CLINICAL PROFILE AND OUTCOMES OF SNAKEBITE ENVENOMATION IN FAYOUM GOVERNORATE, EGYPT.

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ABSTRACT

Objectives: Snakebite is an extreme medical emergency requiring convenient intercession. Snakebite victims and medical care providers assumed a vital role in determining snake type. Two toxic species are widespread in Egypt; the family Viperidae (snakes) and the family Elapidae (Egyptian copra: Naja Haje). The work aims to map out the sociodemographic characteristics, patterns, the profile of clinical manifestations, possible predictors of severity, and the outcomes for snakebite patients admitted to Fayoum general hospital. **Methods:** This study was carried out at Fayoum general hospital from May 2018 to May 2020. In each case, sociodemographic data, poisoning data (delay time, site of bite and type of snake), clinical data (local and systemic manifestations and post-snakebite complications), laboratory data (CBC, PT, INR), grading of the envenomation severity (Grade 0 – no envenomation, Grade 1 – mild envenomation, Grade 2 – moderate envenomation, Grade 3 – severe envenomation), anti-snake venom vials **(ASV**), and outcomes of the patients (survived, non- survived and referred) had recorded. Data were collected and coded for statistical analysis. **Results:** Males outnumbered females (85.7% versus 14.3%), and the mean age of patients was 32.31 years. 85.7% were living in rural places, presented commonly during the summer season (68.6%), the mean delay time was 5.89 hours, the mean duration of hospitalization was 5.13 days, and the mean ASV was 16.71±7.760 for each patient till discharge. 60% was Viper's snake. The lower limb was the most familiar sight of the bite (57.2%). There was a highly significant difference between the outcomes of patients and the delayed time of presentation to the hospital, prothrombin time, and INR. The mortality rate was 8.6%. Early administration of the ASV has reduced morbidity and mortality. **Conclusion:** Gender, residence, the season of bite, the type of snakebite, pain, local oedema, extending oedema, blisters, ecchymosis, respiratory arrest, coagulopathy, CBC findings, and INR; were all excellent predictors of severity.

Keywords: Anti-snake venom; Fayoum; Outcomes; Snakebite; Viperidae.

INTRODUCTION

Snakebite is an extreme medical emergency requiring convenient intercession. The World Health Organization **(WHO, 2018)** reported snakebites as a general medical problem in numerous tropical and subtropical countries. The WHO arranged snakebite envenomation as a Neglected Tropical Disease (Category A). There were 4.5 to 5.4 million bites every year, and of those figures, 40-50% had some clinical disability as a result. Furthermore, the death from such an issue could go somewhere between 80,000 and 130,000 individuals each year **(Langley et al. 2020**).

Snakebite statistics in Africa are lacking and incomplete with the trouble of precise evaluation of snakebite-related morbidity and mortality. Primer evaluations of three to eight thousand envenomations happen in North Africa and the Middle East, although far less mortality is revealed every year **(Kasturiratne et al., 2008; World Health Organization,**

2010).

There are 3,000 distinct snakes, and around 450 are risky for humans **(Saravu et al., 2012)**. Two of these toxic species are widespread in Egypt; the family Viperidae (snakes) and the family Elapidae (Egyptian copra: Naja Haje) **(Filippi and Petretto, 2013).**

Snakebite victims and medical care providers assumed a vital role in determining snake type, and novel procedures (for example, capturing snakes) could assist in the identification of snake species. Additionally, get their nature, epidemiology, and better snakebite management **(Bolon et al., 2020).**

Depending on the kind of snakes, bites can be non-venomous or venomous. Promptly following the snakebite, the victim suffers acute pain and oedema at the site. Gradual systemic affection as neurological, haematological manifestations or even organ failures recorded with venomous snakebites **(Miah et al., 2009).**

Management of snakebite poisoning can be divided into supportive treatment and anti-snake venom administration. However, there is no clear, standardized protocol for giving the anti-snake venom and relying mainly upon the severity of manifestations at the time of presentation for clinical assessment **(Kang et al., 2016).**

In Egypt, of three types of anti-snake venom, just the polyvalent one is created by VACSERA, Egypt. The polyvalent item can neutralize numerous Egyptian snake toxins, particularly Naja haje, cerastes, Cerastes vipers, and Walterinnesia aegyptia **(Seddik et al., 2002).**

The epidemiological characteristics of snakebite are insufficient in most countries. The snakebite's effect is also liable to be undervalued and reliable data on its occurrence, morbidity, and mortality is restricted worldwide **(Chen et al., 2015).**

There were no similar studies focused on the problem of snake bites in the Fayoum governorate. This study aims to map out the sociodemographic characteristics, patterns and profile of clinical manifestations, possible predictors of severity, and the outcomes of snakebite patients admitted to Fayoum general hospital.

MATERIALS AND METHODS:

This study was carried out at Fayoum General Hospital from May 2018 to May 2020.

Informed consent is obtained to follow all the guidelines for experimental investigation with human subjects required by the institution.

The selected patients were of both sexes in different ages (age ranges from 7 years to 65 years) with snakebite envenomation. The diagnosis was based on accurate history taken from the patients or their relatives and clinical and laboratory examination. All snakebite cases were included in the study, either manifested or not. All patients were admitted to the intensive care unit (ICU) of Fayoum general hospital.

Exclusion criteria;

Patients with a history of other medical disorder as cardiac, neurological, bleeding tendency disorders or renal impairment are excluded.

In each case, the following data are recorded;

A-Sociodemographic data included; age, gender, residence, and season at which the snakebite had happened.

B-Poisoning data: It included.

- Delay time since the bite.
- Site of bite.
- Species and types of snakebite are determined mainly by local and systemic manifestations of snakebite. Also, non-manifested cases are included. Based on this data, there were non-venomous snakebites (including dry bites of unknown species), vipers or haemorrhagic snakebites and Elapidae or paralytic snakebites.
- Duration of hospital stay.

C- Clinical evaluation:

- Local symptoms and signs; pain,

local oedema, extending oedema, ecchymosis, and blister.

- Systemic symptoms and signs; ptosis, dysphonia, dysphagia, descending paralysis, coagulopathic manifestations and respiratory arrest.
- Post snakebite complications; include rhabdomyolysis, spontaneous bleeding like bleeding gums, compartment syndrome, gangrene and renal failure.

D- Grading of patients:

The patients included in the study are graded for classification of envenomation severity according to **(Singh et al. 2006; Holve, 2007)** into;

- ✓ Grade 0 – no envenomation.
- ✓ Grade 1 – minimal envenomation (pain and local swelling which is not progressive).
- ✓ Grade 2 – moderate envenomation (pain, swelling, or ecchymosis extending beyond the site of bite, mild systemic, or laboratory manifestations).
- ✓ Grade 3 – severe envenomation (marked local symptoms and signs, severe systemic manifestations, and significant alteration in laboratory findings).

Investigations were done for each patient in the form of complete blood count (CBC), prothrombin time (PT) and international normalized ratio (INR), routinely every six hours. According to each case, creatine kinase (CK) and renal function tests were done when needed and used for grading and severity.

E- Treatment:

After the patient's admission, the wound was cleaned with water and soap, and the limb was immobilized in a padded splint near full extension and lifted on a pillow to prevent dependent oedema. Antitetanus was used as a prophylactic, Supportive treatment consisting of intravenous fluids, analgesic, anxiolytic, and antibiotics. Antihistamines and corticosteroids were administered before giving the antivenom.

Antivenom therapy was started in all symptomatic patients. Polyvalent lyophilized powder antivenom vials produced by VACSERA, Egypt, were given by slow intravenous infusion as initial 5-10 vials dissolved in normal saline and can be repeated according to the patient's condition. Intubation and mechanical ventilation, hemodialysis, fasciotomy or other surgical intervention, blood, fresh frozen plasma, and platelet concentrate transfusion were given if indicated.

E- Patient's outcomes:

- ➢ Survived cases.
- ➢ Non-survived cases.
- ➢ Referred cases.

Statistical analysis:

Data were collected and coded in an excel sheet to facilitate their manipulation. Statistical analysis was performed using Statistical Package of Social Science (SPSS) software version 28 in windows 10. Quantitative data are described as Mean± standard deviation (SD). ANOVA statistical analysis was used to compare the groups. All qualitative data were expressed as frequencies (number of cases) and percentages. Qualitative variables were compared using the Chi-square (χ^2) test. Fisher exact test was used instead of the Chi-square (χ^2) test when the expected frequency is less than 5. P-value was considered significant if < 0.05, highly significant if < 0.001 and non-significant if > 0.05 for all tests.

RESULTS

The current study recorded 35 patients with snake envenomation presented to Fayoum general hospital from May 2018 to May 2020.

Table (1) showed that males outnumbered females by 85.7% and 14.3%, respectively, and the mean age of patients was 32.31 years. Most patients were living in rural places (85.7%), presented commonly during the summer season (68.6%) with a mean delay time of 5.89 hours and have been staying in the hospital for around 5.13 days and had received antivenom vials in around

16.71±7.760 for each patient till discharge. Viper snake envenomation was the most familiar type of bite at 60%, followed by Elapidae envenomation at 31.4%, while the non-venomous snake was present in 8.6% of patients. The snakebite was commonly in the lower limb, followed by the upper at 57.2% and 37.1%. Neck and chest were the sites of bite in only two patients.

Table (1): Sociodemographic data of the studied snake bite patients.

Variable		N	(%)
Gender	Male	30	(85.7%)
	Female	5	(14.3%)
Residence	Urban	5	(14.3%)
	Rural	30	(85.7%)
Season	Summer	24	(68.6%)
	Autumn	5	(14.3%)
	Spring	4	(11.4%)
	Winter	2	(5.7%)
Site of bite	Upper limb	13	(37.1%)
	Lower limb	20	(57.2%)
	Neck and chest	2	(5.7%)
Type of snake	Nonvenomous	3	(8.6%)
	Vipers	21	(60%)
	Elapidae	11	(31.4%)
	Mean ± sd	**Maximum**	**Minimum**
Age (years)	32.31±13.614	65	7
Delay time (hours)	5.89±13.903	72	1
Duration of hospital stay (days)	5.13±3.361	15	1
Number of anti-snake venom vials (asv)	16.71±7.760	30	0

N= Number of cases **%**= Percentage

The local symptoms were presented in **Table (2)** as local oedema in 80% of patients, followed by pain, extending oedema, blisters and ecchymosis presented in 60%, 48.6%, and 34.2% 20%, respectively. Also, abnormal coagulation like prolonged PT and thrombocytopenia was the common systemic manifestation in 48.6% of patients. The current study also found that nine patients (25.7%) had mechanical ventilation, while five (14.3%) suffered from rhabdomyolysis.

Table (2): Clinical presentations and complications of the studied snakebite patients.

Local symptoms and signs	**N (%)**	**Systemic symptoms and signs**	**N (%)**
Pain	21 (60%)	Ptosis	11 (31.4%)
Local oedema	28 (80%)	Descending paralysis	8 (22.9%)
Extending oedema	17 (48.6%)	Dysphonia	11 (31.4%)
Blisters	12 (34.2%)	Dysphagia	8 (22.9%)
Ecchymosis	9 (25.7%)	Respiratory arrest	8 (22.9%)
		Coagulopathies	17 (48.6%)
Complications			
Rhabdomyolysis	5 (14.3%)	Spontaneous Bleeding	2 (5.7%)
Gangrene	1 (5.7%)	Compartment syndrome	4 (11.4%)
Renal failure	**2 (5.7%)**	**MECHANICAL VENTILATION**	9 (25.7%)

N= Number of cases %= Percentage

Table (3) showed that most patients were severely (57.1%) envenomed while 8.6% were in grade 0 and showed no manifestations. Mild and moderate envenomation was presented as 11.4% and 22.9% in grade 1 and grade 2, respectively. Many patients (85.7%) survived and were discharged from the hospital. There were only three dead cases, and two were referred to a tertiary center.

Table (3): Severity and outcome of the studied snakebite patients.

Grade	**Severity**	**N (%)**
Grade 0	Dry bite	3 (8.6%)
Grade 1	Mild	4 (11.4%)
Grade 2	Moderate	8 (22.9%)
Grade 3	Severe	20 (57.1%)
Outcome		
Survived		30 (85.7%)
Non- survived		3 (8.6%)
Referred		2 (5.7%)

N= Number of cases **%**= Percentage

Table (4) showed a highly significant difference (P-value < 0.001) between the outcome of patients and delayed time of presentation to the hospital, prothrombin time and INR, the early time to go to the hospital the hopeful outcome and high chance of survival. PT and INR were bigger in non-survived patients than in survived and referred ones. Also, there was a significant difference (P-value < 0.05) between the outcome of patients and the number of anti-snake venom vials **(ASV)** where the non-survived patients needed a more considerable number (26.67±5.774) of vials than the other outcome.

Table (4): Relation of the delay time (hours), PT, INR and ASV with outcome envenomation in studied snakebite patients using ANOVA statistical analysis.

	Outcome				
	Survived **(N=30)**	Non-Survived **(N=3)**	Referral **(N=2)**	**F** *	**P- value**
Delay time (hours) Mean± SD	2.43±1.357	41.67±33.946	4±2.828	28.439	< 0.0001 **HS**
PT (Mean± SD**)**	20.80±13.048	93.33±55.076	50±14.142	21.864	< 0.0001 **HS**
INR (Mean± SD**)**	1.64±.755	3.67±1.528	3.25±.354	11.333	< 0.0001 **HS**
ASV (Mean± SD**)**	15.33±7.303	26.67±5.774	22.50±3.536	4.146	<0.05 **(S)**

N= number of cases P: < 0.0001 highly significant **(HS) SD**=standard deviation. P: <0.05 significant difference **(S) PT**: prothrombine time **INR**: internal normalized ratio **ASV**= Number of anti-snake venom vials

Table (5) and Table (6) show the relationship between the grade of envenomation and some studied data, hence, predicting the severity of envenomation. Regarding the sociodemographic data, there was a highly significant difference (P-value < 0.001) between the grade of envenomation and gender, residence, the season of bite and the type of snakebite. 95% of severely envenomed patients in grade 4 were males living in rural places; 60% of them had been by viper snakes in the summer season (85%). All the moderately envenomed patients were males who live in rural places; 62.5% of them had been envenomed by viper snakes in the summer season (75%). Regarding patients' clinical and laboratory data, the study reported a significant difference (P-value < 0.05) between the grade of envenomation and pain, local oedema, extending oedema,

blisters, and ecchymosis, respiratory arrest, coagulopathy and CBC findings; they were all excellent predictors of severity.

Table (5): Chi-square statistical analysis for the relation grade of envenomation with sociodemographic data and outcome in the studied snakebite patients.

Variables	Grade of envenomation				P- value
	Grade 0 Dry bite (N=3)	Grade 1 Mild (N=4)	Grade 2 Moderate (N=8)	Grade 3 Severe (N=20)	
	N (%)	N (%)	N (%)	N (%)	
Gender					< 0.0001 **HS**
Male	0	3 (75%)	8 (100%)	19 (95%)	
Female	3 (100%)	1 (25%)	0	1 (5%)	
Residence					< 0.0001 **HS**
Urban	3 (100%)	1 (25%)	0	1 (5%)	
Rural	0	3 (75%)	8 (100%)	19 (95%)	
Season					< 0.0001 **HS**
Summer	0	1 (25%)	6 (75%)	17 (85%)	
Autumn	0	2 (50%)	1 (12.5%)	2 (10%)	
Spring	1 (33.3%)	1 (25%)	1 (12.5%)	1 (5%)	
Winter	2 (66.7%)	0	0	0	
Site of bite					> 0.05 **NS**
Upper limb	2 (66.7%)	1 (25%)	2 (25%)	5 (25%)	
Lower limb	1 (33.3%)	3 (75%)	6 (75%)	13 (65%)	
Neck and chest	0	0	0	2 (10%)	
Type of snake					< 0.0001 **HS**
Non-venomous	3 (100%)	0	0	0	
Vipers	0	4 (100%)	5 (62.5%)	12 (60%)	
Elapidae	0	0	3 (37.5%)	8 (40%)	
Outcome					> 0.05 **NS**
Survived	3 (100%)	4 (100%)	8 (100%)	15 (75%)	
Non-survived	0	0	0	3 (15%)	
Referred	0	0	0	2 (10%)	

N= Number of cases **%**= Percentage P: > 0.05 insignificant difference **(NS)** P: < 0.0001 highly significant **(HS)**

Table (6): Relation grade of envenomation with some clinical data using Chi-square statistical analysis in the studied snakebite patients.

Variables	Grade of envenomation				P- value
	Grade 0 Dry bite (N=3)	Grade 1 Mild (N=4)	Grade 2 Moderate (N=8)	Grade 3 Severe (N=20)	
	N (%)	N (%)	N (%)	N (%)	
Pain					<0.05 **(S)**
No	3 (100%)	0	1 (12.5%)	10 (50%)	
Yes	0	4 (100%)	7 (87.5%)	10 (50%)	
Local oedema					<0.05 **(S)**
No	3 (100%)	0	1(12.5%)	3 (15%)	
Yes	0	4 (100%)	7 (87.5%)	17 (85%)	
Blisters					<0.05 **(S)**
No	3 (100%)	4 (100%)	8 (100%)	11 (55%)	
Yes	0	0	0	9 (45%)	
Extending oedema					<0.05 **(S)**
No	3 (100%)	4 (100%)	3 (37.5%)	8 (40%)	
Yes	0	0	5 (62.5%)	12 (60%)	

Ecchymosis					<0.05 **(S)**
No	3 (100%)	4 (100%)	8 (100%)	11 (55%)	
Yes	0	0	0	9 (45%)	
Coagulopathy					<0.05 **(S)**
No	3 (100%)	4 (100%)	3 (37.5%)	8 (40%)	
Yes	0	0	5 (62.5%)	12 (60%)	
Respiratory arrest					<0.05 **(S)**
No	3 (100%)	4 (100%)	8 (100%)	12 (60%)	
Yes	0	0	0	8 (40%)	
CBC					<0.05 **(S)**
No thrombocytopenia	3 (100%)	4 (100%)	8 (100%)	11 (55%)	
Yes thrombocytopenia	0	0	0	9 (45%)	

N= Number of cases **%**= Percentage P: <0.05 significant difference **(S) CBC**: complete blood count

Table (7) showed a highly significant difference (P-value < 0.001) between the grade of envenomation and anti-snake venom **(ASV)** and duration of hospital stay (days), while a significant difference (P-value < 0.05) with INR where the values were higher in severely envenomed cases in comparison with other groups. However, this relation was non-significant with PT and delayed time.

Table (7): Relation of grade of envenomation with laboratory data, ASV, delay time and duration of hospital stay using ANOVA statistical analysis in the studied snakebite patients.

	Grade of envenomation					
	Grade 0 Dry bite (N=3)	**Grade 1 Mild (N=4)**	**Grade 2 Moderate (N=8)**	**Grade 3 Severe (N=20)**	**F ***	**P- value**
PT (Mean± SD**)**	10.67±.577	10.13±.854	21.44±8.742	38 ±33.399	2.117	> 0.05 NS
INR (Mean± SD)	1.03 ±.150	1.08±.153	1.54 ±.393	2.34±1.152	3.909	< 0.05 (S)
ASV(Mean± SD)	0	6.25±2.5	16.88±3.720	21.25±3.582	48.529	< 0.0001 HS
Duration of hospital stay (days) (Mean± SD**)**	.5 ±.00	1±.000	4.13 ±1.485	7.05 ±2.865	13.042	< 0.0001 HS
Delay time (hours) (Mean± SD)	1.33±.577	2.25±.957	3.62±1.506	8.20±18.14	.431	> 0.05 NS

N= number of cases P: <0.05 significant difference **(S)** SD=standard deviation. P: > 0.05 insignificant difference **(NS) PT**: prothrombine time **INR**: internal normalized ratio **ASV**= Number of anti-snake venom vials

DISCUSSION

The current study reported 35 cases of snakebite envenomation admitted to Fayoum general hospital from May 2018 to May 2020. It aimed to study the pattern and outcome of snakebite cases and determine possible predictors of severity.

Most cases were males, the mean age of patients was 32.31 years, and the majority was living in rural places, presented commonly during the summer season and had bitten in the lower limb commonly. Also, there was a highly significant relationship between the previous parameters and the severity of envenomation. During daily chores and barefooted on the farm, garden, or other outdoor places, Males living in rural areas are exposed to snake bites, especially during the summer when snakes come out of their burrows, where the weather is dry and hot in Fayoum governorate. Similar

findings were reported in different studies in Egypt **(Elawady and Tawfik, 2016; Salah Eldin and Hafez, 2017; Gouda et al., 2017)** and worldwide **(Raju et al., 2020; Patel et al., 2021).**

Fayoum governorate is located in the north of Upper Egypt. It is considered one of the semi-deserted governorates in Egypt; it is surrounded by desert from all sides, but there are some agricultural lands inside the city. According to that, envenomation by Viper's snakebite (60%) was the primary type of snakebites. They were followed by Elapidae envenomation at 31.4%, while the non-venomous snake was present in 8.6% of patients. The low number of non-venomous snakebites may be because numerous cases had sought medical advice in a primary health care centre in the village or the local hospital in their city and not presented to Fayoum general hospital. The snake vipers were the most familiar species in the current study and are also the most common causing bites in France **(De Haro, 2003).**

Based on the clinical presentation and laboratory investigations that mentioned before, the clinical features recorded in the current study were predominantly hemotoxic. Standard features suggesting Elapidae envenomation were presented as ptosis and dysphonia (31.4%), while 22.9% had dysphagia, descending paralysis, and respiratory arrest in the same proportion; nine of them needed Mechanical ventilation. Nearly the same presentation was recorded in different studies **(Gouda et al., 2017; Raju et al., 2020; Patel et al., 2021).** On the contrary, **Paliwal et al., 2021** reported that only 20% of patients had local manifestations, and neurotoxicity was noted in no patients. Additionally, several studies showed the frequency of snakebite-induced local manifestations as high as approximately 85% and 91%, respectively **(Kalantri et al., 2006; Saravu et al., 2012).** These variations in symptoms may be related to the number of studied cases.

The pathophysiology of local tissue injury is portrayed by the degradation of extracellular matrix and basement membrane structure in capillary blood vessels, skeletal muscle fibres, and dermal-epidermal junctions. Accordingly, blistering and haemorrhage occur, moreover myonecrosis with the fondness of regenerative muscle process prompting fibrosis and permanent tissue loss after snakebites **(Amog et al., 2016).** Certain neurotoxins bind to acetylcholine receptors at the motor endplate, prompting various neurological signs and symptoms. Neurotoxic envenoming leads to progressive descending flaccid paralysis. Facial and bulbar inclusion advances to paralysis of the respiratory muscles and weakness of peripheral muscles in severe cases **(Singh et al., 2006; Schroeder and Norris, 2011)**.

Coagulopathic manifestations in the form of bleeding gums, hematuria, and spontaneous bleeding from the nose or mouth, besides prolonged PT (28.69±27.92 sec), thrombocytopenia in only nine cases (25.7%), and increased INR (1.90±1.35), were the most common complications in the studied cases (48.6%). Other complications recorded in the current study include rhabdomyolysis, compartment syndrome, two cases complicated by renal failure, and only one suffered gangrene in the thumb, this number was much less than the reported by **Patel et al., 2021**. They recorded gangrenous changes in 18 patients. Similarly, **Paliwal et al., 2021** reported thrombocytopenia, and more than 50% of patients showed prolonged PT, aPTT, and INR. However, post snakebite complications were noted in four out of 80 patients, and acute kidney injury (AKI) was reported in only 2% of the patients. **Hayat et al., 2008** reported coagulopathic symptoms in 95%, while only one case of renal failure as a complication; added that the low rate of complications because of public acknowledgement of the worth of early presentation to tertiary care emergency clinics and a standardized protocol of treatment, despite the shortage

of medical infrastructures. Furthermore, similar complications were reported by **Elawady and Tawfik, 2016** and **Chew et al. 2011.**

Numerous venom components, like serine proteases, disintegrins, C-type lectin-like proteins, and metalloproteinases, produce many hematologic outcomes, leading to platelet aggregation, platelet activation, or platelet inhibition, coagulopathy, or expanded coagulation, prompting thrombotic complications **(Lu et al ., 2005).**

In the current study, a grading system was done based on clinical and laboratory data to determine the severity of envenomation and the need for the antivenom. The study revealed that most patients were severely (57.1%) envenomed (grade 3) while 8.6% dry bite or non-venomous (grade 0) with no manifestations. Furthermore, Mild (grade 1) and moderate (grade 2) envenomation were presented at 11.4% and 22.9%. **Chew et al., 2011** reported that 65.6% of patients had severe envenomation. On the contrary, **Koirala et al., 2013** revealed that most patients with Grade 1 and grade 2 envenomation (64% and15%). Moreover, **Gouda et al., 2017** reported that most cases were dry bite or nontoxic envenomation.

The severity of snakebite is a prime factor and depends on various variables. Snakes will use their toxin relying upon the circumstance, controlling the volume infused and the fang contact time with their prey. Defence bites intended to fight off danger may sometimes convey less or no venom, bringing about a dry bite. The strength of venom shifts with the types of snake, and in more enormous snakes, the volume of ousted venom usually is higher **(Hayes et al. 2002**).

The current study reported the predictors of severity of snakebite envenomation. The severely envenomed group was mostly males, living in rural places and envenomed by viper snakes in the summer season. Additionally, the clinical data of the patients was also good predictors of severity, where pain, local oedema, extending oedema, blisters, ecchymosis, respiratory arrest, and coagulopathy had existed commonly in the severely envenomed group. These findings go online with **Elawady and Tawfik, 2016** and **Raju et al., 2020** who reported that the renal, respiratory, neurological, gastrointestinal, and cardiovascular system symptoms were significantly more in the severely envenomed group compared to other groups. On the contrary, **Chew et al., 2011** reported that cobra bite was more likely to cause severe envenomation than other species. Additionally, the mean delay time of snakebite was 5.89±13.903 hours; this time has no significant relation with the severity of snakebite, although the values were higher in the severe envenomed group than in other groups (The same was for PT). The mean duration of hospitalization (5.13±3.36 days), as well as the number of anti-snake antivenoms (ASA=16.71±7.760), INR (1.90±1.35), and CBC, showed a significant relation with the grade of envenomation, where the mean values were higher in the severe envenomed group compared to other groups; meanwhile,

They are all good predictive of severity and can determine the protocol of treatment, the need for and the dose of ASV. The dose of ASV and poor outcomes are correlated with higher INR **(Isbister et al., 2015).** This finding strengthens the proposed prognostic value of INR in snakebite envenomation in this study.

These findings were nearly the same as what was reported by **Raju et al., 2020, Elawady and Tawfik, 2016** and **Koirala et al., 2013.** Severity grade revealed a direct corresponding correlation with the duration of hospital stay. The symptomatic cases require more prolonged follow-up after manifestations subside for fear of recurrence of symptoms **(Saravu et al., 2012)**.

Regarding outcomes, most patients (n=30, 85.7%) survived and were

discharged out of the hospital, while two were referred to a tertiary centre. Only three patients had died (mortality rate =8.6%) compared with a national death rate of 1.9 per 100,000 populations. Similarly, **Raju et al., 2020** recorded that eight patients (6.3%) died in hospital. The mortality rate in other studies was lesser than the current as **Koirala et al. 2013** reported the mortality rate was 2.5%, while **Shrestha, 2011 and Paudel et al., 2012** recorded higher mortality rates of 15.9% and 28%. In Egypt, **Gouda et al., 2017** reported no mortality in their study. This finding can be explained as most of the cases had been referred from other hospitals and other governorates to their tertiary centre. They had received the antivenom before referral, which affected the outcome, and the most significant number was non-venomous snakebites.

All the deceased patients were in the severely envenomed group, with poor outcomes. **Elawady and Tawfik, 2016** reported the same. In contrast, **Koirala et al., 2013** recorded that 62.5% of the death cases were in the severe group.

Moreover, the current study showed a perfect relation between the outcomes of patients and the delayed time of presentation to the hospital, prothrombin time, and INR. The mean values in the non-survived patients were higher than those of survived. Also, all the succumbed cases had taken the anti-snake venom compared to only 90% of the survived cases had taken ASV. The previous data was a valuable tool to predict the outcomes of snakebite as the early time to go to the hospital, the better laboratory data, and the lower dose of ASV, the hopeful outcome, and a high chance of survival.

Following the current study, **Narvencar, 2006** and **Elawady and Tawfik, 2016** recorded the same results. **Raju et al., 2020** found that prolonged prothrombin time, thrombocytopenia, and leucocytosis were significantly higher in dead patients than in those discharged from the hospital. All the dead cases (poor outcome group) had received more than ten vials, while half had received more than 30 vials. It is assumed that the total ASV vials administered can affect the outcomes of the patient's condition and determine the severity of snakebite envenomation **(Kang et al., 2016)**.

Contrary to the current results, **Patel et al., 2021** recorded no relation between the hemato toxic parameters, the time between bite and reaching the hospital, the number of ASV vials administered, and the outcome of patients. The reason may be due to the location of the hospital in the centre of the rural population. Another element could be the close contact that the hospital has with the primary care practitioners in the surrounding region.

There were three dead cases in the current study; the first case was envenomed by Elapidae snakebite presented to a local hospital in a rural region with ptosis and descending paralysis. Defective evaluation of the case by the physicians and inadequate ASV administration led to sudden respiratory arrest, cardio-pulmonary resuscitation was done and consumed much time, and then the patient was referred to Fayoum general hospital 24 hours post-arrest. Viper's snakebite envenomed the second and third cases of the same clinical scenario. The cases were a child seven years old and a male 65 years old who had sought medical advice at a primary health care centre with pain and local oedema in the upper and lower limbs. They were under-evaluated and received just pain killers and anti-edematous medications. Seventy-two hours later, the patients presented to Fayoum general hospital with extending oedema, hematuria, pallor, bleeding gums, DIC, and compartment syndrome in the child patient. Laboratory investigations showed defective coagulation profile rhabdomyolysis and acute renal failure. The patients had received ASV, fresh frozen plasma, platelet infusion, fasciotomy for the child, and other treatments to overcome renal affections.

The treatment failed, and the patients died ten days post-admission.

CONCLUSION

Snakebite is an extreme medical emergency requiring convenient intercession. Two toxic species are widespread in Egypt. Males outnumbered females, and the mean age of patients was 32.31 years. Most patients lived in rural places (85.7%) and presented commonly during the summer season (68.6%), with the mean delay time being 5.89 hours. Gender, residence, the season of bite, the type of snakebite, pain, local oedema, extending oedema, blisters, ecchymosis, respiratory arrest, coagulopathy, CBC findings, and INR; were all excellent predictors of severity. The mortality rate was 8.6%. Early administration of the ASV has reduced morbidity and mortality.

RECOMMENDATIONS

1- Establishing a tertiary centre to serve the people of Fayoum governorate.

2- Protocol for managing such snakebite cases should be available for Fayoum general hospital physicians.

3- Conduct training courses for primary health care physicians so we can overcome the problem of undervaluation of cases.

4- Learning the public about the alarming signs in such cases.

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CONFLICT OF INTEREST

NONE.

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الملخص العربي

الملف السريري ونتائج التسمم بلدغة الأفعي في محافظة الفيوم ، مصر.

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المقدمة: لدغة الأفعي حالة طارئة طبية شديدة تتطلب تدخلاً ملائماً. واضطلع ضحايا الثعبان ومقدمو الرعاية الطبية بدور حيوي في تحديد نوع الثعبان. ويتمتع اثنان من الأنواع السامة بشعبية في مصر.

والهدف من هذا العمل: رسم خريطة للخصائص الاجتماعية الديمغرافية ، والنمط ، وملامح المظاهر السريرية ، والتنبؤات المحتملة للشدة ، والنتائج بالنسبة لمرضى الثعابين الذين يدخلون مستشفى الفيوم العام.

وقد أجريت هذه الدراسة في مستشفى الفيوم العام خلال الفترة من أيار/مايو 2018 إلى أيار/مايو 2020. وفي كل حالة يتم تسجيل البيانات التالية ؛ البيانات الاجتماعية الديمغرافية ، بيانات التسمم (وقت التأخير ، موقع العض ونوع الثعبان)البيانات السريرية (المظاهر المحلية والنظمية والمضاعفات اللاحقة للثعبان) ، البيانات المختبرية (صورة دم كاملة, زمن البروثرومبين) ، تصنيف شدة اللدغة والسم المضاد للأفاعي ، ونتائج المرضى (الذين نجوا ولم ينجوا والمحولين). تم جمع البيانات وترميزها للتحليل الإحصائي باستخدام الحزمة الإحصائية من برمجيات العلوم الاجتماعية (SPSS) النسخة 28.

النتائج: فاق عدد الذكور الإناث (85.7% مقابل 14.3%) ، وكان متوسط عمر المرضى 32.31 عاماً. 85,7% كانوا يعيشون في أماكن ريفية ، تقدم بشكل شائع خلال موسم الصيف (68,6%) ، وكان متوسط وقت الوصول للمستشفى 5,89 ساعة ، ومتوسط مدة الإقامة في المستشفى 5,13 يوما ، وكان متوسط جرعة السم المضاد للأفاعي 16,71 لكل مريض. 60% كانت ثعبان (فايبر). وكان الطرف السفلي أكثر المواقع شيوعاً للعضة (57.2%). ووجد فرق كبير بين نتيجة المرضى ووقت التأخير في العرض على المستشفى ، ووقت البروثرومبين. وكان معدل الوفيات 8.6%. وقد أدت جرعة السم المضاد للأفاعي المبكرة لهذا المرض إلى خفض معدلات الاعتلال والوفيات.

الاستنتاج: نوع الجنس ، والإقامة ، وموسم العض ، ونوع الثعبان ، والألم ، والوذمة المحلية ، وأتساع الوذمة ، والبطانة ، وتوقف الجهاز التنفسي ، وأعراض النزيف، والنتائج التي توصل إليها صورة دم وكلها كانت مؤشراً جيداً للشدة.

الكلمات الرئيسية: مضاد سم ثعبان ؛ فيوم؛ النتائج؛ لدغة الأفعي.