Pattern and distribution of defence injuries: A multi-center study on clinical and autopsy findings

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Abstract

Introduction: Defence injuries are the results of immediate and instinctive reaction of the victims in order to protect themselves during an assault. Presence of such injuries indicates that the victim was conscious and could comprehend the attack and provide resistance. They also help in identifying the weapon. The objectives of our study were to differentiate the patterns and the distributions of defence injuries. **Methodology:** This study was carried out on selected patients admitted to the hospital following assaults and deaths following injuries who had defence injuries during the period of March 2015 to January 2016 at Teaching Hospital, Karapitiya, General Hospital, Matara and Base Hospital Hambanthota which are the major hospitals in the Southern Province of Sri Lanka. **Results:** We analyzed 213 cases with defence injuries. Out of them 75% were males. The commonest age group who had defence injuries were between 31-40 years. Blunt force defence injuries were present in 154 cases and sharp force was present in 74 cases. The commonest type of defence injury was contusion followed by abrasion. The commonest anatomical area involved was the forearm followed by the hand. Both left and right upper limbs involved equally in defensing although the majority (94%) was right dominant. More than one injury was present in 45% of cases and 18% had underlying injuries. In 17.8% cases alcohol had been consumed prior to the incident. Head and face was the most frequently protected body part (57%) followed by the chest (14%). Ninety eight percent of victims did not have pre-existing disabilities and 81% of them the assailant was known. **Conclusions:** Back of forearm is the commonly used site for defence and there is no clear correlation with the handedness and defence wounds.

Key words - *assault, self-defense, medico-legal examination, postmortem examination*

Full paper

Introduction

Homicidal crimes and assaults are rapidly increasing in the society. The possible causes are poverty, free availability of weapons after the civil war and increased use of alcohol and drugs. Defence injuries are the results of immediate and instinctive reaction of the victims in order to protect themselves during an assault [1].

Examination of defence injuries in assaults and homicides are of immense importance for forensic pathologists because presence of such injuries indicates that the victim was conscious and could comprehend the attack and provide resistance [1]. Defence wounds are usually seen when assault occurred in close range [2]. They also help in identifying the weapon.

Defence injuries occur due to infliction of both sharp and blunt force. Even in firearm injuries defence injuries may occur. As a result of defence, the wounds are commonly produced over the extensor or ulnar surfaces of forearm, wrist, back of hands, knuckle, palm and lateral and posterior aspects of upper arms. There may be underneath fractures of the carpal bones, metacarpals, digits and ulnar [3]. Defence wounds may also be found in lower limbs [4]. When the weapon is considered, with sharp weapons the wounds are clean cuts; with blunt weapons one may see bruises, abrasion, laceration and fractures [5].

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Defence injuries may be active or passive wounds. Active defence wounds occur when the victim grasp the knife with hands and seen on palms. Passive wounds are sustained when the victim raises the hand or arm to protect the attacked region [6].

According to the literature there was a male preponderance and younger age group was more commonly involved [5]. Studies show that the prevalence, location and effective factors associated with defence wounds vary worldwide and can be an indication of the country and the region where they would have taken place [5]. According to our knowledge no studies have been done to analyze the defence injuries seen among Sri Lankan population.

In this study we want to evaluate specific patterns and distribution of defence injuries on both clinical patients and deaths following assaults and its correlation with age, sex, the weapon used and the targeted body part which was protected. The objectives of this study were to evaluate the different patterns of defence wounds in clinical patients and deaths following assaults and identify the possible associated factors.

Study design and methodology

This Descriptive cross-sectional study was carried out at the Teaching hospital Karapitiya, General Hospital Matara, and Base Hospital Hambanthota which are the major tertiary health care institutions in three major Districts in Southern Province of Sri Lanka. The Judicial Medical Officers' (JMOs') Office at the Teaching Hospital Karapitiya (THK) conduct about 1500 autopsies a year and the examination of about 10000 patients with medico legal issues. The JMOs' office at the Base Hospital Hambanthota (BHH) conduct about 300 autopsies a year and examine about 4000 patients per year. The General Hospital Matara (GHM) conducts about 850 autopsies and medico legal examination of 4700 patients a year.

We analysed 182 patients admitted to the surgical wards following assaults and 31 deaths following assaults on which the medico legal autopsies were performed by the researchers at the JMO's office TH Karapitiya, GH Matara and BH Hambanthota during the period of March 2015 to December 2015. We received 120 cases from Galle, 28 cases from Matara and 65 from Hambanthota and the total no of victims analysed was 213. The victims following assaults were selected by history, police inquest and examination findings. Complete medico-legal examinations and post mortem examinations were performed on clinical patients and deaths respectively.

Out of all the victims following assaults, the victims who had defence injuries were considered in the study. The interpretation of the injuries was done after considering the history, clinical examination and investigations. In this study each case with defence injuries was examined to determine the age, sex, category of hurt, type of defence injury, site of defence injury, targeted body part protected, weapon used, usage of alcohol, handedness and whether the assailant was known to the victim.

Results

A total number of 213 victims were included in the study. Out of them 160 (75%) were males and 53 (25%) were females (Table 1). A higher incident of defence wounds occurred in the age group of 31-40 years (75, 35.2%) followed by the group 21-30 years (58, 27.2%) (Table 2).

Table 1: Sex distribution

Sex	Cases with defence wounds	Percentage
Male	160	75.1
Female	53	24.9

Table 2: Age distribution

Age group	Cases with defence wounds	Percentage
0-10	0	0
11-20	25	11.7
21-30	58	35.2
31-40	75	16.0
41-50	34	6.6
51-60	14	2.0
61-70	5	3.0
71-80	2	9.0

The type of force used in assaults were blunt force in 72.3% (n=154), sharp force in 34.7% (n= 740 and both types in 8.4 % (n=180 (Table 3). This study shows that 28% (n=103) of assault victims had sustained abrasions followed by contusions 22% (n=82) and cuts 16% (n= 60) (Table 4). When analyzing the category of hurt according to the Penal code of Sri Lanka 62.9% (n=134) of defence wounds were non grievous injuries while 24.5% were grievous injuries and 11.7% were fatal in the ordinary cause of nature and necessarily fatal injuries (Table 5). Heavy blunt weapons produced the majority of injuries 51.6% (n=110) followed by light sharp weapons 20.6% (n=44) (Table 6).

Table 3: Type of force used by assailants

Type of force	Cases with defence wounds	Percentage
Blunt	154	72.3
Sharp	74	34.7
Other (Eg: firearm, burn, etc.;)	4	1.8

Table 4: Type of injuries in victims of assaults

Type of injury	Cases with defence wounds	Percentage
Abrasions	103	28.0
Contusions	82	22.3
Lacerations	51	13.8
Cuts	60	16.3
Stabs	14	3.8
Fractures	47	12.8
Burns	2	0.5
Firearms	2	0.5
Other	6	1.5

Table 5: Category of hurt

Category	Cases with defence wounds	Percentage
Non grievous	134	62.9
Grievous	53	24.9
Endangering life	1	0.5
Fatal in the ordinary cause	14	6.6
Necessarily fatal	11	5.2

Table 6: Weapon used

Type of weapon	Cases with defence wounds	Percentage
Light sharp weapons(knife, Glass, screw driver)	44	20.6
Heavy sharp weapons (sword, manna, mammoty)	22	10.3
Light blunt weapons (sticks, wooden clubs)	10	4.6
Heavy blunt weapons (iron rods, crow bar, Kithul club)	110	51.6
Body parts (fist, hand, legs, head)	34	15.9
Other (helmet, ball, stones)	7	3.2
Unknown	7	3.2

Defence injuries were found in 91% (n=194) of victims who had defended and 7.5% (n=6)) did not show any defence injury although they had defended (Table 7). The maximum number of defence wounds 23.7% (n=46) was on the posterior aspect of the right forearm (Table 8). When considering as parts of limbs 77 had got defence injuries on right forearm, 67 on the left forearm, 45 on the left hand and 40 on the right hand (Table 9–a). Overall in 31% (n=62) cases the injuries were seen on the left side and where as in 30% (n=60) of cases they were in the right side. In 37% (n=72) of cases injuries were seen in both sides of the body. (Table 9-b) Although the defence wounds were present equally on both limbs majority 93.9% (n=200) showed right handedness (Table 10). In majority of cases 54.9% (n=117) single body region was affected by defence injuries while in 36.1% (n=77) multiple body regions showed defence wounds (Table 11).

Table 7: Presence of defence injuries

Presence of defence injuries	Cases with defence wounds	Percentage
Yes	194	91.1
No	16	7.5
Not identifiable	3	1.5

Table 8: Distribution of defence injuries over upper extremities

Site involved	Cases with defence wounds	Percentage
Left hand palmar	17	8.7
Left hand dorsal	22	11.3
Left hand outer	6	3.0
Right hand palmar	15	7.7
Right hand dorsal	15	7.7
Right hand outer	10	5.1
Left forearm anterior	13	6.7
Left forearm posterior	40	20.4
Left forearm outer	14	7.2
Right forearm anterior	8	4.1
Right forearm posterior	46	23.7
Right forearm outer	23	11.8
Left arm anterior	5	1.0
Left arm posterior	9	4.6
Left arm outer	8	4.1
Right arm anterior	2	1.0
Right arm posterior	6	3.0
Right arm outer	7	3.6
Other	10	5.1

Table 9: Summary of distribution of defence injuries on upper extremities
(a)

Left upper limb		Right upper limb	
Site	**No**	**Site**	**No**
Hand	45	Hand	40
Forearm	67	Forearm	77
Arm	22	Arm	15
Total	134	Total	132

(b)

Side involved	No of cases	Percentage
Left side	62	31.0
Right side	60	30.0
Both sides	72	37.0

Table 10: Handedness of the victim

Handedness	No of cases	Percentage
Right	200	93.9
Left	13	6.1

Table 11: Number of defence injuries

Number of injuries	No of cases	Percentage
0	16	7.5
1	117	54.9
2	37	17.4
3	27	12.7
4	8	3.8
5	3	1.4
6	1	0.5
7	1	0.5
8	1	0.5
9	2	0.9

The commonest type of defence injury was contusions 32.4% (n=63), followed by abrasion 27.3% (n=53), and cuts 22.6% (n=44) (Table 12). In our study 17.8% (n=38) had underlying injuries in defence wounds and they were fractures and muscle, blood vessel and nerve injuries (Table 13). Majority (79, 37%) had tried to protect their head followed by the chest (9.3%, n=20) (Table 14).

Table 12: Type of defence injury

Type of defence injury	No of cases	Percentage
Abrasion	53	27.3
Contusion	63	32.4
Laceration	13	6.7
Cut	44	22.6
Stab	10	5.1
Fracture	18	9.2
Firearm	1	0.5

Table 13: Presence of underlying injuries in defence wounds

Presence of underlying injuries	No of cases	Percentage
Yes	38	17.8
No	159	74.6
Not relevant	16	7.5

Table 14: Targeted body part protected by defending

Targeted body part	No of cases	Percentage
Head and face	79	37.0
Chest	20	9.3
Abdomen	6	2.8
Genitals	1	0.4
Not clear/not aware	10	4.6
Other	13	6.1

Thirty one (31) homicidal victims were analyzed with defence injuries and the majority of them had died due to direct effect of the major injury (n=21) and in others the cause of death was associated/ contributed by the defence injury (n=7) or it was due to co-morbidity (n=2) or due to complications of the injuries (n=1) (Table 15). In our population 172 victims had not consumed alcohol before the incident where as 38 victims had consumed (Table 16). Only 4 victims with defence injuries had preexisting disabilities such as Diabetic Mellitus, Hypertension, weakness on limbs and the visual impairments (Table 17). In this study we identified that 136 victims were assaulted by known persons while 29 by unknown (Table 18).

Table 15: Causes of death in homicidal cases with defence injuries

Cause of death	No of cases	Percentage
COD is direct effect of major injury	21	67.7
COD is associated with/ caused by defence injury	7	22.5
COD is associated with comorbidity	2	6.4
COD is as a complication of injuries	1	3.2

Table 16: Usage of alcohol before the incident

Usage of alcohol	No of cases	Percentage
Yes	38	17.8
No	172	80.8
Not known	3	1.4

Table 17: Presence of disability in victims of assault who had defended

Presence of disability	No of cases	Percentage
Yes	4	1.9
No	209	91.9

Table 18: Knowledge of the accused

Knowledge of the accused	No of cases	Percentage
Known	136	81.0
Unknown	29	17.3

Discussion

This study was undertaken on examination of 182 clinical cases and 31 homicidal deaths following assaults and who had defended. On analysis of Table 1, it was observed that prevalence of defence was observed in males three times more than in females. By nature males have more defensive reaction to violence than females and they are the frequent victims of violence than females because of extrovert nature of males. Also Sri Lankan society is male dominant where they handle most of the disputes and more exposed to extraneous world. In most studies done in South Asian countries like India males showed more defensive injuries than females [5]. But in some studies done in European countries females showed defence wounds in more number of cases than males [7, 8].

In our study the commonest age group of victims of assault was young adults in the age group of 31-40 years and the result is same in the pilot study done by the researchers in 2014 [9]. The age group of 21-40 years had nearly two third of defence injuries. The reason may be that they involve in violent activities more than kids and elderly people. Sheikh ML also found that two third of the victims were in age group of 21-40 years [6]. Similar results were obtained in studies carried out by Mohite PM et al. [5] and Hugar et al. [10]. The younger age groups show better reaction to sudden assault and they are more alert. Lowest involved group was victims above 60 years and victims below 10 years. The reason for this is the weaker groups in society who are unaware of the assault or sudden attack, or the offender being a known relative, so they do not suspect foul play [6]. In addition the response to sudden attack weakens when the age advances.

Abrasions were the commonest injury in assault victims and contusions were the commonest defence wound while heavy blunt weapon was the frequently used weapon for assault. The results are similar to the pilot study done by the researchers [9]. However, in a study done by Panda BB et al found that sharp pointed weapons were the most common weapon followed by blunt weapon causing defence wound [3]. Similarly Mohanty MK et al [10] had found that 57.4% cases with sharp force and Hugar BS et al [10] found 77.5% cases using with sharp weapons alone. The reason for more blunt force injuries found in this study may be due to freely availability of blunt weapons like wooden clubs, sticks, iron rods, etc. than sharp weapons like swords and knives.

Although all the victims in this study group gave a history of defence, 16 of them did not have any defence injury. The reasonable explanation may be the force is not severe enough to cause injuries and also there may be a flare which may have disappeared at the time of our examination.

Pollanen MS [12] states that defence injuries are common on right side, whereas some studies show marked concentration of defence injuries on left side [7.13]. On the other hand Racette [14] is of the opinion that defence injuries involve both sides. Compared to these studies the current study shows equal number of defence injuries on both sides of the body although right hand is the predominant hand in 94%. Site of defence injury depend on both the handedness of the assailant and the victim and on the direction from which the victim was attacked, i.e. from front, behind or on either sides of the body of the victim [5]. Depending on the position of the assailant the hands are used to protect themselves and it is a reflex action. So the victim may use any hand to defend forgetting the dominant hand. Forearm is the commonest body part used for defence and reason may be that it is most movable part of the upper arm and its posterior side is more resistant to trauma when compared to other surfaces. In this study passive defence injuries were more than the active defence injuries which were on the palmar surfaces of the hands.

The frequent targeted body part by the assailants was the head followed by chest where as in a study done by Schmidt U et al thorax, head and neck were targeted respectively [14]. Head contains more vital areas such as brain and eyes and head injuries frequently leads to death and disability and also facial injuries leads to disfiguration which may be the reason to become the favorite target by the assailant.

Alcohol reduces the reaction time and inhibits the higher centers of the brain and consumption of alcohol around the time of the attack weakens the activity of the defence. In our study this is evident where defence wounds were present in only 17.8% of cases as compared to 80.8% cases where victims had not consumed alcohol prior to the incident. This is similar to the studies done by Mohite PM [13] in which usage of alcohol was 17.6% whereas Katkci et al [7] found no connection between the occurrence of defence wounds and consumption of alcohol.

Preexisting disabilities reduce the ability to defence according to our study. The reason may be that they are less reactive than healthy people due to the different physical disabilities and had less strength to

defence. In this study it was found that 81% of victims with defence injuries were assaulted by a known assailant where as in 17.3% by an unknown one. The relation between the knowledge of the assailant and the presence of defence injuries can be explained that; when accuse is known people are more alert about the attack and they expect an attack when an enemy comes near and they react quickly.

Conclusion

Our study was carried out to evaluate the nature of defence wounds present in victims of assault by different kinds of weapons. There was a male preponderance and young adults were more commonly involved. The Commonest defence wound was contusions due to the fact that blunt weapons were used more frequently by assailants. Forearm was the commonest body part used in defending. Both sided of the body defended equally because it is an instinctive reaction and the side of assault is the main factor which indicates that the defence injuries give a clue about the relative positions of the victim and the assailant. It is observed that alcohol consumption reduce the ability to defend. Presence of defence wounds definitely proves the homicidal intension. But absence of defence wounds doesn't rule out the possibility of homicide or homicidal intension. A meticulous autopsy or clinical examination with the knowledge of possible sites of defence injuries and thorough history and knowledge about the circumstantial evidence are necessary to identify defence injuries. Defence wounds thus help to determine the manner of death and reconstruct the scene ultimately helping for better justice to the victim.

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