

# Prevalence of Intimate Partner Violence and Endodontic Treatment Needs: Pilot Study

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**Objective:** The aim of this study was to assess the prevalence and potential association between intimate partner violence (IPV) with traumatic dental injuries (TDIs) and the subsequent need for root canal treatment (RCT).

**Methods:** A total of 100 subjects with TDIs presented at emergency or postgraduate restorative clinics at University Dental Hospital, King Abdulaziz University, Jeddah, Saudi Arabia post-TDI. All study subjects completed the Hurt-Insult-Threaten-Scream (HITS) domestic violence screening tool and were clinically and radiographically examined to determine the type of TDI they suffered along with the pulp and periapical status of affected teeth. Demographic data were also recorded. Based on the findings, management included regular follow-up, splinting, reattachment of broken tooth part, vital pulp therapy and/or RCT as seen appropriate.

**Results:** Mean age of participants was 28.4±5.7 years. Prevalence of IPV among subjects presented with TDIs was 18%. Most of the IPV victims held a bachelor's degree (67%) and were unemployed (61%). Most of TDI cases were crown fracture (84%) followed by luxation and avulsion (10% and 6%, respectively). Among all TDI cases, 73% required RCT. Crown fracture was the most prevalent TDI among IPV victims followed by luxation and avulsion with prevalence of 56%, 33%, and 11%, respectively. Out of a total of 73 patients requiring RCT, nine were IPV victims (12.3%) which indicated that one of each eight TDI cases requiring RCT might be a potential IPV victim. Half of the IPV victims required RCT to manage their TDIs.

**Conclusion:** Prevalence of IPV among TDIs was 18%. IPV screening should be included as routine assessment part for TDIs. Identification of IPV victims could be difficult, however, employment status, type of TDI, and RCT needs were suggested as potential predictors of positive IPV cases.

**Keywords:** intimate partner violence, root canal treatment, traumatic dental injuries, IPV, RCT, TDIs

## Introduction

Traumatic dental injury (TDI) is defined as any impact injury to the tooth, hard and/or soft tissues within and around the vicinity of the mouth and oral cavity. It is usually sudden, circumstantial, unexpected, accidental, and often requires emergency attention.<sup>1</sup> Observational studies have suggested that the effects of TDIs are pain, loss of function and esthetic problems, with physical, emotional, and social consequences.<sup>2</sup> An estimated one third of all individuals will experience a TDI during their lifetime.<sup>3</sup> According to the American Association of Endodontists, the types of TDI include injuries confined to the tooth structure (eg crown and/or root fracture), injuries combining the tooth and the supporting bone (eg dentoalveolar fractures), periodontal support system involvement (eg luxation or avulsion) and finally soft tissue injuries.<sup>4</sup> Crown fracture was found to be the most prevalent and most frequently reported type of TDIs in the permanent teeth.<sup>3</sup>

The type, severity, time interval before the initial treatment and the quality of treatment provided will affect the outcome of dental trauma.<sup>5</sup> A linear association has been found between the severity of TDI and the increased risk for different adverse sequelae. For instance, enamel and crown fracture can cause the bacteria to enter pulp space leading to pulp inflammation and consequently pulp necrosis. Pulp canal obliteration, inflammatory root resorption, and loss of tooth and alveolar bone are also considered an adverse outcome of TDI.<sup>6,7</sup> Depending on the type of TDI, pulp and periapical status of the affected tooth; different

treatment modalities are available to treat it ranging from periodic follow-ups, splinting teeth, performing vital pulp therapy and/or possible root canal treatment.<sup>8</sup>

The exact cause of TDIs could be correlated to a variety of determinants such as age, gender, malocclusion, elite sports professionals, violence and other factors.<sup>9</sup> A causal relationship between TDIs and physical violence was evident such in the cases of domestic violence (DV). The United Nations defined domestic violence or intimate partner violence (IPV), as a

Pattern of behavior in any relationship that is used to gain or maintain power and control over an intimate partner. Abuse is physical, sexual, emotional, economic or psychological actions or threats of actions that influence another person.<sup>10</sup>

IPV affects around one out of three women worldwide.<sup>11</sup> Dental injuries in the form of fractures and tooth avulsions, recorded as 16.7% and 37.3%, respectively in subjects of IPV.<sup>12</sup> An additional study disclosed that among 2489 participants of IPV victims, 332 (13.4%) were referred due to oral trauma. Oral injuries accounted for 13.8% and included tooth fracture, luxation, avulsion, tooth structure loss and mobility.<sup>13</sup> The results of another study conducted to assess the occurrence of TDIs associated with IPV unveiled that out of the 1844 domestic violence cases analyzed by forensic investigators, 15 reports indicated that 22 teeth were injured, which accounts for 2% of the total injuries. The most commonly affected teeth were maxillary incisors (31.8%), mandibular incisors (27.3%) and maxillary canines (9.1%).<sup>14</sup>

The dental setting has been regarded as a vital place for identifying victims and survivors of IPV considering that dentists form a favorable rapport with their patients and they ideally should be encountering them at least twice a year. Furthermore, dentists have a routine of examination that includes the highly reported sites of IPV's orofacial abuse sites comprised of the head, neck, face, and oral cavity examination. IPV orofacial signs of abuse that can be identified during dental examination include bruising of the neck and palates, bite marks, tearing and laceration of the mucosal lining, non-vital and/or discolored teeth, traumatic tooth or jaw fractures and multiple injuries presenting in different healing stages.<sup>15,16</sup> Previous studies have reported that exposure to IPV is frequently linked to suffering from oral and maxillofacial trauma and development of temporomandibular joint disorder in women.<sup>17–19</sup> In addition, some apparent behavioral indicators of abuse that can be noticed by the dentist in the dental setting include dental neglect, restrictions by the offender leading to failure in attending appointments, unnecessary attendance of partner at appointments, fearful or depressed behavior and patient hesitancy to speak in the presence of the partner.<sup>16,20,21</sup>

Hurt-Insult-Threaten-Scream (HITS) is a screening tool used to identify IPV in various medical settings. This screening tool is a low-burden tool in detecting IPV among women.<sup>22</sup> It is identified as an efficient and effective tool in detecting IPV. This screening tool exhibited excellent construct and content validity, internal consistency, and inter-rater reliability.<sup>23</sup> A systematic review reported that HITS was one of the most studied screening tools with sensitivity range of 30–100% and specificity range of 86–99%. Sensitivity ranges varied depending on the population. For instance, the range of sensitivities were higher for women. The concurrent validity and internal reliability were also tested and found to be acceptable.<sup>24</sup>

Previously published studies have not reported yet on the prevalence of the need for RCT in post-TDI cases among IPV victims hence a gap in the knowledge as for the prevalence of IPV among TDI patients and factors affecting its prevalence was found. The objective of this study was to assess prevalence of IPV among TDI patients and factors affecting it. Further, we investigated potential association of RCT post-TDI as a predictor of IPV.

## Methodology

Ethical approval was obtained from the ethics committee of the Faculty of Dentistry, King Abdulaziz University (Ethical Approval no. 019–16), Jeddah, Saudi Arabia. All aspects of the study complied with the Declaration of Helsinki. Prior to the enrollment, all participants were fully informed as to the nature of the study and signed a consent form, understanding that their decision not to participate in the study would not affect their treatment.

The inclusion criteria included healthy married females aged between 18 and 60 with no history of psychological disorders, never been on any psychiatric medication and have received TDI to maxillary and/or mandibular teeth then presented to emergency and/or postgraduate restorative clinics at University Dental Hospital, King Abdulaziz University, Jeddah, Saudi Arabia. Exclusion criteria included males, single, separated, or divorced females, females with active psychological condition, females with history of taking psychiatric medications, TDI due to road traffic accident or injury

limited to soft tissues. Study sample was recruited through non-probability convenience sampling method. Data collection took place between April 2020 and May 2021.

Five calibrated postgraduate residents obtained medical history, demographic data, and consents of 100 enrolled female participants followed by clinical and radiographic examination to assess TDI and classify cases according to Andreasen's Classification.<sup>25</sup> Examination included percussion and palpation tests, mobility assessment, probing, discoloration check, presence or absence of swelling and/or sinus tract, cold and electric pulp tests. Three digital periapical radiographs were obtained for the affected teeth (straight image and mesial and distal shifts). Images were acquired utilizing Rinn XCP alignment system (Rinn Corp, Elgin, IL, USA). Periapical status of the tooth was determined based on the assessment of the periodontal ligament contour, width, and structure and was categorized as healthy if these parameters were normal or otherwise exhibited apical periodontitis.<sup>26</sup> Patients fulfilling inclusion criteria completed a HITS DV screening tool. HITS Scale for domestic violence DV range from 4–20, and any subject's score >10 considered to be victim of DV. Needed intervention was provided for each case which included arrangement of regular follow-ups, splinting, reattachment of broken tooth segment, composite build-up, vital pulp therapy and/or RCT. For instance, in case of luxation/avulsion trauma, non-rigid (flexible) splinting was done for 2–4 weeks according to the case progress. Uncomplicated tooth crown fracture was restored with reattachment of broken tooth segment or composite restoration. In case of complicated tooth crown fracture, trials of pulp vitality preservation were performed including direct pulp capping and/or partial pulpotomy. Root canal treatment was done if tests confirmed the need for endodontic intervention and was furnished if the pulp was not responsive within three months duration. All tests were revised in two weeks and four weeks if needed.

## Statistical Analysis

Bivariate analysis chi-squared analysis was done to estimate the effect of different predictors on prevalence of IPV, and whether IPV impacted the need for RCT.

## Results

A total of 100 married women suffered from and presented with various types of TDI participated in this study with an average age of  $28.4 \pm 5.7$  years. Women with bachelor's degree education represented 81% of the study population. A total of 66% of the sample was employed. Based on HITS screening tool and cut-off point, an estimated 18% of the study population were identified as IPV victims. Fractured teeth represented the highest proportion of TDIs (84%) followed by luxation with an estimated proportion of 10% and avulsion (6%). RCT was done for 73% of the cases to mitigate the damage (Table 1).

**Table 1** Demographic Characteristics of the Study Population

Variable		Prevalence
Educational Level	Bachelor's degree	81%
	High school	19%
Employment Status	Yes	66%
	No	34%
HITS Domestic Violence Screening Assessment	Positive	18%
	Negative	82%
Type of Dental Traumatic Injury	Crown fracture	84%
	Luxation	10%
	Avulsion	6%
Endodontic Treatment Need	Yes	73%
	No	27%

Bivariate analysis chi-squared analysis was done to estimate the potential association of different demographic predictors on IPV victims, and its influence on the need for RCT. Among all study participants with bachelor's degree education level, about 14.8% of them were identified as IPV victims. In contrast, IPV victims with high school education degree were higher with an estimated proportion of 31.6% when compared to participants with bachelor's degree. Although there was a discernible distinction in IPV prevalence between the two education levels, it was not statistically significant ( $p=0.08$ ).

Employment was a critical predictor of IPV prevalence as about 61.1% of IPV victims were unemployed. Within each category of employment, higher prevalence of IPV victims was observed among unemployed (32.4%) compared to employed women (10.6%). This finding was statistically significant ( $p=0.007$ ).

A variety of TDIs were recognized in IPV victims. Crown fracture was the most prevalent among IPV victim followed by luxation and avulsion with estimated prevalence of 55.6%, 33.3%, and 11.1%, respectively.

Among all subjects identified through HITS screening tool as positive IPV victims, results suggested that 50% of them needed root canal treatment to alleviate their TDIs. On the other standpoint regarding all those who had endodontic treatment need, almost 12.3% of them were identified as positive IPV victims. This finding theorized the possibility that one of each eight traumatic dental injury cases requiring RCT might be a potential IPV victim. This observation was statistically significant ( $p=0.015$ , Table 2).

## Discussion

By recruiting 100 married females, this prospective clinical study attempted to report the prevalence of IPV among TDI cases and determine its predictors including the need for RCT. Results showed that 18% of TDIs were in fact IPV victims. IPV victims were mostly unemployed although they held a bachelor's degree and were mostly subjected to crown fracture with significantly lower need for RCT compared to TDIs in non-IPV victims.

IPV is considered one of the most common forms of violence globally and locally with medical and dental manifestations. It has been proven that IPV is associated with various types of TDIs as well as oral health neglect. Different studies were conducted to assess the interrelationship between IPV with TDIs and found high prevalence of multiple TDIs of different orofacial sites including teeth.<sup>15,16</sup> requiring RCT could be a victim of IPV. Such results indicate that IPV screening for patients presenting with TDIs should be routinely employed.

Several studies showed that mild TDI (eg enamel fracture) rarely lead to adverse pulp reactions and would not adversely affect pulp condition and tooth survival.<sup>25,27</sup> However, moderate to severe TDI (eg complicated crown fracture and laxative injuries) denote a higher rate of adverse pulp sequelae like pulp necrosis and root resorption.<sup>8</sup> Interference or damage with the neurovascular supply can result in alteration of pulp function. A pulp with a healthy neurovascular supply has a better prognosis than a pulp with a damaged neurovascular supply. Bacterial invasion through the dentinal tubules is less likely in healthy pulps.<sup>28</sup> If pulp capping or pulpotomy is performed early in teeth with exposed pulps, a good prognosis for pulp healing can be expected.<sup>8,29</sup> Our results showed high prevalence for the need of RCT despite the fact that the most common encountered TDI was crown fractures (84%, Table 1). Possible reasons for such high prevalence of RCT in this study could be due to the delay in management provided for the traumatized tooth and the age of the patient.<sup>8,30–32</sup> The need for RCT in our study (73%, Table 1) was higher than previously reported findings ranging from 15–28.4%.<sup>30,31</sup> This could be attributed to difference in the recruited sample. Our study included adult patients while the other studies included only children and adolescents with age range 1–15 years.<sup>30,31</sup> Further, many of our sample presented the next day after receiving the impact. This delay coupled with the fact that impacted teeth were mature increased chances for development of pulp necrosis and apical periodontitis mandating RCT.<sup>8</sup> We did not precisely record the duration between TDI occurrence and initiation of needed intervention which could be a limitation of the current study. Future studies should consider delay between time of trauma incidence, patient's presentation, and initiation of intervention as potential factors influencing the need for RCT in IPV cases post-TDI.

The association of IPV with unemployment was significant in this study as 61.1% of those positively identified as IPV victims were unemployed. Different studies correlated unemployment with IPV suggesting association of low-income women and IPV,<sup>33,34</sup> while other studies failed to find such association.<sup>35,36</sup> This could be attributed to differences in the studied populations' social, educational, and economic factors.

**Table 2** Bivariate Chi-squared Analysis to Estimate Potential Association of Demographic Predictors with IPV Status

Demographic Variable		HITS Domestic Violence Screening Assessment		Chi-square d Statistics	p-value
		Positive HITS Screening	Negative HITS Screening		
		(n=18)	(n=82)		
Educational Level	Bachelor's degree	12 (14.81%) (66.67%)	69 (85.19%) (84.15%)	2.930	0.08
	High school	6 (31.58%) (33.33%)	13 (68.42%) (15.85%)		
Employment Status	Yes	7 (10.61%) (38.89%)	59 (89.39%) (71.95%)	7.19	0.007*
	No	11 (32.35%) (61.11%)	23 (67.65%) (28.05%)		
Type of Dental Traumatic Injury	Crown fracture	10 (11.90%) (55.56%)	74 (88.10%) (90.24%)	15.021	0.00055**
	Luxation	6 (60%) (33.33%)	4 (40%) (4.88%)		
	Avulsion	2 (33.33%) (11.11%)	4 (66.67%) (4.88%)		
Endodontic Treatment Need	Yes	9 (12.33%) (50%)	64 (87.67%) (78.05%)	5.891	0.0152*
	No	9 (33.33%) (50%)	18 (66.67%) (21.95%)		

**Notes:** \*Statistically significant at 0.05 level of significance. \*\*Fisher's exact test as one of the cell count is less than five subjects. Blue Percentage = Row percentage. Red Percentage = Column percentage.

The prevalence of dental trauma that was calculated in this study has only included married female adults. This limitation explains why our results differ from those of other studies. Further, sample selection was limited to patients attending a university dental hospital limiting generalizability. Majority of the included sample in this pilot study held a bachelor's degree. A larger sample with more balanced selection in terms of educational background might yield different results. The US Postal Service Task Force (USPSTF) evaluated the HITS tool and found it to be one of the most sensitive and specific IPV measures available.<sup>37</sup> It is also unique in that it measures both psychological and physical aggression. It is considered to be a simple and a fast tool in contrast to other IPV identifying measures. Which is found to be more practical in the clinical setting.

## Conclusion

Within the limitation of this study, there was a potential association between TDIs and the subsequent need for RCT in women exposed to DV. IPV screening should be included as routine assessment part for TDIs. Prevalence of IPV among TDIs was 18%. These cases were characterized to involve unemployed females holding a bachelor's degree exhibiting crown fractures with low need for RCT.

## Disclosure

The authors report no conflicts of interest in this work.

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