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Parental Awareness and the Use of Space Maintainers in Preventing Malocclusion

A Cross-Sectional Study in Zawia, Libya

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Abstract

Premature loss of primary teeth is a significant public health concern in pediatric dentistry, as it can adversely affect the normal development of occlusion, leading to malalignment, arch length reduction, and future orthodontic complications. Early tooth loss disrupts the guidance of erupting permanent teeth and can compromise both functional and esthetic aspects of oral health. This study explores the prevalence of premature primary tooth loss among children aged 4 to 10 in Zawia City, Libya, and assesses parental awareness regarding space maintainers. A cross-sectional study was conducted using dental examinations and structured questionnaires. The results revealed that 26% of children experienced premature tooth loss, while only 17.5% of parents were aware of space maintainers. Although many parents understood the general importance of dental visits and hygiene, specific knowledge about space maintainers was limited. Findings highlight the urgent need for public awareness programs aimed at educating parents on preventive pediatric dental care.

Keywords: space maintainer, Awareness, premature loss of primary teeth.

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الوعي الأبوي واستخدام أجهزة الحفاظ على المسافة في منع سوء الإطباق

دراسة مقطعية في الزاوية، ليبيا

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الملخص

يُعدّ فقدان الأسنان اللبنية المبكر مصدر قلق كبير على الصحة العامة في طب أسنان الأطفال، إذ يُمكن أن يؤثر سلبًا على النمو الطبيعي للإطباق، مما يؤدي إلى سوء محاذاة الأسنان، وانخفاض طول قوس الأسنان، ومضاعفات تقويم الأسنان المستقبلية. يُعيق فقدان الأسنان المبكر توجيه الأسنان الدائمة الناشئة، وقد يُؤثر سلبًا على الجوانب الوظيفية والجمالية لصحة الفم. تستكشف هذه الدراسة انتشار فقدان الأسنان اللبنية المبكر بين الأطفال الذين تتراوح أعمارهم بين 4 و10 سنوات في مدينة الزاوية، ليبيا، وتُقيّم وعي الوالدين بأجهزة الحفاظ على المسافة. أُجريت دراسة مقطعية باستخدام فحوصات الأسنان واستبيانات مُهيكلة. كشفت النتائج أن 26% من الأطفال عانوا من فقدان أسنان مبكر، بينما كان 17.5% فقط من الآباء على دراية بأجهزة الحفاظ على المسافة. على الرغم من أن العديد من الآباء يدركون الأهمية العامة لزيارات طبيب الأسنان والنظافة، إلا أن المعرفة المحددة بأجهزة الحفاظ على المسافة كانت محدودة. *تُسلط النتائج الضوء على الحاجة المُلحة لبرامج توعية عامة تهدف إلى تثقيف الآباء حول الرعاية الوقائية لأسنان الأطفال.

الكلمات المفتاحية: جهاز الحفاظ على المسافة، الوعي، فقدان الأسنان اللبنية المبكر.

1. Introduction

Oral health plays a critical role in a child's overall development and well-being [1]. Among the various challenges in pediatric dentistry, premature loss of primary teeth stands out as a significant concern due to its long-term implications on dental arch integrity, speech development, aesthetics, and the eruption pattern of permanent teeth [2-4]. Primary teeth, often referred to as "baby teeth," are not merely placeholders; they serve as essential guides for the proper alignment and spacing of the permanent dentition [5].

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The premature loss of primary teeth is primarily caused by dental caries, trauma, infection, or congenital absence. When a primary tooth is lost too early, the adjacent teeth may drift into the vacant space, resulting in a loss of arch length, misalignment, or malocclusion [6-7]. These problems can eventually lead to the need for complex orthodontic treatment, which is often costly and time-consuming [7-8].

One of the most effective interventions to prevent these complications is the use of space maintainers [9]. Space maintainers are custom-made dental appliances designed to maintain the space left by prematurely lost primary teeth until the corresponding permanent teeth erupt [10-11]. They come in various forms—fixed or removable—and are chosen based on the location and condition of the tooth loss [12]. When appropriately used, space maintainers can significantly reduce the risk of orthodontic problems and preserve the function and esthetics of the dental arch [13].

Despite their importance, awareness of space maintainers among parents remains limited, especially in developing regions. Parental knowledge and attitudes significantly influence a child's oral hygiene practices and compliance with dental care recommendation [14]. Studies have shown that parents often underestimate the importance of primary teeth and may delay or ignore necessary dental interventions, including the application of space maintainers [15]. This gap in knowledge can lead to preventable complications in the child’s oral development [12]

In Libya, particularly in cities like Zawia, limited access to pediatric dental education and outreach programs contributes to the problem. There is a lack of community-based studies assessing the prevalence of premature tooth loss and the extent of parental awareness regarding its consequences and preventive measures. Identifying these gaps is vital for planning targeted educational campaigns and improving pediatric dental care services in the region.

Therefore, this study aims to investigate two key aspects: the prevalence of premature primary tooth loss among children aged 4–10 years in Zawia City, Libya, and the level of parental awareness and understanding regarding the role and importance of space maintainers. By assessing these variables, the research seeks to inform health professionals and policymakers of the current shortcomings and to provide a basis for future interventions in pediatric oral health promotion.

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Premature loss of primary teeth due to factors like caries, trauma, or disease can cause serious complications in dental alignment and occlusion. Space maintainers serve as a preventive solution to preserve the gap for permanent teeth, minimizing the risk of malocclusion and other orthodontic problems. Parental involvement and awareness are critical in ensuring early dental intervention and effective maintenance of children's oral health. This study focuses on evaluating both the prevalence of early tooth loss and the level of parental awareness regarding the role and function of space maintainers.

2. Materials and Methods

2.1 Study Design

A cross-sectional study was conducted from April to September 2023, involving 57 children aged 4–10 who attended private dental clinics in Zawia City, Libya. Clinical examinations were performed by two calibrated dental examiners using WHO guidelines for evaluating primary tooth status.

2.2 Questionnaire and Sampling

A structured questionnaire covering demographics, oral hygiene knowledge, and awareness of space maintainers was distributed to the children's parents. Systematic sampling was applied to include parents who provided informed consent. Responses were collected on the same day of clinical examinations.

2.3 Statistical Analysis

Data were analyzed using SPSS v27.0. Descriptive statistics were used to present frequencies and percentages. Cross-tabulations and Chi-square tests assessed the relationships between awareness levels and demographic or experiential variables, with significance defined at $P < 0.05$.

3. Results

Of the 57 children examined, 26% had a premature loss of primary teeth. Parental awareness about space maintainers was low, with only 17.5% being informed. Despite this, most parents (71.9%) acknowledged the importance of regular dental visits and brushing care (68%). Awareness was particularly low in understanding the purpose and timing of space maintainer use. No significant correlations were found between awareness levels

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and variables such as gender, educational level, or income. Data are supported by tables summarizing the demographic distribution, awareness metrics, and correlation analyses.

A total of 57 children, aged between 4 and 10 years, were included in the study, along with their parents. Clinical examination revealed that 26% (n = 15) of these children experienced premature loss of primary teeth, indicating a relatively high prevalence within the population surveyed.

3.1 Demographic Characteristics of Parents

According to the demographic analysis, the majority of participating parents were aged between 20 and 40 years (70.2%), with 56.1% being female and 43.9% male. In terms of educational background, 52.6% held university degrees, followed by 35.1% with high school education and 12.3% with postgraduate qualifications. Regarding family size, most families had more than three children (59.6%), and 45.6% reported a monthly income ranging between 1,000 and 2,000 Libyan dinars (Figure 1).

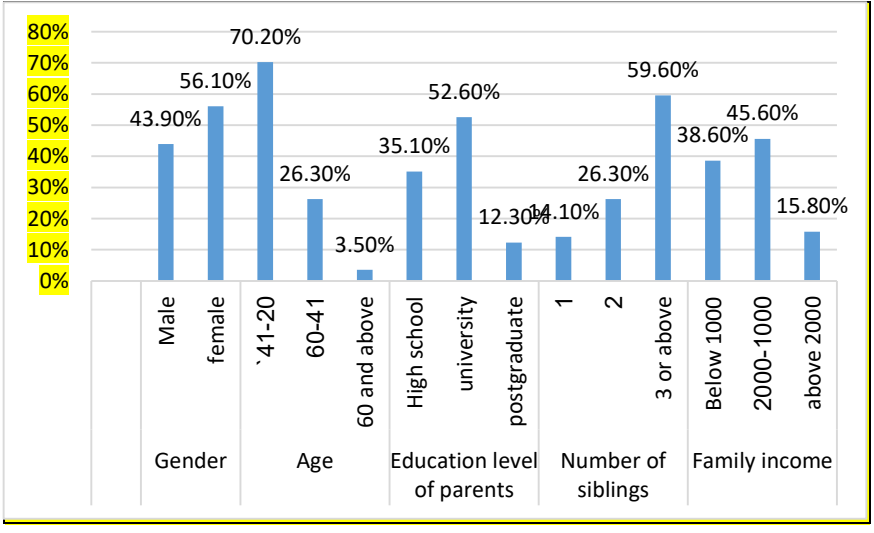

Figure 1. Graphical representation of demographic data

3.2 Oral Health Knowledge

Figure 2 illustrates the distribution of parental responses regarding general oral health knowledge. The assessment revealed mixed outcomes: 71.9% of parents acknowledged that children should visit a dentist every six months, and 86.0% reported that they supervise their children during tooth brushing. However, 35.1% of

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parents believed that primary teeth are less important than permanent teeth. These findings indicate that, while general awareness of basic oral hygiene practices is relatively high, misconceptions about the significance of primary teeth remain common among many parents.

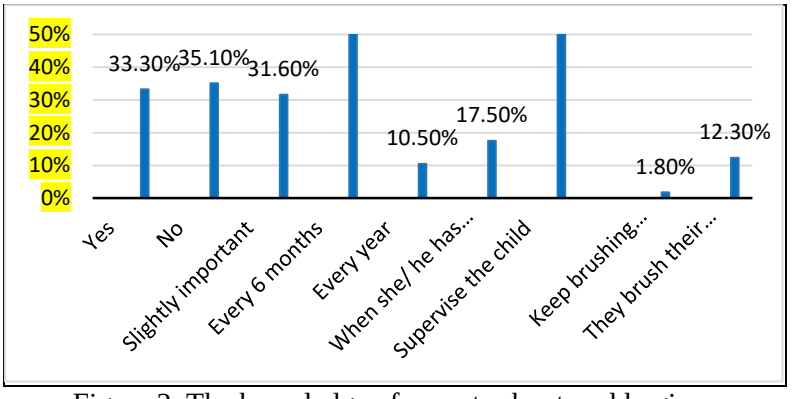

Figure 2. The knowledge of parents about oral hygiene

3.3 Awareness of Space Maintainers

Figure 3 illustrates the low level of parental awareness regarding space maintainers. Only 17.5% (n = 10) of parents reported knowing what a space maintainer is, whereas 82.5% (n = 47) had never heard of or encountered the term before. Additionally, 52.6% of parents were uncertain about the appropriate timing for the application of space maintainers. Regarding care practices, 40.4% of parents encouraged their children to avoid sticky and sugary foods while using such appliances. Moreover, 63.2% believed that space maintainers require special care, and 75.0% agreed that children wearing space maintainers should visit a dentist every six months. Notably, a high proportion (89.5%) of parents preferred to schedule immediate dental appointments in the event of appliance breakage or loss.

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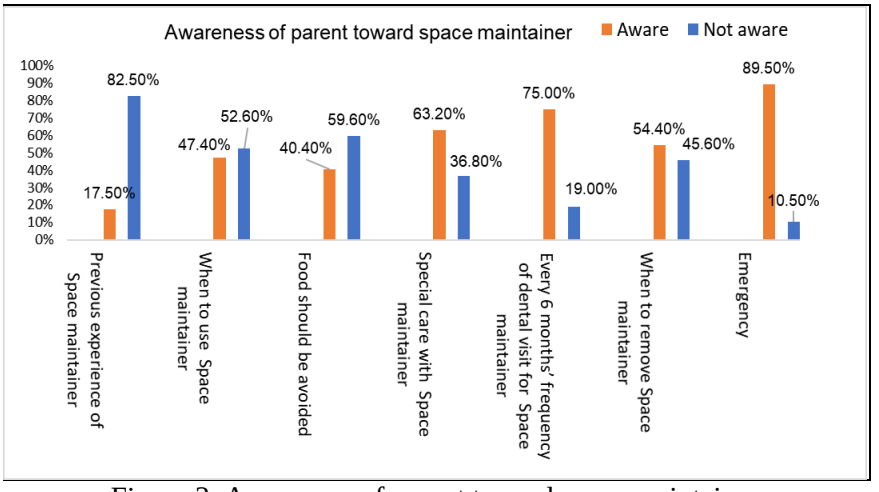

Figure 3. Awareness of parent toward space maintainer

3.4 Statistical Correlation

Chi-square testing was conducted to assess any statistically significant relationships between awareness levels and demographic variables (e.g., gender, education level, income, and prior dental experience).

The results showed no statistically significant correlations ($P > 0.05$) across all examined variables: Education level vs. Awareness: No significant association ($P = 0.731$). Family income vs. Awareness: No significant association ($P = 0.093$). Gender vs. Previous experience with space maintainers: No significant association ($P = 0.667$). Beliefs about the importance of primary teeth: No significant association based on gender ($P = 0.100$). Frequency of dental visits: Not significantly associated with gender ($P = 0.359$) as shown in Tables (1-3). These findings suggest that low awareness about space maintainers is consistent across demographic subgroups, indicating a systemic lack of information regardless of socioeconomic background.

Table 1. Educational Status of Parents by Gender

Education Level	Male (n)	Female (n)	Total (n)	% of Total
High School	8	12	20	35.1%
University	13	17	30	52.6%
Postgraduate	4	3	7	12.3%
Total	25	32	57	100.0%

Chi-Square Test: $\chi^2 = 0.626$, p-value: 0.731
Significance: Not significant ($p > 0.05$)

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Table 2. Family Income Status of Parents by Gender

Income Level	Male (n)	Female (n)	Total (n)	% of Total
Below 1000 LYD	6	16	22	38.6%
1000–2000 LYD	13	13	26	45.6%
Above 2000 LYD	6	3	9	15.8%
Total	25	32	57	100.0%

Chi-Square Test: $\chi^2 = 4.758$, p-value: 0.093
Significance: Not significant ($p > 0.05$)

Table 3. Parental Awareness and Oral Hygiene Knowledge by Gender

Category	Male (n)	Female (n)	Total (n)	% of Total
Aware of space maintainers	5	5	10	17.5%
Not aware of space maintainers	20	27	47	82.5%
Primary teeth as important as permanent teeth	12	7	19	33.3%
Primary teeth slightly important	6	14	20	35.1%
Primary teeth not important	7	11	18	31.6%
Dental visit every 6 months	18	23	41	71.9%
Dental visit every year	4	2	6	10.5%
Visit only when in pain	3	7	10	17.5%
Total	25	32	57	100.0%

Awareness of Space Maintainers: Chi-Square Test: $\chi^2 = 0.186$.
$p = 0.667$, Significance: Not significant.

Belief About Importance of Primary Teeth: Chi-Square Test: $\chi^2 = 4.615$, $p = 0.100$, Significance: Not significant.

Frequency of Dental Visits: Chi-Square Test: $\chi^2 = 2.048$,
$p = 0.359$, Significance: Not significant

4. Discussion

The findings of this study highlight a concerning yet not surprising trend in pediatric oral health in Zawia City, Libya: a significant prevalence of premature loss of primary teeth (26%) paired with low parental awareness about space maintainers (17.5%). This combination presents a dual threat—high dental risk for children and a lack of knowledge among the key influencers of child health: parents. Premature loss of primary teeth can have long-lasting consequences on oral development [13]. The early removal or shedding of a primary tooth disrupts the natural guidance

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pathway for permanent teeth, often resulting in misalignment, crowding, or impaction [14].

The literature consistently supports that unaddressed premature tooth loss is a primary contributor to malocclusion in adolescence and later stages of dental development [15]. Despite global recognition of space maintainers as a standard and cost-effective preventive intervention, this study indicates that the concept is still relatively unfamiliar among parents in Zawia.

Similar studies in other regions, such as Saudi Arabia and India have also reported poor awareness, even among educated populations [5, 12]. This suggests that general educational attainment does not always correlate with specialized health knowledge unless targeted interventions are implemented. Interestingly, while most respondents showed a positive attitude toward routine dental visits (71.9%) and supervised brushing (68%), only a minority could accurately describe when and why space maintainers are used. This points to a gap between general oral hygiene practices and specialized knowledge, likely due to insufficient communication by dental professionals or a lack of integration of pediatric oral health topics in public health education.

The study also found no statistically significant relationship between awareness levels and demographic factors like gender, income, or previous dental experiences. This suggests that misinformation or lack of information about space maintainers is widespread and not confined to any one socioeconomic or educational group. As a result, interventions should be comprehensive and community-wide, rather than targeting specific groups. Moreover, when parents were asked how they would respond if a space maintainer was broken or lost, only 54.4% recognized the importance of scheduling an immediate dental appointment. This delayed reaction could further exacerbate the risk of malocclusion and complex orthodontic treatment later. It also reflects a tendency to treat dental issues reactively rather than proactively—a common pattern in many developing countries where preventive care is undervalued [12].

The results of this study align with the global call to shift from curative to preventive pediatric dentistry. A model of early intervention not only improves long-term outcomes but also reduces the economic burden of dental care. Incorporating educational materials about space maintainers in pediatric clinics, schools, and

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community centers could serve as a powerful step forward. Additionally, there's a role for technology and media campaigns to raise awareness. Social media platforms, mobile health apps, and text-message reminders could be effective tools to engage modern Libyan parents, especially those already familiar with technology. Involving schools in this awareness campaign may also help normalize discussions about dental appliances, thus reducing stigma and fear [7]. Finally, the lack of awareness might also reflect a gap in pediatric dentist-parent communication. Dental professionals may assume that such appliances are self-explanatory or may not allocate enough time during appointments to discuss their benefits and maintenance. Training programs for dentists that emphasize patient education could help bridge this communication gap. Awareness through dental education programs and school-based outreach can mitigate the long-term consequences of early tooth loss.

5. Conclusion

A study in Zawia, Libya, found a significant gap between early tooth loss and parental awareness of space maintainers among children aged 4 to 10. The study found that only 17.5% of respondents were familiar with space maintainers, indicating a risk factor for malocclusion and long-term orthodontic complications. Despite a positive attitude towards oral health, more than half of the parents were unsure of the correct timing for space maintainer application. Only 40.4% reported implementing dietary precautions during their child's appliance use. Despite this, 89.5% of parents would seek immediate dental attention in case of appliance damage or loss. The study concluded that greater emphasis on community outreach, professional-parent communication, and structured oral health education programs is urgently required. Integrating preventive dental topics into public health strategies, school curricula, and pediatric clinic protocols could significantly reduce the burden of malocclusion and complex orthodontic treatment in this population.

6. Limitations

The study's cross-sectional design limits longitudinal assessment. The sample was skewed toward the 20–40 age group and female respondents, which may affect the generalizability of the results. Future studies with broader demographic representation are needed.

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References

[1] Naaman, R. K., Al Blowi, R. H., Alshaikh, M. A., Ghudaf, A. A., Alhazmi, O. A., Alsehli, A. M., & Ali, M. M. (2024, October 26). Assessment of parental awareness of space maintainers in Al-Madinah, Saudi Arabia. *Cureus, 16*(10), e72416. https://doi.org/10.7759/cureus.

[2] Hassan, S., & Al-Suliman, A. (2021). Impact of early tooth loss in children. *Pediatric Dental Review, 22*(1), 45–52.

[3] Sowmiya Sree, R. A., Louis, C. J., Eagappan, A. S., Srinivasan, D., Natarajan, D., & Dhanalakshmi, V. (2022). Effectiveness of parental participation in a dental health program on the oral health status of 8–10-year-old school children. *International Journal of Clinical Pediatric Dentistry, 15*(4), 417–421. https://doi.org/10.5005/jp-journals-10005-2411

[4] Kumar, V., & Mehta, S. (2023). Preventive dentistry: Role of space maintainers. *Contemporary Pediatric Dental Care, 18*(1), 56–62.

[5] AlHumaid, J., El Tantawi, M., AlAgl, A., Kayal, S., Al Suwaiyan, Z., & Al-Ansari, A. (2018). Dental visit patterns and oral health outcomes in Saudi children. *Saudi Journal of Medicine&sciences-Medical,6*(2),89–94. https://doi.org/10.4103/ sjmms. sjmms_103_17

[6] Northridge, M. E., Kumar, A., & Kaur, R. (2020). Disparities in access to oral health care. *Annual Review of Public Health, 41*, 513–535. https://doi.org/10.1146/annurev-publhealth-040119-094318.

[7] Abubakar, M., & Nouri, M. (2023). Knowledge and attitude towards space maintainers. *Libyan Journal of Medical Research, 8*(1), 34–41.

[8] Ramli, N., & Hassan, Z. (2022). Use of space maintainers in urban and rural clinics. *Malaysian Dental Journal, 11*(2), 78–85.

[9] Alharbi, N., & Alharbi, A. S. (2024, September 12). AI-driven innovations in pediatric dentistry: Enhancing care and improving outcome. *Cureus, 16*(9), e69250. https://doi.org/10.7759/cureus.

[10] Ghoneim, A., & Farag, A. (2021). Parental influence on child dental habits. *Middle East Dentistry, 5*(3), 102–109.

[11] Casaña-Ruiz, M., Aura-Tormos, J. I., Marques-Martinez, L., Garcia-Miralles, E., & Perez-Bermejo, M. (2025).

http://www.doi.org/10.62341/awhp6004

Effectiveness of space maintainers in pediatric patients: A systematic review and meta-analysis. *Dentistry Journal*, (1), 32. https://doi.org/10.3390/dj13010032

[12] Singh, R., & Patel, A. (2022). Pediatric dental visit patterns and outcomes. *Indian Pediatric Journal of Dentistry*, *26*(2), 88–94.

[13] Elareibi, I., Fakron, S., Gaber, A., Lambert, M., El Tantawi, M., & Arheiam, A. (2022). Awareness of sports-related dental emergencies and prevention practices among Libyan contact sports coaches: A cross-sectional study. *Health Science Reports*, *6*(1), e977. https://doi.org/10.1002/hsr2.977.

[14] Morales, J. M., & Rivera, E. (2024). Technological integration in pediatric dentistry. *Latin American Dental Review*, *17*(2), 154–160.

[15] Omar, A., & Bashir, S. (2025). Evaluation of dental health awareness among parents. *Global Pediatric Dentistry*, *9*(1), 12–19.