

Keeping venomous snakes in the Netherlands: a harmless hobby or a public health threat?

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ABSTRACT

Objective: To describe the incidence of venomous snakebites and the hospital treatment thereof (if any) amongst private individuals who keep venomous snakes as a hobby.

Structure: Descriptive study.

Method: Private keepers of venomous snakes were invited via the social media *Facebook*, *Hyves*, *Twitter*, *Google Plus*, *Linked In* and two large discussion forums to fill in an online questionnaire on a purely voluntary and anonymous basis.

Results: In the period from 1 September 2012 to 31 December 2012, 86 questionnaires were completed by individuals who keep venomous snakes as a hobby. One-third of the venomous snake keepers stated that they had at some point been bitten by a venomous snake. Out of those, two-thirds needed hospital treatment and one-third of those bitten required at least one, sometimes more, doses of antiserum. The chances of being bitten increased the more venomous snakes a person kept. An inventory of the collections of venomous snakes being kept further revealed that no antiserum exists for 16 of the species, including for the most commonly held venomous snake, the coral cobra.

Conclusion: Keeping venomous snakes as a hobby is not without danger. Although in the majority of snakebite cases no antiserum had to be administered, there is nevertheless a significant risk of morbidity and sequelae. Preventing snakebites in the first place remains the most important safety measure since there are no antisera available for a substantial number of venomous snakes.

KEYWORDS

Bite, antivenom, snake, hobby, treatment, venomous

INTRODUCTION

Keeping reptiles is a popular hobby in the Netherlands. In total an estimated 35,000 households are believed to house 250,000 reptiles between them.¹ The keeping of dangerous and venomous reptiles including venomous snakes is not banned in the Netherlands. The relevant (local law) regulations ('APV') do not contain any specific restrictions on the keeping of such snakes. Some municipalities such as Utrecht have introduced certain requirements but these usually amount to no more than a requirement to notify. Currently, no municipalities require residents to have a license for keeping dangerous animals and no attempt is being made to control the large number of poisonous animals being held by hobbyists by means of environmental licences. Regardless of which rules are appropriate, it appears that keeping venomous snakes as a hobby takes place largely in anonymity. Bites by exotic venomous snakes are, however, widely reported in the media, almost exclusively in a very one-sided sensationalist manner.²

The Havenziekenhuis in Rotterdam treats on average one to three people annually who have been bitten by (exotic) venomous snakes. The protocol for the care of and emergency help for victims of venomous snakebites was previously published³ and forms the basis for the national exotic (venomous) snake protocol.⁴ It is striking that the snakebites treated in our hospital are actually always bites by exotic venomous snakes and never bites by the adder (*Vipera berus*), the only true indigenous venomous snake in the Netherlands. However, recent research has shown that in the vicinity of Poortugaal in South Holland there is a small population of the Asp adder (*Vipera aspis*), which is not native but was probably consciously or unconsciously

introduced by someone.⁵ These snakes could be a potential danger to hikers in this area.

It is likely that the number of exotic venomous snakebites treated in hospital is just the tip of the iceberg because these are the only ones which come onto our radar. The full picture of what type and how many incidents of venomous snakebites are experienced by hobbyists is unclear. In order to gain more insight into the prevalence of snakebites amongst keepers of venomous snakes and into the scale and diversity of collections of venomous snakes amongst hobbyists, we have conducted a survey amongst keepers of such snakes via the Internet. The results of this study are given below.

PATIENTS AND METHODS

The Working Group 'Venomous Snakes Havenziekenhuis' has conducted a web-based survey over the Internet of people who keep venomous snakes as a hobby. The target group was invited through the social media *Facebook*, *Hyves*, *Twitter*, *GooglePlus*, *Linked In* and the two largest relevant discussion groups 'The Snakes Forum' and the forum of 'the Target Group Venomous Snakes Lacerta' to answer the following questions on a purely voluntary and anonymous basis:

1. In which province do you keep your snakes?
2. What type(s) of venomous snakes do you keep?
3. How many venomous snakes do you have (approximately)?
4. How long have you been keeping venomous snakes for?
5. Have you ever been bitten by one of your venomous snakes?
6. How many times was hospital treatment necessary for your snakebite(s)?
7. If you have had a venomous snakebite, have you ever been treated with antivenom?

To ensure (as far as possible) the uniformity of responses, the maximum possible number of closed questions were used with a limited number of choices.

RESULTS

In the period from 1 September 2012 to 31 December 2012, the questionnaire was completed by 86 keepers of venomous snakes. As shown in *figure 1*, the largest number of these keepers were living in the provinces of South Holland ($n = 21$, 24.4%), Noord-Brabant ($n = 15$, 17.4%) and Gelderland ($n = 13$, 15.1%). Thirty-two (37.2%) of the respondents had 1-5 venomous snakes, while 18 people (20.9%) had more than 20 snakes. Forty-five (52.3%) of the respondents had been keeping snakes as a

Figure 1. The distribution of the 86 respondents to the Internet survey about the bites of exotic venomous snakes in the Netherlands, represented by province

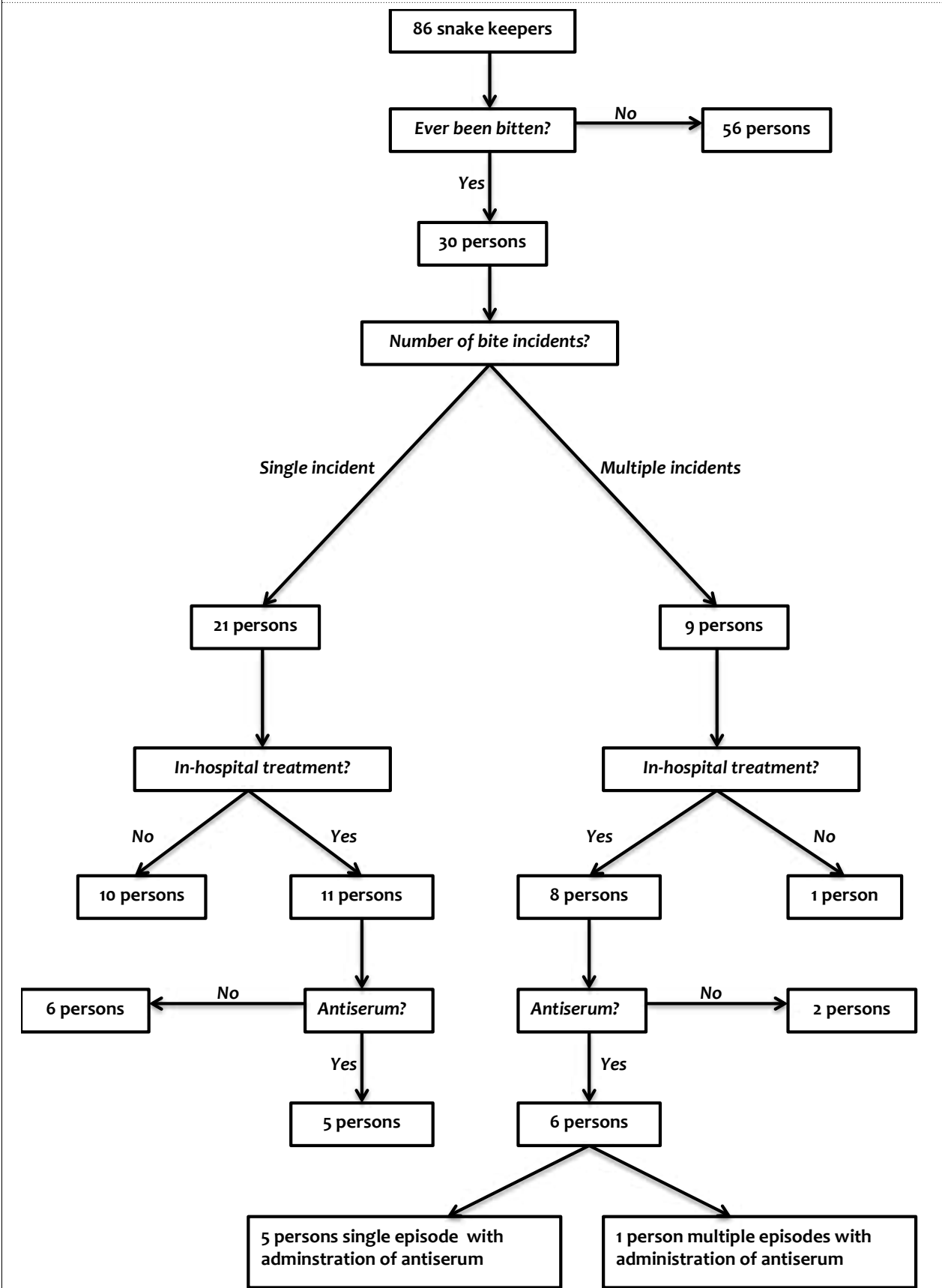


hobby for less than five years, whilst 12 of them (14.0%) had been doing so for over 15 years. Fifty-four (64.3%) respondents indicated that they had never been bitten by their venomous snake, 21 (25.0%) of them reported having been bitten once, seven (8.3%) had been bitten between 2-4 times, one (1.2%) respondent had been bitten between 5-9 times and one (1.2%) respondent actually reported having been bitten ≥ 10 times by a venomous snake. Nineteen (23.4%) respondents reported having had to go to hospital for treatment one or more times. Twelve (14.1%) had been to hospital just once for treatment, five (5.9%) needed to go to hospital between 2-4 times, one (1.2%) respondent had been between 5-9 times and one (1.2%) other person had been to a hospital for treatment ≥ 10 times. As part of their treatment 11 (13.2%) individuals had had an antiserum administered in a hospital. One person (1.2%) was given antiserum on several occasions. In *figure 2*, the flowchart shows the number of venomous snakebites as well as any treatment in a hospital and the administration of antiserum amongst the 86 respondents.

Risk factors for snakebites

A significant trend was observed between on the one hand the number of snakes being kept and the number of snakebites reported (p value = 0.0013) and on the other hand between the number of snakebites and the number of years that the hobby was exercised (p value = 0.0139). There was also a significant trend between the number of

Figure 2. Flowchart illustrating the responses of the 86 individuals who took part in the Internet survey concerning the incidents of venomous snakebites, the number requiring hospital treatment and those resulting in the administration of antiserum



years that the snakes were kept as a hobby and the number of snakes (p value <0.0001).

Extent and diversity of venomous snake collections

Table 1 lists the top five species of venomous snakes that are being kept, broken down by family. From the pit viper or pit adder (*Crotalinae*) family there are 43 species (with 31 subspecies) with the neotropical rattlesnake (*Crotalus durissus*) the most popular (15 times). From the family of coral snakes (*Elapidae*) there were 34 species with 11 subspecies. The coral cobra (*Aspidelaps lubricus*) is the most commonly kept within this family (30 times). Amongst the family of true vipers (*Viperinae*), 24 species with nine subspecies were being held and the sand viper (*Vipera ammodytus*) was the most popular adder (16 times). It also appears from the survey that in addition to the above there are four types of colubrids (*Colubridae*) being kept. Out of all the snake species identified by the survey, it is worth noting that no antiserum exists for 16 species, and this includes the most popular species, the coral cobra.

DISCUSSION

Because most people who keep venomous snakes as a hobby do so in private, little is known about the number of incidents involving exotic venomous snakes, or about the exact size and diversity of collections of venomous snakes. Since its inception in 2008, the National Serum Depot, as part of the National Institute for Public Health and the Environment and the National Poisons Information Centre (NVIC), has been the institute that coordinates the distribution of antiserum. A recent publication revealed that in the period between 2008 and December 2011, the NVIC was on average consulted five times per year over a bite from an exotic venomous snake, whilst during the same period an antidote was only issued five times in total, and was actually administered on just two occasions.⁴ No fatalities caused by bites from exotic venomous snakes have been recorded in the Netherlands. These observations suggest that a significant proportion of such bites trigger only mild reactions, that the administration of antiserum is not always necessary and that it is quite possible that many of the bites are so called 'dry' or defensive bites. Our survey gives a similar picture. On average, one in three keepers of snakes confirmed having been bitten by exotic venomous snakes whilst keeping them as a hobby. Of the 30 people bitten by these snakes, 11 of them (36.7%) did not require any hospital treatment. Of the remaining 19 people who reported having been bitten, 11 had been given an antiserum at least once in their lives. Trend analysis shows a clear relationship between the occurrence of snakebites and the number of snakes

Table 1. Listing of the top five species (broken down by family) of venomous snakes that are being kept by the 86 internet respondents

Family name	Number of times kept	Existing antiserum
I. Pitvipers (<i>Crotalinae</i>)		
Neotropical rattlesnakes (<i>Crotalus durissus</i>)	15 (4 subspecies)	Yes
Western Diamond Back rattlesnake (<i>Crotalus atrox</i>)	12	Yes
Massasauga (<i>Sistrurus catenatus</i>)	11 (3 subspecies)	Yes
Copperhead (<i>Agkistrodon contortrix</i>)	9 (3 subspecies)	Yes
White-lipped Bamboo viper (<i>Trimeresurus albolabris</i>)	8	Yes
II. Elapid snakes (<i>Elapidae</i>)		
Coral Cobra (<i>Aspidelaps lubricus</i>)	28 (3 subspecies)	No
Snouted Cobra (<i>Naja annulifera</i>)	12	Yes
Monocle Cobra (<i>Naja kaouthia</i>)	11	Yes
Indo-Chinese Spitting Cobra (<i>Naja atra</i>)	9	Yes
Cape Cobra (<i>Naja nivea</i>)	8	Yes
III. Vipers (<i>Viperinae</i>)		
Long-nosed viper (<i>Vipera ammodytus</i>)	16 (2 subspecies)	Yes
Puff viper (<i>Bitis arietans</i>)	9	Yes
Sahara Horned viper (<i>Cerastes cerastes</i>)	6	Yes
Gabon viper (<i>Bitis gabonica</i>)	5 (2 subspecies)	Yes
Asp viper (<i>Vipera aspis</i>)	5	Yes

being kept (or the size of the venomous snake collection) but also with the number of years that a person has been keeping snakes as a hobby (or the number of times he/she has been exposed to venomous snakes). Unfortunately, the survey did not ask about the circumstances under which the bites occurred, such as whether this was during the cleaning of the terrarium, while changing the water, or whilst handling the snakes.

The survey has provided detailed information about the extent and diversity of venomous snake collections belonging to the 86 respondents. There is no antiserum against 16 of the species of venomous snakes being kept. This means that even more emphasis needs to be put on the prevention of venomous snakebites. Further research revealing the circumstances in which snakebites are occurring would be valuable when preparing advice for persons keeping venomous snakes about what preventative measures they should take.

Further information is important not only for individuals keeping snakes but also for the emergency services, such as those at the Havenziekenhuis, which provide specialised help in the case of an (exotic) venomous snakebite. It would also assist with the proper alignment of the stock and diversity of antiserums against bites from venomous snakes. In order for such an initiative to succeed, help from individuals keeping snakes and an open dialogue between them and the emergency services is essential.

LIMITATIONS

The incidence of snakebites identified in the survey must be considered in a specific but probably also limited context, due to inherent recall and response biases. Because many snake owners exercise the hobby in anonymity, the questionnaire was written in such a way as to ensure that it was not traceable to any individual. And in order to guarantee the anonymity of the persons keeping venomous snakes we specifically did not ask which year an individual was bitten or, if this was the case, in which year they received in-hospital treatment, but only whether the respondents had ever been bitten during the time that they kept venomous snakes as a hobby and whether or not they required hospital treatment. In addition, the question remains whether the persons who took part in the study are representative of all individuals who keep exotic venomous snakes as a hobby, the exact number of whom in the Netherlands is unknown.

CONCLUSION

Keeping venomous snakes as a hobby is not without danger. The chances of being bitten increase the more snakes are kept and the longer they are kept for. Although there have been no fatalities recorded in the Netherlands as a result of bites of exotic venomous snakebites, a considerable number of such bites require the administration of an antiserum. Because there are a significant number of species of venomous snakes for which no antiserum exists, the prevention of bites by venomous snakes remains the most important safety measure.

ACKNOWLEDGEMENTS

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