

ORIGINAL RESEARCH

Bridging Knowledge Differences: A Comparative Cross-Sectional Study on Avulsed Tooth Management Among Undergraduate and Postgraduate Dental Students in a Dental Institution

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ABSTRACT

Background: Tooth avulsion is one of the most severe traumatic dental injuries, and its prognosis depends largely on immediate and appropriate emergency management. Dental students are expected to possess adequate knowledge regarding such emergencies; however, deficiencies have been reported regarding extra-alveolar dry time, handling, storage media, replantation, and splinting.

Objectives: To evaluate and compare the awareness and knowledge of undergraduate and postgraduate dental students regarding the emergency management of avulsed teeth.

Methods: This descriptive cross-sectional questionnaire-based study was conducted among undergraduate and postgraduate dental students of a teaching dental institution. A structured questionnaire assessed knowledge regarding immediate management, handling and cleaning, storage media, factors influencing prognosis, replantation, splinting, and follow-up care.

Results: Of 165 completed responses, 139 were from undergraduate and 26 from postgraduate students. The mean overall knowledge score was 5.94 ± 2.00 . Important gaps were identified regarding fluoride application before replantation, critical extra-alveolar dry time, management of avulsed primary teeth, and appropriate storage media. Postgraduate students demonstrated slightly higher knowledge scores, but the difference was not statistically significant ($p = 0.294$).

Conclusion: Dental students demonstrated moderate knowledge with important deficiencies in avulsion management. Strengthening evidence-based dental trauma education through structured teaching,

simulation, and hands-on training may improve preparedness for managing avulsion emergencies.

Introduction

Traumatic dental injuries pose significant clinical challenges because they can cause immediate functional and esthetic problems and adversely affect long-term oral health and well-being [1]. Tooth avulsion, a severe form of traumatic dental injury, involves the complete displacement of a tooth from its socket [2]. Replantation of an avulsed tooth is considered a dental emergency because immediate management directly influences treatment outcome and prognosis [2,3]. The outcome of replantation is influenced by the management protocol before and after reinsertion. Important factors include extra-alveolar time, handling of the avulsed tooth, selection of an appropriate storage medium when immediate replantation is not feasible, and stabilization after replantation [3,4]. Several studies have reported deficiencies in knowledge regarding critical aspects of avulsion management among dental students and dental professionals [1,4-7].

Since prompt and appropriate emergency management is essential for the successful outcome of an avulsed tooth, adequate knowledge among dental students is of considerable importance. However, deficiencies in knowledge regarding critical aspects of avulsion management may affect their preparedness to manage such dental emergencies effectively. Therefore, the present study was conducted to assess and compare the knowledge, attitudes, and experiences regarding the emergency management of permanent tooth avulsion among undergraduate and postgraduate dental students.

Materials and Methods

A structured questionnaire consisting of 23 questions assessing knowledge and awareness regarding the emergency management of avulsed teeth was administered online using Google Forms. A total of 300 undergraduate and postgraduate dental students were invited to participate. Of the 166 responses received, one incomplete response was excluded, and 165 completed responses were included in the final

analysis. The responses were compiled and analyzed using the Statistical Package for the Social Sciences (SPSS). The Chi-square test was used to assess associations between study variables, and statistical significance was set at $p < 0.05$.

Results

A total of 300 undergraduate and postgraduate dental students were approached for participation in the study. Of the 166 responses received, one incomplete response was excluded, and 165 completed responses were included in the final analysis. The demographic characteristics and previous training of the participants are presented in Table 1. Among the participants, 139 (84.2%) were undergraduate students and 26 (15.8%) were postgraduate students. Only 46 participants (27.9%) reported having received formal training in dental trauma management.

The mean overall knowledge score was 5.94 ± 2.00 , with scores ranging from 1 to 11 (Table 2). The highest proportion of correct responses was observed for the follow-up protocol [127 (77.0%)], followed by appropriate systemic medication [114 (69.1%)], tetanus prophylaxis [111 (67.3%)], and cleaning of a contaminated avulsed tooth [106 (64.2%)]. Conversely, knowledge regarding fluoride application before replantation was limited, with only 32 participants (19.4%) responding correctly. Lower levels of awareness were also observed regarding critical extra-alveolar dry time [65 (39.4%)], management of avulsed primary teeth [70 (42.4%)], and appropriate storage media [76 (46.1%)].

The attitude-related responses are presented in Table 3. Nearly half of the participants [74 (44.8%)] reported a neutral response regarding their confidence in managing an avulsed tooth. More than half of the participants agreed or strongly agreed that immediate management improves the prognosis of an avulsed tooth [93 (56.4%)] and that workshops and continuing dental education programmes could improve their preparedness for managing avulsion emergencies [93 (56.4%)].

Regarding clinical exposure and practice, only 20 participants (12.1%) had previously encountered an avulsed permanent tooth, whereas 59 participants (35.8%) reported having provided education regarding

the management of avulsed teeth (Table 4). Postgraduate students demonstrated a higher mean knowledge score (6.23 ± 1.39) than undergraduate students (5.88 ± 2.09); however, the difference was not statistically significant ($p = 0.294$). Attitude scores differed significantly between undergraduate students (13.20 ± 3.97) and postgraduate students (9.96 ± 3.41) ($p < 0.001$) (Table 5). A significantly higher proportion of postgraduate students reported having provided education regarding avulsed teeth compared with undergraduate students (53.8% vs. 32.4%; $p = 0.036$).

Discussion

Tooth avulsion is one of the most severe forms of traumatic dental injury, and its prognosis is highly dependent on prompt and appropriate emergency management. Successful management is influenced by several factors, including extra-alveolar dry time, handling of the avulsed tooth, appropriate storage media, timely replantation, and adequate stabilization following replantation. Therefore, dental students, as future dental professionals who may encounter such emergencies in clinical practice, should possess adequate knowledge regarding the emergency management of avulsed teeth.

Several questionnaire-based studies conducted among dental students and oral healthcare professionals have evaluated knowledge regarding the emergency management of avulsed permanent teeth. Although many participants demonstrated reasonable knowledge of basic principles, deficiencies have frequently been reported regarding immediate management, appropriate storage media, extra-alveolar dry time, replantation, and splinting [4,6,7]. A study among Japanese dental students reported deficiencies in knowledge regarding emergency management of avulsed teeth [9]. Similarly, a recent study among Chinese dental students reported variations in knowledge, attitudes, and practices regarding traumatic dental injuries [11]. These findings highlight the importance of identifying areas of inadequate knowledge among dental students and implementing appropriate educational interventions.

The mean knowledge score in the present study

was 5.94 ± 2.00 , indicating moderate overall knowledge with important gaps across several aspects of avulsion management. Similar discrepancies have been reported among dental students and dental professionals in different settings [1,2,5,6].

In this study, most participants answered correctly regarding follow-up protocols (77.0%), systemic medication (69.1%), tetanus prophylaxis (67.3%), and cleaning of a contaminated avulsed tooth (64.2%). This suggests that they possessed relatively better knowledge regarding some clinical aspects of dental trauma. However, their knowledge was not uniform across all areas. This uneven understanding echoes findings from earlier studies, where students knew some aspects well but demonstrated deficiencies in urgent management procedures for avulsed teeth.

Knowledge regarding critical extra-alveolar dry time was limited, with only 39.4% of participants responding correctly. This finding is important because prompt management is central to the prognosis of an avulsed tooth. The present findings underscore the need to emphasize the urgency of avulsion care in both undergraduate and postgraduate curricula.

Only 46.1% of participants correctly identified the appropriate storage medium. Previous studies have also reported variation in knowledge regarding the selection of suitable media for transporting avulsed teeth [1,6,9]. This highlights the need to reinforce practical guidance regarding emergency management and storage of avulsed teeth.

When it came to managing avulsed primary teeth, only 42.4% answered correctly. This is clinically important because inappropriate management can affect the development of permanent teeth. Earlier studies have reported similar awareness issues, stressing the need for teaching clear distinctions between the management of primary and permanent dentition.

Surprisingly, the lowest correct response rate was for fluoride application before replantation, with just 19.4% of participants answering correctly. This indicates that while students may understand general trauma management concepts, they are less familiar with specific guideline-based procedures. Previous studies have documented variation in knowledge depending on question complexity, reinforcing the need for regular updates on trauma protocols beyond theoretical teaching.

Nearly half of the participants reported a neutral level of confidence in managing an avulsed tooth. This

uncertainty may be related to limited clinical exposure, as only 12.1% had previously encountered an avulsed permanent tooth. Previous studies among dental students have likewise identified deficiencies in preparedness and knowledge regarding emergency management of avulsed teeth [1,5,6,9].

Similar findings have been reported among Japanese dental students, where deficiencies in knowledge regarding emergency management of avulsed teeth were identified [9].

Encouragingly, over half of the participants agreed that immediate management improves the prognosis of an avulsed tooth, and 56.4% believed workshops and ongoing education could boost their preparedness for such emergencies. These findings reflect recognition of the importance of emergency management and the potential benefit of additional training. Previous studies have also highlighted the role of structured education in improving knowledge and readiness.

Previous research has reported variations in knowledge and preparedness among different groups of dental students [11].

Postgraduate students scored slightly higher on average (6.23 ± 1.39) compared to undergraduates (5.88 ± 2.09), but this difference was not statistically significant.

Progression from undergraduate to postgraduate education generally provides greater clinical exposure, which may influence practical understanding of emergency dental procedures. However, individual clinical exposure and previous training may vary considerably among students.

This suggests that advancing to postgraduate training does not automatically mean better knowledge of avulsion management. The lack of a statistically significant difference might also be influenced by the smaller number of postgraduate participants.

A statistically significant difference was observed in attitude scores between undergraduate and postgraduate students. This finding should be interpreted cautiously because the meaning of a higher or lower total attitude score depends on the scoring direction of the individual Likert-scale items. Therefore, the significant difference indicates variation in response patterns rather than establishing that one group had a universally more

favorable attitude.

More postgraduates reported having educated others about avulsed teeth compared to undergraduates (53.8% vs. 32.4%; $p = 0.036$). This likely results from greater clinical practice and interaction opportunities in postgraduate settings. Still, overall, relatively few participants had provided such education, underscoring the need for dental professionals to educate others about emergency measures alongside treatment.

In summary, dental students demonstrated partial knowledge of avulsion management, with notable gaps in areas such as extra-alveolar dry time, storage media, primary tooth management, and specific protocol-based procedures. Similar inconsistencies have been reported among dental students and dental professionals [1,5-7].

These findings support the importance of identifying areas where dental students lack adequate knowledge, as such assessments can help determine whether existing education regarding emergency management is sufficient or requires improvement [1,5,6].

Dental trauma education should therefore extend beyond conventional lectures. Incorporating case discussions, simulations, hands-on workshops, emergency demonstrations, and regular updates on current guidelines could enhance both knowledge and confidence.

The study does have limitations. Being cross-sectional and questionnaire-based, it captures self-reported knowledge and attitudes at one point in time and may not reflect actual clinical performance. Conducted at a single institution, its findings might not be widely applicable. In addition, the higher number of undergraduates compared to postgraduates might have influenced group comparisons. Limited exposure to avulsion cases and some missing responses also pose constraints. Nonetheless, the study sheds light on current awareness levels among dental students and identifies areas requiring targeted educational interventions.

Overall, these findings highlight the ongoing need to reinforce evidence-based avulsion management in dental education. Strengthening awareness through structured teaching and practical training could better equip future dental professionals to manage avulsion emergencies effectively and potentially improve clinical outcomes.

Conclusion

The study found that both undergraduate and

postgraduate dental students had moderate overall knowledge regarding the emergency management of avulsed teeth. Although participants showed relatively better knowledge regarding follow-up care, systemic medication, tetanus prophylaxis, and cleaning of contaminated avulsed teeth, important deficiencies were identified in critical extra-alveolar dry time, appropriate storage media, management of avulsed primary teeth, and fluoride application before replantation.

Postgraduate students demonstrated slightly higher mean knowledge scores than undergraduate students; however, the difference was not statistically significant. Limited clinical exposure and uncertainty regarding management were also evident. Structured teaching, case-based learning, simulation, hands-on training, and regular reinforcement of evidence-based recommendations may improve students' knowledge, confidence, and preparedness for managing avulsion emergencies.

Ethical Considerations

Ethical approval was obtained from the Institutional Ethics Committee, SDM College of Dental Sciences and Hospital, Sattur, Dharwad (SMDCCS IEC No. 2026/PG/PED/109; approved on 07 September 2026). Participation in the study was voluntary.

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Conflict of interest

The authors declare no conflict of interest.

Prior dissemination

This work was not part of a thesis or dissertation and has not been previously published.

Use Of Artificial Intelligence Tools

Artificial intelligence tools were used for language

refinement and technical assistance during manuscript preparation. The authors reviewed and verified the manuscript and remain fully responsible for the accuracy, originality, and integrity of the submitted work.

Supplementary Material

Not applicable.

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Figures

Variable	Category	n (%)
Academic level	Undergraduate students	139 (84.2)
	Postgraduate students	26 (15.8)
Formal training in dental trauma management	Yes	46 (27.9)
	No	119 (72.1)

Table 1. Demographic characteristics and previous dental trauma training of participants (N = 165)

Knowledge domain	Correct response n (%)	Incorrect response n (%)
Immediate management of an avulsed permanent tooth	98 (59.4)	67 (40.6)
Critical extra-alveolar dry time	65 (39.4)	100 (60.6)
Appropriate storage medium	76 (46.1)	89 (53.9)
Management of avulsed primary teeth	70 (42.4)	95 (57.6)
Cleaning of a contaminated avulsed tooth	106 (64.2)	59 (35.8)
Appropriate type of splint	93 (56.4)	72 (43.6)
Timing of root canal treatment	88 (53.3)	77 (46.7)
Appropriate systemic medication	114 (69.1)	51 (30.9)
Fluoride application before replantation	32 (19.4)	133 (80.6)
Tetanus prophylaxis	111 (67.3)	54 (32.7)
Follow-up protocol	127 (77.0)	38 (23.0)

Overall knowledge score: 5.94 ± 2.00 (range: 1–11).

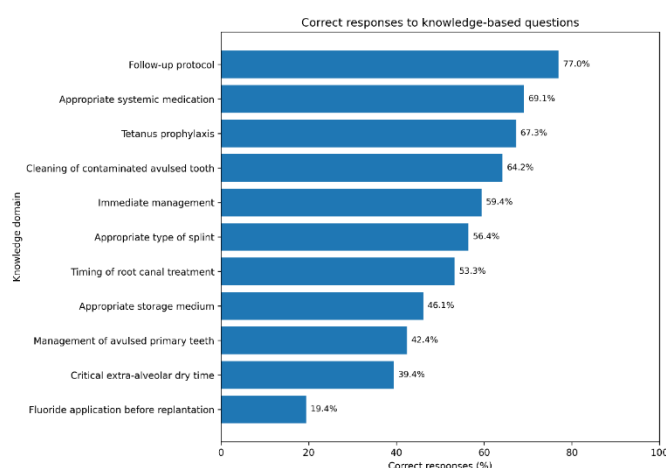


Table 2. Knowledge regarding emergency management of avulsed teeth among participants (N = 165).

Statement	Strongly agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly disagree n (%)
Confidence in managing an avulsed tooth	20 (12.1)	34 (20.6)	74 (44.8)	27 (16.4)	10 (6.1)
Greater incorporation of trauma management guidelines is required	39 (23.6)	35 (21.2)	71 (43.0)	14 (8.5)	6 (3.6)
Willingness to attempt emergency management/replantation	20 (12.1)	46 (27.9)	67 (40.6)	25 (15.2)	7 (4.2)
Immediate management improves prognosis	54 (32.7)	39 (23.6)	45 (27.3)	17 (10.3)	10 (6.1)
Workshops/CDE programmes improve preparedness	51 (30.9)	42 (25.5)	50 (30.3)	10 (6.1)	12 (7.3)

Table 3. Attitudes and perceptions regarding emergency management of avulsed teeth (N = 165)

Variable	Response	n (%)
Previously encountered an avulsed permanent tooth (N = 165)	Yes	20 (12.1)
	No	145 (87.9)
Action taken (Q20; valid responses = 123)	Appropriate response	23 (18.7)
	Other responses	100 (81.3)
Provided education regarding management of avulsed teeth (N = 165)	Yes	59 (35.8)
	No	106 (64.2)

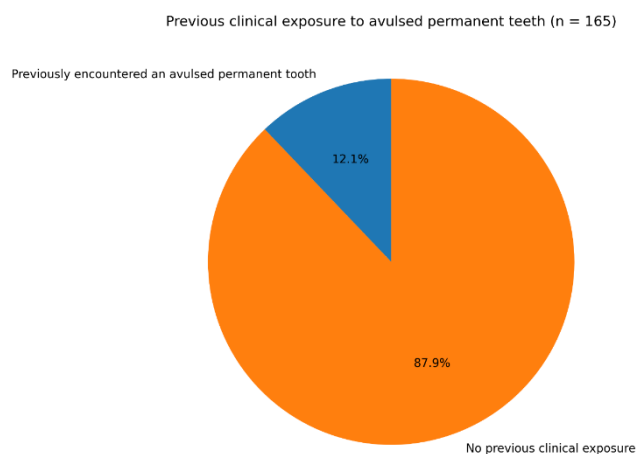


Table 4. Clinical exposure and practice-related responses regarding avulsed teeth

Variable	Undergraduate (n = 139) Mean $\pm$ SD	Postgraduate (n = 26) Mean $\pm$ SD	p-value
Knowledge score	5.88 $\pm$ 2.09	6.23 $\pm$ 1.39	0.294
Attitude score	13.20 $\pm$ 3.97	9.96 $\pm$ 3.41	<0.001

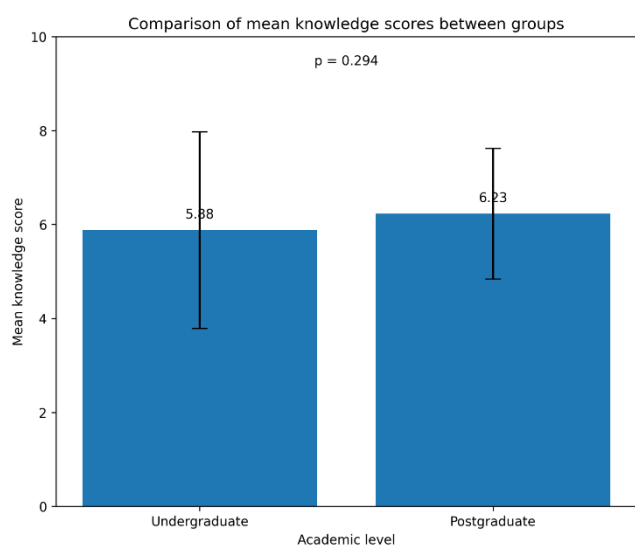


Table 5. Comparison of knowledge and attitude scores between undergraduate and postgraduate students.