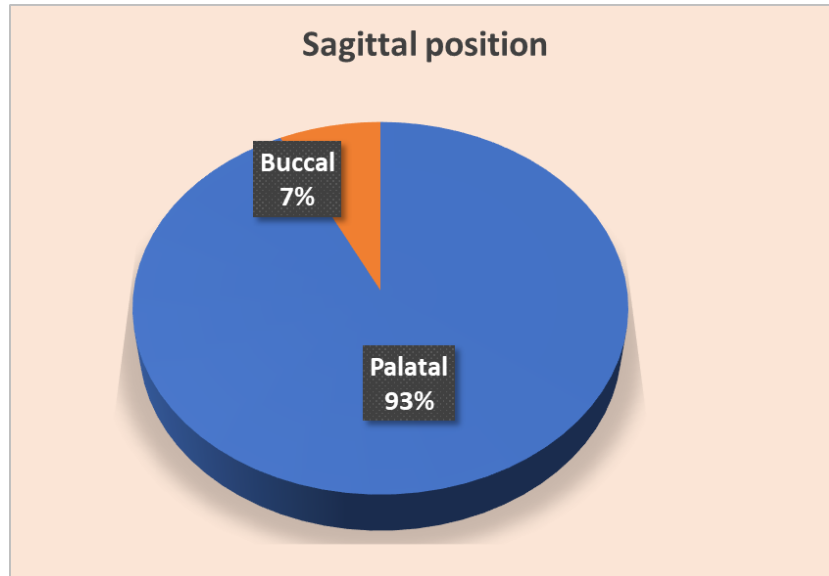


Figure (5): Pie chart illustrating sagittal position of ST

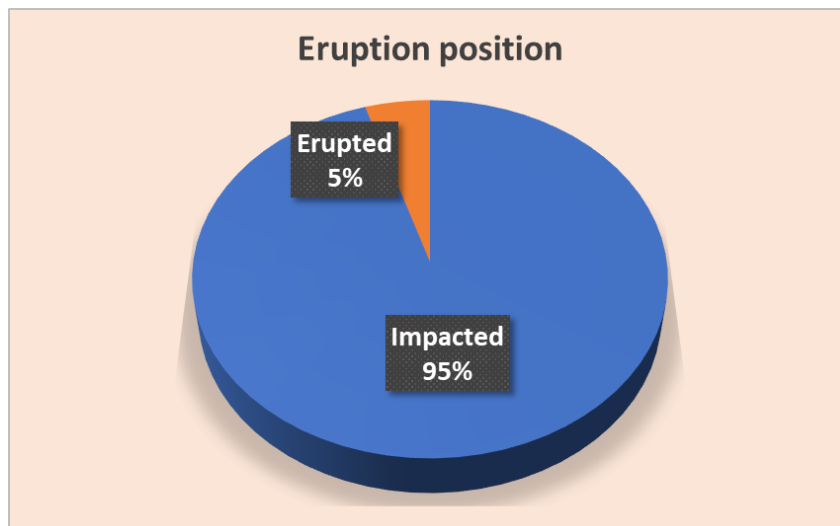


Figure (6): Pie chart illustrating eruption position of ST

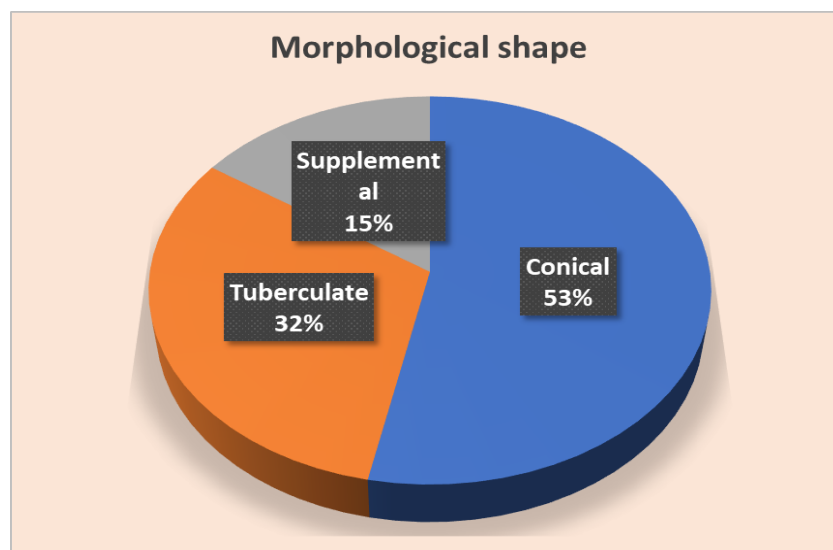


Figure (7): Pie chart illustrating shape of ST

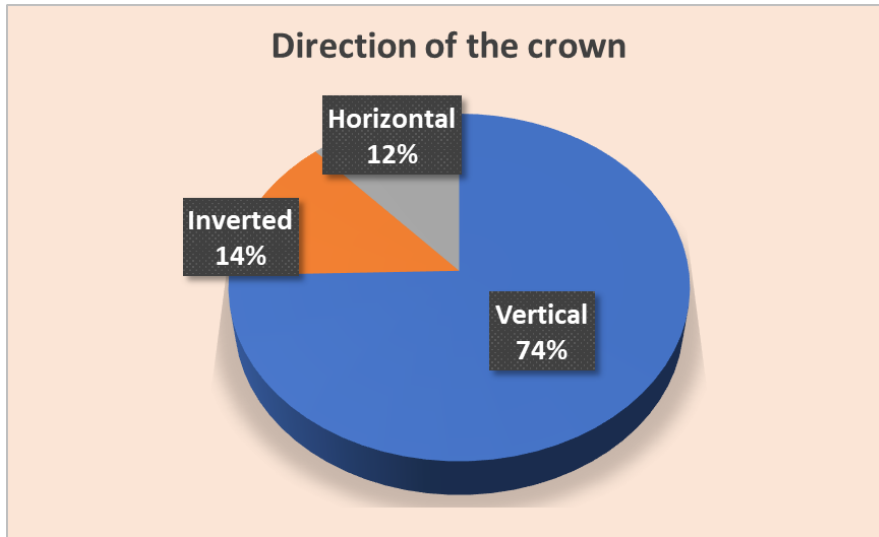


Figure (8) Pie chart illustrating direction of the crown of ST

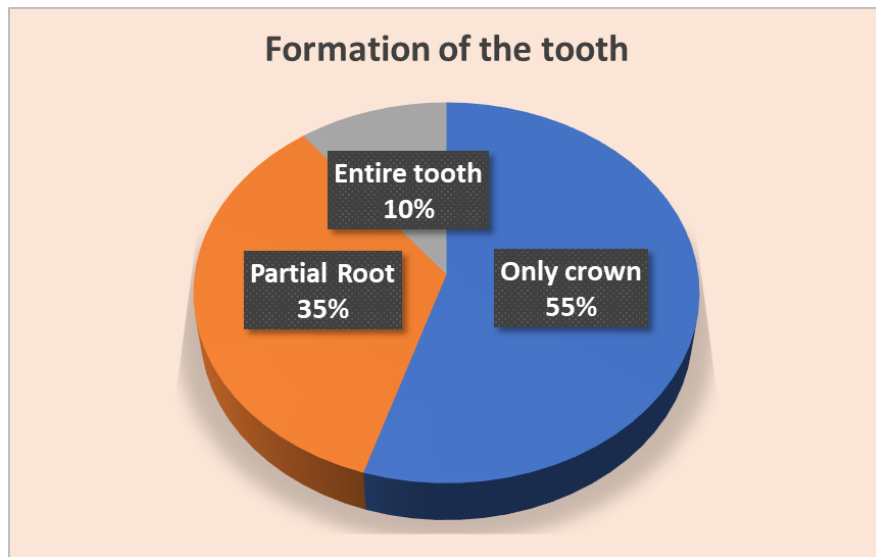


Figure (9): Pie chart illustrating formation of the tooth in ST

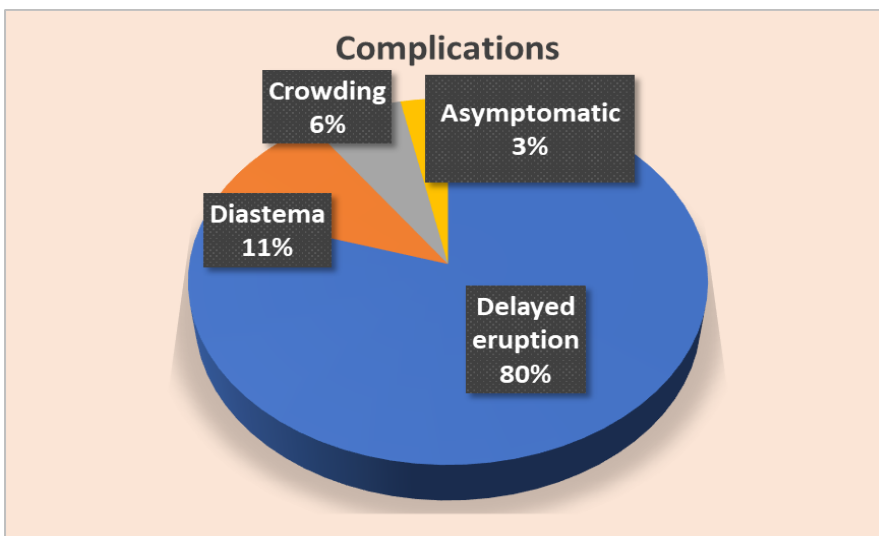
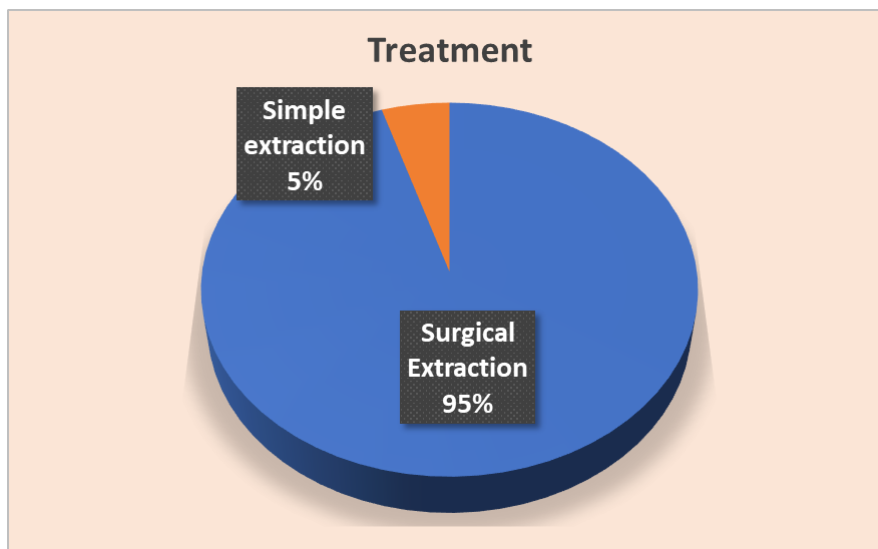


Figure (10): Pie chart illustrating frequency of different complications



**Figure (11): Pie chart illustrating treatment modalities**

#### IV. Discussion

Management of supernumerary teeth is considered one of the most challenging topics. Surgical extraction of ST with no complications, and the ideal timing for intervention are the most frequently asked questions by clinicians. Data about general characteristics, and the most common complications of ST are of extreme importance to facilitate clinical decision. Therefore, this study aimed to identify ST characteristics and analyze their associations with complications.

In the present retrospective study, 189 patients showed the presence of 248 ST. Prevalence was 0.3% out of 51421 patients visited outpatient clinic of Pediatric Dentistry and Dental Public Health Department, Faculty of Dentistry, Cairo University. This percentage is nearly close to the percentage published by Colak et al., 2013 (0.13%) and Aren et al., 2019 (0.1 %). While it's much lesser than the percentage observed by Salcido García et al., 2004 (1.6%) and Patil et al., 2013 (1.4%).

The sample of this study included 62% males and 38% females. Male: female ratio is 1.7:1. This ratio is different from other studies like Kim & Lee, 2003, Asaumi et al., 2004, and Huang et al., 1992 who stated male: female ratio 4:1, 2.8:1, and 2.3:1 respectively. The possibility of sex-linked inheritance of ST was

suggested by Burning et al., 1957. While Niswander & Sujaku, 1963, have reported that ST may be associated with an autosomal recessive gene, which has less penetrance in females. The results of all the previously mentioned studies suggests that there is a strong influence of a genetic component for the higher occurrence of ST in males.

In this study 96% of the patients were diagnosed at the age 6 to 11 years old, this comes in accordance with Gündüz et al., 2008; 47% of cases were diagnosed at 6-9 years. Kazanci et al., 2011; 50% of cases were diagnosed at 8-9 years. Shekhar, 2012, more than 88% were diagnosed at 7-12 years. Herath et al., 2017, 50.47% of cases were diagnosed at 8-9 years. It is clear that the highest presentation of ST is in this age group, because this stage is the time of eruption of permanent anterior teeth. So patients seek medical consultation in case of abnormal shape, delayed eruption, or malocclusion.

Number of the ST; out of 189 patients examined in this study, 65% had single ST, 31% double, and 4% triple. Other studies reported similar results of Single ST; Kim & Lee, 2003, 75%, Asaumi et al., 2004, 73% , Gündüz et al., 2008, 76.8%, and Kazanci et al., 2011, 80.0%.

As regards the location and sagittal position of ST; only one ST was in the mandible

(0.04%), While 247 (99.06%) were found in maxilla. Sagittal position results revealed, 230 (93%) of the ST occurred palatal, and 18 (7%) were buccal. This comes in accordance with von Arx, 1992, De Oliveira Gomes et al., 2008, and Limbu et al., 2017 who stated that most of the ST erupt palatal to maxillary incisors. On other hand Some researchers found that the position of ST was usually found between maxillary incisors which results in impaction of the maxillary incisors (Yusof, 1990), (De Oliveira Gomes et al., 2008).

The scientific evidence available about the amount formed of ST is scarce. In the present study 55% of the ST showed only crown formed, while 35% had partial root, and 10% had entire tooth. These findings are different from those of Limbu et al., 2017, who reported that 7% of ST showed only crown formed, 7% had partial root, and nearly 55% had entire tooth.

In terms of the shape observed in this study; 53% of the cases were conical, 32% tuberculate, and 15% supplemental. These results are in line with Burhan et al., 2015, Herath et al., 2017, and Aren et al., 2019.

While the direction of the crown of ST was found as follow; vertical in 74% of the cases, inverted in 14% and horizontal in 12%. Most of the published data have reported similar results to our study; the normal orientation was the most prevalent (Burhan et al., 2015), (Herath et al., 2017). While few previously published studies have reported that inverted ST were the most common (Tay et al., 1984), (Liu, 1995).

The main clinical consequence of ST is the effect on developing dentition. The results of the current study showed that delayed eruption was the most common complication 80%. These results come in line with Celikoglu et al., 2010 and Brinkmann et al., 2020, who found that delayed eruption is the most common complication 25.1% and 16.7% respectively. The great difference in the percentages is because this study Is mainly concerned about ST in anterior region while the

other two study have investigated both anterior and posterior regions, with wider age range.

On the other hand, diastema and crowding were observed in 11% and 6% of the cases in our study respectively. While 3% of the cases were asymptomatic. There were no root anomalies, cyst formation or intraoral infection in any case. This comes in accordance with Park et al., 2020, who stated that the incidence of cysts formation increases significantly with age.

Finally, most of the cases (95%) were treated by surgical extraction, while only 5% were treated by simple extraction. The timing of the treatment was the same time of the diagnosis 6 – 11 years. Treatment decisions were taken according to clinical and radiographic findings of each case. Worthy to mention that there is a great debate in the available scientific evidence about proper timing, and line of treatment of ST.

Some authors have suggested that extraction of ST should be in the early mixed dentition period to limit the deleterious effects on developing dentition (Tay et al., 1984), (Russell & Folwarczna, 2003), (Park et al., 2020). Others have suggested that surgical intervention should be delayed until age 8 to 10 years when root development of the maxillary central and lateral incisors is almost complete (Meighani & Pakdaman, 2010).

## V. CONCLUSION

From this retrospective study we found prevalence of ST is 0.3% in a sample of Egyptian children. Most of the ST were diagnosed at age 6 -11 years. Most of them are single, vertically impacted in the palatal maxillary region, both conical and tuberculated in shape. Males: female ratio is 1.7:1.

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