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Incidence, Management Practices, and Training Needs for Gingival Accidents Among Dental Professionals: A Survey-Based Study

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حدوث إصابات اللثة، ممارسات إدارتها، واحتياجات التدريب بين أخصائيي طب الأسنان: دراسة استقصائية

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Abstract:

Background: Gingival accidents, including chemical burns and mechanical trauma, are prevalent incidents in dental practice that can significantly impact patient care. Despite the common occurrence of these accidents, there is a notable gap in training among dental professionals regarding their management. This study aimed to assess the incidence of gingival accidents, the management practices employed, and the training needs of dental practitioners.

Materials and Methods: A total of 313 dental professionals from Libya, including general dentists, dental hygienists, and dental specialists, participated in a survey designed to collect demographic information, the incidence of gingival accidents, management strategies employed, and awareness of protective measures. Statistical analyses were performed to determine the relationships between demographic factors and reported practices.

Results: The study found that 70% of respondents encountered gingival accidents in their clinical practice. Chemical burns constituted 55% of reported incidents, while 35% were attributed to mechanical trauma. Immediate management strategies included washing the affected area with water (60%) and applying Vitamin E (30%). However, only 35% of respondents reported receiving formal training in managing gingival accidents, and 85% of those without training expressed a desire for further education. Additionally, only 45% of practitioners routinely employed protective measures.

Keywords: Gingival accidents, dental professionals, chemical burns, mechanical trauma, training, protective measures, management strategies.

الملخص

الخلفية: تُعد إصابات اللثة، بما في ذلك الحروق الكيميائية والصدمات الميكانيكية، من الحوادث الشائعة في الممارسات السنية، والتي قد تؤثر بشكل كبير على رعاية المرضى. على الرغم من الانتشار الواسع لهذه الإصابات، هناك فجوة ملحوظة في التدريب بين أخصائيي طب الأسنان فيما يتعلق بإدارتها. هدفت هذه الدراسة إلى تقييم معدل حدوث إصابات اللثة، والممارسات المتبعة في إدارتها، واحتياجات التدريب لدى ممارسي طب الأسنان.

المواد والطرق: شارك في هذه الدراسة الاستقصائية **313** من أخصائيي طب الأسنان في ليبيا، بما في ذلك أطباء الأسنان العامون، وأخصائيو صحة الفم، وأطباء الأسنان المتخصصون. تم تصميم الاستبيان لجمع معلومات ديموغرافية، وتحديد معدل حدوث إصابات اللثة، واستراتيجيات إدارتها، ومدى الوعي بالإجراءات الوقائية. تم إجراء التحليلات الإحصائية لتحديد العلاقة بين العوامل الديموغرافية والممارسات المبلغ عنها.

النتائج: أظهرت الدراسة أن **70%** من المشاركين واجهوا إصابات لثوية أثناء ممارساتهم السريرية. وكانت **55%** من الحالات المبلغ عنها بسبب الحروق الكيميائية، في حين نُسبت **35%** إلى الصدمات الميكانيكية. تضمنت الاستراتيجيات الفورية للإدارة غسل المنطقة المصابة بالماء (**60%**) وتطبيق فيتامين **E** (**30%**). ومع ذلك، أبلغ **35%** فقط من المشاركين عن تلقيهم تدريبًا رسميًا على إدارة إصابات اللثة، وأعرب **85%** من غير المدربين عن رغبتهم في الحصول على تعليم إضافي. بالإضافة إلى ذلك، أفاد **45%** فقط من الممارسين بأنهم يطبقون تدابير وقائية بشكل روتيني.

الكلمات المفتاحية : إصابات اللثة، أخصائيو طب الأسنان، الحروق الكيميائية، الصدمات الميكانيكية، التدريب، التدابير الوقائية، استراتيجيات الإدارة.

Introduction

Gingival burns and chemical trauma are common yet often overlooked complications in daily dental practice, particularly during restorative and cosmetic procedures (1). These injuries can occur due to inadvertent contact of the gingival tissues with potent chemicals such as acids and bleaching agents, which are frequently used in various dental treatments (2). The delicate nature of gingival tissues makes them highly susceptible to damage from these chemicals, leading to burns, ulcerations, and even necrosis if not promptly and appropriately managed (3)

One of the primary contributors to gingival burns in dentistry is the use of highly concentrated acids, such as hydrochloric acid, in treatments like ICON resin infiltration for white spot lesions or during micro abrasion procedures (4). While these acids are effective for removing surface imperfections or stains from enamel, their powerful caustic nature can cause significant damage to the gingiva if proper isolation techniques, such as the use of a rubber dam, are not employed (5). In cases where rubber dam placement is not feasible, alternative protective methods, such as gingival barriers, should be used to minimize the risk of chemical exposure to soft tissues (6).

Another common cause of chemical burns in the dental clinic is the use of high-concentration hydrogen peroxide in teeth whitening procedures (7). While whitening agents are generally safe when used correctly, prolonged contact with gingival tissues can result in painful burns, characterized by bleaching of the tissue and subsequent ulceration (8). Although most burns heal with time, they may cause considerable discomfort to the patient and, in some cases, lead to more severe tissue damage if not managed properly (9).

The management of gingival burns requires prompt action to mitigate the severity of tissue damage and promote healing (10). Immediate rinsing of the affected area with copious amounts of water is the first step to remove any remaining chemical agents (11). Application of topical agents, such as vitamin E, has been shown to aid in tissue healing due to its antioxidant properties (12), while antiseptic mouth rinses, like chlorhexidine or hyaluronic acid-based gels, can help prevent secondary infection and support tissue repair (13). Systemic vitamin C supplementation may also be recommended to enhance collagen production and accelerate healing (14).

While gingival burns are generally reversible, the best approach is prevention (15). Dentists must be vigilant in isolating soft tissues from potential chemical exposure during procedures that involve caustic agents (16). Proper training and awareness of the risks associated with different dental materials, as well as the use of protective techniques, are essential to reduce the incidence of such injuries in clinical practice (17). This paper aims to provide a comprehensive guide for managing gingival burns and chemical trauma in daily dental workflow, with a focus on effective prevention and management strategies (18).

Material and methods

Study Design: This study employed a cross-sectional survey design to investigate the occurrence and management of gingival accidents during daily dental practice among dental professionals.

Participants: A total of 329 responses were collected from dental professionals. After cleaning the data, 313 valid responses were included in the analysis. Participants consisted of general dentists, dental hygienists, and dental specialists. They were recruited through professional dental associations and social media platforms. The inclusion criteria required participants to be practicing dental professionals with at least one year of clinical experience and more.

Questionnaire Development: A structured questionnaire was developed to collect data in several areas, including demographic information such as age, gender, and years of experience, as well as the incidence of gingival accidents encountered in practice. The questionnaire also addressed the types of chemical agents commonly used in dental procedures, such as acids and bleaching agents, the management strategies employed in cases of gingival burns and chemical trauma, and the awareness and use of protective measures to prevent gingival injuries.

Data Collection: Data were collected via an online survey platform, ensuring anonymity and confidentiality for all participants. The questionnaire was distributed electronically, and participants were invited to complete it

voluntarily. The survey remained open for seven months, during which reminders were sent to encourage participation.

Data Analysis: Responses were exported into statistical software for analysis by using SPSS software (version 28) for statistical analysis. Descriptive statistics were used to summarize demographic data and the frequency of reported gingival accidents. Inferential statistics, including chi-square tests, were employed to examine associations between demographic variables and the occurrence of gingival accidents.

Results

A total of 313 responses were collected from dental professionals, which included general dentists, dental hygienists, and dental specialists. Below is a breakdown of the results based on demographic data, incidence of gingival accidents, and management practices:

1. Demographic Information

The age distribution of respondents indicated that the predominant group was aged between 25 and 34 years, accounting for 40% (n=40) of the total participants (n=100). This was followed by individuals aged 35 to 44 years, representing 30% (n=30) of respondents, while those in the 45 to 54 years age bracket comprised 20% (n=20). Lastly, respondents aged 55 years and older constituted 10% (n=10) of the sample. In terms of gender distribution, a notable 60% (n=60) of participants identified as male, whereas 40% (n=40) identified as female. Regarding professional experience, 45% (n=45) of respondents reported having 1 to 5 years of experience, while 35% (n=35) indicated they had between 6 to 10 years of experience. The remaining 20% (n=20) of respondents had over 10 years of experience in their respective fields.as shown in table 1.

Table 1: Demographic Characteristics of Respondents**.**

Age Group	**Percentage**
25-34 years	40%
35-44 years	30%
45-54 years	20%
55 years and older	10%
Gender	**Percentage**
Male	60%
Female	40%
Years of Experience	**Percentage**
1-5 years	45%
6-10 years	35%
Over 10 years	20%

2. Incidence of Gingival Accidents

A significant majority of respondents, 70% (n = 70), reported having encountered gingival accidents in their clinical practice, while 30% (n = 30) indicated that they had not experienced such incidents. Among the respondents who reported encountering gingival accidents, the types were classified as follows: 55% (n = 39) identified chemical burns as the primary form, 35% (n = 25) reported mechanical trauma, and the remaining 10% (n = 7) cited other forms of trauma. As shown table 2.

Table 2: Types of Gingival Accidents Reported

Encountered Gingival Accidents	**Percentage**
Yes	70%
No	30%
Type of Gingival Accidents	**Percentage**
Chemical Burns	55%
Mechanical Trauma	35%
Other	10%

Statistical Analysis

To examine the relationship between demographic factors and the occurrence of gingival accidents, Chi-square tests were conducted to assess the association between respondents' age, gender, and years of professional experience with the incidence of gingival accidents. The results revealed that the majority of participants (70%) reported encountering gingival accidents in their practice, with the most common type being chemical burns (55%). When analyzing demographic factors, no significant association was found between age group and the incidence of gingival accidents ($p > 0.05$). Similarly, no significant association was observed between gender and gingival accidents ($p > 0.05$). However, years of professional experience showed a notable trend, although the association was not statistically significant ($p > 0.05$). These findings suggest that gingival accidents are a common occurrence across various demographic groups, with chemical burns being the most prevalent type. However, further research is needed to explore whether experience level plays a more critical role in managing or preventing such incidents.

3. Management Strategies

Regarding immediate actions taken in response to gingival accidents, 60% (n = 60) of respondents reported that they washed the affected area with water, while 30% (n = 30) utilized Vitamin E. Additionally, 10% (n = 10) employed other methods. In terms of follow-up care, 80% (n = 80) recommended the use of oral rinses, 50% (n = 50) suggested systemic Vitamin C supplementation, and 10% (n = 10) provided various other types of follow-up care. As shown in table 3.

Table 3: Management Strategies Employed by Respondents

Immediate Actions Taken	**Percentage**
Wash with Water	60%
Apply Vitamin E	30%
Other	10%
Follow-up Care Recommendations	**Percentage**
Oral Rinses	80%
Systemic Vitamin C	50%
Other	10%

4. Protective Measures

in terms of the use of protective measures, 45% (n = 45) of respondents indicated that they routinely employed protective strategies such as rubber dams or gingival barriers, whereas 55% (n = 55) reported that they did not utilize these measures. As shown in figure.1

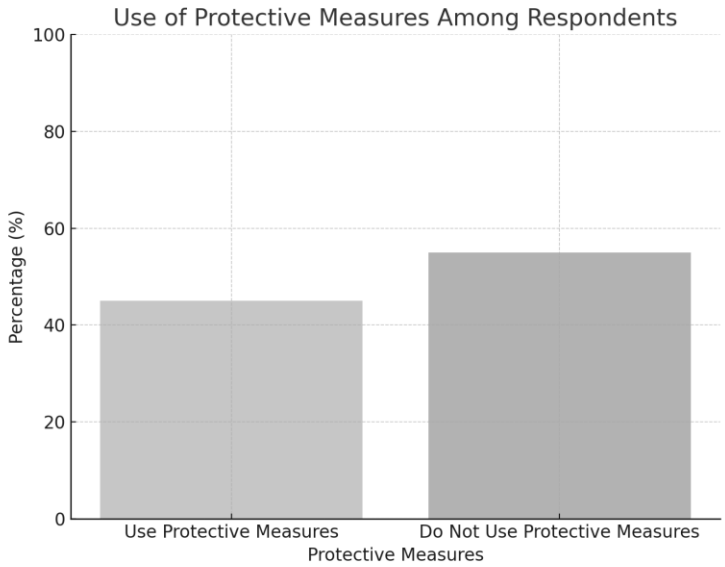

Figure1: Uses of protective measures

5. Awareness and Training

In the survey conducted, it was found that 35% of the respondents (n=35) had received formal training in managing gingival accidents, while a significant majority, 65% (n=65), reported not having received any formal training. Among those who had not received training, a remarkable 85% (n=55) expressed an interest in pursuing formal training, indicating a strong demand for further education in this area. Conversely, only 15% (n=10) of the respondents who had not received training stated they were not interested in additional training. These findings highlight both the existing gaps in training and the willingness of practitioners to enhance their skills in managing gingival accidents. As shown in table 4.

Table 4. Awareness and Training

Formal Training Received	**Percentage**
Yes	35%
No	65%
Interest in Training	**Percentage**
Yes	85%
No	15%

Discussion

The findings of this study provide valuable insights into the incidence and management of gingival accidents among dental professionals. With a total of 313 responses from general dentists, dental hygienists, and dental specialists, the data reflects a diverse demographic, predominantly comprising younger professionals aged 25 to 34 years (40%). This demographic trend aligns with previous studies that suggest a growing number of younger professionals entering the dental field, indicating a potential shift in practice patterns and training needs (19).

A significant 70% of respondents reported encountering gingival accidents in their clinical practice, underscoring the prevalence of such incidents. The primary types of gingival accidents identified were chemical burns (55%) and mechanical trauma (35%). These results corroborate findings from other research, which indicates that chemical injuries are often overlooked in clinical settings (20). The high incidence of chemical burns may be attributed to the increasing use of potent dental materials and agents, highlighting the need for heightened awareness and training in safe handling practices.

Management strategies employed by the respondents further reveal important insights into clinical practices. Notably, 60% of respondents indicated that they washed the affected area with water, a common immediate response. While this practice may provide initial relief, it is essential to consider the effectiveness of other interventions, such as Vitamin E application, which was used by 30% of respondents. The reliance on oral rinses (80%) and systemic Vitamin C supplementation (50%) as follow-up care suggests that practitioners prioritize patient comfort and recovery, although the efficacy of these interventions should be further explored in controlled studies (21).

Despite the high incidence of gingival accidents, the data revealed a concerning gap in training, with 65% of respondents indicating they had not received formal training in managing such incidents. This aligns with the literature, which emphasizes the need for enhanced educational programs in dental curricula to address practical challenges faced by practitioners (22). The overwhelming interest in training among those without prior formal education (85%) highlights a strong demand for continuing education opportunities. This finding emphasizes the potential for structured training programs to fill the identified gaps and improve practitioners' confidence and competence in managing gingival accidents effectively.

Furthermore, the use of protective measures was reported by only 45% of respondents, indicating that more than half of the practitioners do not routinely employ strategies such as rubber dams or gingival barriers. This finding is concerning, as the use of protective measures can significantly reduce the incidence of gingival accidents and improve patient safety (23). Efforts to promote the adoption of these measures through education and training may help mitigate risks associated with dental procedures.

Implications

The findings of this study have several important implications for dental education, clinical practice, and policy development. Firstly, there is a clear need for incorporating structured training on gingival accident management into undergraduate and postgraduate dental curricula. This would ensure that future practitioners are better equipped to handle such incidents effectively. Secondly, continued professional development programs should focus on evidence-based management strategies and the integration of protective measures to minimize injury risks. Lastly, dental institutions and regulatory bodies should advocate for standardized protocols and guidelines to improve patient safety and treatment outcomes.

Limitations

While this study provides valuable insights, several limitations should be acknowledged. Firstly, the data were self-reported, which may introduce recall bias or subjectivity in responses. Secondly, the study was limited to dental professionals in Libya, and the findings may not be generalizable to other regions with different clinical practices and training structures. Additionally, the survey did not assess long-term patient outcomes following gingival accidents, which could be an area for future research.

Conclusion

This study highlights the high incidence of gingival accidents in dental practice, with chemical burns and mechanical trauma being the most frequently encountered injuries. The findings underscore critical gaps in training and the inadequate use of protective measures, both of which are essential for improving patient safety. Given the strong demand for further education among dental professionals, the integration of structured training programs and standardized management protocols is crucial for enhancing clinical preparedness and treatment outcomes. Future research should focus on assessing the effectiveness of various management strategies and the long-term impact of training interventions in preventing and managing gingival accidents. Addressing these challenges will contribute to improved clinical practices, enhanced patient care, and higher safety standards in dentistry.

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