

# Prevalence of prematurely lost primary teeth in 5–10-year-old children in Thamar city, Yemen: A cross-sectional study

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## Abstract

**Objectives:** The premature loss of primary teeth is a potential risk factor for poor arch length development. Adequate arch length is important to the progression of the permanent teeth. Poor arch length can lead to crowding, ectopic eruption, or impaction of these teeth. This study is designed to assess the prevalence of premature loss of primary teeth in the 5–10-year-old age group. **Materials and Methods:** The study group included 185 children, that is, 91 boys and 94 girls. The dental examination was conducted by an experienced examiner under sufficient artificial light. Data including patient age and missing teeth were collected. Descriptive statistics were applied for data analysis, and from the results, Chi-square tests were used at a level of significance of 5% ( $P < 0.05$ ). **Results:** We observed a 40.54% prevalence of premature loss of primary teeth with no statistically significant difference between genders. The lower left primary second molar was the most commonly absent tooth in the dental arch (13.5%). **Conclusion:** The status of premature loss of primary teeth was high in the study group. Implementation of efficient educational and preventive programs to promote oral health would help children maintain a healthy primary dentition and eventually prevent the disturbances in the future development of normal occlusion. Early detection and management of the space problems associated with the early loss of primary teeth would help in reducing malocclusion problems.

**Key words:** Malocclusion, premature tooth loss, prevalence, primary teeth

## INTRODUCTION

Primary teeth maintenance is essential for establishing normal permanent occlusion.<sup>[1,2]</sup> Early loss of primary teeth is most commonly caused by inappropriate oral hygiene, dental injuries, and tooth decay. Tooth decay continues to be the main causative factor for the high rate of loss.<sup>[3-5]</sup> As a result, those of us in the

pedodontics and orthodontics practice frequently encounter malocclusion problems that occur from the premature loss of these primary teeth in children.

The premature loss of primary teeth is a major factor that can cause malocclusion in the sagittal, transverse, and vertical planes.<sup>[6]</sup> Studies have shown that the

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premature loss of primary teeth is associated with the reduction of the dental arch length and migration of the marginal and antagonist teeth, leading to rotation, crowding, and impaction of the permanent teeth.<sup>[7-9]</sup> In addition, the reduction of the dental arch length is greater in the mandible than in the maxilla<sup>[10,11]</sup> if a primary second molar, rather than primary first molar, is lost.<sup>[12]</sup> In addition, this effect is also apparent if tooth loss occurs at an earlier age,<sup>[13]</sup> and if it occurs in crowded dentition as opposed to well-spaced dentition.<sup>[14]</sup> For instance, early loss of primary second molar, especially in the maxillary arch, results in arch length reduction due to mesial migration of permanent first molars.<sup>[7]</sup> Premature loss in the maxillary arch may require extractions of the permanent teeth to align the dental arch, whereas premature loss in the mandible may require long-term orthodontic treatment in most cases.<sup>[2,7,15]</sup>

In Yemeni children, early loss of primary teeth correlates to a marked increase in the prevalence of primary teeth extractions that are not further evaluated for spacing treatment needs. Because of the severity of the consequences that arise with the premature loss of primary teeth, we decided to study the prevalence of early loss of primary teeth among children in Thamar city.

## MATERIALS AND METHODS

A cross-sectional study was conducted involving all the children aged between 5 and 10 years, attending the Clinic of Child Dentistry of Thamar University Dental School for dental care, during the academic year 2014–2015. All the children ( $n = 185$ ) present in the Clinic of Child Dentistry were invited to participate in the study. All the children who fulfilled the study inclusion criteria, (a) 5 to 10 years of age and (b) a parent or guardian agreeing to participate in the study, were included in the study. The exclusion criteria included: (a) medically comprised children, (b) a parent or guardian not willing to participate, and (c) children with uncooperative behavior to receive a clinical examination. The study was approved by the research ethics committee of Faculty of Dentistry, University of Thamar. All procedures were performed with adequate understanding and written consent of the parents/guardians.

Detailed information of all participants' personal data and general health was recorded through individual interviews conducted by a researcher on the day of the dental check-up. Dental examination was performed by a single examiner under sufficient artificial light.

Gloves, masks, and disposable wooden spatulas were utilized. The early loss was classified according to the chronological age table of eruption of the permanent teeth proposed by Kronfeld,<sup>[16]</sup> and decreasing 12 months as proposed by Cardoso *et al.*<sup>[2]</sup> The data were documented in the forms specifically designed for this study. We took into consideration age, sex, general health, and type of missing tooth.

All statistical analyses were performed with the Statistical Package for Social Sciences, version 10 (SPSS Inc., Chicago, Illinois, USA). The data were analyzed using descriptive statistics techniques to obtain the absolute and percentage frequency. Chi-square tests were applied to verify the existence of significant associations among the variables at a level of significance of 5% ( $P < 0.05$ ).

## RESULTS

Of the total number of children included in this study group, 75 (40.54%) had prematurely lost primary teeth (49.33% in boys and 50.67% in girls), and the prevalence peak was registered at approximately the age of 8 years [Table 1].

We found a total of 170 primary teeth that were prematurely lost, with FDI tooth number 75 (13.5%) [Table 2] being lost at the highest rate.

According to the number of prematurely lost teeth per person, 30 children (40%) had 1 missing tooth, 22 children (29.3%) had 2 missing teeth, 11 children (14.7%) had 3 missing teeth, 4 children (5.3%) had 4 missing teeth, 3 children (4%) had 5 missing teeth, 4 children (5.3%) had 6 missing teeth, and 1 child (1.3%) had 8 prematurely lost primary teeth.

According to the distribution of prematurely lost teeth relative to tooth type, the molars (60.6%) were the most commonly prematurely lost teeth followed by the cuspids (27.6%) and the incisors (11.8%) [Tables 3 and 4].

According to the distribution of prematurely lost teeth relative to the dental arch, the mandibular arch (53.5%) had more cases than the maxillary arch (46.5%). The mandibular left quadrant had the highest loss of primary teeth (28.8%) [Tables 5 and 6].

## DISCUSSION

There was a noticeable increase in the prevalence of extractions of primary teeth which were not followed

**Table 1: Distribution of children with premature loss of primary teeth according to age and gender**

| Gender | Age (years), PPP, n (%) |         |         |           |           |           | Total, PPP, n (%) |
|--------|-------------------------|---------|---------|-----------|-----------|-----------|-------------------|
|        | 5                       | 6       | 7       | 8         | 9         | 10        |                   |
| Boys   | 3 (4)                   | 3 (4)   | 5 (6.7) | 9 (12)    | 10 (13.3) | 7 (9.3)   | 37 (49.33)        |
| Girls  | 0 (0)                   | 1 (1.3) | 7 (9.3) | 13 (17.3) | 11 (14.7) | 6 (8)     | 38 (50.67)        |
| Total  | 3 (4)                   | 4 (5.3) | 12 (16) | 22 (29.3) | 21 (28)   | 13 (17.3) | 75 (100)          |

$\chi^2=5.173$ ;  $df=5$ ;  $P=0.395$ ; PPP=Prevalence of premature loss of primary teeth

**Table 2: Distribution of primary teeth that were affected the most by premature loss according to gender**

| Tooth | Gender             |                     |                     |
|-------|--------------------|---------------------|---------------------|
|       | Boys<br>PPP, n (%) | Girls<br>PPP, n (%) | Total<br>PPP, n (%) |
| 51    | 2 (1.2)            | 0 (0)               | 2 (1.2)             |
| 52    | 4 (4.7)            | 3 (1.8)             | 7 (4.1)             |
| 53    | 8 (4.7)            | 8 (4.7)             | 16 (9.4)            |
| 54    | 6 (3.5)            | 4 (2.4)             | 10 (5.9)            |
| 55    | 1 (0.6)            | 4 (2.4)             | 5 (2.9)             |
| 61    | 2 (1.2)            | 0 (0)               | 2 (1.2)             |
| 62    | 5 (2.9)            | 4 (2.4)             | 9 (5.3)             |
| 63    | 6 (3.5)            | 7 (4.1)             | 13 (7.6)            |
| 64    | 8 (4.7)            | 1 (0.6)             | 9 (5.3)             |
| 65    | 2 (1.2)            | 4 (2.4)             | 6 (3.5)             |
| 71    | 0 (0)              | 0 (0)               | 0 (0)               |
| 72    | 0 (0)              | 0 (0)               | 0 (0)               |
| 73    | 5 (2.9)            | 2 (1.2)             | 7 (4.1)             |
| 74    | 9 (5.3)            | 7 (4.1)             | 16 (9.4)            |
| 75    | 10 (5.9)           | 13 (7.6)            | 23 (13.5)           |
| 81    | 0 (0)              | 0 (0)               | 0 (0)               |
| 82    | 0 (0)              | 0 (0)               | 0 (0)               |
| 83    | 6 (3.5)            | 5 (2.9)             | 11 (6.5)            |
| 84    | 9 (5.3)            | 8 (4.7)             | 17 (10)             |
| 85    | 7 (4.1)            | 10 (5.9)            | 17 (10)             |
| Total | 90 (52.9)          | 80 (47.1)           | 170 (100)           |

PPP=Prevalence of premature loss of primary teeth

**Table 3: Distribution of primary teeth that were affected by premature loss according to tooth types (central incisors, lateral incisors, cuspids, first molars, second molars) relative to gender**

| Tooth type       | Gender             |                     |                     |
|------------------|--------------------|---------------------|---------------------|
|                  | Boys<br>PPP, n (%) | Girls<br>PPP, n (%) | Total<br>PPP, n (%) |
| Central incisors | 4 (2.4)            | 0 (0)               | 4 (2.4)             |
| Lateral incisors | 9 (5.3)            | 7 (4.1)             | 16 (9.4)            |
| Cuspids          | 25 (14.7)          | 22 (12.9)           | 47 (27.6)           |
| First molars     | 32 (18.8)          | 20 (11.8)           | 52 (30.6)           |
| Second molars    | 20 (11.8)          | 31 (18.2)           | 51 (30)             |
| Total            | 90 (52.9)          | 80 (47.1)           | 170 (100)           |

$\chi^2=9.023$ ;  $df=4$ ;  $P=0.060$ ; PPP=Prevalence of premature loss of primary teeth

by space maintenance, particularly for cases with the early loss of primary teeth among Yemeni children. Therefore, the major aim of this cross sectional study

to give a comprehensive overview of the premature loss of primary teeth condition in the target sample in order to predict the future health care needs in preventing the disturbances in the development of normal occlusion in children, with no interest in generalizing our findings to the total Yemeni population. In addition, this study is, to the best of our knowledge, the first study to explore this issue among the children in Yemen.

In our study, the status of premature loss of primary teeth in the study group was high with a prevalence rate of 40.54%, which is in accordance to a recent study conducted in Saudi Arabia.<sup>[17]</sup> The early loss of primary teeth status in the present study was represented by a sample of children who sought dental care at the Clinic of Child Dentistry of Thamar University Dental School. Therefore, we can expect that these children present with more dental treatment needs than the general population. This supposition may also be made because parents, and occasionally even dentists, do not emphasize the importance of the primary dentition of the child. These parents and dentists may believe that the prevention and treatment of the primary teeth is unimportant because these teeth will eventually be replaced anyhow,<sup>[2,18]</sup> and these might explain this high rate of premature loss of these teeth in the present study.

The present study also showed that there was not a statistically significant difference in the premature loss of primary teeth between boys and girls. This finding was similar to a previous study.<sup>[3]</sup> This finding implies that premature loss of primary teeth in the study group is due to poor oral health care, rather than gender.

In this study, the majority of children had one or two teeth prematurely lost, similar to that reported in a previous study.<sup>[18]</sup>

The present study revealed that the highest percentage of premature tooth loss was at the age of 8 years, and the primary molars were more prematurely lost than other primary teeth. The most frequently missing teeth were the lower left primary second molars, which is similar to the results reported by previous studies.<sup>[1,18]</sup> This finding could be observed because the likelihood of *Streptococci mutans*

**Table 4: Distribution of primary teeth that were affected by premature loss according to tooth types (incisors, cuspids, molars) relative to gender**

| Tooth type | Gender          |                  | Total PPP, n (%) |
|------------|-----------------|------------------|------------------|
|            | Boys PPP, n (%) | Girls PPP, n (%) |                  |
| Incisors   | 13 (7.6)        | 7 (4.1)          | 20 (11.8)        |
| Cuspids    | 25 (14.7)       | 22 (12.9)        | 47 (27.6)        |
| Molars     | 52 (30.6)       | 51 (30)          | 103 (60.6)       |
| Total      | 90 (52.9)       | 80 (47.1)        | 170 (100)        |

$\chi^2=1.418$ ;  $df=2$ ;  $P=0.492$ ; PPP=Prevalence of premature loss of primary teeth

**Table 5: Distribution of primary teeth that were affected by premature loss according to dental quadrants relative to gender**

| Dental quadrant           | Gender          |                  | Total PPP, n (%) |
|---------------------------|-----------------|------------------|------------------|
|                           | Boys PPP, n (%) | Girls PPP, n (%) |                  |
| Maxilla (right quadrant)  | 21 (12.4)       | 19 (11.2)        | 40 (23.5)        |
| Maxilla (left quadrant)   | 23 (13.5)       | 16 (9.4)         | 39 (22.9)        |
| Mandible (right quadrant) | 22 (12.9)       | 20 (11.4)        | 42 (24.7)        |
| Mandible (left quadrant)  | 24 (14.1)       | 25 (14.7)        | 49 (28.8)        |
| Total                     | 90 (52.9)       | 80 (47.1)        | 170 (100)        |

$\chi^2=0.887$ ;  $df=3$ ;  $P=0.829$ ; PPP=Prevalence of premature loss of primary teeth

**Table 6: Distribution of primary teeth that were affected by premature loss according to dental arches relative to gender**

| Dental arch | Gender          |                  | Total PPP, n (%) |
|-------------|-----------------|------------------|------------------|
|             | Boys PPP, n (%) | Girls PPP, n (%) |                  |
| Maxilla     | 44 (25.8)       | 35 (20.6)        | 79 (46.5)        |
| Mandible    | 46 (27.1)       | 45 (26.5)        | 91 (53.5)        |
| Total       | 90 (52.9)       | 80 (47.1)        | 170 (100)        |

$\chi^2=0.447$ ;  $df=1$ ;  $P=0.503$ ; PPP=Prevalence of premature loss of primary teeth

acquisition in infants increases with age or as the number of erupted teeth increases.<sup>[19]</sup> The primary molars may be particularly susceptible to initial *S. mutans* colonization because they emerge into the oral cavity between 16 and 29 months of age and impact both fissured occlusal surfaces and concave approximal surfaces.<sup>[19]</sup> Occlusal fissures are more readily colonized by *S. mutans* than smooth surfaces.<sup>[19]</sup> This can result in caries of the primary molars, that if left untreated, might result in premature extraction and thus contributing to early loss.

In addition, by analyzing the distribution of premature loss on the arches, we observed a higher prevalence in the mandibular arch. These results were similar to previous findings.<sup>[1,20]</sup> The greater loss of primary

teeth in the mandibular arch may be due to food packing potential and greater plaque accumulation in the mandibular posterior region. In addition, saliva has anticariogenic properties and is relatively abundant in the maxillary molar teeth, thus reducing the rate of premature loss of these teeth.<sup>[21]</sup>

The premature loss of the primary teeth can cause problems due to loss of function and the increased possibility of migration of other teeth.<sup>[6]</sup> The incidence of space closure increases with the time that elapses from the moment of extraction.<sup>[7]</sup> Previous studies have demonstrated that the closing rate of a space is higher for the maxillary than for the mandible arch but decreases after the first 6 months.<sup>[7,22]</sup> A greater amount of time elapsed because extraction positively correlates with greater space loss, especially in extractions performed for primary second molars.<sup>[6,13]</sup> Therefore, it is necessary to increase awareness of the importance of oral health in our children and to inform parents of the potential for malocclusion problems caused by the early loss of primary teeth. Parents of children with early loss of primary teeth should be advised to bring their children to the dental clinic to have space maintainers if necessary.<sup>[22-25]</sup>

The main limitation in the present study is the fact that sample size was small. In addition, this study was conducted on children who sought dental care at the Clinic of Child Dentistry of Tamar University Dental School, hence, we can expect that these children present with more dental treatment needs than does the general population. Therefore, generalization must be made carefully as this study population may not reflect the prevalence of premature loss of primary teeth in the children in Yemen. Further studies are needed to address this issue by observation of large groups of children from different regions in order to form reliable conclusion. The research group will take this regard into consideration in future studies.

## CONCLUSION

The following conclusions can be drawn from the findings of this study:

- Prevalence of early loss of primary teeth was high (40.54%), and was higher at 8 years of age.
- Majority of the children had one missing tooth (40%).
- More number of teeth was lost in the mandibular arch (53.5%).
- The lower left primary second molar was the most commonly missing teeth (13.5%).



The status of premature loss of primary teeth was high in the study population. This conclusion is important in light of existing studies that revealed the malocclusion problems associated with early loss of primary teeth. Therefore, it is imperative to increase oral health awareness for our children and their parents to make them realize the significance of the primary teeth and how to care for them as well as the deleterious effect of the early loss of primary teeth. Parents of children with early loss of primary teeth should be advised to bring their children to the dental clinic to have space maintainers if necessary.

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### Conflict of interest

There are no conflicts of interest.

### REFERENCES

- Alamoudi N. The Prevalence of crowding, attrition, midline discrepancies and premature tooth loss in the primary dentition of children in Jeddah, Saudi Arabia. *J Clin Pediatr Dent* 1999;24:53-8.
- Cardoso L, Zembruski C, Femandes DS, Boff I, Pessin V. Evaluation of prevalence of malocclusion in relation to premature loss of primary teeth. *Pesq Bras Odontoped Clin Integr* 2005;5:17-22.
- López-Gómez SA, Villalobos-Rodelo JJ, Ávila-Burgos L, Casanova-Rosado JF, Vallejos-Sánchez AA, Lucas-Rincón SE, *et al.* Relationship between premature loss of primary teeth with oral hygiene, consumption of soft drinks, dental care, and previous caries experience. *Sci Rep* 2016;6:21147.
- Mulu W, Demilie T, Yimer M, Meshesha K, Abera B. Dental caries and associated factors among primary school children in Bahir Dar city: A cross-sectional study. *BMC Res Notes* 2014;7:949.
- Holan G, Needleman HL. Premature loss of primary anterior teeth due to trauma – Potential short- and long-term sequelae. *Dent Traumatol* 2014;30:100-6.
- Ngan P, Alkire RG, Fields H Jr. Management of space problems in the primary and mixed dentitions. *J Am Dent Assoc* 1999;130:1330-9.
- Macena MC, Tornisiello Katz CR, Heimer MV, de Oliveira e Silva JF, Costa LB. Space changes after premature loss of deciduous molars among Brazilian children. *Am J Orthod Dentofacial Orthop* 2011;140:771-8.
- American Academy of Pediatric Dentistry Clinical Affairs Committee. Guideline on management of the developing dentition and occlusion in pediatric dentistry. Reference Manual 2006-07. *Pediatr Dent* 2006;28:157-69.
- Alexander SA, Askari M, Lewis P. The premature loss of primary first molars: Space loss to molar occlusal relationships and facial patterns. *Angle Orthod* 2015;85:218-23.
- Tunison W, Flores-Mir C, ElBadrawy H, Nasser U, El-Bialy T. Dental arch space changes following premature loss of primary first molars: A systemic review. *Pediatr Dent* 2008;30:297-302.
- Cernei ER, Mavru RB, Zetu IN. Axial modifications of permanent lower molars after premature losses of temporary molars. *Rev Med Chir Soc Med Nat Iasi* 2016;120:178-85.
- Lin YT, Chang LC. Space changes after premature loss of the mandibular primary first molar: A longitudinal study. *J Clin Pediatr Dent* 1998;22:311-6.
- Law CS. Management of premature primary tooth loss in the child patient. *J Calif Dent Assoc* 2013;41:612-8.
- Alnahawi HH, Donly KJ, Contreras CI. Space loss following premature loss of primary second molars. *Gen Dent* 2015;63:e1-4.
- Cernei ER, Maxim DC, Zetu IN. The influence of premature loss of temporary upper molars on permanent molars. *Rev Med Chir Soc Med Nat Iasi* 2015;119:236-42.
- Kronfeld R. Development and calcification of the human deciduous and permanent dentition. *The Bur* 1935;35:18.
- Al-Shahrani N, Al-Amri A, Hegazi F, Al-Rowis K, Al-Madani A, Hassan KS. The prevalence of premature loss of primary teeth and its impact on malocclusion in the Eastern Province of Saudi Arabia. *Acta Odontol Scand* 2015;73:544-9.
- Ahmed SS, Reddy VN, Krishnakumar R, Mohan MG, Sugumaran DK, Rao AP. Prevalence of early loss of primary teeth in 5-10-year-old school children in Chidambaram town. *Contemp Clin Dent* 2012;3:27-30.
- Caufield PW, Cutter GR, Dasanayake AP. Initial acquisition of Mutans streptococci by infants-Evidence for a discrete Window of Infectivity. *J Dent Res* 1993;72:37-45.
- Leite-Cavalcanti A, Menezes SA, Granville-Garcia AF, Correia-Fontes LB. Prevalence of early loss of primary molars: Study retrospective. *Acta Sci Health Sci* 2008;30:139-43.
- Saravanan S, Kalyani V, Vijayarani MP, Jayakodi P, Felix JW, Arunmozhi P, *et al.* Caries prevalence and treatment needs of rural school children in Chidambaram Taluk, Tamilnadu, South India. *Indian J Dent Res* 2008;19:186-90.
- Brothwell DJ. Guidelines on the use of space maintainers following premature loss of primary teeth. *J Can Dent Assoc* 1997;63:753, 757- 60, 764-6.
- Grippaudo C, Paolantonio EG, Pantanali F, Antonini G, Deli R. Early orthodontic treatment: A new index to assess the risk of malocclusion in primary dentition. *Eur J Paediatr Dent* 2014;15:401-6.
- Agarwal R, Chaudhry K, Yeluri R, Singh C, Munshi AK. Alternative approach to management of early loss of second primary molar: A clinical case report. *J Calif Dent Assoc* 2014;42:327-30.
- Davydov BN, Bakernikova TM, Lavrikov VG, Chumakov AN. Evaluation of clinical efficiency of various space maintainers in premature loss of deciduous molars. *Stomatologiya* 2015;94:64-7.