

### PREVALENCE OF PREMATURE LOSS OF PRIMARY TEETH AT THE AGE OF 6-10 YEARS IN SANA'A CITY, YEMEN

#### ABSTRACT

**Background:** Primary teeth and the integrity of the primary teeth are very important for the normal growth and development of the occlusal relationships and the dentofacial structures. Premature loss of the primary teeth may lead to the loss of the arch length required for the eruption of permanent teeth and thus lead to crowding, rotation and impaction of permanent teeth. **Objectives:** This study aimed to determine the prevalence of premature loss of primary teeth among children aged 6-10 years in Sana'a city, Yemen. **Materials and methods:** This observational cross-sectional study included 1091 children, aged 6-10 years. An experienced examiner the first author performed all clinical examinations under natural light. Data including age and missing tooth was collected. **Results:** The results showed that 26% of the sample suffered premature loss of primary teeth with no significant difference between the sexes ( $P > 0.05$ ). There was low prevalence of premature loss of primary teeth in 10 years (17.7%), while the rate raised to 29.7%, 31.6%, and 31.7% in 6, 7 and 9 years respectively. When considering the number of teeth, the prevalence of one premature loss was 10.8%, followed by two premature loss (9.8%), while the loss rate of 3 or more was 5.4%. Considering dental arch 61.8% of loss was Mandible loss, while the loss in Maxilla was 38.1% only. The most common missing tooth is the first lower right primary molar (17%). **Conclusion:** The prevalence of premature loss in our study is similar to that of developing countries, the rate was low at 10 years for children, while the rate increased at 6, 7 and 9 years; most of the loss was in the lower jaw and the most common missing tooth was the right lower primary molar. This result determines the importance of increasing awareness of this problem and focusing on the need for more preventive efforts to maintain healthy and natural teeth that improve the chewing function and aesthetic appearance of children and the entire population.

**Keywords:** children, prevalence, premature loss, primary teeth, Sana'a city, Yemen

#### INTRODUCTION

Dental research is still limited in studying dental problems in Yemen, however some recent studies have been conducted that discussed the prevalence of malocclusion, the causes of permanent tooth extraction in general dental practices, the spread of the retromolar canal, and the prevalence and causes of traumatic dental injuries<sup>1-4</sup>. The primary teeth and the integrity of the primary teeth are very important for the normal growth and development of the occlusal relationships and dentofacial structures. Preserving the primary teeth until they are naturally exfoliated is one of the most important goals of pediatric dentistry<sup>5</sup>. An early or premature loss is known as the loss of a primary tooth before the time of natural exfoliation<sup>5,6</sup>. Early loss of primary teeth is a public health problem. A tooth is lost prematurely if it is lost from a dental arch within a year before the normal age of exfoliation<sup>7</sup>. There are local and systemic factors that cause early loss of primary teeth. Local factors include tooth decay, which is the most common cause, inadequate nutrition, bad oral health, trauma, periodontal disease and premature root resorption<sup>8-10</sup>.

There are a number of systemic diseases such as diabetes, phosphate deficiency, leukemia, hyperthyroidism, etc., whose effects on the oral cavity may make the teeth subject to exfoliation<sup>11</sup>. It is generally accepted that premature loss of deciduous teeth is associated with malocclusion of permanent dentitions, such as tooth rotation, extrusion of antagonist teeth, dental crowding, development of habits, and disorders of craniofacial development, especially post-dental impaction and reduction of the length of the dental arch<sup>12-14</sup>. Early loss of the primary teeth leads to early or late eruption of successor teeth<sup>10</sup>. The significance of the consequences that arise after the early loss of a primary tooth that has not been assessed further for particularly divergent treatment needs explain the reason for choosing this topic, to determine the widespread of premature loss of primary teeth in Yemen.

#### SUBJECTS AND METHODS

**Study Design:** A cross sectional study was conducted.

**Study Population:** The target population was students of both genders, aged 6 and 10 years, chosen from public and private primary schools that are located in the five districts.

All children should match the study inclusions criteria a) 6 to 10 years old, b) a tooth was considered to be prematurely lost if it was missing from the dental arch one year before its natural age of exfoliation<sup>15</sup>, and c) The study subjects provided informed consent and presented

for examination on the day of screening. However, the exclusions criteria included: a) Non-Yemeni children and b) medically comprised children.

**Sample size:** The sample size was calculated using EPI version 7, based on the following assumptions: a) The total number of students in the five Sana'a City districts is 101,590 according to the Ministry of Education; b) The previous recurrence of early loss of primary teeth is estimated to be approximately 51%, with a 99.9% confidence level and with a margin error of 0.01. From previous assumptions, 1091 participants are needed to give significant results out of the total population.

**Study area and sampling type:** Multistage sampling method which the first Stage: from the ten districts we chosen randomly five districts: from the south Al- sabein district, from the north Al-Thwarh District, from the west Azal district and Al- wahda; and from the middle the Old Sana'a District. The second stage: In each district, we considered that all private and public schools are included in the study, then we randomly selected sixteen public schools and ten private schools which represent nearly 10% of total number of schools according to Education, 2018. The Third stage: In all randomly selected school, we considered that all the classes of students aged from 6 to 10 years old are included in the study. Then we randomly selected one class from each level. Finally, selection from the selected classes was systemically random; so that we can reach the sample size target.

**Data collection and clinical examination:** An experienced examiner the first author performed all clinical examinations under natural light. Data including age and missing tooth was collected.

**Ethical consideration:** The study was approved by the research ethics committee of Faculty of Dentistry, University of Sana'a.

**Statistical analysis:** The data was analyzed by using Statistical Package for the Social Science version 21.0 software (SPSS version 21.0).

## RESULTS

The result revealed that of the 1091 children included in this study group, 284 (26%) had a premature loss of their primary teeth (Table 1). Both males and females had roughly the same prevalence: 26.2% and 25.8%, respectively. There was a decrease in the prevalence of premature loss of primary teeth at 10 years (17.7%), while the rate increased to 29.7%, 31.6%, and 31.7% in children aged 6, 7 and 9 years, respectively (Table 2). The results showed that a total of 543 primary teeth were lost prematurely. The most commonly lost tooth was 84 (mandibular right first primary molar) with (17%) of the total, followed by 74 (mandibular left first primary molar) with (16%), 54 (maxillary right first primary molar) with (14%), then 13% for teeth numbers 85, 75 and 64 (mandibular right and left second primary molar and maxillary left primary molar respectively) (Table 3). When considering the number of teeth, the prevalence of one premature loss was 10.8%, followed by two premature loss (9.8%), while 3 or more loss was 5.4% (Table 4). Considering dental arch 61.8% of loss was Mandible, while loss in Maxilla was 38.1% only (Table 5). Table 6 shows the distribution of premature loss according to dental quadrant among male and female children aged 6-10 years. The result showed that the mandibular right side had the highest cases of the early loss (31%), followed by the mandibular left side (30%), then the maxillary right side (21%).

## DISCUSSION

Premature loss of primary teeth is the most common local factor that leads to malocclusion. Many practitioners prefer to extract the primary teeth rather than treat them because it is often complicated<sup>16</sup>. On the other hand, most parents believe that it is not necessary to treat the primary teeth because they will be replaced in any way<sup>16</sup>. The harmony of the permanent teeth overlaps with the premature loss of the primary tooth and the main effect of this loss is congestion caused by the migration of the adjacent teeth<sup>13,17</sup>. Knowledge of the pattern and causes of tooth extraction will increase the knowledge of the dental practitioner in order to provide better information about the prevalence of dental disease, availability of dental care, and behaviors towards tooth mortality<sup>18-20</sup>.

Of the 1091 children, 284 (26%) had premature loss of primary teeth in our study which corresponds to (28.3%) of children in a study conducted in Mexico and approved by Galicia-Sosa *et al.*<sup>21</sup>, (24.9%) in a study conducted in Brazil by Cavalcanti *et al.*<sup>6</sup> and (25.3%) in a study conducted in Lacey Romania by Petcu *et al.*<sup>22</sup>. Compared to other studies conducted in Saudi Arabia, Yemen and Denmark, early loss of primary teeth was (51%), (40.5%) and (47.3%) respectively and it is higher than this study<sup>5,23,24</sup>. This difference may be due to the higher rate of decaying deciduous teeth. In general, the increase in the rate of early loss of primary teeth may be a result of parents and dentists believing that prevention and treatment of a primary tooth is unnecessary because the teeth will eventually be extracted.

Some socio-demographic variables in this study showed that there was no statistically significant difference in premature loss of primary teeth between boys and girls. This result was similar to previous studies<sup>15, 24-26</sup>. This indicates that premature loss is due to poor oral hygiene, not related to children sex. Comparison of a study conducted in Brazil by Almeida-Heilborn *et al.*<sup>10</sup>, there was a significant difference between the sexes, with premature loss being more in males than in females. This may be a result of a prolonged period of feeding male infants due to a preference for sons which could be a causative factor for the high incidence of decay-filled (dft) scores among male individuals leading to increased loss of primary molars in a male individual as confirmed by Saravanan *et al.*<sup>27</sup>.

There was a decrease in the prevalence of premature loss of primary teeth at 10 years (17.7%), while the rate increased to 29.7%, 31.6%, and 31.7% in children aged 6, 7 and 9 years, respectively (Table 2) which confirms the result reported by previous studies<sup>6,9,16</sup>. In this study the teeth more frequently lost was 84 (the right lower molar) with (17%), followed by 74 (the lower left primary molar) with (16%), which was consistent with studies conducted by many researchers in the developing countries<sup>6,15,16,26,28</sup>. These findings could be a result of the chronological age of the first and second primary molar eruption. Because the first primary molars erupt early and stay in the oral environment for a longer period. These teeth are more prone to tooth decay. Moreover, dentists usually prefer to preserve the second primary molar to prevent space loss during the eruption of the first permanent molar. This explains why the first primary molars are more commonly extracted compared to the second primary molar, which leads to repeated early loss of the primary first molars<sup>29</sup>.

The colonization of *mutant streptococci* is the main cause of early loss of primary molars. Increase of the *mutant streptococcus* colony towards primary molars due to anatomy of the occlusal fissured surface in nature and the proximal concave surface<sup>30</sup>. Compared to the study carried out in Romania by Andronic<sup>31</sup>, the tooth most affected by premature loss was the second primary molar of the mandible. This difference may be the result that each group has its own characteristics depending on the region in which you live and the health education. In this study, premature loss of only one tooth constituted the highest percentage of the total study group agreed upon with a study conducted by Al-Asadi<sup>32</sup>. This shows that preserving the natural teeth throughout the life of the children, either by preventing or providing treatment for dental diseases, was the main goal of the children's clinic.

In this study, the mandibular arch had more premature loss of the primary teeth than the upper jaw, which is similar to previous studies conducted in developing countries<sup>6,15,22,28,31</sup>. The increased rate of premature loss of primary teeth in the mandibular arch may be due to food packaging and plaque accumulation compared to the abundance of saliva and its anticariogenic effect on the maxillary molar teeth<sup>16</sup>. The current study showed that the greater loss of primary teeth in the right quadrant of both jaws than in the left quadrant is consistent with other studies conducted by Ahmed *et al.*<sup>15</sup> and Ayachandar *et al.*<sup>26</sup>. Due to the reduced level of cleaning and chewing powers, this leads to plaque accumulation on the right side, as emphasized by Lotto<sup>33</sup> and Park *et al.*<sup>34</sup>.

## CONCLUSION

The prevalence of premature loss is similar or roughly lower the rate in developing countries, the rate was low in 10 years children, while the rate raised in 6,7, and 9 years; and most of the loss in dental arch was in mandible and the most common missing tooth was the right lower first primary molar. This result determines the importance of raising awareness about this problem and focusing on the need for more preventive efforts to maintain healthy and natural teeth that improve the chewing function and aesthetic appearance of children and the entire population.

## AUTHOR'S CONTRIBUTION

This research work is part of a Master's thesis. The candidate is **Kadija Ahmed Omer Bamashmoos** to conduct clinical, field works and thesis. Corresponding author (HAA), second author (AHA), and the rest of the authors supervised the work, revised and edited the thesis draft and the manuscript.

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## CONFLICT OF INTEREST

"No conflict of interest associated with this work".

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Table 1: The age and sex distribution of children aged 6-10 years examined for the prevalence of premature loss of primary teeth in Sana'a city, Yemen.

Age in years	Gender					
	Female		Male		Total	
	N	%	N	%	N	%
6	62	11.6%	56	9.9%	118	10.8%
7	125	23.5%	103	18.3%	228	20.9%
8	130	24.5%	138	24.5%	268	24.6%
9	123	23.2%	123	21.9%	246	22.5%
10	90	16.9%	141	25.1%	231	21.2%
<b>Total</b>	530	48.6%	561	51.4%	1091	100.0%

Table 2: Prevalence of premature loss of primary teeth among different ages and sex.

Prevalence of premature loss of primary teeth												
Ages	6 years old		7 years old		8 years old		9 years old		10 years old		Total	
Gender	N	%	N	%	N	%	N	%	N	%	N	%
<b>Males</b>	17	30.4%	32	31.1%	29	21%	41	33.3%	28	19.8%	147	26.2%
<b>Females</b>	18	29%	40	32%	29	22.3%	37	30.1%	13	14.4%	137	25.8%
<b>Total</b>	35	29.7%	72	31.6%	58	21.6%	78	31.7%	41	17.7%	284	26%

Table 3: Distribution of premature loss of primary teeth according to the site number of the teeth among male and female children aged 6-10 years .

Tooth site numbers	Gender					
	Female		Male		Total	
	Number	%	Number	%	Number	%
51	0	0.0%	1	0.2%	1	0.2%
52	0	0.0%	1	0.2%	1	0.2%
53	1	0.2%	2	0.4%	3	1%
54	34	6.3%	44	8.1%	78	14%
55	10	1.8%	19	3.5%	29	5%
61	1	0.2%	1	0.2%	2	0.4%
62	1	0.2%	1	0.2%	2	0.4%
63	1	0.2%	1	0.2%	2	0.4%
64	28	5.2%	42	7.7%	70	13%
65	11	2.0%	8	1.5%	19	3%

71	0	0.0%	0	0.0%	0	0.0%
72	0	0.0%	0	0.0%	0	0.0%
73	5	0.9%	1	0.2%	6	1%
74	37	6.8%	50	9.2%	87	16%
75	31	5.7%	41	7.6%	72	13%
81	0	0.0%	0	0.0%	0	0.0%
82	0	0.0%	0	0.0%	0	0.0%
83	5	0.9%	2	0.4%	7	1%
84	40	7.4%	52	9.6%	92	17%
85	37	6.8%	35	6.4%	72	13%
<b>Total</b>	242	44.5%	301	55.4%	543	100%

Table 4: The number of lost premature primary teeth among male and female children aged 6-10 years .

Number of lost teeth	Male (561)		Female (530)		Total n=1091	
	N	%	N	%	N	%
One tooth	58	10.3%	60	11.3%	118	10.8%
Two teeth	53	9.5%	54	10.2%	107	9.8%
Three and more teeth	36	6.4%	23	4.3%	59	5.4%
	147	26.2%	137	25.8%	284	26%

Table 5: Distribution of premature loss of primary teeth according to dental arch among male and female children aged 6-10 years

Dental arch	Gender					
	Male (number of teeth=301)		Female (number of teeth=242)		Total (n=543)	
	Number	%	Number	%	Number	%
Maxilla	120	39.9%	87	16.4%	207	38.1%
Mandible	181	60.1%	155	29.2%	336	61.8%
Total	301	53.6%	242	45.7%	543	100.0%

Table 6: Distribution of premature loss according to dental quadrant among male and female children aged 6-10 years

Dental quadrant	Gender					
	Male (561)		Female (530)		Total (1091)	
	Number	%	Number	%	Number	%
Maxilla (right)	67	12%	45	8%	112	21%
Maxilla (left)	53	10%	42	8%	95	17%
Mandible (right)	89	16%	82	15%	171	31%
Mandible (left)	92	17%	73	13%	165	30%
Total	301	55%	242	45%	543	100%