Outcomes and effectiveness of antivenom treatments in snakebite patients in north-west Ethiopia: retrospective cohort

SCIENTIFIC DAYS

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Background

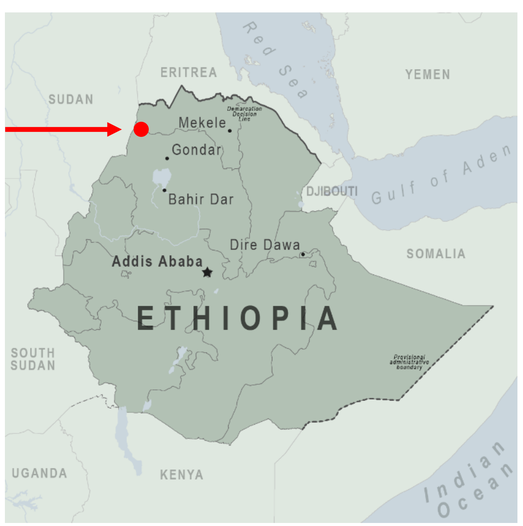
Worldwide, millions of people are bitten by venomous snakes annually, causing high mortality and disability. However, the true burden of this neglected health issue remains largely unknown. Since 2015 Médecins Sans Frontières is treating snakebite patients in a field hospital in Abdurafi, north-west Ethiopia. Between 2015 and 2019, 2,289 snakebite patients were admitted. Patients with severe envenomation, based on clinical symptoms and blood clotting tests, are treated with antivenom.
Unfortunately, due to the poor market situation for effective and safe antivenoms for Sub-Saharan Africa, preferred antivenom is not always available, forcing changes in the choice of antivenoms used. Evidence of efficacy and safety of antivenoms for Sub-Saharan Africa is scarce or non-existent.

Aim

To describe treatment outcomes and the effectiveness and safety of different antivenoms used.

Methods

In this retrospective observational study, 469 patients who received antivenom treatment between 2015 and 2019 were included. ANOVA-analyses were used to compare the treatment outcome between patients treated with the three antivenoms that were available at different times: Fav-Afrique, VacSera, and EchiTabPlus antivenom, and to determine the risk of developing adverse reactions or complications for each antivenom. Cure was defined as resolution of symptoms; poor outcome as death or complications and long-term sequelae prohibiting resumption of normal life. Pearson correlations were used to determine factors influencing the treatment outcome.



"The number of snakebite patients admitting to the field hospital increased from 330 in 2015 to 1,431 in 2019"

Results

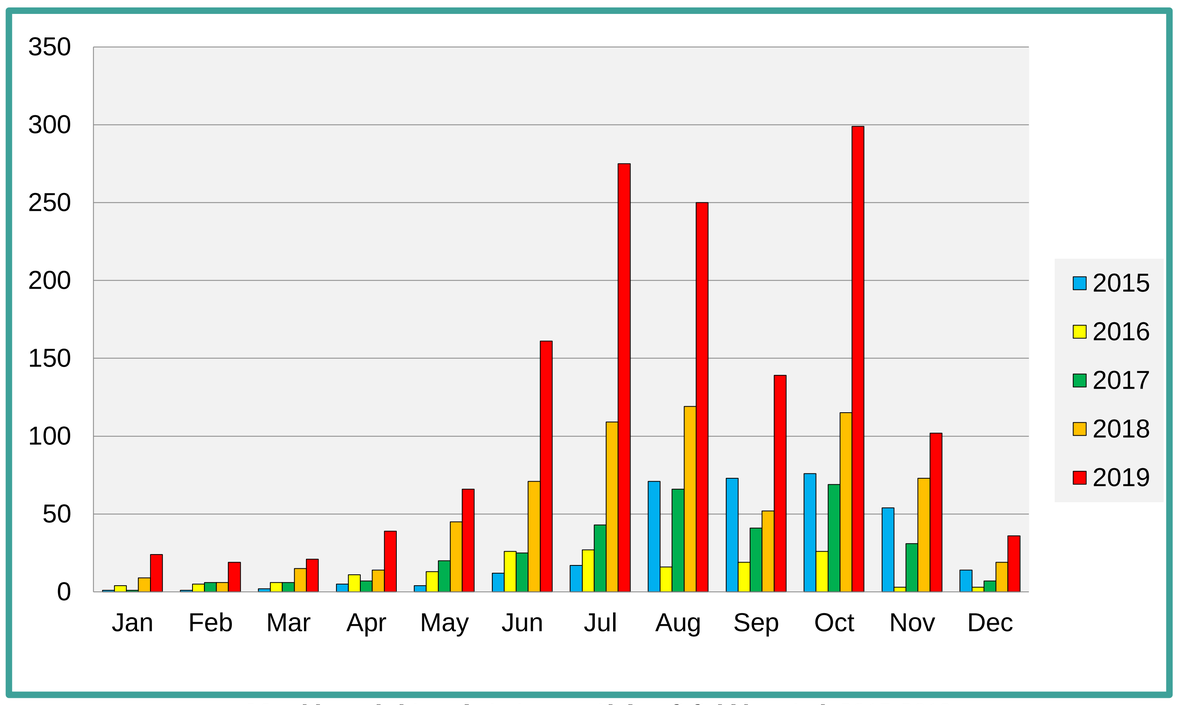
Whereas only incidental snakebite cases presented before 2015, when treatment was made available, cases presenting rapidly increased to 1,431 in 2019. Envenomation was mainly caused by Northeast African carpet viper (*Echis pyramidum*) and puff adder (*Bitis arietans)*.

Comparison of treatment outcome between the different antivenoms

Patients treated with VacSera showed a lower chance of positive treatment outcome (147/164: 89.6%) compared to patients treated with Fav-Afrique (140/149: 94.0%) and EchiTabPlus (152/156: 97.4%). More complications were observed in patients treated with Fav-Afrique (24/149: 16.1%) and VacSera (36/164: 22.0%) compared to patients treated with EchiTabPlus (4/156: 2.6%). Less adverse reactions to antivenom were observed in patients treated with Fav-Afrique (2/149: 1.3%) and EchiTabPlus (11/156: 7.1%) compared to patients treated with VacSera (30/164: 18.3%).

Factors contributing to a poor outcome of treatment

Factors correlating with poor outcome were time between bite and hospital admission, number of vials of antivenom administered, time between hospital admission and antivenom administration, and occurrence of complications.



Monthly snakebite admissions to Abdurafi field hospital, 2015-2019

Outcome	Fav-Afrique	VacSera	EchiTabPlus
	N=149	N=164	N=156
Cure	140 *(94.0%)*	147 *(89.6%)*	152 *(97.4%)*
Adverse effects	2 *(1.3%)*	30 *(18.3%)*	11 *(7.1%)*
Complications	24 *(16.1%)*	36 *(22.0%)*	4 *(2.6%)*
Death	2 *(1.3%)*	8 *(4.9%)*	3 *(1.9%)*

"The high costs of antivenoms lead to a low demand which makes it a non-profitable market for manufacturers, resulting in a shortage in the supply of antivenoms"

Conclusion

Snakebite incidence is grossly underreported unless treatment options are available and health seeking is improved. This research gives an overview of the size of this health problem in north-west Ethiopia and provides information necessary for improving access to antivenom treatment. Although EchiTabPlus showed the most favourable outcomes in this retrospective analysis, a multi-country randomised clinical trial is currently planned to determine the efficacy, safety, and regional specificity of existing antivenoms for Sub-Saharan Africa. Structural investment in sustained production and supply of antivenom and health promotion and advocacy among communities at risk are urgently needed to improve health-seeking behavior in the case of snakebites.

Susanne Doettling, MSF, 2018

Ethical considerations

This research fulfilled the exemption criteria set by the MSF Ethical Review Board (ERB) for a posteriori analyses of routinely collected clinical data, and thus did not require MSF ERB review. It was conducted with permission from the Medical Director of the MSF Operational Centre Amsterdam. This research was approved by the Ethiopian Public Health Institute – Institutional Review Board (EPHI - IRB).

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