



## Prevalence of Premature Loss of Primary Teeth among School-children Aged (6-10 Years Old) in the Libyan City of Bani Waleed and Assessment of Parental Knowledge and awareness towards Space Maintainer

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**Abstract:** The premature loss of primary teeth is one of the most common dental problems affecting the growth and development of children's teeth. It is often caused by dental caries. Premature loss of the primary teeth results in a loss in the length of dental arch and leads to malocclusion. Space Maintainers play an important role in managing the spaces created by the early loss of primary teeth. The use of space maintainers depends on parent's awareness and knowledge towards space maintainers. The current study was goaled to define prevalence of premature loss of primary teeth among schoolchildren (6-10 years old) in the Libyan city of Bani Waleed, as well as, evaluating the awareness level of their parents toward space maintainers. A descriptive cross-sectional questionnaire-based study was conducted. The data were analyzed and summarized statistically using SPSS version 26.0. Chi-square test was carried out to detect correlation between variables. The results revealed that (55.1%) of the children suffered of premature loss of their teeth with no significant variation among the genders ( $P>0.05$ ). The highest prevalence (16.4%) was recorded at the age of 7 years old. (70.5%) caused by dental caries. (82.40%) of parent's respondents that they don't know what is (SM) appliances and when used. This study demonstrated that, prevalence of premature loss of primary teeth among school-children was high, and the Knowledge of space maintainers among Bani Waleed parents is very less. So, dentists need to create awareness about space maintenance of primary teeth and preventive orthodontic.

**Keywords:** Primary teeth, Premature loss of teeth, Malocclusion, Preventive orthodontic, Space maintainer.

### Introduction

The primary dentition plays an important functional, morphological and psychosocial role in the dental growth and development of children. In addition to providing appropriate conditions for the establishment of normal occlusion, esthetics, mastication and speech. Furthermore, Maintenance of the integrity of the primary dental arch has a strong influence on the development and eruption of the

permanent teeth, preserving the length of the dental arch and conserving the space necessary for the eruption of the permanent teeth [1]. Exfoliation of primary teeth and eruption of permanent teeth is a normal physiological process [2]. Premature loss of primary teeth leads to disruption in this physiological process of exfoliation [3]. Furthermore, one of the most important goals of pediatric dentistry is maintain the primary teeth till they are naturally exfoliated [4]. Premature loss of teeth is defined as the loss of a primary tooth before the time of natural exfoliated [4- 5]. One of the most common dental problems affecting children is premature loss of primary teeth that leads to negative consequences in both dentition and malocclusion [6]. Parents are in charge of their children's oral hygiene habits and regular dental visits in the 1st year of infancy [7]. Inappropriate oral hygiene is a key behavioral risk factor for premature loss of primary teeth [4], [8]. Many parents think that losing primary teeth prematurely is unimportance. They believe that the losing of primary tooth is not significant as losing of the permanent tooth. Primary teeth work as natural space maintainer for secondary teeth [9]. Premature loss of primary teeth may occur by local or systemic factors. Local causes include dental caries (Fig. 1), which is the most common cause, dental trauma, periodontal diseases and abnormal root resorption [10- 12].



**Fig. 1:** Severe dental caries of the 1<sup>st</sup> and 2<sup>nd</sup> lower primary molars, intraoral arch length reduced  
(*International Journal of Oral Science*).

There are systemic diseases, such as leukemia, diabetes, and hyperthyroidism, can affect the oral cavity and lead to subject to exfoliation of the primary teeth. Premature loss of primary teeth leads to shifting of adjacent teeth into the space of tooth loss created making abnormal axial inclination spacing between teeth and shifting of dental midline [13], which can cause crowding along with short arch length. [3].



**Fig. 2:** (A). Clinical photograph and (B). Radiograph showing the migration of primary teeth into space after early loss of primary upper left central incisor [14].

This deters the normal eruption and deviation of their permanent teeth from pathways guiding to malocclusion [13]. In form of dental crowding, ectopic eruption, tooth rotation, excessive overjet, crossbite, excessive overbite, impaction of permanent teeth (Fig. 3), supra-eruption of opposing teeth and unfavourable molar relationships [3] (Fig. 4).



**Fig. 3:** Impaction the permanent upper central incisors after loss by dental trauma of all 4 primary upper incisors and canine [14].



**Fig. 4:** The migration of adjacent teeth and decrease of space required for the eruption of permanent  
(Collection of the Department of Pediatric Dentistry).

Premature teeth loss in children should be treated as soon as possible to prevent the development of malocclusion [6]. Early orthodontic treatments are often in the beginning of developing dentition help to improve favorable developmental changes [15]. Space maintainer is the safest way to maintain space after premature loss of tooth and prevent malocclusion. (SM) is a fixed or removable appliance used to maintain the length of the dental arch and the relationship between teeth after premature loss or extraction of primary teeth. [16] (Fig. 5).



**Fig. 5:** Unilateral band and loop space maintainer [17].

It will eliminate or decrease the severity of a developing malocclusion, the complexity of treatment, and overall treatment time and cost as complicated occlusions are more expensive to correct. [18- 19]. Dentists should be taken early management after premature loss of primary teeth including preventive and corrective measures to prevent malocclusion in future [20- 21]. The use of preventive orthodontics depends on parents' knowledge and awareness of space maintenance. The Parents usually obtain information about immunizations, nutrition and diet, prevention of injury and accident at the hospital during their child's regular medical visits for checkups, but in the case of oral hygiene, the position is completely different, and the dentist is visited in the later stages of caries progression and malocclusion which increases the possibility of losing teeth early. Most of the time, the parents responsible for the oral care of children believe or feel that since primary teeth will be replaced in any way, it is not worth their while to spend time/money on providing good oral health to children. Even in advanced countries, most parents still take their children to the dentist for therapeutic and not for preventive treatments [22].

This title is important in terms of determining such problem which affects dental growth and development of the child's teeth and the extent of its prevalence, spreading knowledge and awareness among parents of preventive orthodontic treatment from the consequences of early loss of primary teeth, which is "space maintainer" appliance.

AlMeedani LA. *et al.* 2020, who studied Prevalence of premature loss of primary teeth among children in Dammam city and parents' awareness toward space maintainers. The purpose of this study was to assess the prevalence of early loss of primary teeth among children in the Saudia city of Dammam and to evaluate parent's attitudes toward space maintainer appliance. Used to examine decay-missing-filled index and premature loss of primary teeth. Questionnaires were distributed to the parents of selected children to explore their demographic data and their knowledge toward space maintainers. The study revealed a high prevalence of premature loss of primary teeth among children in Saudi Arabia. parents were unaware towards space maintainer, its used, benefits and maintenance.

According to Bamashmoos KA. *et al.* 2020, who studied Prevalence of Premature Loss of Primary Teeth at the Age of 6-10 Years in Sana'a City, Yemen. The goal of study to define the prevalence of premature loss of primary teeth among children (6-10 years) in Sana'a city, Yemen. Cross-sectional observational research involved 1091 student (6-10 years). All clinical examinations were carried out under natural light by the first author, an experienced examiner. The prevalence of premature loss in current study

is comparable to that of developing nations, the rate was low at 10 years for children, but the rate increased at 6,7 and 9 years.

According to Ali A. *et al.* 2022, Assessment of Parental Knowledge towards Space Maintainer as an Essential Intervention after Premature Extraction of Primary Teeth. This study evaluated parents' knowledge towards space maintainers as preventive measures following premature loss of primary teeth. A descriptive study was conducted using a cross-sectional questionnaire. The knowledge of parents about space maintainers was (49.8%), which is deemed inadequate. It was considered essential to rise knowledge among parents about space maintainers as preventive treatment after premature loss of primary teeth.

To the knowledge of the researchers, this study is the first was conducted in the city of Bani Waleed to define extent prevalence of premature loss of primary teeth among children (6-10 years old), and assessment of parent's knowledge and awareness towards space maintainer as an essential intervention after premature loss of primary teeth in Bani Waleed as this is an important in preventive treatment planning and awareness so, necessary spread knowledge this problem between the medical society and community in general.

Question of the research: How is the level of prevalence of premature loss of primary teeth among school-children (6-10 years old) and awareness of Bani Waleed their parents towards space maintainers in Bani Waleed city?

Hypothesis: The prevalence of premature loss of primary teeth among school-children (6-10 years old) is high and the level of awareness of Bani Waleed parents toward space maintainer is low.

## **1. Material and methods**

**2.1. Study design:** A cross-sectional questionnaire based descriptive-analytical study was carried out.

**2.2. Study population:** The target population included 1273 students of both genders (6 to 10) years old, as well as their parents. The students were selected from 30 elementary (private and public) schools are located in five schools' clusters in the Bani Waleed city. The sample size was determined using (Krejcie and Morgan, 1970) Table, the total number of students in the Bani Waleed city is 9000, based on the ministry of education; the sample size enters table N=9000 is 368 sample size. From the overall target population, 1273 participants were selected to provide significant results.

**2.3. Sampling technique:** multistage sample method which the first stage using sample cluster technique, the city's schools were divided into five clusters. The second stage was to ensure that all private and public schools in each cluster were included in the study, thus we randomly picked 18 public schools and 12 private schools, representing almost (36%) of the total number of schools based on Education 2022. The third stage was to ensure that all classes of children aged from 6 to 10 years old were involved in the study in all randomly selected schools. Then, at random, we took one class from each level. Finally, we distributed by hand to each class as a whole; so that we can attain the sample size requirement. After completing the questionnaire by parents, we returned the next day to receive it from the students.

**2.4. Study duration:** This cross-sectional study was conducted from January 31st, 2023 to May 15th, 2023.

3.

<b>Table 1: Distribution of study participants according to sociodemographic variables.</b>			
		<b>Frequency</b>	<b>Percent (%)</b>
<b>Gender</b>	Male	685	53.8%
	Female	588	46.2%
<b>Age group</b>	20-30	196	15.4%
	31-45	765	60.1%
	46 and above	312	24.5%
<b>Education level</b>	Intermediate	182	14.3%
	Secondary	182	14.3%
	University	909	71.4%
	Total	1273	100%

**3.1. Details of the Questionnaire:** The questionnaire designed so that the questions fall into four categories. The first section gathered sociodemographic data of the parents: Gender, age, educational level. The second section gathered sociodemographic data of the child included: Gender, age. The three section surveyed parents’ knowledge of oral health; The third section surveyed parents’ knowledge and awareness toward space maintainers.

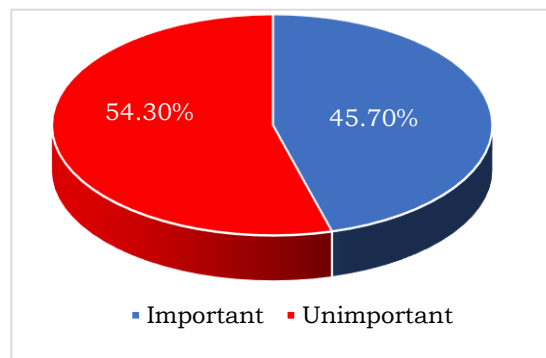
**3.2. Statistical analysis:** The data were analyzed and summarized statistically using SPSS version (26.0). Chi-square test was carried out to detect correlation between variables. A Significant level test was ( $p < 0.05$ ). Data from the questionnaires were analyzed using the following: Table, Frequencies, Percentages.

**4. Results:** A total of 1273 questionnaires were gathered in this study; (94.3%) were answered completely. The results of Demographic data show 685 (53.8%) male and 588 (46.2%) female. According to survey, the majority of the participants were in the age range of 31–45 years 765 (60.1%) and 909 (71.4%) had completed university studies as their highest education (Table1).

The result revealed that of the 1273 children consisted of 612 male (48.1%) and 661 female (51.9%) student. The majority of the students were in the age 7 years 401 (31.5%) while the minority of the students were in the age 10 years 31 (2.4%) (Table 2).

When the parents were asked about their oral health knowledge, high parentage of parents 691 (54.3%) believe that primary teeth are not important (Fig. 6).

<b>Table 2: Child’s data including gender and age.</b>			
		<b>Frequency</b>	<b>Percent (%)</b>
<b>Gender</b>	Male	612	48.1%
	Female	661	51.9%
<b>Age</b>	6 years	184	14.5%
	7 years	401	31.5%
	8 years	336	26.4%
	9 years	321	25.2%
	10 years	31	2.4%
	Total	1273	100%

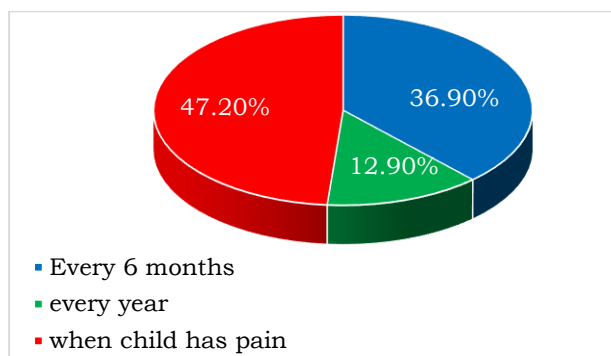


**Fig. 6:** Importance of primary teeth.

Through the previous values, the level of awareness of the importance of teeth is low. The parents’ lack awareness of the teeth importance and

maintenance until the time of natural exfoliation. It is one of the reasons that affect the health of primary teeth and increases the possibility of early loss, and these results are not harmony with previous studies [23].

The parents (47.2%) answered that the child should visit the dentist only child has pain, and (62.3%) of parents indicated that their children had visited the dentist (Fig. 7.)



**Fig. 7:** Frequency of dental visit.

The parents didn't agree on the child's need of visit to the dentist in every 6 months and this depicts their level of awareness about how much importance they do give to their child's oral health. This study results are not supportive of previously published literature [24].

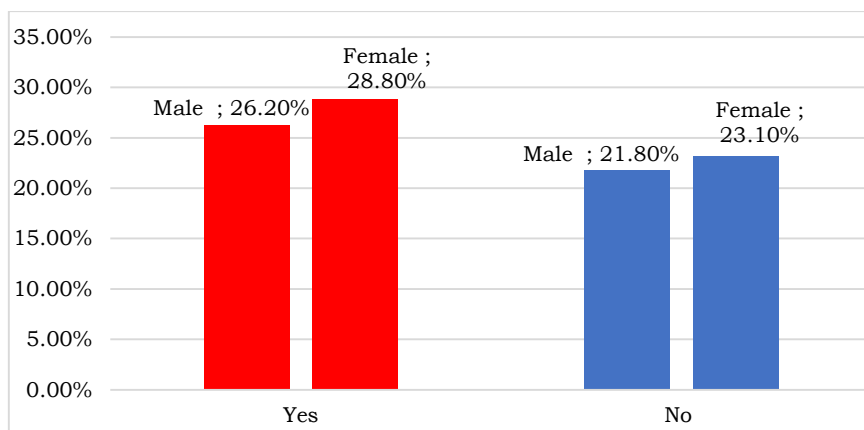
When asked the parents a question regarding if their children suffers premature loss of primary teeth (55.1%) answered their children had premature loss of their teeth (Table 3 and Fig. 8).

**Table 3:** Distribution of children's gender according to early loss.

		Male	Female	Total
Yes	N	334	367	701
	%	26.2%	28.8%	55.1%
No	N	278	294	572
	%	21.8%	23.1%	44.9%
Total	N	612	661	1273
	%	48.1%	51.9%	100.0%

Chi-Square =0.115      p Value 0.734 =

The (28.8%) were female and (26.2%) were male, a significant was ( $p > 0.05$ ) this indicates that there is no difference between males and females in premature loss of their teeth.



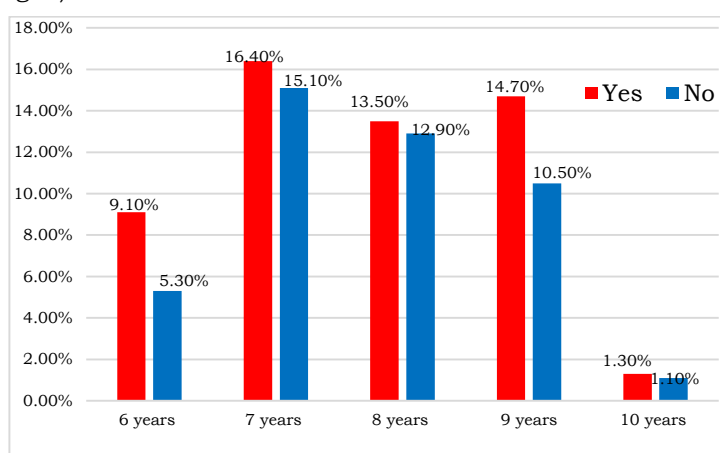
**Fig. 8:** Prevalence of premature loss of primary among gender.

Compared to other studies in some cities: (Dammam) Saudi Arabia, (Melmaruvathur, Tamil Nadu) India, (Sana'a) Yemen, and (Thamar) Yemen. early loss of primary teeth was (20%), (20.8%), (26%) and (40.54%) respectively and this study higher than these studies [6], [25- 27]. This difference may be due to the higher rate of dental caries in primary teeth. The rise in the rate of early primary teeth loss could be attributed to dentists and parents assuming that preventing and treating a primary tooth is unnecessary because the teeth will eventually be lost or extracted.

According to several socio demographic variables, there was no significant difference in early primary teeth loss between males and females.

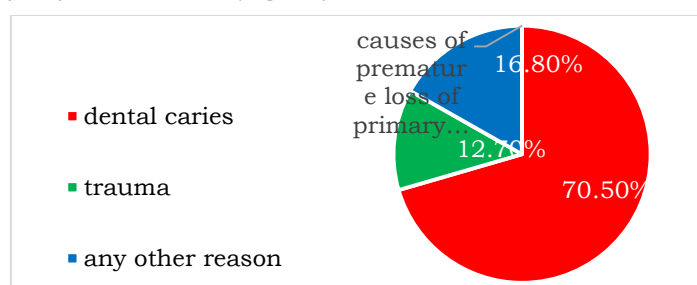
This illustrates that premature loss is not related to the sex of the child, but can be due poor oral hygiene.

The prevalence of early loss was significantly reduced ( $p > 0.05$ ) at 10 years (1.3%), but the rate increased non-significantly to (13.5%), (14.7%), and (16.4%) in the schoolchildren at aged 8, 9 and 7 years, respectively (Fig. 9).



**Fig. 9:** The prevalence of premature loss of primary according to age.

The children had premature loss their teeth caused by (70.5%) dental caries, (12.7%) dental trauma and (16.8%) caused by any other reason (Fig. 10).

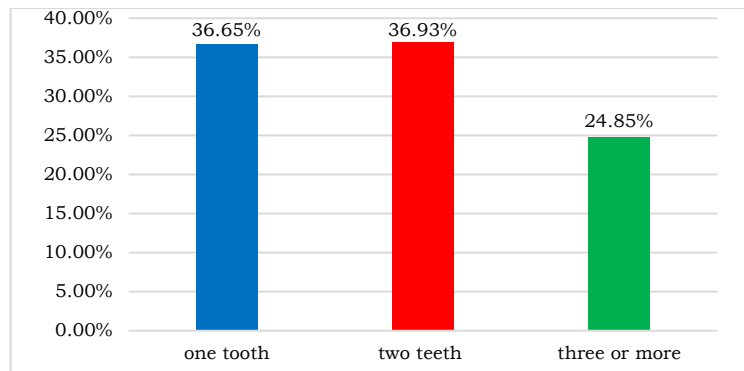


**Fig. 10:** The causes distributed of the premature loss of primary teeth.

The higher percentage was due to dental caries, which is the most common cause of early tooth loss, and this may be due to poor oral health. Some parents take their children to the dentist in the late stages of decay, which leads to early tooth loss. On the other hand, some dentists prefer tooth extraction rather than treatment.

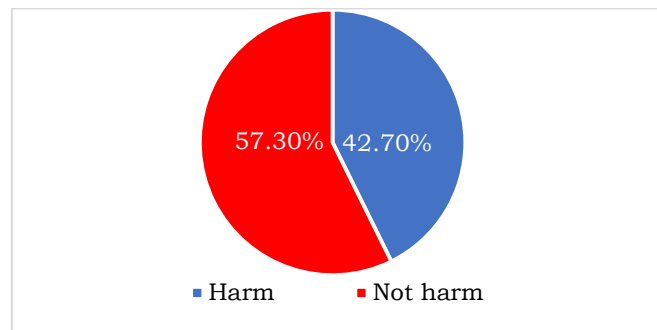
The (36.6%) of the children lost only one tooth, (36.9%) were lost two teeth and (24.8%) lost three or more teeth (Fig. 5).





**Fig. 11:** Number teeth lost by premature loss.

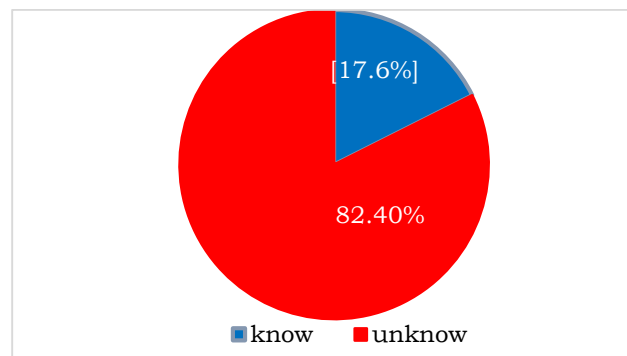
The highest percentage (57.3%) of parents believe that premature loss of primary teeth will not harm the permanent teeth (Fig. 12).



**Fig. 12:** Parents' belief about premature loss.

This belief indicates that the parents are not aware of the consequences of early loss and dental problems in both dentition that will occur in the future. Their awareness is limited that the primary teeth will be replaced by the permanent teeth anyway.

Regarding parents' knowledge about space maintainers appliances, (82.40%) of parent's respondents that they don't know what is (SM) appliances and when used. The majority of the male parents were don't know what is (SM) (84.1%) and the female parents (80.4%), a significant was ( $p=0.090$ ) this indicates that there is no difference between males and females in knowledge about space maintainer. No difference between age group of parents in knowledge about (SM) a significant was ( $P=0.485$ ), also between educational level a significant was ( $P=0.334$ ). (Table 4 and Fig. 13).



**Fig. 13:** Distribution of the percentage of parent's knowledge about (SM).

**Table 4:** The demographic data of the parents' distribution according knowledge about

		Yes	No	Total	Chi-Square	P value
Male	N	109	576	685	2.900	0.090
	%	15.9%	84.1%	100.0%		
Female	N	115	473	588	1.448	0.485
	%	19.6%	80.4%	100.0%		
20-30	N	37	159	196	2.192	0.334
	%	18.9%	81.1%	100.0%		
31-45	N	139	626	765	2.192	0.334
	%	18.2%	81.8%	100.0%		
<46	N	48	264	312	2.192	0.334
	%	15.4%	84.6%	100.0%		
Intermediate	N	28	154	182	2.192	0.334
	%	15.4%	84.6%	100.0%		
Secondary	N	27	155	182	2.192	0.334
	%	14.8%	85.2%	100.0%		
University	N	169	740	909	2.192	0.334
	%	18.6%	81.4%	100.0%		

Most of the parents (82.8%) were unaware of the fact that there are appliances available for their children's h as an early treatment. This is in accordance with study conducted in Al-Kharj, KSA. by Alduraim HS *et al.* [22]. Then compared to other studies conducted in some cities: Riyadh, Saudi Arabia, Parents' awareness toward space maintainers was (49.8%) and our study lower than this study [28].

When asked parents who do they know (3.6%) of parents know space maintainer from dentist, (6%) form Family and relatives, and (8%) know appliance from social media. (95.8%) of the parents answered the dentist did not explain how it is important to use a space maintainer after premature loss of teeth. The percentage of parents who treated their children with space maintainer is (2.20%).

Note: From the previous ratios, it was found that parents' knowledge of the space maintainer is very low, as they answered the rest of the questions related to the device.

The (15.7%) of the parents replied "Yes" a child with a space maintainer need regular visits to the dentist, and (1.5%) replied "No" and about (82.8%) were unaware.

When asked the parents a question regarding if they know what should you do when the permanent teeth are erupting while the child still wearing the space maintainer, 162 (12.7%) answered I will immediately go to the dentist, 39 (3.1%) answered wait for the next visit 18 (1.4%) answered I don't care and 1054 (82.8%) answered they don't know. And we asked what should you do if (SM) breaks if they know 186 (14.6%) of the parents answered they will immediately go to the dentist, 28 (2.2%) answered at any time and 1056 (83.2%) answered they don't know.

When asked the parents a question regarding if they know which type of food your child should be avoiding while wearing the space maintainer appliance, 1086 (85.3%) parents answered I don't know and 47 (3.7%) parents mentioned Vegetables and fruit, 21 (1.6%) parents answered soft drinks, 53 (4.2%) of the parents answered Candies and 66 (5.2%) mentioned all above. last question we asked the parents if they know when the space maintainer appliance should be removed and 1139 (89.50%) of them answered that they don't know and 134 (10.5%) parents answered yes.

The level of unawareness and knowledge about the space maintainers results in decreased response rates about the last few queries as the types of food that should be avoided when having space maintainers and when does the dentist remove of appliance *et al.*

#### **4. Conclusion**

The prevalence of premature loss of primary teeth was high (55.1%) in the Bani Waleed, Libya. According to age, the highest prevalence was registered at 7 (16.4%) years followed by 9 (14.7%) years and 8 (13.5%). The premature loss was more in females (28.8%) than males (26.2%). The majority of the children had two missing teeth (36.9%). Dental caries was the main reason for early loss of primary teeth (70.5%). The parents in Bani-Waleed City were not aware of primary teeth importance and maintenance. Most parents (82.8%) in Bani Waleed city were unknow space maintainer and when used. The higher educated respondents were more knowledgeable than the lower educated.

This indicates the need to raise awareness of space maintainers among the general population.

As a result, it is essential to increase oral health awareness among children and their parents in order to make them understand the important of primary teeth and maintenance of oral health. To reduce the prevalence of dental caries and the early loss of primary teeth, parents must be urged to take responsibility for cleaning their children's teeth. It is strongly advised that educational lectures and workshops be established in order to promote knowledge of kids about hygiene of oral cavity amongst fathers and mothers. To pique parents' interest and drive, oral health practitioners must be taught in new effective learning methodologies. Parents should be encouraged to bring their children to the dental clinic for a dental check-up every 6 months. Parents of children with early loss of primary teeth should be advised to bring their children to the dental clinic to have space maintainers and Dentists need to explain to parents the importance of primary teeth and must raise knowledge among parents towards (SMs) and their longevity during regular dental visits in order to keep the integrity and minimize occlusal discrepancies of dental arches.

We suggest an increased awareness level of space maintainers is need in the parents of Bani Waleed city. Further replication of this study in different settings, and sample populations is also needed in the future.

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#### **Conflicts of interest**

There are no conflicts of interest.

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