Snakebite in Children in Nigeria: A Comparison of the First aid Treatment Measures with the World Health Organization’s Guidelines for Management of Snakebite in Africa

Obinna Chukwuebuka Nduagubam, Onyinye H. Chime1, Ikenna K. Ndu, A. Bisi-Onyemaechi2, Christopher B. Eke2, Ogechukwu F. Amadi, Obianuju O. Igboke2
Departments of Paediatrics and 1Community Medicine, Enugu State University College of Medicine, ESUT, Enugu, 2Department of Paediatrics, College of Medicine, University of Nigeria, Ituku/Ozalla, Enugu State, Nigeria

Abstract

Background: Snakebite and envenomation remains a public health problem with significant morbidity and mortality in children in developing countries. The World Health Organization (WHO) in 2010 developed guidelines for the prevention and management of snakebite in Africa. Aim: The aim of this study was to compare the pattern of first aid treatment among children presenting with snakebite/envenomation with the 2010 WHO guideline for the prevention and clinical management of snakebite in Africa. Patients and Methods: All children who presented with snakebite over a 7-year period in a teaching hospital in Enugu, Nigeria. The first aid treatment given to these children was obtained and was compared with the provisions of the WHO guideline for the prevention and clinical management of snakebite in Africa (2010). Data collected were analyzed using SPSS version 22. Results: Five (71.4%) of the snakebites occurred in the rainy season and in the dark involving the lower limbs in 85.7% of cases. Six (87.5%) of the patients received one form of first aid before presentation to a health facility. None received first aid interventions in line with the WHO recommendation. Topical application of herbal concoctions to the site of the bite (37.5%) was the most common intervention. One (14.3%) of the children was promptly brought to the health facility following snakebite. The interval from bite to presentation to the health facility ranged from 1 to 12 h (median 5 h: 43 min). Conclusion: Huge gaps still exist in the first aid treatment given to snakebite victims compared to the WHO guidelines. Keywords: Children, first aid treatment, snakebite, World Health Organization

Résumé

Contexte: La morsure de serpent et l’envenomation demeurent un problème de santé publique avec une morbidité et une mortalité importantes chez les enfants des pays en développement. L’Organisation mondiale de la Santé (OMS) a élaboré en 2010 des lignes directrices pour la prévention et la gestion des morsures de serpent en Afrique. Objectif: L’objectif de cette étude était de comparer le modèle de traitement des premiers soins chez les enfants présentant des morsures de serpent/envenomation avec la directive 2010 de l’OMS pour la prévention et la prise en charge clinique de morsures de serpent en Afrique (2010). Les données recueillies ont été analysées à l’aide de la version 22 du SPSS. Résultats: Cinq (71.4%) des morsures de serpent se sont produites pendant la saison des pluies et dans l’obscurité impliquant les membres inférieurs dans 85,7% des cas. Six (87.5 %) des patients ont reçu une forme de premiers soins avant d’être présentés à un établissement de santé. Aucun d’entre eux n’a reçu d’interventions de premiers soins conformément à la
**INTRODUCTION**

Snakebite and envenomation remains an important cause of death among rural patients in developing countries, and it is still a neglected public health problem (category A) drawn up by the World Health Organization (WHO).[1-5] Although the incidence and fatalities from snakebite are said to be underestimated because of lack of epidemiological data, the highest burden of snakebites is believed to be in Asia and sub-Saharan Africa.[6-11] Studies have shown a yearly increase in incidence cases of snakebite with a concomitant increase in morbidity and mortality.[12-14] One of the reasons for the perceived underestimation of snakebite data, especially in Africa, is the observation that many victims of snakebite do not present to health facilities for treatment, and this practice is not in line with the WHO guidelines on first aid treatment of snakebite for Africa.[15]

In Nigeria, snakebite still remains a common and serious problem, especially in rural areas where access to prompt and effective treatment is limited. An earlier study on snakebite in the Savannah Region of Northern Nigeria reported an annual incidence of 497/100,000 and a mortality of 12.2% for snakes.[13] A greater percentage of snakebite victims do not present at the hospital in Nigeria. A study by Pugh and Theakston revealed that only 8.5% of snakebite victims attend hospitals in Nigeria.[14] This is worrisome as some of the persons believe that it is not a condition to be brought to the hospital. Some are made to believe that they will die if they go to the hospital. Other reasons are that they will be amputated. Some, however, do not go due to lack of funds.

Proper first aid treatment when given to victims of snakebite could positively influence their outcome more so in children who tend to sustain more severe toxicity from envenomation because of increased venom-to-body mass ratio compared to adults.[15-17] The WHO in its guidelines for the prevention and clinical management of snakebite in Africa recommended first aid measure for victims of snakebite in Africa. These recommendations include calling for help using cellular phones and other forms of communication; moving victim of snake bite to safety from areas where they might be bitten again and remove the snake if it is still attached but not with bare hands. WHO also recommended reassuring the victim; remove constricting clothing, rings, bracelets, bands, shoes etc.; immobilization of the whole victim and tying above the site of the bite preferably using the pressure-immobilization technique;[18] Other recommendations by the WHO in management of victims of snake bite in Africa include that caregivers/health workers should avoid washing, rubbing, massaging or tampering with the bite wound; avoid the many harmful and time-wasting traditional first aid treatments such as cauterization, incision or excision, tattooing, immediate prophylactic amputation of the bitten digit; suction by mouth, vacuum pumps[19] or “venom-ex” apparatus; instillation of chemical compounds such as potassium permanganate, application of ice packs (cryotherapy), “snake stones” or electric shocks. WHO recommended that these are absolutely contraindicated as they are all potentially harmful and none has any proven benefit.[20] The WHO in addition recommends taking the snake to hospital if it happens to have been killed as well as early/ prompt presentation to a health facility.[15]

Butt et al.[21] in their study suggested that patients diagnosed with snakebite had first aid treatment administered either by a nursing staff close to the place of bite or by a quack and later on transferred to field hospital. Despite the current categorization of snakebite among the neglected public health problems globally; the greater risks faced by the child victim of snakebites compared to adults; the undeniable role of prompt and effective first aid treatment to victims of snakebite coupled with the recent target by the WHO to reduce deaths and disability from snakebite by 50%; not much has been documented regarding the first aid practices given to child victims of snakebite in Africa comparing them with established standards. However, this may not be so in majority of cases of snakebite in Africa. In Southeast Nigeria, the incidence of envenomation from snakebite was reported to be 30.8%[22] which is lower than figures from Egypt and the global estimates by the WHO that range from 40% to 55%.[23-24] However, the issue of poor data collection on snakebite may influence this finding.

Despite the current categorization of snakebite among the neglected public health problems globally; the greater risks faced by the child victim of snakesbites compared to adults; the undeniable role of prompt and effective first aid treatment to victims of snakebite coupled with the recent target by the WHO to reduce deaths and disability from snakebite by 50%; not much has been documented regarding the first aid practices given to child victims of snakebite in Africa comparing them with established standards. This retrospective, descriptive study, therefore, aims to ascertain the first aid treatment given to children with snakebite before presentation to a tertiary hospital in Enugu, Southeast Nigeria, and to compare with the first aid measures in the WHO guidelines set for Africa in the year 2010.

**Mots clés:** Enfants, traitement des premiers soins, morsure de serpent, Organisation mondiale de la Santé.
**Patients and Methods**

This is a retrospective, descriptive study conducted at the Children Emergency Room (CHER) of Enugu State University Teaching Hospital (ESUTH), Enugu, Southeast Nigeria. ESUTH is a tertiary hospital in Southeast Nigeria, and its CHER provides all levels of pediatric health care and is open for 24-h service. It attends to children up to 18 years of age. Its major catchment area is Enugu State but also receives patients from the other four states of Southeast Nigeria and beyond.

The admission records of all the children with snakebite that were admitted into CHER of ESUTH over a 7-year period (January 2012–December 2018) were retrieved and reviewed. The register of the CHER, ESUTH, Parklane, was used to ascertain the total number of admission over the same period. Ethical approval for the study was obtained from the Health Research Ethics Committee of the University of Nigerian Teaching Hospital, Enugu (protocol number NHREC 05/01/2008B-FWA00002458-1RB00002323).

Datasheet designed for the study was used in extracting relevant patient information from the case files including sociodemographic variables, details of first treatment given before presentation to health facility as well as outcome. First aid treatment given was compared with the WHO guidelines for the prevention and clinical management of snakebites in Africa (2010). Key recommendations of the guidelines used for comparison were the avoidance of the use of tight tourniquet; immobilization of the whole patient; avoidance of the use of useless/harmful first aid treatment measures; avoidance of washing, rubbing, massaging, or tampering with the bite wound; and early/prompt presentation to a health facility with the snake for identification and diagnosis.

Data collected were analyzed using the IBM SPSS Statistics for Windows (Version 22.0, Armonk, NY: IBM Corp). Analysis was mainly descriptive. The frequency distribution of all relevant variables was reported in tables and prose. Test of significance for discrete variable was done using the Chi-square test. Statistical significance was set at the value of $P < 0.05$.

**Results**

During the period under review, there were 8420 admissions, of which 13 cases of snakebite were recorded in the hospital register, giving a prevalence of 0.15%, but only 7 (53.8%) case files could be retrieved from the medical records department of the hospital and were studied. Of the 7 cases, 6 were male giving a male: female ratio of 6:1. The children’s ages ranged from 7 years to 17 years, with a mean age ($\pm$standard deviation) of 12.4 ($\pm$2.8) years.

Five (71.4%) of the snakebites occurred during the rainy season, and most (5; 71.4%) of them also occurred in the dark (at night and early hours of the morning). Six (85.7%) of the bites were on the lower limb while the remaining occurred on the hand. Of the six bites that occurred in the lower limb, both right and left limbs had equal chances of occurrence (42.8%). Four (57.2%) of the children were taken to a traditional herbal practitioner before presentation to the health facility.

Six (85.7%) of the children were given one form of first aid before presentation. However, none of the children received first aid treatment in line with the WHO recommendation on case management and prevention of snakebite in Africa. The most frequent form of first aid treatment given to these children was the topical application of herbal medications in 3 cases (37.5%). Other prehospital interventions given included incision at the site of bite and use of “black stone” in 2 cases (25.0%) and application of a tourniquet in 2 cases each (25.0%) [Table 1].

Table 2 shows the various first aid measures recommended by the WHO for Africa and how it compares with the first aid treatment given to the children. It shows that the WHO recommendations were largely not adhered to.

Only one (14.3%) child was promptly brought to the health facility following snakebite [Table 3]. The interval from bite to presentation to the health facility ranged from 1 to 12 h (median 5 h: 43 min) [Table 2].

**Table 1: First aid treatment given to children following snakebite**

| First aid treatment given | Frequency, $n$ (%) |
|---------------------------|--------------------|
| Herbal application        | 3* (37.5)          |
| Local incision and use of black stone | 2 (25.0) |
| Tourniquet application    | 2* (25.0)          |
| None                      | 1 (12.5)           |

*A child had both application of herbal medication and use of tourniquet

**Table 2: First aid treatment recommended by the World Health Organization and the treatment given to the children**

| World Health Organization recommendations for first aid treatment of snakebite in Africa | Number of children ($n = 7$) |
|----------------------------------------------------------------------------------------|----------------------------|
| Avoid use of tight tourniquet                                                         | Yes 2  No 5 |
| Immobilize the whole patient                                                          | Yes 0  No 7 |
| Avoid harmful traditional first aid treatment                                        | Yes 2  No 5 |
| Avoid washing, rubbing, massaging, or tampering with the bite wound                  | Yes 2  No 5 |
| Early/prompt presentation to a health facility                                       | Yes 1  No 6 |
| Present to the hospital with the snake for identification and diagnosis              | Yes 0  No 7 |

**Table 3: Interval from bite to presentation to the health facility**

| Interval from bite to presentation (h) | Frequency, $n$ (%) |
|--------------------------------------|--------------------|
| <2                                   | 1 (14.3)           |
| ≥2                                   | 6 (85.7)           |
However, despite the prolonged interval of time between the bite and presentation to the hospital, the duration of hospitalization was short ranging from 2 to 4 days. All the snakebite victims survived and were discharged from the hospital without any associated morbidity.

**Discussion**

First aid treatments are immediate treatments provided for a victim immediately after an incident or accident before seeking medical care. Despite the high incidence of snakebite reported in sub-Saharan Africa,[13] this study on snakebite in Southeast Nigeria noted low rate presentation of cases of snakebite to the health facilities. This was not surprising as some earlier studies in Nigeria have reported similar findings.[17,23] Sani et al.[25] in Sokoto also noted a similar low prevalence in the pediatric department of Usmanu Danfodiyo University Teaching Hospital, Sokoto, North West Nigeria. Similarly, in Benin South-South Nigeria, a multicenter hospital-based study involving 2 major public health facilities in the same area recorded only 435 cases of snakebite over a 20-year period.[7] These reports collaborate with the findings by Pugh and Theakston[14] who in an earlier study had reported that only 8.5% of snakebite victims attend hospitals in Nigeria. The main reason proffered for this is that most snakebite victims are managed at home and with traditional methods; hence, the actual prevalence and degree of envenomation are poorly documented.[14,22,25,26]

Although majority of children in this study, 6 (87.5%), attempted one form of first aid treatment or the other before presenting to the hospital, it is worrisome that they were largely at variance with the WHO recommendation on case management and prevention of snakebite in Africa.[15]

For snakebite victims, the WHO recommends immobilization of the bitten limb with a splint or sling. There was no reported case of limb immobilization as recommended in the WHO guideline. Similar findings were reported in Nepal where none of the patients performed any recommended first aid treatment.[27] This is contrary to findings in Sri Lanka where 75% immobilization of affected limb was recorded among the first aid treatments given to children bitten by snakes in the region.[28]

The use of traditional medicines and methods are familiar practices after snakebite in Nigeria and other developing countries.[29-32] About 80% of snakebite victims access treatment with traditional healers more willingly than in hospitals.[26] Traditional first aid interventions are not without dire consequences, as studies have shown an association between visit to traditional healers and increased risk of death from snakebite.[7,31,33-35] The WHO in its guidelines for Africa also discouraged the use of traditional concoctions as they are not effective and could rather be harmful to the victims.[15] Cases of jaundice and wound infections after ingestion and application of unidentified concoctions at incised wound sites, respectively, have been documented.[31] This notwithstanding, topical application of herbal medications was the most common form of first aid treatment given to the children in this study. Other prehospital/first aid interventions recorded in this study include use of tourniquet, intended to localize envenomation to the affected limb, local incision, and application of black stone. Application of tourniquets is a common first aid practice among snakebite victims in Nigeria and other regions of the world.[7,28,31,36] The WHO guidelines strongly discourage the use of tourniquets as studies have shown that the use of tourniquet causes tissue anoxia and can trigger severe systemic envenomation after removal and experts recommend slow removal of already applied tourniquet to reduce these effects.[15] In addition, studies have shown that patients who used tourniquet required higher doses of antivenom and increased hospital stay.[7,31] Unfortunately, five patients in this study developed complications which included limb swelling, compartment syndrome, and necrotic ulcers.

Another WHO recommendation is a passive and prompt transport of patients to the nearest medical facility with antivenom and other resources for treatment.[15] Findings from this study reveal that more than half of the children presented 5 h after snakebite accident. This is consistent with findings from previous studies where the late presentation was reported in majority of cases.[31,32] Based on the WHO guidelines, anti-snake venom are recommended to be administered within 4 h after each bite.[15,37] Fortunately, all children admitted for snakebite in this study survived the incident without any disabilities irrespective of their time of presentation. This high success rate recorded in this study may probably be due to lesser degrees of envenomation from the snakebites in this part of Nigeria. There are, however, no studies that have documented species of snakes in Southeast Nigeria and the degree of envenomation following snakebite in Southeast Nigeria. This is worsened by the absence of accurate data on the prevalence of snakebite in this area and the poor presentation to health facilities by victims of snakebite. The finding of high survival rate noted in this study may also be related to the small sample size. Some other studies have also noted no mortality following snakebites. Similarly, some other studies have reported no mortalities within and outside Nigeria.[29,38,39] However, severe envenomation has been reported among victims who presented late for treatment.[15] Consequently, this increased the likelihood of longer hospital stays, increased cost of hospitalization, and poor outcome among those with delays compared to those without delay.[26,31,35] The difference in severity of symptoms in these regions could be attributed to the difference in species of snakes commonly found in these regions. Since only 50%–55% of all snakebites result in envenoming, some of the snakebites could have been from nonpoisonous species or dry bites as studies have shown that bites by nonvenomous snakes are common and bites by venomous species occasionally are devoid of venom.[23,24] Likewise, there have been stipulations of variation in the volume of venom injected; while some bites are associated with injection of small amounts of venom, others have large...
doses of venom injected.[39] Other contributory factors include occasional stockout of antivenom recorded in the health facilities in Northern region within the time frame as well as site of snakebite.[31] This confirms the concern raised by the WHO that effective treatment of snakebite envenoming is currently not readily available and affordable in many countries.[15]

The majority of snakebite in this study (85.7%) affected the lower limbs. This is consistent with findings occurring in children and adults.[27,30,37-41] In the tropics, snakebites occur more on lower extremities because the victims are bitten while treading upon or near the snake, while most bites are on fingers and hands in nontropical countries because of deliberate contact with the reptiles.[42] This evidently suggests that the site of bite is primarily determined by fortuitous contact with the snakes during daily activities.[41] The use of light and protective footwear cannot be overemphasized as this will effectively reduce incidence of snakebite among high-risk groups.[15] Rarely, bites on the thigh, gluteus, genital, and neck have been reported in other studies.[10,33] The site of injection of venom is a factor in determining the prognosis of the treatment. Venoms can be injected into skin, muscle, or vessel. Intravascular injections result in fast commencement of systemic toxicity and have poor prognosis even when antivenom is readily available.[36]

The site of bite on the victim is associated with the victim’s activity and time incident occurred. All the bites in this study occurred at night and early hours of the morning, unlike in Northern Nigeria where majority of the bites occurred between 12 noon to 6 pm, during the heat of the day.[31] This difference in peak time of occurrence could be attributed to the nomadic lifestyle and extensive farming activities engaged in the Northern part of the country. This is similar to findings in India and Sri Lanka where 72.7% and 59% of the bites, respectively, occurred at night.[28,42]

The study is limited by its sample size; 13 cases of snakebite were recorded over a 7-year period and only 7 case files could be retrieved from the medical records department of the hospital at the time of the study. Hence, misplaced hospital records and poor documentation may, for this reason, not fully account for the prevalence of snakebites in this region. Furthermore, being a hospital-based study, underestimation of prevalence of snakebite is expected as many cases of snakebite are not managed in the hospitals. There is a paucity of published data on first aid treatments given to children compared to data on adults in this region.

**Conclusion**

Despite the public health importance placed on snakebites and envenomation, huge gaps still exist in the first aid treatment of victim of snakebite in Nigeria when compared with the WHO guidelines for Africa. Of particular concern is the practice of harmful traditional first aid measures with delays in presentation to a medical facility. Public enlightenment campaigns on proper first aid approaches to victims of snakebite with emphasis on avoiding all forms of traditional first aid treatment and early presentation to health facilities need to be intensified.

**Financial support and sponsorship**
Nil.

**Conflicts of interest**
There are no conflicts of interest.

**References**

1. Murray CJ, Lopez AD, Jamison DT. Global health statistics. Global Burden of Disease and Injury Series. Cambridge, MA: Harvard School of Public Health; 1996.

2. Venkatraman V. Snakebites under-reported in India. Nature India 2012. Available from: http://www.nature.com/nindia/2012/120509/full /nindia.2012.69.html. [Last access on 2018 Nov].

3. Warrell DA. Snake bite. Lancet 2010;375:77-88.

4. Murray CJ, Lopez AD, Jamison DT. The global burden of disease in 1990: Summary results, sensitivity analysis and future directions. Bull World Health Organ 1994;72:495-509.

5. Chippaux JP. Snakebite envenomation turns again into a neglected tropical disease! J Venom Anim Toxins Incl Trop Dis 2017;23:38.

6. Ghosh R, Mana K, Gantait K, Sarkhel S. A retrospective study of clinico-epidemiological profile of snakebite related deaths at a tertiary care hospital in Midnapore, West Bengal, India. Toxicol Rep 2018;5:1-5.

7. Habib AG. Public health aspects of snakebite care in West Africa: Perspectives from Nigeria. J Venom Anim Toxins Incl Trop Dis 2013;19:27.

8. Kshirsagar VY, Ahmed M, Colaco SM. Clinical profile of snake bite in children in rural India. Iran J Pediatr 2013;23:632-6.

9. Harrison RA, Hargreaves A, Wagstaff SC, Faragher B, Laloo DG. Snake envenoming: A disease of poverty. PLoS Negl Trop Dis 2009;3:e569.

10. World Health Organization. Neglected Tropical Diseases: Snake Bites. Geneva: World Health Organization; 2015.

11. Mohapatra B, Warrell DA, Suraweera W, Bhattacharjee P, Dhingra N, Jotkar RM, et al. Snakebite mortality in India: A nationally representative mortality survey. PLoS Negl Trop Dis 2011;5:e1018.

12. State/UT wise Cases and Deaths Due to Snake Bite in India. In: Government of India, Central Bureau of Health Intelligence. Health Status Indicators, National Health Profile 2007 and 2008 (Provisional), p. 107-108. Available from: http://ebhidghs.nic.in/writereadd ata/mainlnkFile/Firell33.pdf. [Last access on 2018 Nov].

13. Chippaux JP. Estimate of the burden of snakebites in sub-Saharan Africa: A meta-analytic approach. Toxicon 2011;57:586-99.

14. Pugh RN, Theakston RD. Incidence and mortality on snake bite in savanna Nigeria. Lancet 1980;2:1181-3.

15. World Health Organization. Guidelines for the Prevention and Clinical Management of Snakebite in Africa. Brazzaville: World Health Organization; 2010.

16. Banerjee BN. Poisonous snakes of India, their venoms, symptomatology and treatment of envenomation. In: Ahuja MM, editor. Progress in Clinical Medicine in India. New Delhi: Arnold Heinmann; 1978. p. 136-79.

17. Habib AG, Gebi UI, Onyenmelukwe GC. Snake bite in Nigeria. Afr J Med Sci 2001;30:171-8.

18. Sutherland SK, Coulter AR, Harris RD. Rationalisation of first-aid measures for elapid snakebite. Lancet 1979;1:183-5.

19. Bush SP, Green SM, Laack TA, Hayes WK, Cardwell MD, Tanen DA. Pressure immobilization delays mortality and increases intra-compartmental pressure after artificial intramuscular rattlesnake envenomation in a porcine model. Ann Emerg Med 2004;44:599-604.

20. Hardy DL. A review of first aid measures for pit viper bite in North America with an appraisal of Extractor TM suction and stun gun electroshock. In: Campbell JA, Brodie ED, editors. Biology of the Pit Vipers. Tyler, Texas: Selva; 1992. p. 405-14.
21. Butt KZ, Anwar F, Rizwan M. Snake bite; experience in a field hospital. Prof Med J 2010;17:263-8.
22. Ndu IK, Edelu BO, Ekwochi U. Snakebites in a Nigerian children population: A 5-year review. Sahel Med J 2018;2:204-7.
23. Gouda AS, Elnabarawy NA, Badawy SM. A study of snakebite envenomation cases admitted to Egyptian National Poisoning Centre. Acta Med Int 2017;4:34-40.
24. WHO. Global Snakebite Burden. Report by the Director General. Seventy-First World Health Assembly WHA71.5. Agenda Item 12.1. WHO; 15 March, 2018.
25. Sani UM, Jiya NM, Ibitoye PK, Ahmad MM. Presentation and outcome of snake bite among children in Sokoto, North-Western Nigeria. Sahel Med J 2013;16:148-53.
26. Aga AM, Hurisa B, Niwaysillasse B, Kebede G, Kerga S, Kebede A, et al. Epidemiological Survey of Snake Bite in Ethiopia. Epidemiology (Sunnyvale) 2014;4:174.
27. Shrestha BR, Thapa-Magar C, Pandey DP. Retrospective study of snakebites in nawardup snakebite treatment center, South-central Nepal. Adv Clin Toxicol 2018;3:000138.
28. Karunanayake RK, Dissanayake DM, Karunanayake AL. A study of snake bite among children presenting to a paediatric ward in the main Teaching Hospital of North Central province of Sri Lanka. BMC Res Notes 2014;7:482.
29. Michael GC, Aliyu I, Grema BA. Viper bite on the neck following a fight. Sudan Med Monit 2015;10:133-6.
30. Michael GC, Thacher TD, Shehu MI. The effect of pre-hospital care for venomous snake bite on outcome in Nigeria. Trans R Soc Trop Med Hyg 2011;105:95-101.
31. Gupta R, Gupta BM, Gupta A. Drug usage in the management of snake bite patients in a tertiary care teaching hospital – A retrospective study. Int J Med Sci Public Health 2018;7:954-8.
32. Fadare JO, Afolabi OA. Management of snake bite in resource-challenged setting: A review of 18 months experience in a Nigerian hospital. J Clin Med Res 2012;4:39-43.
33. Sharma SK, Bovier P, Jha N, Aliro E, Loutan L, Chappuis F. Effectiveness of rapid transport of victims and community health education on snake bite fatalities in rural Nepal. Am J Trop Med Hyg 2013;89:145-50.
34. Sharma SK, Chappuis F, Jha N, Bovier PA, Loutan L, Koirala S. Impact of snake bites and determinants of fatal outcomes in Southeastern Nepal. Am J Trop Med Hyg 2004;71:234-8.
35. Iliyasu G, Tiamiyu AB, Dariyab FM, Tambuwal SH, Habib ZG, Habib AG. Effect of distance and delay in access to care on outcome of snakebite in rural North-Eastern Nigeria. Rural Remote Health 2015;15:3496.
36. Parker-Cote J, Meggs WJ. First aid and pre-hospital management of venomous snakebites. Trop Med Infect Dis 2018;3:45.
37. Paudel KM, Poudyal VP, Rayamajhi RB, Budhathoki SS. Clinico-epidemiological profile and outcome of poisonous snake bites in children using the WHO treatment protocol in Western Nepal. J Nobel Med Coll 2007;4:21-5.
38. Omogbai EK, Nworgu ZA, Imhafidon MA, Ikpeme AA, Ojo DO, Nwako CN. Snake bites in Nigeria: A study of the prevalence and treatment in Benin City. Trop J Pharma Res 2002;1:39-44.
39. Madaki JK, Obilom R, Mandong BM. Clinical presentation and outcome of snake bite in patients at Zamko comprehensive health centre. Highland Med Res J 2004;2:61-5.
40. Punde DP. Management of snake-bite in rural Maharashtra: A 10-year experience. Natl Med J India 2005;18:71-5.
41. Krishnappa R, Chandrika DG, Gowda RM, Babu P, Banala R. A study on demographical and clinical profile and the outcome of snake bite victims in a Tristate tertiary care center. Int J Med Sci Public Health 2016;5:1818-22.
42. Bhalla G, Mhaskar D, Agarwal A. A study of clinical profile of snakebite at a tertiary care centre. Toxicol Int 2014;21:203-8.