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Knowledge and application of first aid and treatment of snakebites among Sri Lankan North Central Province farmers

Conocimiento y aplicación de los primeros auxilios y el tratamiento de las mordeduras de serpiente entre los agricultores de la Provincia Central Norte de Sri Lanka

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Abstract

The application of first aid for snakebites are important in rural Sri Lanka. This study aimed to assess the current level of knowledge and application of snakebite first aid. Results revealed a substantial gap between knowledge and practices. This study highlights the need for education programs to improve snakebite management.

Keywords: snakebites, first aid, therapeutics, Sri Lanka, farmers.

Resumen

La aplicación de primeros auxilios en mordeduras de serpientes es importante en zonas rurales de Sri Lanka. Se evalúa el conocimiento y aplicación de primeros auxilios. Los resultados revelan una brecha entre el conocimiento y las prácticas. Existe la necesidad de educación para mejorar el manejo de estos casos.

Palabras claves: mordeduras de serpientes, primero auxilios, tratamiento, Sri Lanka, agricultores.

Introduction

Snake bite is one of the most neglected public health issues in poor rural communities living in the tropics. Because of serious misreporting, the true worldwide burden of snake bite is not known. South Asia is the world's most heavily affected region, due to its high population density, widespread agricultural activities, numerous venomous snake species and lack of functional snake bite control programs. The annual number of snakebites around the globe is estimated to be around 1.2-5.5 million. Of this, 81-95% occur in tropical regions of South Asia, South-East Asia, Sub-Saharan Africa and Latin America [1]. Large numbers of victims survive with permanent physical and psychological sequel, grossly affecting the ability to work and quality of remaining life [2]. Despite having this high disease burden [1], snakebite is still a neglected topic in the global health agenda. In Sri Lanka, around 37,000 snakebites are reported annually [3]. Of these, most bites are reported from the dry zone of Sri Lanka where they are among the three leading causes of admission to emergency care units at high prevalence districts [3]. As observed in other countries [4], snakebite is primarily an occupational hazard in Sri Lanka.

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Patikorn et al [5] showed that the estimated annual mortality rate due to snake bite in Sri Lanka is the highest in the world. In Sri Lanka the annual death rate is 6/100,000 population. In Pakistan it is 1.9/100,000 population. In India the reported annual mortality is 5.4/100,000 population. In Myanmar (Burma) snake bite has been the fifth most common cause of death (3.3/100,000 population). Among many species of snakes in Sri Lanka, only 6 are medically important. They are Russell's viper (*Daboia russelli russelli*), cobra (*Naja naja*), the kraits (*Bungarus caeruleus* and *Bungarus ceylonicus*), saw-scaled viper (*Echis carinatus*) and hump-nosed viper (*Hypnalehypnale*). Most of the morbidity and mortality is caused by the highly venomous Russell's viper, cobra, and krait bites. Other species are either mildly venomous or non-venomous, where bites never cause systemic envenoming or death [6].

After a snake bite immediate hospitalization is essential rather than the treatment given at home. Furthermore, the correct first aid measures are also equally important. By using correct first aid we can prevent patient from setting into serious complications and it will help to save lives. In Sri Lanka most snake bites occur in the dry zone, especially in North Central Province. Many cases are reported annually from the Anuradhapura district where most of the residents are farmers. Russell's viper, Cobra and Krait is the common snake in Anuradhapura area. Paddy farmers in this area are the common victims of Russell's viper bite. Most of the bites occurred in paddy field while the victims were engaged in agricultural works [7]. Krait bites the highest incidence of bites in Sri Lanka was reported from the North Central Province, where the vegetation and climate provide an ideal habitat for snakes [8].

Almost all the patients who were admitted to Anuradhapura Hospital during 1996-1998 were from poor farming families living in villages, many of them in Cadjan thatched, wattle and daub houses where individuals sleep on the floor. These houses were surrounded by un-cleared vegetation. Most of the bites occurred at night while the victims were sleeping on the floor and in another in a watch hut situated on a treetop [9]. These previous studies depended mainly on snake bite victims, who came for treatment in government hospitals. In this study, data was collected not only from people going for western medical treatment but also from the indigenous treatment. Data collected from both people who were going for traditional medicine and western medicine in Padaviya 1st mile post area, Anuradhapura, North Central Province of Sri Lanka. The gap was identified as the knowledge about snake bites and correct first aid measures in the community is not adequate. Therefore, this study may help to improve the knowledge about snake bites, and it would in turn, help to reduce the mortality and morbidity in the community. This study was based on awareness of first aid about snake bites in a rural area.

Method

Population and study sample: data were collected from villagers of the 1st Milepost area, Padaviya, Anuradhapura, North Central Province of Sri Lanka. Permission was obtained from the medical officer in Health of Padaviya for the research to take place. Whole population living in the Padaviya 1st milepost area during last two weeks of April 2011 was considered as the study population.124 villagers were selected as the study group. Males and females both aged 18-70 living in DS-Division of Padaviya 1st Milepost were included. People who cannot speak and hear, mentally ill persons, and people under 15 years and above 70 years old were excluded. Unit is the family. Maximum two adults were participated as volunteers. Small numbers of houses were excluded, since the occupants were not there when data was collected.

Data collection procedure: an interviewer administered the questionnaire was used to collect data. One-trained assistants were used to collect data. The questionnaire was introduced and were interviewed the villagers and victims. Observed the responders and communicated with them during the interview. The interviewer (an undergraduate, of the Faculty of Allied Health Sciences) was trained on how to explain the purpose of the research and how to obtain correct results during interview as well as how to identify socio economic and housing risk factors. The questionnaire consisted of 45 questions including question to identify the Socio-economic factors related to snake bites, Knowledge and attitudes about snakes, awareness, habits and attitudes about First Aid, and beliefs about first aid in snakebites. Also, the victims were identified in the population and related details of who has own experience of snakebites and first aid, or they who had their close relation's experience on snake bite during their life.

Categorizing data: data were categorized and coded to facilitate the data analyzing. Variables were categorized in to groups. An investigator assisted self-completed questionnaire in Singhalese and Tamil languages was used for data collection. The validity of the translation was independently assessed by two observers competent in both languages. Relevant demographic data, awareness and perceptions on the venomous snakes in the area, first aid practices for snakebite, snakebite prevention and treatment were assessed via the questionnaire. The conduct of the study was approved by the Ethics Review Committee, Rajarata University of Sri Lanka. Consent was sought from all participants prior to the participation.

Statistical analysis: to find out the awareness of first aids, Knowledge and attitudes about snakes, and other socio-economic factors of the population the Minitab 16 software, was used. To find out if there is a significant association between snakebites and risk factors, log linear model's *p* value and chi-square value were used. Data analyzing performed with the SAS statistical software package.

Results

Padaviya 1st mile post, 124 people were interviewed. Among them 60 (48.38%) were male and 64 (51.61%) were female. Education of the people in this area was very poor.

Not a single person found who had done (G.C.E) Advanced level. Among the total population, 8.87% didn't attend school, 55.64% attended grade 5 to 10 (Table 1).

Table 1. Study on awareness of first aid for snake bites in a rural area (Padaviya, Anuradhapura district, Sri Lanka)

	General (n=124)	Victim(n=65)	
	Frequency (%)	Victim Condition	
Educational Level			
No school attendance	11 (08.87)	Well	57 (87.69)
From Grade 1 - 5	27 (21.77)	With complication	05 (07.69)
From Grade 5 -10	69 (55.64)	Dead	03 (04.61)
Grade 10 to advanced level	17 (13.70)		
First aid follow-up			
First aid using	97 (78.22)		22 (33.84%)
First aid not using	27(21.77)		43 (66.15%)
First aid			
Cutting wound	04 (03.22%)		05 (07.69%)
Sucking out toxin	15 (12.09%)		03 (04.61%)
Applying tourniquet	69 (55.64%)		06 (09.23%)
Applying Ice	06 (04.83%)		0
Squeezing blood	35 (28.22%)		03 (04.61%)
Washing with soap	73 (58.87%)		08 (12.30%)
Remove jewelries	13 (10.48%)		03 (04.61%)
Not Any first aid	27 (21.77%)		42 (64.61%)
Pressure-bandaging and immobilizing	0		0
Method of transport during emergency			
Van			04 (03.22%)
Three wheels			90 (72.58%)
Motor cycle			21 (16.93%)
Tractor			0
Bicycle			03 (02.41%)
None			06 (04.83%)

Details of general public

In the population a high percentage of people were answered they are using First Aid. Among this population, 78.22% people had answered that they were using first aid for snake bites. Among the population some people have cut the bitten wound, 12% used suction, 55.64% applying tourniquet and another proportion of people applying ice on bitten wound. These three methods are not compatible with recommended standard first aid methods. Present recommended best first aid method for snake bite is pressure bandage and immobilizing, unfortunately no one knew about these methods (Table 1).

Details of victims

Among the study population 65 people had their own experience of snake bites or they had a close relative, who had faced a snake bite and they have played a main part in giving first aid and transport patient referred to as victims (Table 1). Among the population 72.58% used three wheelers as their mode of transport during the emergency.16.93% used motorcycles and 4.83% hadn't used any transport method. Victims 87.69% became cured without any complications after treatments.7.69% people had complications from snake bites.4.61% died from 65 victims. Among 33.84% people who were used first aid, 3.22% were cut the bitten wound, 4.61% had done suction, 9.23% had applied tourniquet.66.16 % people did not follow any first aid method. The 3.07% had squeezed blood by force from the bitten side and 12.3% had washed the bitten wound with soap. Present recommended best first aid method for snake bite is pressure bandage and immobilizing, (Table 1).

Almost 44.61% of the offending snakes had escaped after attack to the victims.32.3% people had killed it and brought it to the hospital. Almost 23.07%of victims did not pay attention to the snake (Table 2). Some people in this area were given some sort of food soon after the bite. E.g. Cow ghee, Karapincha juice, coconut milk and rarely children's urine. Majority of 92.74% people did not administer any food before proper treatment (Table 2).

Discussion

Snake bite is one of the most neglected public health issues in poor rural communities in the tropics. South Asia is the most affected region. In India 35000-50000 people die per year [10]. Ediriweera et al, showed that annual death rate in Sri Lanka due to snake bite is highest in the world. In Sri Lanka snake bites mostly occur in dry zones in North Central Province [11]. A large number of cases are reported annually from the Anuradhapura district and most of them are farmers [12].

The study area is 1st mile post area in Padaviya, Anuradhapura, North Central Province of Sri Lanka, where the majority of people are farmers. We had examined 124

people. Among them 64 were male and 60 were female. This is situated between Siripura and Aluthhalmillewa. I included people who were age group 18-70 years and selected 62.8% were farmers and others were non occupied persons. The education level is very poor. Among the population not a single person had more than 12 years of education/higher education. During last three decades the villagers had suffered from war. As a result of that they couldn't earn anything. Some of them were having paddy fields, but some are haven't. Therefore, majority of them were poor. Furthermore, Snake bite is common in this area. Among the 124 people interviewed by questionnaire based about the incidence of snake bites of this area. Eighty-Three percent (83%) people answered that incidence is high. Among 124 people 65 had their own experience or their closed relation had faced a snake bite during their life. It was found that the four common venomous snakes in this area were Russell's viper, Common krait, (people called as Habaralaya), Hump nosed viper and Cobra.

Table 2. Behaviors of the victims

Towards the offending snake	
Let it escape	29(44.61%)
Kill and take it to the place of treatment	21(32.30%)
Did not pay attention	15 (23.07%)
Provision of fluids after a snake bite	
Yes	08 (06.451%)
No	115(92.74%)

The knowledge level of the people towards snakes, snake bites and first aids were analyzed. Most of the people (78.2%) were believed myths about snake bites. There were so many myths among them. Sometimes these myths affected them harmfully. As an example, some of them believed that if a victim shouted for help immediately after a snake bite or talked about snake bite incident to others, he may become envenomed. Therefore, sometimes some tried to go for the treatment alone without the support of the family. This action affected victims very harmfully. People living in this area could identify most of the snakes. But it was different towards some types of snakes. High percentage of people 80% could clearly identify Cobra, 76.6% people could identify Russell's viper and 71% could identify hump nosed viper. Considerable number of people could identify other highly venomous snakes. But 0.8% of people could identify saw scaled viper. Because saw scaled viper's habitat was not in this area. Different snakes have different venom strengths. Among species only six are medically important [13] and others are mildly venomous or non-venomous. 96.8% of people had identified the cobra as highly venomous. Also 87% identified Russell's viper and 64.5% identified Krait as highly venomous snakes. Mostly 87% of people believed Cat snake (mapila) is highly venomous. But it is incorrect when compared with present medical knowledge [14]. Also, only 37.9% people knew Hump nosed viper is highly venomous. Others believed Hump nosed viper is mildly venomous snake. But Hump nosed viper (*Hypnala hypnale*) is a highly venomous snake which causes ARF and coagulopathy.

Most participants believed the fact that snakebites could be successfully treated and were aware that snake antivenom is available in some hospitals in Sri Lanka. However, it is noteworthy that two thirds of the participants believed that capturing the snake for identification is essential for treating the victim. The only available antivenom in Sri Lanka is a polyvalent antivenom (Indian polyvalent antivenom), and the initiation of antivenom treatment is being decided based on the clinical evidences of envenoming and evidence for presence of a coagulopathy. Physical identification of the offending snake certainly would assist the physician in clinical decision making in treating snakebite victims. Hence, making the offending snake specimen available for medical staff for identification should be encouraged. However, non-availability of the snake for identification would not drastically alter the routine management of snakebite victims in Sri Lanka. Therefore, delays in taking the victim to medical care must be discouraged as life saving time would be lost. It is essential to communicate this message correctly to the communities at risk of snakebite.

The vast majority of the study participants preferred to get the treatment from the Hospital treatment. Of these, majority stated that the rea-son for their preference was the availability of government hospital within reach by three wheelers. High percentages of the participants were aware of the practices that minimize snakebites in houses and outdoors. Due to a lack of storing facilities, many small-scale farmers in Sri Lanka tend to store paddy harvest within their houses. This could attract rodents and their predators (snakes) to houses [15]. Although the vast majority of the participants were aware of this, it is uncertain that awareness will lead to a change in practice, unless practical solutions for harvest storage problems are provided for farmers.

Although 93.6% of the farmers were aware that wearing protective footwear would protect them against snakebite, it is highly unlikely that such measures would be adopted even by farmers who can easily afford protective footwear in Sri Lanka, because farming activities in Sri Lanka are almost always being conducted barefoot, due to the prevalent attitude of considering footwear as a burden. This study shows a high awareness of important preventive measures, first aid measures and available

treatment for snakebites, among participant farmers in the three dry-zone districts. These figures on high awareness, however, do not reflect from the large number of hospital admissions due to snakebites and associated morbidity and mortality in the dry zone of Sri Lanka. However, it was evident that a very high percentage of participants prefer the application of a tourniquet as a first aid measure following snakebite. When it comes to reality victims are not using the methods properly. This practice, although considered a dangerous first aid measure for the patients due to they are not in use. Furthermore, the low priority given for snakebite prevention in community health promotion programs in Sri Lanka has presumably played a role in not bringing the knowledge into practice. However, unless the important knowledge gaps in the socio-epidemiology of snakebites are filled and permanent snakebite prevention programs established, chances of changing practices towards minimizing snakebite appear slim in Sri Lanka.

Conflict Relationships and Activities

The authors state that the research was conducted in the absence of business or financial relationships that could be construed as a possible conflict of relationships and activities.

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HP and **MFMM**: conceptualization, methodology, drafting-preparation of the original draft, writing-review and editing. **Banneheka B**: conceptualization, methodology, drafting-preparation of the original draft, writing-review and editing, supervision, planning and execution.