



Cross Sectional Study

**Management Modalities of Mandible Fracture and Dental Trauma in Pediatric Patients: A Cross Sectional Study**

**Fatmah AlMotawah<sup>1</sup>, Shahzeb Hasan Ansari<sup>2\*</sup>, Albandari Suliman Alenezi<sup>3</sup>, Asraa Ali Alhussaini<sup>3</sup>, Hajar Alhajri<sup>3</sup>**

<sup>1</sup>College of Dentistry, Riyadh Elm University, Riyadh, Saudi Arabia.

<sup>2</sup>College of Community and Global Health, University of Manitoba, Winnipeg, Canada.

<sup>3</sup>Department of Internship Training Program, Riyadh Elm University, Riyadh, Saudi Arabia.

**ABSTRACT**

Pediatric dental specialists have to perform extensive treatment interventions that involve surgical approaches and conservative dental therapy programs when managing mandibular fractures and dental trauma in the children. Mandibular fractures are common among Saudi children; hence, the pediatric dentists must be aware of the treatment modalities. The present study is a cross-sectional study using a closed-ended questionnaire, and its reliability and validity were tested. The questionnaire included questions related to demographics, trauma-related questions, experiences, treatment options, etc. 120 pediatric dentists working in private and public hospitals in Riyadh were included. The data were analyzed using the SPSS software version 22. In order to present the demographical distribution of participants, a descriptive analysis was conducted. Thus, to analyze the results and compare between the groups, a chi-square test was used, and the level of significance used was 0.05 or lower. The majority of participants were males (63.6%), having less than five years of experience (54.5%), with 52.3% working in the Ministry of Health. When inquired about the correct mode of treatment, 51.5% chose flexible RPD for case 1, 66.6% chose open reduction for case 2, 52.7% chose cap splint for case 3, 36.4% opted for prefabricated acrylic splints for case 4, and 81.8% went for 81.8% for case 5. Statistically significant differences in responses were found among gender, work experience, and type of workplace (p-value <0.05). It was concluded that the overall knowledge of Riyadh-based pediatric dentists was satisfactory.

**Keywords:** Pediatric dentistry, Trauma, Cross-sectional, Prevalence

**Introduction**

The mixed dentition development phase extends from approximately six years to twelve years and stands as a crucial period for pediatric dental treatment. While in this phase, children lose their primary teeth, and their jaws expand as their permanent teeth grow in [1]. The combination of higher physical engagement and sports activity and accidental incidents results in a period during which children become more prone to dental injuries and mandibular traumas [2].

A mandibular fracture combined with dental trauma in the mixed dentition phase of children is a severe worry since it jeopardizes functionality while also compromising development and cosmetic aspects [3]. The therapy of these injuries presents unique challenges since pediatric bones differ from adult bones in terms of flexibility, structure, and developmental dynamics [4].

Research into mandibular fracture as well as dental trauma treatment in child patients continues to gain attention because professionals now understand pediatric craniofacial basic structures and their developing features differ from those of adults. Cancellous bone comprises the majority of the pediatric mandible, resulting in superior elasticity for fracture resistance than adult mandibular structures [3, 4]. Children in Saudi Arabia and Yemen

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**Corresponding author:** Shahzeb Hasan Ansari  
**E-mail** ✉ [shahzebhasan1821@gmail.com](mailto:shahzebhasan1821@gmail.com)  
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experience increased incidence of mandibular fractures from traffic collisions and falls and sports injuries because of their specific environmental and behavioral patterns [5].

Pediatric dental specialists working in the particular medical area have to perform extensive treatment interventions that involve surgical approaches and conservative dental therapy programs when managing mandibular fractures and dental trauma in the children. Intermaxillary fixation also benefits the pediatric patients because it does not only leave growing tissues intact but also does not disrupt maxillofacial growth [6].

Therapies for pediatric patients who sustained mandibular fractures and dental injuries are not easily approached because images demonstrating both developmental changes are scarce and can only be obtained from using advanced diagnostic imaging studies and combined client-professional treatment teams in the mixed dentition state [7].

**Study Rationale:** Mandibular fractures are common among Saudi children; hence, the pediatric dentists must be aware of the treatment modalities. This research will provide information on how much Saudi-based pediatric dentists are ready to treat such cases.

**Hypothesis:** The knowledge and practice of Saudi-based pediatric dentists regarding the treatment of mandibular fractures in children.

#### *Aims & objectives*

The aim of this study was to evaluate the level of knowledge among pediatric dentists when it comes to the treatment of mandibular fractures among children.

Objectives include:

- To assess the awareness and practice.
- To compare between gender, work experience, and work sector.
- To list down the various treatment modalities and their usage among pediatric dentists based on their preference.

#### **Materials and Methods**

**Study type:** Cross-sectional study using a closed-ended questionnaire.

**Data Collection:** A closed-ended questionnaire was created, and its reliability and validity will be assessed. The questionnaire contained questions about demographics, trauma, experiences, therapy possibilities, and so on.

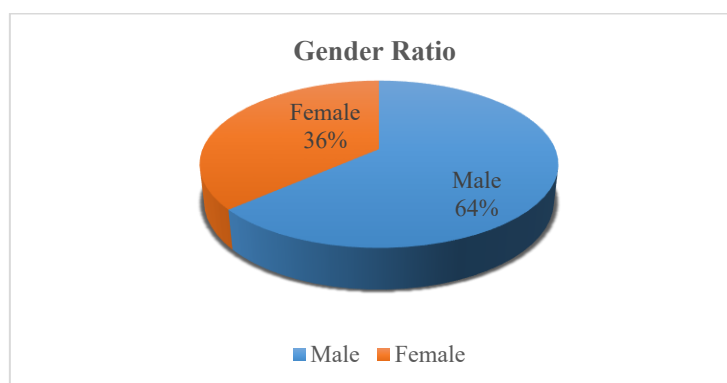
**Sample Characteristics:** Pediatric dentists were included, with the following margin of error: 5%, 95% confidence level, 2000 population size, 50% response distribution, and a minimum sample size of 120.

**Survey Administration:** The questionnaire was sent to the participants using Google forms.

**Study preparation:** The questionnaire was subjected to validity and reliability tests, which included 20 participants (reliability 0.734).

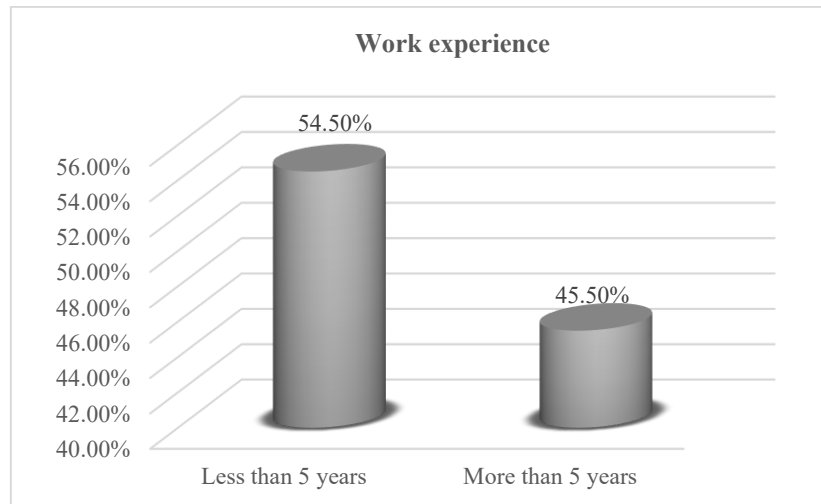
**Statistical methods:** The data was analyzed using the Statistical Package for Social Sciences (SPSS) software version 22, developed by IBM, New York, in 2018. In order to present the demographical distribution of participants, a descriptive analysis was conducted. Thus, to analyze the results and compare between the groups, a chi-square test was used, and the level of significance used was 0.05 or lower.

#### **Results and Discussion**



**Figure 1.** Gender ratio of the study participants

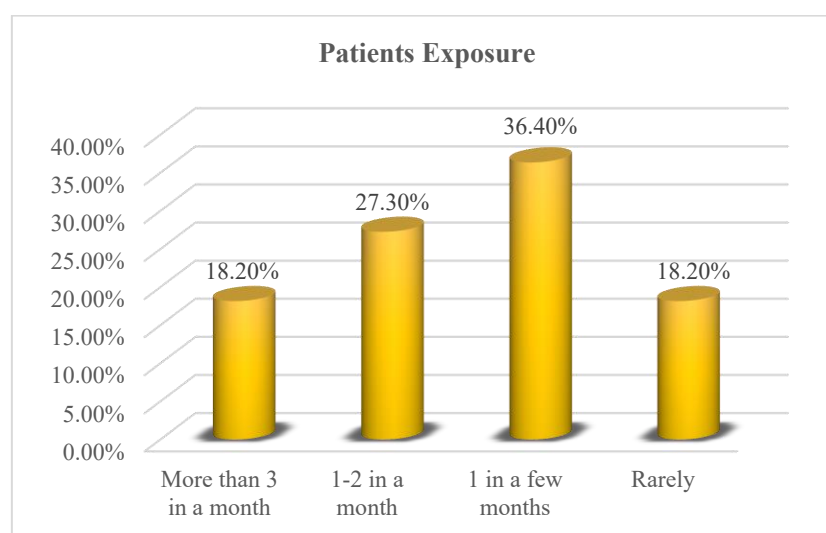
The gender distribution of the study participants shows a clear majority of male practitioners (64%) compared to female practitioners (36%) (**Figure 1**). This disparity in gender representation may reflect the gender composition of the field at the time of the study or may indicate specific trends within the local healthcare system. The overrepresentation of male practitioners could be related to cultural or professional factors that influence career choices. However, the study does not provide further insights into whether this gender imbalance impacts treatment outcomes or the approach to pediatric trauma cases.



**Figure 2.** Work experience of the study participants

#### *Work experience of study participants*

In terms of work experience, a substantial proportion of participants (54.5%) have less than 5 years of experience in the field, while 45.5% have more than 5 years of experience (**Figure 2**). This indicates a relatively balanced mix of newer clinicians and those with more extensive experience. The presence of both experienced and less experienced participants suggests that the study provides a well-rounded perspective on treatment preferences and clinical decision-making. However, the differences in experience levels may also influence how participants approach patient care, as those with more experience may prefer more invasive procedures or have more confidence in complex cases, whereas less experienced clinicians may opt for more conservative treatments.

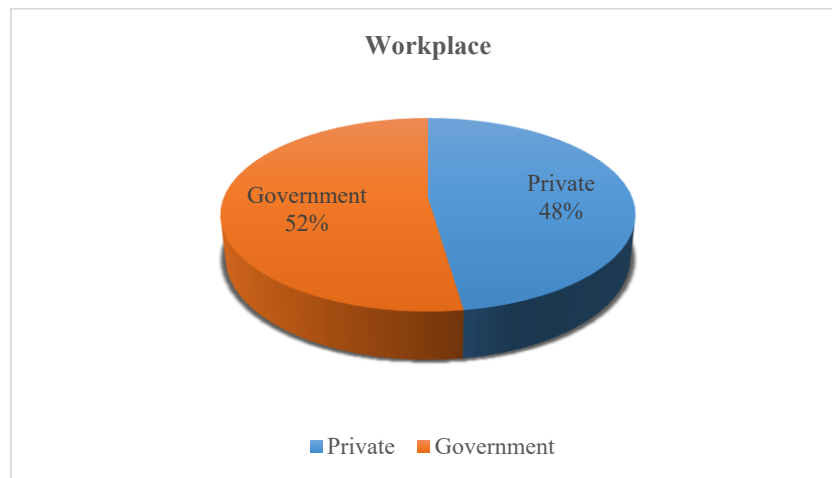


**Figure 3.** Frequency of pediatric patients' with trauma treated by study participants

#### *Frequency of pediatric trauma cases treated*

The frequency of pediatric trauma cases treated by study participants varies significantly. About 36.4% of clinicians reported treating pediatric trauma cases approximately once every few months, and 27.3% treated 1–2 cases per month. Meanwhile, 18.2% treated more than three cases a month, and an equal percentage (18.2%)

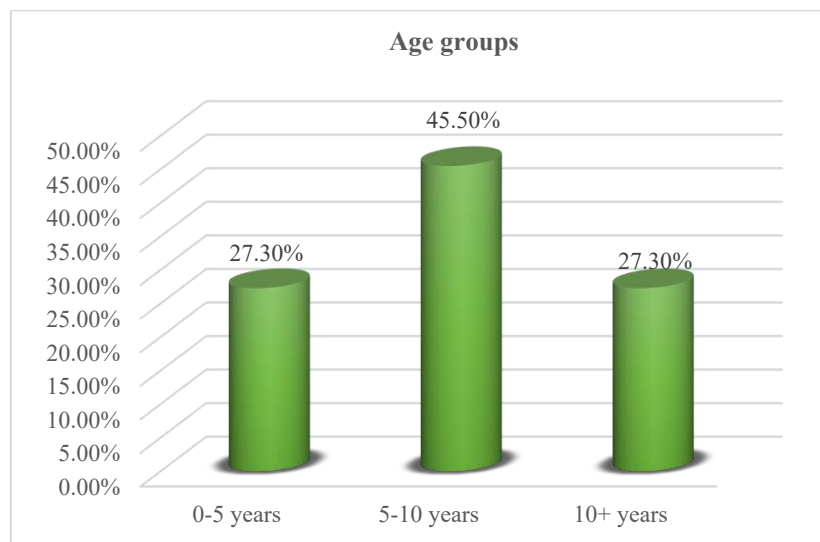
treated trauma cases rarely (**Figure 3**). This spread of responses reflects differing patient populations and practice settings. For example, clinicians working in busy urban centers or specialized trauma units may see higher volumes of trauma cases, while those in less populated areas or general practices may encounter them less frequently. Understanding these variations is crucial for tailoring clinical guidelines and training programs to the realities faced by practitioners in different settings.



**Figure 4.** Workplace details for the study participants

#### *Workplace environment: government vs. private*

Regarding workplace environments, the study found that 52% of participants work in government institutions, while 48% work in private practices. This near-even split suggests that both government and private sectors have significant roles in pediatric trauma care (**Figure 4**). Government-employed clinicians may have access to more standardized protocols and patient referrals, while private practice clinicians might have different resources or patient demographics. The slight difference in percentages may also indicate that pediatric trauma cases are handled with similar frequency in both sectors, though specific treatment approaches might vary due to available resources, institutional protocols, and patient population types.

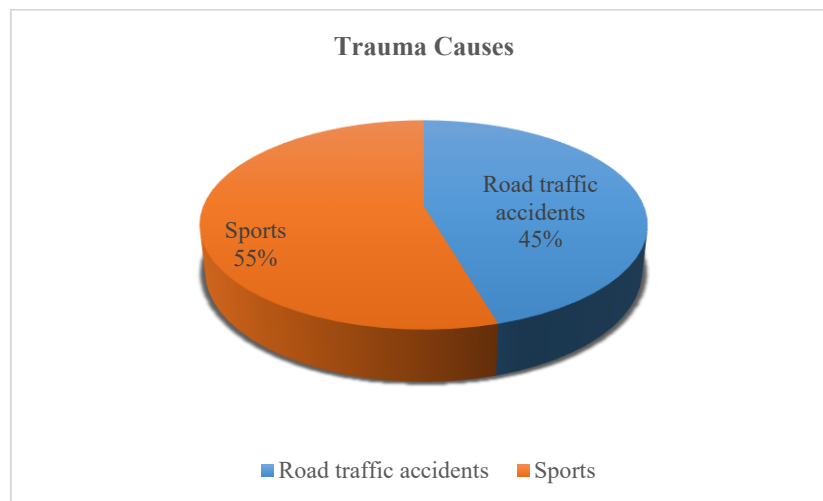


**Figure 5.** Age group of pediatric patients with trauma

#### *Age group of pediatric trauma patients*

The study found that the majority of pediatric trauma cases involved children aged 5–10 years (45.5%), followed by younger children aged 0–5 years (27.3%) and older children aged 10+ years (27.3%) (**Figure 5**). The predominance of the 5–10-year-old age group can be attributed to increased physical activity and participation in sports, which are common risk factors for trauma in this age range. The distribution of trauma cases across the

other two age groups, 0–5 years and 10+ years, reflects a mix of early childhood incidents (often due to falls or accidents) and adolescent injuries, which may be linked to more intense physical activities or sports injuries.



**Figure 6.** Causes of trauma among the pediatric patients treated by study participants

#### *Causes of pediatric trauma*

The causes of trauma in pediatric patients are relatively evenly split between sports-related injuries (55%) and road traffic accidents (45%) (**Figure 6**). The higher percentage of sports injuries aligns with trends in pediatric trauma literature, where active participation in sports leads to an increased risk of trauma, particularly in growing children. Road traffic accidents are a common cause of trauma as well, especially in urban settings where traffic congestion and unsafe pedestrian environments may increase the risk of injury for children. Understanding the causes of trauma is important for clinicians to anticipate injury patterns and implement preventive measures, such as safety education and protective equipment use in sports.

**Table 1.** Cases related to pediatric trauma and their preferred treatment options.

| Cases                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Responses                                                                                                                             |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| CASE-1: 11 year old patient had only dental trauma with avulsion of Tooth Nos. 32, 33, and 34. No sublingual ecchymosis or any other clinical signs of jaw fracture were observed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Flexible RPD: 54.5%<br>Open reduction: 18.2%<br>Osteosynthesis: 18.2%<br>cap splint: 9.1%                                             |
| CASE-2: 7-year-old male patient had a bilateral mandibular fracture that had been referred from the pediatric department with a history of accidental falls. Clinically, there was slight disarrangement of occlusion with an open bite and abrasion of skin on the accidental side; no intraoral ecchymosis was found as such. After observing the 3D x-ray of the patient, it shows a bilateral fracture of the mandible                                                                                                                                                                                                                                                                                                 | Flexible RPD: 18.2%<br>Open reduction: 63.6%<br>Osteosynthesis: 9.1%<br>cap splint: 9.1%                                              |
| CASE-3: 7 years old who had reported to dental OPD with a history of accidental falls while playing on the road. The only concern was for a displaced mandible fracture seen in an orthopantomograph and other x-rays of the jaw. On clinical examination, lingual ecchymosis is found and a slight disarrangement of occlusion was present with slight difficulty in chewing food.                                                                                                                                                                                                                                                                                                                                        | Open reduction: 27.3%<br>Osteosynthesis: 18.2%<br>cap splint: 54.5%                                                                   |
| CASE 4: A ten-year-old male had mandibular trauma and reported non-specific pain and tenderness over both the left and right side of the mandible. There was limited mouth opening. Intraoral examination revealed a laceration of the gingival tissues between the lower right permanent lateral incisor (tooth number 42) and the lower right deciduous canine (tooth number 83). There was minimal intraoral bleeding. OPG showed one fracture was located at the site of the intraoral laceration extending to the border of the mandible through the unerupted canine (tooth number 43). The other fracture was located at the left angle of the mandible through the unerupted lower second molar (tooth number 37). | Open reduction: 9.1%<br>Osteosynthesis: 9.1%<br>cap splint: 18.2%<br>prefabricated acrylic splints: 36.4%<br>Internal fixation: 27.3% |

CASE 5: A history of fall from height one day back, On an extraoral examination, a bruise present over the chin region and a deviation of chin towards the right side was seen. On an intraoral examination, lacerated wound with respect to 72 73 and 82 83 regions was noted, and on palpation, step deformity was felt with respect to the same region. Malocclusion was present and sublingual hematoma was also noted. After a thorough clinical and radiographic examination, the patient was diagnosed as having a bilateral mandible parasymphysis fracture

cap splint: 9.1%  
prefabricated acrylic  
splints: 9.1%  
Bridle wiring: 81.8%

#### *Treatment preferences for specific pediatric trauma cases*

The study also provides detailed insights into treatment preferences for various pediatric trauma cases. For instance, in **Case-1**, an 11-year-old with avulsed teeth, most participants (54.5%) opted for flexible removable partial dentures (RPD), while smaller proportions chose open reduction or osteosynthesis. This suggests that when dental trauma occurs without significant bone fractures, clinicians may prefer less invasive solutions like RPDs, especially in younger patients (**Table 1**).

For **Case-2**, a 7-year-old with bilateral mandibular fractures, the majority (63.6%) opted for open reduction, likely due to the complexity of bilateral fractures, which typically require surgical intervention for stabilization. The high incidence of open reduction in this case underscores the importance of surgical expertise in managing more severe fractures.

In **Case-3**, a displaced mandibular fracture in a 7-year-old, the use of cap splints (54.5%) predominated, though open reduction (27.3%) was also a common choice. This suggests that for less complex fractures or cases with mild occlusal disruption, a more conservative approach with splints may be preferred.

In **Case-4**, involving a 10-year-old with a complex mandibular fracture, treatment choices were more varied, with a significant proportion (36.4%) opting for prefabricated acrylic splints, while 27.3% chose internal fixation. The need for individualized treatment plans is evident, as more severe fractures involving multiple sites may require more rigid fixation methods.

Finally, in **Case-5**, involving a 7-year-old with a bilateral mandible parasymphysis fracture, the majority (81.8%) of participants selected bridle wiring, indicating its popularity as a stable, less invasive treatment for fractures with associated malocclusion.

**Table 2.** Comparison of all the cases on the basis of gender, work experience and workplace

| Cases         | Subgroups       | P-value |
|---------------|-----------------|---------|
| <b>Case-1</b> | Gender          | 0.062   |
|               | Work experience | 0.000*  |
|               | Workplace       | 0.104   |
| <b>Case-2</b> | Gender          | 0.000*  |
|               | Work experience | 0.001*  |
|               | Workplace       | 0.043*  |
| <b>Case-3</b> | Gender          | 0.456   |
|               | Work experience | 0.376   |
|               | Workplace       | 0.386   |
| <b>Case-4</b> | Gender          | 0.011*  |
|               | Work experience | 0.000*  |
|               | Workplace       | 0.136   |
| <b>Case-5</b> | Gender          | 0.000*  |
|               | Work experience | 0.000*  |
|               | Workplace       | 0.258   |

\*Statistically significant differences

#### *Gender, work experience, and workplace impact on treatment*

The statistical analysis in **Table 2** examined whether treatment preferences for each case were significantly influenced by gender, work experience, or workplace. For some cases, such as **Case-2** and **Case-4**, treatment choices showed statistically significant differences based on these factors. For example, clinicians from government institutions or those with more experience tended to favor more invasive treatments like open reduction or internal fixation for complex fractures. In contrast, certain cases (like **Case-1** and **Case-3**) did not show significant differences in treatment based on the participants' gender, experience, or workplace, suggesting that for simpler cases, clinical decisions may be less influenced by these factors.

The study outlines some factors influencing pediatric trauma care, beginning with the demographics of the clinicians, who were 64% males and 36% females, demonstrating that the presence of guards in the care system for pediatric trauma reflects the enduring male culture in trauma care, particularly in its specialized branches such as surgery and orthopedics [7]. The combination of junior and senior clinicians participating in the study (54.5% with less than 5 years of experience, 45.5% with more than 5 years) revealed that more novice clinicians appeared to favor conservative approaches, while more seasoned clinicians gravitated toward invasive procedures, particularly in complicated cases. According to earlier research, more experienced medical professionals tended to favor more aggressive care in situations of pediatric trauma [7, 8]. In terms of the type of workplace, the survey found equal numbers for two groups, with 52% of participants working in government institutions and 48% in private practice. This indicates that both sides contribute equally to the treatment of pediatric trauma. The treatment success was not considerably impacted by these variations in the resources and treatment methods offered in different settings.

In the study, most pediatric trauma cases were found to occur in children aged between 5-10 years, corroborating previously held beliefs that associate this age range with greater injury risks because of heightened physical activities and playing outdoors, which suggests climbing is one of the more preferred activities, necessitating targeted injury prevention approaches for different age groups [7, 8].

#### *Pediatric trauma causes*

The causes of pediatric trauma in this study are fairly evenly distributed between sports-related injuries (55%) and road traffic accidents (45%). The rising prevalence of sports-related injuries is consistent with the overall picture presented in pediatric trauma literature, which shows that physical activity, particularly among children and adolescents, is associated with an increased risk of injury. This emphasizes the importance of protective measures and sufficient training, including the use of specialist protective equipment, in order to reduce the risk of damage. Accidental falls, road traffic accidents, and a variety of sporting activities were mentioned as the major causes of pediatric trauma in research carried out by Díaz *et al.* in 2010 and Patidar *et al.* in 2021. Of these causes, the majority of participants (93.1%) reported that falls were the most common cause of traumatic dental injuries in children. The present study deviates from this finding, as falls do not make up the majority of cases, with sports-related injuries being more prevalent.

This study also attempts to offer a more precise account of the causes of pediatric trauma, articulating an almost equal prevalence of sports injuries and road traffic accidents. A previous study, particularly the one conducted by Patidar *et al.* in 2021, highlighted the commonality of falls as the primary reason, with secondary factors being sports injuries and road traffic accidents. Children living in one geographic region and coming from a specific demographic tend to have particular cross-contextually distinct preconceptions. This contrast is likely to stem from a blend of geographic or demographic reasons, like the age group of participants or the rural versus urban setting of the study.

#### *Treatment preferences for specific pediatric trauma cases*

This study sheds light on the choice of treatment among different cases of pediatric trauma. Taking patients from the age of 11, in Case-1 of the study, where an 11-year-old had avulsed teeth, a denture (RPD) was selected by 54.5% of the participants. This indicates that there is a tendency towards conservative treatment for older patients, even when significant bone fractures do not exist. One benefit of using RPDs in children is that they are readily modifiable in the case of jaw development changes during growth.

Other complicated situations, such as Case 2, in which a patient presented with bilateral mandibular fractures, have previously been studied. Participants who chose open reduction accounted for 63.6%, indicating that the more severe the issue, the more options that must be surgically addressed are also surgically resolved. The issue is dealing with bilateral fractures and determining the best way to achieve long-term stabilization and function, which is why surgical procedures are commonly used.

Alhammadi *et al.* (2022) have previously investigated children diagnosed with midface fractures and mandible fractures, and their consensus is that children should be handled conservatively with close reduction and cap splints, or in more severe cases, ORIF [9, 10]. The current study demonstrates that less invasive therapies are the preferred option when dealing with less severe fractures, which is consistent with previous studies.

The application of customized pediatric trauma acrylic splints of the type used in the current study is also in concordance with another study, who reported use of these splints for pediatric mandibular fractures and had good outcomes [11]. These splints are easily managed in most pediatric dental practices because they are low-

prevalence, cost-effective, adjustable, and non-invasive tools, especially since these patients are growing. Other studies have also reported the use of conservative techniques such as partial dentures and cap splints in the treatment of trauma in children.

#### *Impact of gender, work experience, and workplace on treatment*

As revealed in the current study's analysis, gender, work experience, and workplace significantly influenced treatment choices in the case of more complex trauma. For instance, in Case-2 and Case-4, government clinicians and those with more experience were more likely to preferentially treat the trauma with various invasive methods such as open reduction and internal fixation. Such a finding indicates that clinicians' professional background and level of experience affect their treatment choices, especially in more intricate trauma cases. In the same way, Shahraki *et al.* (2024) reported that more experienced clinicians exhibited greater knowledge and opted for more aggressive approaches when dealing with complex mandibular fractures. Unlike our study, Shahraki *et al.* did not detect any largely prevailing treatment preference differences based on gender. This contrasts with our findings, where gender appeared to be a more significant factor [12].

In contrast, past studies highlighted that male pediatricians displayed greater knowledge of managing dental injuries compared to females and noted substantial differences among pediatricians based on years of experience. The study also made the observation that participants with 11 to 20 years of experience demonstrated the highest knowledge concerning the management of dental trauma, especially regarding the pediatric dental emergency procedures [13]. This concurs with the finding of the current study that years of work experience constitute a pivotal factor determining the treatment choice in complicated pediatric trauma cases. Yet, as this study found no gender-related differences in the treatment of complex trauma, the other study had noted that male pediatricians tended to have greater knowledge of the management of dental injuries as opposed to their female counterparts.

#### *Management of specific pediatric mandibular fractures*

In Case-5, a 7-year-old had a bilateral mandible parasymphysis fracture, and bridle wiring was selected by 81.8% of the participants as the less invasive treatment for fractures affiliated with malocclusion.

This observation implies that more conservative treatment approaches are usually selected in pediatric trauma scenarios, particularly when dealing with non-displaced fractures or where there is an attempt to conserve the developing dentition. Past studies, highlight the management of pediatric condylar fractures through the use of functional removable appliances, like splints. These studies report favorable outcomes with the use of splints for both high- and low-level displaced fractures, emphasizing the need for modest intervention in the Toulon mandible to preserve normal growth and function, which is of considerable importance. Both past studies support the use of conservative treatments with splints and removable appliances in pediatrics [14, 15].

### **Conclusion**

The findings of the study under review are in agreement with previous studies on trauma in children and its treatment. Both studies highlight the relevance of conservative management of pediatric trauma with removable partial dentures or splints, along with managing non-complex fractures. Unlike previous studies, however, this study points out the increasing preference for more invasive surgery in the more complex cases due to advances in treatment techniques and options, as well as an array of clinician preferences.

Also draws new understanding of how these elements are important for clinical decision-making. Unlike prior studies that focused solely on clinician experience, the current study posits that the institution within which a clinician operates may also influence his or her treatment choices.

In sum, the present study adds meaningful information to the debate on the treatment of pediatric trauma by emphasizing the differential approach that is the framework of the various clinical situations. This research highlights the need to develop strategies for the management of trauma in children that incorporate the changing concepts of these injuries.

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**Conflict of Interest:** None

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**Ethics Statement:** This study received an ethical approval # FUGRP/2025/416/1235/1120 from the institutional review board of Riyadh Elm University.

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