Epidemiological and Clinical Analysis of Intentional Injuries: A Comprehensive Study in Laghouat Province, Algeria

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Abstract:

Introduction:

Traumas resulting from intentional assaults, termed as intentional injuries (II), pose a significant challenge to public health. Addressing this challenge requires a meticulous approach from healthcare professionals to provide essential psychological support during evidence collection. This study aims to investigate the correlation between the severity of intentional injuries and variables such as gender, age, and occupation of the affected individuals.

Materials and Methods:

This research takes the form of a prospective monocentric cross-sectional study conducted over a six-month period, from September 2022 to March 2023. The study was carried out at the forensic medicine department of Ahmed Benadjaila Hospital and at the medical-surgical emergency department of the Laghouat Mixed Hospital

Results:

The primary objective was to assess the existence of a causal relationship between the severity of intentional injuries and factors such as gender, age, and occupation. The results indicate that 89% of the sampled patients were assaulted by male individuals. The mean age of the patients was 29.89 years, with a range from 4 to 73 years, and a majority of individuals were without a profession (46% of the population). Inferential analysis revealed that gender was a significant risk factor in the severity of intentional injuries, while neither age nor occupation were identified as risk factors in this study.

Conclusion:

Intentional injuries pose a major public health concern with potentially severe consequences for victims. It is imperative to continue in-depth investigations and studies to develop tailored preventive and safety measures. These findings underscore the importance of devising targeted strategies to mitigate the impact of intentional injuries, highlighting the necessity of a multidisciplinary approach to address this issue comprehensively.

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Introduction :

Traumas resulting from intentional assaults, specifically intentional injuries (II), pose a significant global public health challenge. They impose a considerable burden on healthcare systems, lead to severe physical and psychological consequences for victims, and have significant social and economic repercussions.

Healthcare professionals play a crucial role in providing medical and psychological support to assault victims during evidence collection.

According to the World Health Organization's (WHO) global report on violence and health, an estimated 1.6 million people worldwide died in 2000 due to self-inflicted,interpersonal, or collective violence, resulting in an age-adjusted global rate of 28.8 per 100,000 inhabitants [1].

In 2001, WHO estimated that one million deaths per year globally were intentionally caused [2].

Globally, injuries are a major cause of death among individuals aged 1 to 44 years [3].

In the United States, intentional injuries represent a significant portion of trauma-related deaths, with a substantial proportion attributed to self-harm [2].

Traumatic injuries also lead to a considerable number of emergency room visits and hospitalizations [3].

The management of severely traumatized patients necessitates specialized trauma centers [3].

Intentional injuries, particularly those caused by assaults, are a major concern in various regions. The wilaya of Laghouat in Algeria, specifically, faces a growing issue of intentional violence incidents resulting in severe traumas.

Laghouat is not exempt from this reality. Therefore, it is essential to assess the incidence of intentional injuries in this region to better understand the phenomenon's extent, identify associated risk factors, and formulate recommendations for improved care.

Intentional injuries are defined as any deliberately inflicted physical violence by one person upon another. They can result from various situations, including assaults, domestic violence, brawls, acts of vandalism, etc. These injuries can range from bruises and fractures to cranial trauma and injuries caused by bladed or firearm weapons.

The incidence of intentional injuries in the wilaya of Laghouat has not been thoroughly studied. Hence, there is a need for a rigorous investigation to assess the prevalence of these injuries, analyze the profiles of victims and aggressors, examine the characteristics of observed traumatic injuries, and identify associated risk factors.

The objective of this study is to provide accurate epidemiological data on the incidence of intentional injuries in the wilaya of Laghouat, focusing on the medical and legal aspects of these traumas. The study will identify risk factors and specific characteristics of these injuries in the region, crucial for developing appropriate prevention and care strategies.

Studying the incidence of intentional injuries in the wilaya of Laghouat is of crucial importance to better understand this phenomenon and develop prevention and care strategies tailored to the local reality. By combining medical knowledge and forensic medicine principles, this study aims to provide a solid foundation for improving public health policies and protecting the rights of victims of such traumas.

Materials and Methods:

This study, of a prospective observational monocentric cross-sectional design, was conducted within the forensic medicine department of Ahmed Benadjaila Hospital and at the medical-surgical emergency department of the Laghouat Mixed Hospital, which has 240 beds. The study period spanned six months, from September 2022 to March 2023.

The primary objectives of the study were centered on estimating the incidence of injuries caused by intentional assaults in the

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Laghouat province. Additionally, secondary objectives were outlined, including the clinical-epidemiological investigation of these injuries and the assessment of associated risk and severity factors.

The study population comprised all patients who experienced trauma resulting from intentional assaults during the period from September 2022 to March 2023. The sample size was determined using a calculation based on a 95% confidence level, an estimated incidence of 7.3% (according to a Tunisian study), and a 5% margin of error, resulting in a sample size of 100 patients.

Selection criteria encompassed all patients subjected to intentional physical aggression with documented medical records in the forensic medicine department during the study period. Exclusion criteria included non-consenting patients, mentally disabled individuals, and records lacking necessary information.

Data collection involved medical records, follow-up appointments, and survey forms, ensuring compliance with medical confidentiality and patient consent. Information encompassed details on the circumstances of the injuries, characteristics of the lesions, complications and sequelae, as well as medicolegal assessments.Statistical analysis was performed using IBM SPSS Statistics version 22, employing descriptive statistical methods to represent population characteristics, compare means using the Student's t-test, and assess percentages through the Chi-square test or Fisher's exact test. Confidence intervals of 95% were established for means and percentages.

Results:

During the study duration, 100 patients were included out of a total of 644 cases. Sociodemographic characteristics of the study population are outlined in **[Table 1].**

The mean age of our sample is 29.89 years, ranging from 4 to 73 years. Notably, 46% of the population is unemployed, with 28% identified as workers, 17% as students, and the remaining 7% having unspecified professions.

Anamnestic characteristics detailing the circumstances of intentional injuries are elucidated in [**Table 02]**.

Analysis reveals that 89% of the patients in our series experienced assaults by men. Acquaintances comprised the largest portion in the victim-offender relationship, estimated at 34%, followed by unknown relationships at 32%. Intentional injuries predominantly occurred in public places (59%), with 24% transpiring at home.

Physical assault, encompassing stabbing, kicking, biting, and body projection, was the most prevalent method at 37%, succeeded by blunt objects at 29%. Street brawls accounted for 57% of incidents, while marital conflicts constituted 20%.

Post-assault, almost the entire population sought medical attention (97%), with 57% receiving treatment at public health institutions, 36% at public hospital, and only 7% privately.

Hospitalization was required for only 9% of the sample, ranging from 1 to 33 days, while 91% did not necessitate hospitalization.

Results indicate that bruises (20%) were the predominant lesion type, followed by wounds (18%), and a combination of bruising and wounds (15%).

Topographic study statistics reveal that 67% of our study population had facial lesions, 55% experienced limb injuries, and 21% suffered osteoarticular lesions, including closed and open fractures and sprains. Cranial-cerebral injuries included scalp wounds (19%), depression (1%), and 80% with none. Chest injuries were observed in 13% of patients, while abdominal injuries and

dorsal lesions were presented by 2% and 5%, respectively. No visceral injuries were noted in our sample.

In terms of hemodynamic stability, almost all patients were stable upon emergency room admission (97%). Complications during the convalescence phase were noted in 5% of victims, with the rest experiencing an uneventful recovery, except for one case with an unclear evolution. Regarding sequels, only 2% retained lasting damage, 97% healed without sequels, and 1% remained unknown.

Lesion assessment involved biological tests and morphological examinations detailed in Table 03. Biological tests were minimally requested (15%), while standard X-rays were indicated in 51% of cases, followed by CT scans (12%), ultrasound (3%), and IRM (1%). Medical treatment was predominant (82%), with orthopedic treatment required in 16% and surgical intervention in 10%.

Evaluation of total work incapacity (ITT) and severity of injuries showed that 81% had an ITT of 15 days or less, indicating non-severe trauma, while the remaining 19% had severe trauma with an ITT exceeding 15 days.

Psychological care statistics revealed that 38% of the population received support, of which 42.1% accepted. Notably, 62% of the entire study population did not require psychological assistance. Depression emerged as the predominant psychological consequence at 37.5%, followed by panic at 25%, and fear and anxiety at an equal rate of 18.75%.

Inferential analysis allows us to compare, confirm, or refute a causal link between the severity of trauma and gender, age, and profession. The results are presented in [**Table 03], t**his table presents the results of an inferential analysis comparing severe and non-severe trauma cases across various parameters. The mean age does not exhibit a statistically significant difference between individuals with severe and non-severe trauma. However, a statistically significant association is observed between gender and the severity of trauma, indicating a higher proportion of males in severe trauma cases. Marital status and occupation do not show statistically significant associations with the severity of trauma. Similarly, the location and circumstances of assault do not demonstrate statistically significant associations with trauma severity. Notably, there is a significant difference in the type of complementary exams administered between severe and non-severe trauma cases. Additionally, the type of treatment significantly varies between these two groups. In summary, this inferential analysis offers insights into the relationships between different parameters and the severity of trauma, contributing to a nuanced understanding of the studied population.

Table 1: General Characteristics of the Study Population

Parameter	Value
Age (mean, years)	29.89
Gender (%)	
Male	70 (70)
Female	30 (30)
Marital Status (%)	
Single	55 (55)
Married	45 (45)
Occupation (%)	
Civil Servant	15 (15)
Self-employed	13 (13)
Unemployed	46 (46)
Student	17 (17)
Not specified	7 (7)

→ ***moy: mean; n: sample size.***

Table 2: Anamnestic Characteristics of Intentional Injuries

Parameter	Value	n (%)
Sex of the Assailant		
Male	89	89
Female	7	7
Unidentified	3	3
Not Specified	1	1
Relationship with the Assailant		
Family Circle	6	6
Spouse	20	20
Neighbor	4	4
Acquaintance	34	34
Client	1	1
Unknown	32	32
Other	3	3
Location of the Assault		
Public Road	59	59
Workplace	6	6
At Home	24	24
At School	7	7
Other	4	4
Weapon Used		
Sharp Object	12	12
Blunt Object	29	29
Physical Force	37	37
Sharp + Blunt Object	8	8
Blunt + Physical Force	5	5
Other	1	1
Undetermined	8	8
Circumstances of the Assault		
Family Conflict	6	6
Marital Conflict	20	20
School Conflict	7	7
Street Brawl	57	57
Workplace Brawl	5	5
Armed Robbery	2	2
Other	3	3
Consultation After Assault	97	97
Type of Consultation		
Private Practice	7	7
Public Hospital (EPH)	36	36
Public Health Center (EPSP)	57	57
Hospitalization After Consultation	9	9
Duration of Hospitalization (days)	1	33

→ *cbv: intentional injuries; n: sample size; min: minimum; max: maximum.*

Table 3: Inferential Analysis of Severe vs Non-severe Injuries

	SEVERE TRAUMA (19)	NON-SEVERE TRAUMA (81)	p
Age mean (years)	29.58	29.98	0.644**
Gender (%)			0.040**
Male	17 (89.5)	53 (65.4)	
Female	2 (10.5)	28 (34.6)	
Marital status (%)			0.420**
Single	12 (63.2)	43 (53.1)	
Married	7 (36.8)	38 (46.9)	
Occupation (%)			0.42**
Civil Servant	3 (15.8)	14 (73.7)	
Self-employed	3 (15.8)	2 (10.5)	
Unemployed	9 (47.4)	1 (5.3)	
Student	3 (15.8)	2 (10.5)	
Military	1 (5.3)	1 (5.3)	
Not Specified	0 (0)	0 (0)	
Location of assault (%)			0.72**
Public Road	73 (90.1%)	77 (95.1%)	
At Home	6 (7.4%)	18.75 (3%)	
Workplace	2 (2.5%)	1 (1.2%)	
School	0 (0)	0 (0)	
Other	0 (0)	0 (0)	
Circumstances of assault (%)			0.259**
Family Conflict	35.2%	55.6%	
Marital Conflict	28.4%	23%	
School Conflict	4.9%	4.9%	
Street Brawl	7.4%	6.2%	
Workplace Brawl	3.7%	3.7%	
Armed Robbery	3.7%	0%	
Other	7.4%	2.5%	
Complementary exams (%)			0.000**
Biological	0%	0%	
X-ray Standard	5.3%	0%	
Ultrasound	5.3%	0%	
CT Scan	68.4%	0%	
IRM	10.5%	0%	
Treatment (%)			0.000**
Medical	45.7%	55.6%	
Orthopedic	28.4%	28.4%	
Surgical	4.9%	4.9%	

→ *n: sample size; p: significance value; **Pearson's chi-squared test; mean: average; CI: confidence interval. ***Fisher's exact test.*

Discussion

Our main objective was to determine the incidence of injuries caused by intentional blows and injuries in our Wilaya, and the result of our study reports that the incidence is estimated at 64%.[13] The inferential analysis conducted to achieve this goal demonstrated that gender is a implicated risk factor in the severity of injuries caused by intentional blows and injuries, while occupation (P=0.72) and age (P=0.64) were not identified as risk factors in our study.

The average age of our sample was 29.89 (p=0.644) years, with extremes ranging from 4 to 73 years, indicating the youthfulness of our study population. This characteristic can be explained by social interactions, frequenting potentially dangerous environments, or engaging in activities that expose individuals to a larger number of people, such as parties and gatherings, or it may be related to poverty, unemployment, or social instability.

This result is nearly identical to the Burkinabe study by Diallo Thierno Mamadou Cherif, which reported an average age of 29.88 years, as well as the Tunisian analysis by Bardaa et al., which demonstrated an average age of 30 years.

In our study, the dominant gender is male, with a rate of 70% compared to 30% for females. This is likely due to the identification of men being more exposed to risky situations, such as violent conflicts, gang-related assaults, or high-risk behaviors, and the societal pressure on men to appear strong and dominant. This predominance was also noted in the aforementioned study by Diallo, with a percentage of 71.97% for males and 28.03% for females. The Tunisian study by Bardaa et al. similarly showed a male majority at 83.7%. Another Malian study by Kamissoko reported a similar result of 71.1%.

Although male gender is recognized as a risk factor for intentional blows and injuries in the literature, we found a significant correlation with GBV [GBV+ (male): 17 (89.5%) vs GBV+ (female): 02 (10.5%)] (P=0.040).

Regarding marital status, we found that 55% of the victims were single, and 45% were married (P=0.42). It is evident that assaults can occur independently of marital status. Kamissoko's study showed a nearly similar result for the married status with a value of 42.70%, while it was slightly lower for the single category with a rate of 46%. No causative link was observed between the occurrence of intentional violence and the severity of trauma from intentional blows and injuries.

Single: [GBV+: 12 (63.2%) vs GBV-: 43 (53.1%)]
Married: [GBV+: 7 (36.8%) vs GBV-: 38 (46.9%)]

Regarding occupation, our survey demonstrated that unemployed individuals are the most affected (46%), followed by the educated group (17%), then civil servants (15%), and professionals (13%). This contrasts with the results of Bardaa et al., where employees were the most affected (81.4%), and only (12%) were unemployed. This discrepancy may be explained by regional variability, social context, and data collection methods.

The dominance of the unemployed category in our study can be explained by the stress induced by unemployment, as well as the frustrations and anxiety that may simulate aggressive behavior. Unemployment is acknowledged in the literature as a risk factor for the occurrence of violence, which aligns with our results. However, we did not find a causative link between the severity of trauma and professional status or unemployment, indicating no significant association with the severity of trauma caused by intentional blows and injuries [GBV+: 09 (47.4%) vs GBV-: 37 (45.7%)] (P=0.72).

In this segment of the study, the analysis reveals that the majority of aggressors were males, comprising 89% of the cases, compared to 7% females, 3% unidentified, and 1% unmentioned in medical records. This male predominance aligns with Kamissoko's findings, where the male rate was 70.10%. The argument posits that men are perceived to be more involved in combats, brawls, and gang-related aggressions, potentially justifying the study's outcome. However, no significant correlation was found between the gender of the aggressor and the severity of trauma [GBV+: 19(100%) vs GBV-: 70(86.4%)] (P=0.40).

Concerning the number of assailants, the results indicate that in 89% of cases, there was a lone aggressor, with two assailants in 8% of the studied assaults, and three assailants in 3% of cases. This contrasts with Kamissoko's study, where the percentage of single assailants was 47.70%, almost half of the current rate. The observed difference is attributed to variations in the types of conflicts studied during different periods. No correlation was found with the severity of trauma (P=0.72); 95% CI [-1.29; 0.303]. Further breakdown indicates that in cases with a single aggressor [GBV+: 16(84.2%) vs GBV-: 73(90.1%)], with two aggressors [GBV+: 2(10.5%) vs GBV-: 6(7.4%)], and with three aggressors [GBV+: 1(5.3%) vs GBV-: 2(2.5%)].

Regarding the relationship with the aggressor, acquaintanceship takes the lead at 34%, followed by an unknown connection at 32%, and an identified intimate partner (spouse) at 20%. In contrast to Kamissoko's study, which showed that the majority of aggressors had no relationship with the victim (estimated at 40.2%), Diallo found that the predominant link was neighborhood at 27.07%, followed by family ties at 22%, and simple acquaintanceship at 20.7%. The variability is attributed to the study location, socio-cultural context, and study period. No significant correlation was found between the most common relationship with the aggressor and the severity of trauma [GBV+: 10(52.6%) vs GBV-: 24(29.6%)] (P=0.43).

The study identifies various circumstances of violence, with street brawls being the most prevalent at 57%, followed by marital conflicts at 20%, school conflicts at 7%, family conflicts at 6%, workplace brawls at 5%, and 5% encompassing armed robberies and other circumstances. This differs from Kamissoko's study, where armed robberies predominated with a percentage of 30.12%, followed by family conflicts at 16.73%, and street brawls at 14.6%. Economic disparities between Mali and Algeria may contribute to the observed differences in the types of aggression. No significant correlation was found between street brawls and the severity of trauma [GBV+: 13(68.4%) vs GBV-: 44(54.3%)] (P=0.335).

Most assaults occurred in public spaces (59%), followed by the home (24%), school (7%), work (6%), and other locations (4%). The argument suggests that public spaces, being open and accessible, provide opportunities for assailants to take advantage of anonymity and crowd density. Despite streets and public spaces being known as preferred locations for violence, no significant concordance was found with the severity of trauma [GBV+: 14(73.7%) vs GBV-: 45(55.6%)] (P=0.25).

Regarding the weapons and instruments used, physical mechanisms were most prevalent within the population at 37%, followed by blunt objects at 29%, and sharp objects at 12%. The combination of blunt and sharp objects accounted for 8%. This contrasts with a Tunisian study where blunt objects were the most frequently used at 74.4%, similar to Diallo's study, which highlighted blunt objects as the most frequently used at a rate of 67.83%. The rationale is that physical mechanisms represent a direct and visible action that can be implemented rapidly without requiring specific tools or skills. No significant relationship was found between physical mechanisms and the severity of trauma [GBV+: 6(31.6%) vs GBV-: 31(38.3%)] (P=0.50).

Regarding types of injuries and their topographies, bruises were most prevalent at 20%, followed by wounds at 18%, and their combination at 15%. These results differ from Diallo's study, where wounds predominated at 52.87%, followed by bruises at 18.15%. The topography mainly involved the face (67%), followed by limbs (upper and lower) at 55%, osteoarticular sites at 21%, and cranio-cerebral injuries at 19%. This contrasts with Bardaa et al.'s study, where the head and neck were the preferred sites for injuries at 80.6%, followed by the upper limbs at 52.6%, lower limbs at 29.5%, and the thorax at 14.8%. The predominance of injuries in these regions may be linked to the fact that they are uncovered and visible areas of the body. The variation is attributed to the dissimilarity in the predominantly used instruments.

In the realm of treatment, medical intervention took precedence at 82%, followed by orthopedic treatment at 16%, and surgery as an alternative in only 10% of cases. The distribution of treatments can be elucidated by considering the nature of agents and weapons used, as well as the type of injuries incurred. A comparison with Kamissoko's

survey reveals an increase in medical treatment at 42.19%, with surgery ranking second at 26.40%, while orthopedic treatment was planned in only 9.20% of cases. The higher incidence of surgery is attributed to the presence of sharp objects as the second-most-used weapons, constituting 26.1% (86 cases). Doumbia's study aligns with Kamissoko's findings, where medical treatment led at 59.4%, followed by surgical treatment at 21%, and orthopedic treatment at 10.4%.

Significantly, there was a correlation found between the indication for surgical treatment and the severity of trauma [GBV+: 9(47.4%) vs GBV-: 1(1.2%)] (P=0.000). However, no significant correlation was observed between orthopedic and medical treatments and the severity of intentional injuries.

Regarding complications and sequelae, 5% of cases experienced complications, while 94% presented none, with 1% having an unknown progression. This contrasts with Soumaila Doumbia's results, which reported a complication rate of 17.9%, and Kamissoko's study, revealing a complication rate of 33%. The variability is attributed to socio-economic conditions, identified in the literature as an indirect factor influencing violence intensity and subsequent complications and sequelae.

In terms of medico-legal evaluation, the significant value of the Incapacity for Work (ITT) in the study was 15 days, with ≤15 days considered non-severe trauma, and >15 days indicating severe trauma. The majority of the study population had an ITT ≤15 days (81%), reflecting the non-severity of trauma caused by intentional violence. Comparatively, Kamissoko's study set the ITT threshold at 8 days, with 1.70% below or equal to 8 days and 80.80% strictly above 8 days. This difference suggests a higher degree of violence intensity, potentially explained by fluctuations in socio-economic levels and armed conflicts arising from political instability in Mali.

Concerning psychological support and psychological repercussions, psychological support was recommended in 38% of cases, with only 16% adhering to this therapy. The most prevalent repercussion was depression, accounting for 37.5%. Due to the limited number of cases receiving this therapy, a conclusive link with the severity of trauma could not be established.

Conclusion

Drawn from the study highlights the escalating prevalence of intentional injuries, encompassing various age groups and involving a diverse array of weapons. The repercussions for victims are often severe, both in terms of physical harm and the legal consequences for the perpetrators. As a result, combating violence is deemed crucial, necessitating a focus on prevention strategies.

Several preventive measures are proposed, including enhanced public education about the consequences of violence, the establishment of online counseling services, and initiatives to mitigate family, social, and occupational stress. Within the realm of prevention and the management of trauma resulting from intentional injuries, several perspectives are envisioned.

From a healthcare perspective, it is imperative for health authorities to establish a dedicated medical and surgical emergency response system to ensure prompt and effective care for victims. This entails ongoing training and retraining of medical professionals and forensic experts to enhance their proficiency in assessing and documenting injuries resulting from intentional violence. The creation of forensic medicine institutes and specialized units within hospitals can elevate the quality of medical expertise and facilitate collaboration between healthcare professionals and judicial authorities. Additionally, comprehensive victim support, particularly emphasizing psychological assistance, is essential for aiding recovery.

At the governmental level, acquiring in-depth information about violence phenomena is deemed necessary to comprehend their causes and mechanisms better. This knowledge will inform evidence-based preventive policies tailored to the specific needs of each region. Public awareness campaigns highlighting the socio-economic and legal consequences of violence are crucial for fostering a culture of non-violence and encouraging the reporting of violent acts. Stricter controls on illegal firearm possession, including strengthened border checks, coupled with efforts to address youth

unemployment and poverty, can mitigate risk factors associated with violence. Collaborating with judicial authorities is vital to ensuring the rigorous enforcement of laws related to intentional injuries and penalizing all forms of physical violence.

Healthcare professionals play a crucial role in prevention and management by maintaining comprehensive and precise medical records, serving as evidence during investigations and legal proceedings. Close coordination with judicial authorities is essential for effective collaboration and ensuring that victims receive the justice they deserve.

By adopting these perspectives, it is feasible to develop comprehensive and integrated strategies for preventing intentional injuries, improving victim care, and promoting overall societal safety and well-being

Conflicts of interest

The authors do not declare any conflict of interest.

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