

A Descriptive Study Of Snakebite Victims At Two Public Hospitals Of Jember

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ABSTRACT

Introduction: The snakebite cases in Jember as agricultural areas are the potential problem to threaten a person's life. Jember, where most residences are working in the agriculture and plantation sectors, has a very high risk of being bitten by a poisonous snake. **Objective:** To describe the snakebite cases in the agricultural area from two public hospitals of Jember. **Methods:** This was a cohort design with a retrospective approach. Two public hospitals in Jember were selected (dr. Soebandi and Kalisat hospital). The medical records were used to explore the data with a total sampling technique. We selected 162 medical records in total (2017-2019) for secondary data resources. The data collection tool used was a checklist sheet based on the guidelines from WHO. **Results:** Most snakebite victims were male and were farmers with a mean age of 40.95 (SD = 18.97). Most of the victims were bitten in the legs/feet (53,7%). More victims could not identify the snake species (48,8%), but more of them were identified as a green snake (42,6%) and *Naja sputatrix* (6,2%). They used a constricting method (32,7%) with a rope or cloth to prevent the poison move through the blood vessel. Most victims had mild envenomation (59,9%). Swelling (53,1%), local pain (32,1%), and dizziness (9,4%) were the most common symptoms after the snakebite. The treatment of snakebite victims mostly used 1st dose (83,3%). The nurse also reported several nursing diagnoses such as acute pain (68,5%), risk of infection (22,8%), and skin problem (5,6%). Most of the patients only stay \leq one day (69%) in the hospital. **Conclusion:** Snakebites from poisonous snakes are a threat to the agricultural area of Jember. No victims adopted either of the WHO-recommended first aid methods. Most of them had mild envenomation with only a 1st dose treatment.

ABSTRAK

Latar belakang: Kasus gigitan ular di Jember berpotensi menjadi masalah yang mengancam kehidupan seseorang. Jember yang sebagian besar penduduknya bekerja di sektor pertanian dan perkebunan memiliki resiko yang sangat tinggi untuk digigit ular berbisa. **Tujuan:** Untuk mengidentifikasi kasus gigitan ular di kawasan pertanian Jember dari dua RSUD Jember. **Metode:** Penelitian ini menggunakan desain kohort dengan pendekatan retrospektif. Dua rumah sakit umum di Jember dipilih (RSUD dr. Soebandi dan Kalisat). Data rekam medis digunakan untuk menggali data dengan teknik total sampling. Kami memilih 162 rekam medis (2017-2019) yang memenuhi kriteria digunakan sebagai sumber data sekunder. Alat pengumpulan data yang digunakan adalah checklist sheet yang dikembangkan oleh peneliti berdasarkan pedoman dari WHO. **Hasil:** Korban gigitan ular terbanyak adalah laki-laki dan sebagai petani dengan rerata umur 40,95 (SD = 18,97). Tungkai / kaki (53,7%) adalah bagian tubuh yang paling banyak digigit. Lebih banyak korban yang tidak dapat mengidentifikasi jenis ular (48,8%), tetapi lebih banyak yang teridentifikasi sebagai ular hijau (42,6%) dan ular kobra (6,2%). Kebanyakan dari mereka menggunakan cara penanganan gigitan ular pra rumah sakit yang salah, yaitu menggunakan metode konstriksi (32,7%) dengan tali atau kain untuk mencegah racun masuk melalui pembuluh darah. Sebagian besar korban mengalami envenomasi ringan (59,9%). Pembengkakan (53,1%), nyeri lokal (32,1%), dan pusing (9,4%) adalah gejala yang paling banyak dilaporkan setelah gigitan ular. Pengobatan korban gigitan ular sebagian besar menggunakan dosis pertama (83,3%). Perawat juga melaporkan beberapa diagnosis keperawatan seperti nyeri akut (68,5%), risiko infeksi (22,8%), dan masalah kulit (5,6%). Sebagian besar pasien hanya tinggal \leq satu hari (69%) di rumah sakit. **Kesimpulan:** Gigitan ular berbisa adalah ancaman bagi penduduk di area pertanian Kabupaten Jember. Tidak ada korban gigitan ular yang melakukan pertolongan pertama sesuai dengan panduan WHO. Kebanyakan dari mereka mengalami envenomasi ringan dengan pemberian dosis terapi sebanyak 1 dosis.

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Introduction:

Snakebite cases are one of the health problems that can threaten human life. The mortality rates for snakebite victims in tropical countries are relatively high (Musah *et al.*, 2019). WHO report showed that deaths from venomous animals reached 79,000 deaths with a range of 56,800 - 89,400 in 2016. The number of snakebites victims with permanent disabilities (as blindness, paralysis, and amputation) reaches 400,000 people each year (WHO, 2018).

Snakebite cases have been neglected in health cases. Snakebite victims in rural areas still use the help of a traditional physician or use traditional medicine instead of going to health services (Warrell, 2012). Thus, many cases of snakebites are not recorded by health care workers. Also, the effects of first aid and improper pre-hospital care can worsen the victim's condition. Based on this condition, it will increase the risk of death for the snakebite victims. For example, first aid with improperly traditional methods will produce an adverse effect that outweighs the benefits (WHO, 2016).

Indonesia, as one of the tropical countries, has agricultural and plantation sectors as the primary source of livelihood for the community. Work as a farmer has several hazards that will impact the health of farmers (Susanto and Purwandari, 2014). Venomous snakes have a role as natural predators in the agricultural sector and are often referred to as farmer's friends, but snakes can kill farmers when they feel threatened and bite them (Omogbai *et al.*, 2002). In certain seasons the number of prey from snakes such as rats, frogs, lizards, and other small reptiles will increase so that the snakes will start to roam in search of prey. This condition will increase the intensity of the meeting between farmers and snakes, leading to snakebite cases (Adiwinata and Nelwan, 2015).

Indonesia still does not have accurate data on snakebite cases. The reported mortality rate is less than 20 deaths due to snakebites in Indonesia with more than 18,000 islands. This makes the presumption that many cases go unrecorded (WHO, 2018). Bondowoso, which is the nearest district to Jember, has recorded 55 cases of snakebites since 2015. Of the 55 cases,

45 were caused by snake bites of the *Trimeresurus albolabris* species, and the rest were caused by *Bungarus sp.* and *Naja sp.* (Rifaie, Maharani and Hamidy, 2017).

Snakebite cases in Jember are well known and often reported to government agencies or health workers who provide services to the victims. These snakebite cases are still not well documented even though these cases are a type of case that threatens a person's life (Dinas Kesehatan Jember, 2019). The research aimed to describe the snakebite cases in the agricultural area from two public hospitals of Jember.

Methods:

This was a cohort design study with a retrospective approach. We carried out this study in two public hospitals of Jember: dr. Soebandi hospital and Kalisat hospital. The population of this study were patients with snakebite and received treatment and care in those public hospitals from 2017 to 2019. We used 162 medical records to explore the data. We used the total sampling method as the sampling technique.

We collected the data with a checklist sheet based on the guidelines from WHO (WHO, 2016). The checklist form consisted of age, sex, job, time, season, part of the body, snake species, symptoms, the grade of envenomation, length of stay, the dose of antivenom, and nursing diagnosis. Data were entered and analyzed using a computer system, also were summarized using mean standard deviations, frequency tables, and graphics.

This study was approved by the ethical committee review board for research No: 4880/UN.25/I.14/2019. Ethical and administrative approval from the ethics commission of health research of the Faculty of Nursing, University of Jember.

Results:

Figure 1. explained the characteristics of age and sex of snakebite victims. The age ranges for snakebite victims are 1 - 79 years (male) and 4 - 75 years old (female). The mean age of snakebite victims is 40.95 (SD = 18.97). Most of the snakebite victims were men (80.9%).

Table 1. explained the perceptual characteristic of snakebite victims. Farmers are the most victims who did not work (mothers and kids) (30.3%). Snakes mostly bite in bright conditions (the morning and the afternoon) (72.8%) compared to dark conditions (27.2%). The rainy season is the season with the most snakebite case reports (59.9%) than the dry season (40.1%).

Victims also reported that they were bitten on the legs/feet (53.7%), arms/hands (44.4%), and head (1.9%). The types of snakes that bit was mostly *Trimeresurus albolabris* (42.6%) and *Naja sputatrix* (6.2%), but 48.8% of victims could not identify the type snake. The most common pre-hospital snakebite management was constricting using a rope or cloth (32.7%), but several of them took no action (18.5%).

victims of snakebites (40.1%). A considerable number was also dominated by groups of

Table 2 explained the symptoms, grade of envenomation, medical treatment, and nursing treatment of snakebite victims. Symptoms that were most often reported by the patients were swelling (53,1%), acute pain (32,1%), and dizziness (9,4%). The medical team also noted that most victims have mild (59,9%) and moderate envenomation (34,6%). The treatment of snakebite victims mostly was using 1st dose (83,3%). The nurse also reported several nursing diagnoses such as acute pain (68,5%), risk of infection (22,8%), and skin problem (5,6%). The length of stay of patients during the treatment mostly ≤ 1 day (69%).

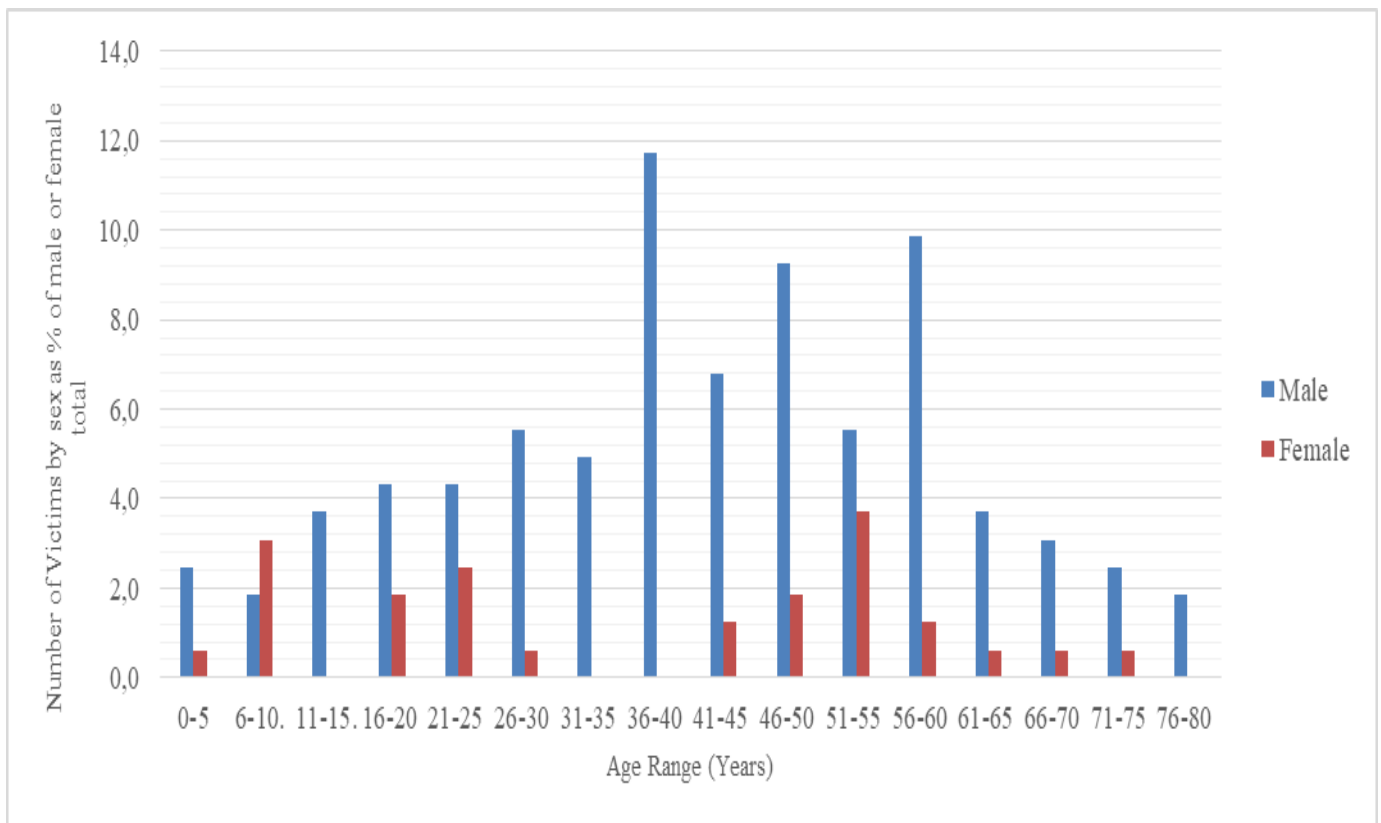


Figure 1: Percentage of victims of snakebites in Jember per age group based on sex. Age Range: 1 – 79 years (males), 4 – 75 years (females); mean age \pm SD: 40,95 \pm 18,97; 41,96 \pm 1,82 (males); 36,5 \pm 2,16 (females). Sex of victims: 131 male (80,9%) and 31 females (19,1%).

Table 1. Perceptual Characteristic of Snakebite Victims

Variables	Sub-Group Variables	N (162)	%
Victim's Job	Farmer	65	40,1
	Civil Servant	19	11,7
	Entrepreneur	29	17,9
	Not Working	49	30,3
Day time hours of snakebite	Morning	64	39,5
	Afternoon	54	33,3
	Evening and night	44	27,2
Season of snakebite	Rainy season	97	59,9
	Dry season	65	40,1
Position of snakebite infliction	Legs and feet	87	53,7
	Arms and hands	72	44,4
	Head	3	1,9
Field Care	Incision	2	1,2
	Constriction	53	32,7
	Suction	14	8,6
	No Action	30	18,5
	Not identified	58	35,8
Likely causal snake species	Green Snake	69	42,6
	Cobra Snake (<i>Naja sputatrix</i>)	10	6,2
	Weling Snake (<i>Bungarus candidus</i>)	2	1,2
	Land Snake (<i>Calloselasma rhodostoma</i>)	1	0,6
	Picung Snake (<i>Rhabdophis subminiatus</i>)	1	0,6
	Not Identified	79	48,8

Table 2. Symptoms, Grade of Envenomation, Medical Treatment, and Nursing Treatment of Snakebite Victims

Variables	Sub-Group Variables	N (162)	%
Symptoms most often reported	Swelling	86	53,1
	Local pain	52	32,1
	Dizziness	15	9,4
	Blood spitting	4	2,5
	Shivering	3	1,9
Grade of envenomation	No Envenomation	5	3,1
	Mild	97	59,9
	Moderate	56	34,6
	Severe	4	2,4
Dose of anti snake venom (ASV)	1 st Dose	135	83,3
	2 nd Dose	20	12,3
	3 rd Dose	7	4,3
	4 th Dose	0	0
	≥ 5 th Dose	0	0
Nursing Diagnosis	Acute Pain	111	68,5
	Risk of infection	37	22,8
	Skin problem	9	5,6
	Lack of tissue perfusion	5	3,1
Length of stay of patients in hospital (days)	≤ 1	112	69
	2-4	45	27,9
	≥ 5	5	3,1

Discussion:

Perceptual Characteristic of Snakebite Victims

The mean age of snakebite victims is 40.95 (SD = 18.97). Most of the snakebite victims were men (80.9%). Many of the victims were farmers (40,1%). These results are also following previous studies conducted in tropical countries that the victims of snakebite are mostly men of productive age in the age range of 20-40 years (Wasko and Bullard, 2016; Roriz *et al.*, 2018; Afzal *et al.*, 2019). The farmers had a high risk to experienced snakebites (Afzal *et al.*, 2019; Babo *et al.*, 2019; Guthi, Arepalli and Toka, 2019). Snakebite is largely an occupational disease of food- producers such as farmers, plantation workers, herdsmen, and etc (WHO, 2016). Male farmers tend to spend more time on the farm, so they often interact with poisonous snakes (Omer *et al.*, 2017). Farmers usually encountered snakes in agricultural areas particularly during short rainy seasons while clearing fields for cultivation, and during the dry season, when harvesting crops and in grazing areas during livestock herding (Kipanyula and Kimaro, 2015).

Another fact showed that apart from farmers, not working victims (mothers and children) also have entirely a large number became the victims of snakebite (30.3%). According to a WHO report, 59.2% of bites occur in and around the house. Snakes are attracted to the rodents who come for grain being grown. Snakes can hide behind the objects in the house and accidentally bite victims (WHO, 2016). Especially children who were mostly bitten while playing in their house where the snakes were hiding (Schulte *et al.*, 2016).

The majority of snakebite resulting in envenomations occurred in the morning (39.5%) and afternoon (33.3%). Previous studies also revealed a similar result (Tareq Khan, Fatema2 and Abdullah Al

Shekeili, 2017; Musah *et al.*, 2019). Snake is a type of reptile which is active depends on temperature and humidity. Most types of snakes will come out during the day to bask and carry out hunting activities. However, many kinds of snakes also carry out activities at night, so it does not rule out that a snake bites someone at night. The prey of snakes in the form of small mammals such as rats will be active at night, which will attract the snake's attention (Nonga and Haruna, 2015).

A high incidence of snakebite victims occurred during the rainy season (59,9%) between October to April. Previous research explained that during the rainy season, temperatures become very hot during the day and are followed by high rainfall. This condition causes the water to enter the snake's hiding holes and forced out the snake to find a drier place (Roriz *et al.*, 2018; Musah *et al.*, 2019). The rainy season is closely related to agricultural activities, such as planting crops. This activity will make contact between farmers and snakes even closer (Ochoa *et al.*, 2020). Activities during farming are activities that can cause farmers to become victims of snake bites (Afzal *et al.*, 2019). The main food of snakes, such as small reptiles and small mammals, also becomes more active during the rainy season, so snakes will be more active to prey (Ochoa *et al.*, 2020).

The majority of victims were bitten in the legs/feet (52.7%). The legs/feet are the body part most often bitten by poisonous snakes (Feitosa *et al.*, 2015; Roriz *et al.*, 2018; Musah *et al.*, 2019). Snakes usually look for taller grass to hide and camouflage. If someone comes near or accidentally steps on, the snake will bite immediately (Adiwinata and Nelwan, 2015). The farmers usually cutting the grass to feed the livestock. They can accidentally touch the snake and get bitten (Rifaie, Maharani, and Hamidy, 2017). Children or young boys usually put their

hands into holes while hunting for rodents inside the house. The snakes might be resting in those holes and ready to bites (WHO, 2016).

The type of snake most reported in this study was a green snake (42.6%). There are several species of green snake in Jember: *Trimeresurus albolabris*, *Ahaetulla prasina*, and *Trimeresurus insularis*. The victim of snakebite in Jember only mentioned the snake color, not the snake species. It was difficult for the healthcare provider to identify the species of snake based on the color. Identification of the species of snake is the key to the treatment of the victim. Based on those problems, the literacy of snakes should be improved. Previous research explained that one of the species of green snake was responsible for the snakebite victim. In agricultural and plantation areas, the population *Trimeresurus albolabris* is big and often bites humans (Rifaie, Maharani, and Hamidy, 2017).

Other snake species were also reported such as *Naja sputatrix*, *Bungarus candidus*, *Calloselasma rhodostoma*, and *Rhabdophis subminiatus*. Most of the victims were unable to identify the snake. The victims did not see the type of snake nor even caught the snake after being bitten. Previous research also stated that only 38% of victims could catch or kill a snake that bites, the others could not even see the type of snake that bites because the snake naturally runs away after biting (Bolon *et al.*, 2020).

No victims adopted either of the WHO-recommended first aid methods (pressure immobilization bandaging or local compression pad immobilization) for the snakebite. Snakebite first aid mostly used tourniquets (constricting) (32.7%). This method will restrain the blood rate so that the snake venom does not spread throughout the body. However, the use of a tourniquet is not following the first aid guideline by WHO (WHO, 2016; Parker-Cote and Meggs, 2018). Their

effectiveness relies on the occlusion of peripheral pulses, causing pain, ischemia, nerve injury, and gangrenous limbs (Parker-Cote and Meggs, 2018). Immobilization is the best way to reduce the potential for further complications for snakebite victims (WHO, 2016).

Furthermore, we have to increase the awareness of snakebites for the community in the agricultural area. Proper education about the types of venomous snakes that exist in the agricultural area, the prevention to avoid snake bites, and first aid training for snake bites victims need to be done for the community. Accurate identification of snake species, good prevention efforts, and the right first aid management can reduce the incidence of snake bites and reduce the severity of snake bites victims.

Symptoms, Grade of Envenomation, Medical Treatment, and Nursing Treatment of Snakebite Victims

Most victims reported swelling (53,1%), local pain (32,1%), and dizziness (9,4%) after the snakebite. The medical team also wrote that most victims had mild (59,9%) and moderate envenomation (34,6%). Snakebites can have various effects on the victim, depending on the type of poison, snake, and resistance of the victims. Snakebite victims also received therapy according to clinical indications (Şahan *et al.*, 2016). Previous research revealed that venomous snakes generally caused a swelling and pain effect, which would then form the basis for identifying the degree of envenomation of each victim. The degree of envenomation starts from Grade 0 (No Envenomation) to Grade 3 (Severe Envenomation) (Sönmez *et al.*, 2015; Kang, Moon and Chun, 2016).

The treatment of snakebite victims in Jember mostly was using 1 dose (83,3%). The administration of anti-snake venom (ASV) to the victim based on signs and symptoms of envenomation with or without evidence of laboratory tests.

Medical treatment should not wait for any test report. In a patient with a history of bite, known or unknown, if there is spontaneous abnormal bleeding beyond 20 minutes from a bite, the medical team should start ASV (Ministry of Health & Family Welfare Government of India, 2016).

The first dose of ASV was administered immediately after the bite. After the 1st dose of ASV, the initial dose should be repeated 6 hours later. This option could be done if, in 1 hour, the blood remains incoagulable, spontaneous systemic bleeding continues, and there is a sign of neurotoxic. However, if after one hour, the condition does not worsen, then the 1st dose is sufficient as ASV therapy for the victim, and the victim can continue treatment at home (WHO, 2016). The length of stay of patients in the hospital during the treatment was mostly \leq 1st day (69%) because most of them only get 1st dose of ASV.

The nurse also reported several nursing diagnoses such as acute pain (68,5%), risk of infection (22,8%), and skin problem (5,6%). Swelling and pain are the most symptoms of snakebite victims (Hifumi *et al.*, 2015; Sönmez *et al.*, 2015; Şahan *et al.*, 2016). Therefore, most nursing diagnoses obtained from patients are acute pain. To deal with acute pain, nurses can provide several interventions: pain management, medication management, and emotional support. The output of those interventions can be measured with the comfort level increase, and the patient can control their pain (Carpenito, 2013). The role of nurses as a caregiver to the patients is crucial. Nurses must be able to provide the best service for snakebite patients to pass through their suffering comfortably.

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Conclusion:

Snakebites are a threat to the agricultural area of Jember. Most snakebite victims were male and were farmers. Many of the victims were bitten in their legs/feet. Most of the victims could not identify the snake species, but more of them were identified as a green snake. No victims adopted either of the WHO-recommended first aid methods. Swelling, local pain, and dizziness were the most common symptoms after the snakebite. The treatment of snakebite victims mostly was using 1st dose. The length of stay of patients in the hospital was mostly \leq one day. Several nursing diagnoses were acute pain, risk of infection, and skin problem.

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