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Research Article

Ocular Injuries Caused by Intimate Partner Violence Using an Emergency Room Database - A Gender - Based Analysis

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Abstract

Objective: Intimate partner violence (IPV) has increased since the start of the COVID-19 pandemic. Ophthalmologists and emergency department (ED) physicians should be vigilant in assessing patients with ocular injuries for a history of IPV. Our study is aimed to describe the epidemiology of patients presenting to the emergency department with ocular injuries secondary to IPV.

Methods: We conducted a retrospective study using the National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP) from 2006 to 2016 in 60 emergency departments across the United States. 25,541 ED patients with an ocular injury due to IPV were analyzed. Main outcomes included race, hospital size, incident location, reason for assault, precipitating cause of injury, and medical diagnosis.

Results: IPV-related ocular injuries were more commonly noted in women compared to men (73.8% vs 26.2%). Most patients were in the young adult group (21-30 years old). Men and women were primarily Black in majority. In males, the precipitating cause of injury was either being struck by an object or injury by fire (struck 66.1%, fire 30.6%), whereas females were overwhelming injured by a striking injury (90.4%). The most common diagnosis was an ocular contusion or abrasion (males 43.4% vs females 53.4%).

Conclusion and Relevance: IPV results in significant ocular trauma that presents to the ED, and is more commonly see in women, black race, and young adults. However, men can also be victims of IPV and should be equally evaluated. Assessment of IPV is important in ocular injury seen in the ED.

Keywords: Intimate Partner Violence; IPV; Ocular Injuries; Eye Trauma

Introduction

Intimate partner violence (IPV) is defined as "physical or sexual violence, stalking, or aggression by a partner, current or former" by the National Center for Injury Prevention and Control [1]. Women are more likely than men to experience IPV; 1/3 of US women have been affected, particularly at a younger age [2]. Dearwater reported approximately 40% of female homicides are due to IPV, and half of these cases had presented to the emergency department (ED) within two years prior to death [3].

IPV accounts for 70% of facial trauma cases in women, and ocular involvement is noted in 45% of these cases [4]. Previous studies have identified IPV as a significant cause of orbital floor fractures in women [5]. Victims of IPV are likely to visit the ED, but in most cases IPV as the cause of the injury may not be identified [3]. The current literature on IPV-related ocular injuries is scarce. It is important for ED physicians and ophthalmologists to recognize ocular injuries due to IPV in both men and women. The current study aims to determine epidemiologic trends of IPV-related ocular trau-

ma presenting to the ED to improve our understanding and to raise awareness of these injuries.

Methods

The National Electronic Injury Surveillance System-All Injury Program (NEISS-AIP) was queried for injuries specifically involving the eye (variable "eyeball") between 2006 and 2016. The All Injury Program (AIP) samples around 60 hospitals from the overall NEISS dataset to obtain data regarding all injuries presenting to the ED. This data is collected as public information, and available through the Interuniversity Consortium for Political and Social Research (ICPSR) at https://www.icpsr.umich.edu/icpsrweb/ICPSR/search/studies?q=all+injury+program. The information is deidentified and considered to be exempt by the Rutgers Institutional Review Board.

The data included age and categorical variables including gender, race, hospital size, incident locale, disposition from ED, reason for assault, precipitating cause of injury, and diagnosis (selecting for the anatomic location of the eyeball [code=77]). Data was weighted using the inborne weight variable in the database. Domestic violence was analyzed similar to previous studies using the AIP database [6]. Statistical analysis was completed with IBM Statistical Package for the Social Sciences (SPSS) version 25.0.

Results

A total of 6,888,197 cases of ocular injury were described in the NEISS database (Table 1). Of those, 0.37% were secondary to intimate partner violence. Between 2006 and 2016, 25,451 ocular injuries as a result of IPV were identified in 6,667 men (26.2%) and 18,748 (73.8%) women in a ratio of approximately 1:4. The average age (in years) of males and females was 36.7 and 32.9, respectively. Demographics are noted in table 2. The majority of victims, both male and female, were between 21 and 50 years old. The highest proportion of men presenting with ocular injuries due to IPV were Black (47.5%, $p < 0.001$, Chi-square), a trend that was similar in women (Black women 35.5%, $p < 0.001$).

Ocular injuries in NEISS database	6,888,197	
Ocular injuries secondary to IPV	25415 (0.37%)	
	Male	Female
Ocular cases	4,675,649	2,207,395
Mean age (years)	36.64 (27.1)	39.28 (34.7)
Race		
Unknown	1,114,446 (23.8%)	505,858 (22.9%)
White	2,683,615 (57.4%)	1,157,909 (52.5%)
Black	405,067 (8.7%)	334,382 (15.1%)
Hispanic	392,201 *8.4%)	150,040 (6.8%)
Asian	47,353 (1.0%)	37,182 (1.7%)
American Indian	15,503 (0.3%)	12,497 (0.6%)
Other	409,665 (8.8%)	159,840 (7.2%)

Table 1: Ocular injuries in NEISS database and demographics.

	Male	Female	p-value
Number of cases	**6667 (26.2%)**	**18748 (73.8%)**	
Mean age (years)	36.68 (12.38)	32.78 (11.27)	P < 0.001
Race			
Unknown	1623 (24.3%)	4701 (25.1%)	P < 0.001
White	1205 (18.1%)	5094 (27.2%)	
Black	3165 (47.5%)	6663 (35.5%)	
Hispanic	590 (8.8%)	1547 (8.3%)	
Asian	0 (0%)	406 (2.2%)	
American Indian	84 (1.3%)	133 (0.7%)	
Other			
Hospital Size			
Small	893 (13.4%)	1815 (9.7%)	P < 0.001
Medium	1343 (20.1%)	3383 (18%)	
Large	2472 (37.1%)	6880 (36.7%)	
Very large	1957 (29.4%)	6631 (35.4%)	
Children's	0 (0%)	39 (0.2%)	
Incident Locale			

Unknown	3347 (50.2%)	10079 (53.8%)	P < 0.001
Home	3161 (47.4%)	8113 (43.3%)	
Street	113 (1.7%)	251 (1.3%)	
Property	46 (0.7%)	305 (1.6%)	
Disposition from ED			
Released	5829 (87.4%)	17129 (91.4%)	P < 0.001
Transferred	139 (2.1%)	133 (0.7%)	
Hospitalized	273 (4.1%)	581 (3.1%)	
Observation	85 (1.3%)	92 (0.5%)	
AMA	341 (5.1%)	814 (4.3%)	
Reason for Assault			
Altercation	2224 (33.4%)	3899 (20.8%)	P < 0.001
Drug-related	0 (0%)	44 (0.2%)	
Sexual assault	0 (0%)	370 (2%)	
Other specified	130 (1.9%)	296 (1.6%)	
Unknown unspecified	4313 (64.7%)	14139 (75.4%)	
Precipitating Cause of Injury			
MV-occupant	0 (0%)	24 (0.1%)	p < 0.001
Fall	0 (0%)	84 (0.4%)	
Struck by object	4408 (66.1%)	16964 (90.4%)	
Cut/pierce	215 (3.2%)	179 (1%)	
Fire/burn	2043 (30.6%)	1093 (5.8%)	
Inhalation/ sufflation	0 (0%)	102 (0.5%)	
Foreign body	0 (0%)	197 (1.1%)	
BB/pellut gun	0 (0%)	22 (0.1%)	
Other specified	0 (0%)	84 (0.4%)	
Diagnosis			
Burn chemical	758 (11.4%)	539 (2.9%)	P < 0.001
Contusion/ abrasion	2890 (43.4%)	10017 (53.4%)	
Foreign body	21 (0.3%)	287 (1.5%)	
Hematoma	49 (0.7%)	836 (4.5%)	
Laceration	217 (3.3%)	208 (1.1%)	
Puncture	44 (0.7%)	0 (0%)	
Hemorrhage	487 (7.3%)	1223 (6.5%)	
Other	1140 (17.1%)	4696 (25%)	
Derma/ conjunctivitis	1061 (15.9%)	942 (5%)	
Day of the Week			
Weekday	4256 (63.85%)	11563 (61.68%)	P < 0.001
Weekend	2410 (36.15%)	7185 (38.32%)	
Month			
January	516 (7.7%)	1719 (9.2%)	P < 0.001
February	491 (7.4%)	1111 (5.9%)	
March	366 (5.5%)	962 (5.1%)	
April	515 (7.7%)	1063 (5.7%)	
May	510 (7.6%)	2014 (10.7%)	
June	892 (13.4%)	1705 (9.1%)	
July	925 (13.9%)	1801 (9.6%)	
August	589 (8.8%)	1681 (9.0%)	
September	1051 (15.8%)	1903 (10.2%)	
October	154 (2.3%)	2148 (11.5%)	
November	342 (5.1%)	1437 (7.7%)	
December	316 (4.7%)	1204 (6.4%)	

Table 2: Demographics and Precipitating Causes of Ocular Injuries Due to IPV in the ED.

The most common ocular injury was contusion/abrasion (Men 43.4%, women 53.4%, p < 0.001). Approximately 45% of incidents occurred at home (men 47.4%, women 43.3%, p < 0.001). The vast majority of patients were treated and released from the ED (men 87.4%, women 91.4%, p < 0.001). Fewer than 5% of patients were hospitalized (men 4.1%, women 3.1%, p < 0.001). Upon assessing for the reason for assault, the cause was unknown in the majority of cases (men 64.7%, women 75.4%, p < 0.001), followed by altercation (men 33.4%, women 20.8%, p < 0.001). Women were more likely than men to have ocular injury after a reported sexual assault (men 0%, women 2%, p < 0.001). For females, the overwhelming precipitating cause of injury was being struck by an object (90.4%,), whereas in males, the two major causes were being struck by an object (66.1%) or fire/burns (30.6%). Distribution of cases in time is shown in table 2; almost one-fourth of cases in women presented to the ED on Sunday.

Table 3 shows a univariate analysis assessing the risk of hospitalization when taking into account race and age - those > 35 years old were significantly more likely to be hospitalized, in women (OR 2.257, 95% CI 1.912-2.664, p < 0.001) and men (OR 6.163, 95% CI

4.445-8.545, p < 0.001). Blacks with IPV related eye injuries were less likely to be hospitalized than Whites [women (OR 0.593, 95% CI 0.448-0.873, p < 0.001); men (OR 0.505, 95% CI 0.385-0.663 p < 0.001)].

	Male		Female	
	OR (95% CI)	**p-value**	**OR (95% CI)**	**p-value**
Race				
White	Ref		Ref	
Black	0.505 (0.385-0.663)	<0.001	0.593 (0.448-0.783)	<0.001
Age Group				
< 35	Ref		Ref	
>35	6.163 (4.445-8.545)	<0.001	2.257 (1.912-2.664)	<0.001

Table 3: Univariate Analysis by Gender assessing for risk of hospitalization.

Discussion and Conclusion

Laceration and abrasion have been described as common diagnoses for IPV related ocular injuries, and accidental trauma by an object as the most common etiology [7]. Our study similarly found that in females, the most common precipitating ocular injury was being struck by an object resulting in contusion or abrasion. Although our study does not detail the type of object being used, prior studies have found that household objects are usually seen in these injuries [8]. Contusions, abrasions, and hemorrhages were the most common overall presentations of patients in this study. NEISS-AIP only includes primary diagnoses of patients, but meta-analyses have shown that witnessed head, neck, or facial injuries are significant markers for IPV whereas injuries to the extremities and abdomen are not as sensitive for IPV [9].

This study found that the victims of IPV were most commonly Black, consistent with previous literature. However, black patients were less likely to be hospitalized for their injuries. Males were more likely to be hospitalized than females. Younger adult women, between the age of 20-40 years are more likely to be victims, and with increasing age there is increased risk of hospitalization. Although we could not distinguish pregnant females from non-pregnant females, IPV is unfortunately commonly seen in pregnant women, with rates as high as 5% prior to delivery and 12% after delivery [10]. Recognition of IPV is important, as homicide is a leading cause of maternal mortality [10]. While current literature often focuses on women, men are equally likely to report IPV when interviewed, particularly in the LGBTQ community [11]. Many studies also lack including men as victims of IPV [11]. This study highlighted one-fourth of IPV-relatd ocular injuries in men, through fire, burns, or being struck by an object.

Literature shows that abuse is not a one time event - there is significant morbidity and mortality from IPV. 40% of all female homicides are due to an intimate partner [3]. Victims of IPV have increased rates of inflammatory bowel disease and fibromyalgia, somatic symptoms such as chronic pain, and increased rates of suicide and substance use disorder [12].

Limitations of this study are inherent in the database. NEISS-AIP only captures patients presenting to the ED and outpatient clinic visits are not incorporated, thus possibly limiting community incidence. Furthermore, NEISS-AIP only encodes one diagnosis for a bodypart and thus an additional, less severe, diagnoses cannot be identified. NEISS does not allow for identification of gender of the partner, which would help identify LGBTQ violence.

Screening and identification of IPV has previously been discussed by the American Academy of Ophthalmologists through the "ASK, ASSESS, and REFER" format, understanding that while identification and assessment is within the scope of clinician practice, patients often need to be referred to social workers for further management [13]. Female patients are more likely to disclose IPV when directly asked by a healthcare provider [14]. Education of ophthalmologists regarding the signs of IPV has been shown to help improve social work referrals, law enforcement involvement, and homegoing safety assessments [15]. Additionally, standardized screening methods to assess a potential history of IPV can be crucial to increase the chance of utilizing an intervention. Screening is especially important in men presenting with injuries suspicious for IPV, as they are often not identified as victims.

Conflicts of Interest

The authors report no known conflict of interests.

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Ethical Statement

This study contains deidentified data and was deemed IRB exempt.

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