

ORIGINAL ARTICLE

Assessing Response Awareness to a Snake Bite in Population of Pune Region

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ABSTRACT

Introduction: Snake bite is a preventable public hazard of the country. Community awareness & empowering healthcare workers can reduce snakebite associated mortality. A well-timed first aid is always decisive in the management of snake bite.

Material and Methods: An observational cross-sectional study based on questionnaire of 20 questions done, data tabulated, analysed and compared in order to determine the awareness in study group about the identification of type of snakes, first aid, management, traditional practices performed in case of snake bites.

Results: A total of 906 persons participated in survey. Most of them answered to all of the 20 questions with very few skipping 1-2 questions. Snake bite mark identification is important for early and effective treatment. 785 (86.64%) persons identified poisonous and non-poisonous snake bite from two images. Identifying important early symptom of neurotoxic snakebite is paramount for quick life saving measures. 514 (56.85%) identified drooping of eyelids as early warning

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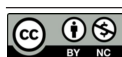
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sign. Reassuring and calming of the snakebite victim helps to prevent anxiety and helps correctly observing signs-symptom; 550 (60.70%) participants agreed to this reasoning.

Conclusion & Recommendations: Although most of the participants were able to identify commonly known snakes like cobra, venomous bite mark and common treatment methods, but many were unaware about features of uncommon sea snakes, misconceptions regarding treatment and complications. Inclusion of snakebite first aid measures in educational curriculum at early level might help to improve outcomes.

KEYWORDS:

• Awareness • Response • Snakebite

INTRODUCTION

The World health organization (WHO) designated poisoning by snake bite a neglected tropical disease in 2017.¹ It is a more serious problem in tropical countries like India because the subcontinent is home to so many different types of snakes: 60 of the country's nearly 300 species are highly venomous.²

It is a preventable public hazard faced by population of the country. Global estimates of snakebite deaths have ranged from 50,000 to 125,000; in India alone, about 50,000 cases reported per annum.³ Only 22.19% of the snakebite victims attended the hospitals. This is because even today most of the victims initially approach traditional healers for treatment and many are not even registered in the hospital.⁴ Lack of precise first aid knowledge for snake bite is a consequential reason for its severe fatality in human beings.

A recent study done in Palghar district in Maharashtra suggests that community awareness, empowering healthcare workers can reduce snakebite deaths.⁵ Hence, there is a need to assess and compare the awareness among medical students and general rural population about the identification of type of snakes, first aid management, traditional practices performed in case of snake bites.

In addition to this, the people living in the rural areas are the first responders in case of a snake bite as in most of the cases the nearest health facility is not reachable distance, taking more than 30 minutes to reach and no transport facility is available to reach the nearest health center. Thus, a well-timed first aid is always decisive in the management of this life-

threatening condition. So, their fundamental knowledge is of utmost importance.

The study aims to assess knowledge among general population about the identification of type of snakes, first aid, management and traditional practices followed in case of snake bite and to suggest remedial measures to bridge the knowledge gap.

MATERIAL AND METHODS

It is an Observational cross-sectional study. A survey of awareness regarding response to snakebite in general population in Pune region based on questionnaire both in English and vernacular language. After the survey answers were provided to participants to enhance their knowledge and hopefully better understanding about the first aid and management of snake bite cases. 906 participants from the general population (mostly visitors to Dr. D Y Patil hospital and allied Rural & Urban health Centres), who were willing to participate in the study were surveyed.

A questionnaire included 20 questions (based on image-based identification of snakes, true or false questions, based on traditional practices, multiple choice questions based on first aid and management of snake bite). Additionally relevant demographic data related to participant was collected. After completion of survey a detailed answer sheet provided to participant to increase awareness and any doubts were answered. Verbal consent from participants taken before answering questionnaire.

All the data tabulated, analysed and compared in order to determine the

awareness in study group about the identification of type of snakes, first aid, management, traditional practices performed in case of snake bites.

RESULTS

In this awareness survey a total of 906 persons participated of which 518(57.1%) were Male, 377(41.7%) Female and 11(1.1%) preferred not to reveal their gender. (Chart 1) Age distribution of participants as per age groups was 15-25 years: 551 (61.1%), 25-45 years: 235 (26.1%), 45-60 years: 112 (12.4%) and older than 60 years: 11 (1.2%). (Chart 2)

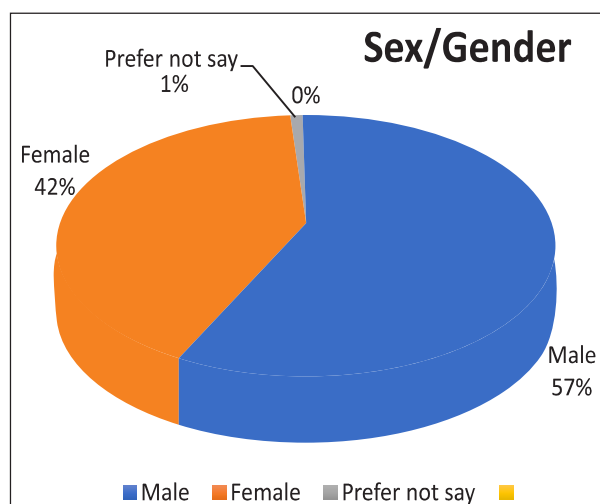


Chart 1: Sex distribution

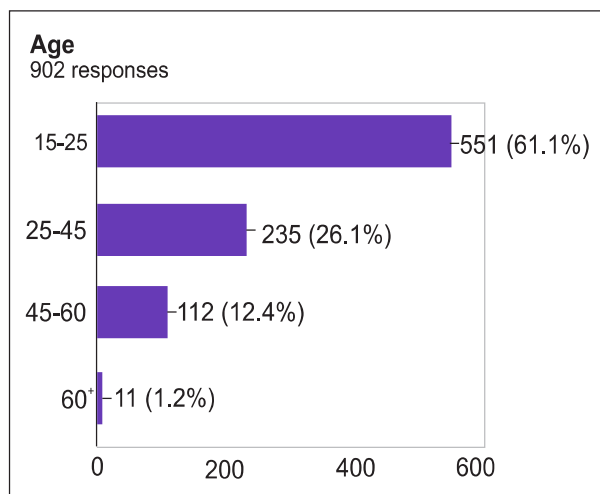


Chart 2: Age distribution

Educational profile of participants included 73.3% Graduates or Post-graduates, 18.1% completed Secondary/Higher secondary level education, 5.6% had completed Primary schooling, and only 3% were Illiterates. (Chart

3) Profession of participants mentioned are as follows: Health care workers formed most of the bulk of participants with 40.7%, followed by 21.3% doing Office work, Farmer/ Labourer blue collar job 8.2%, other profession 31.8%. The reason for healthcare workers being most commonly surveyed might be due to survey done in hospital premises and willingness of participants. (Chart 4)

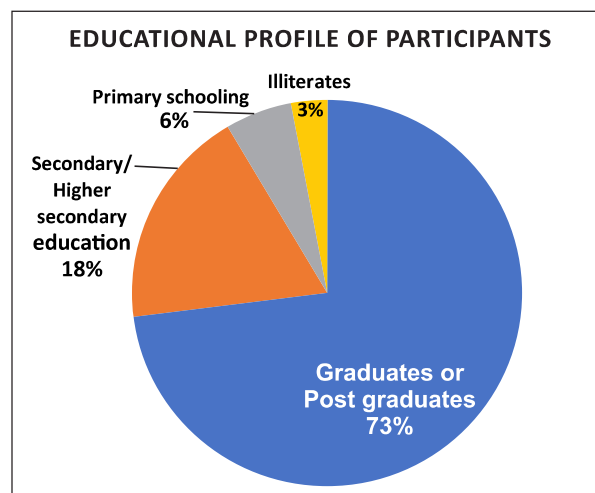


Chart 3: Educational profile of participants

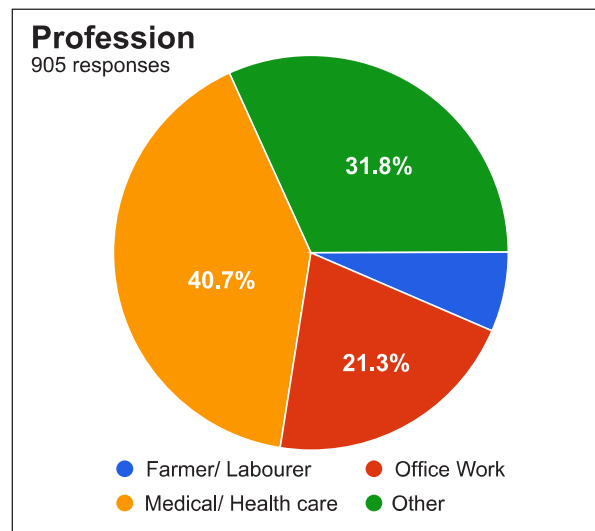


Chart 4: Profession of participants

Responses given by participants were noted down on survey forms and Google forms. The data was tabulated and analysed as shown in Table 1 and Chart 5. A total of 906 people, aged 15 years and above, belonging to various demographic background were surveyed. Most of them answered to all of the 20 questions with very few skipping 1-2 questions.

Table 1: Response to questionnaire

S. No.	Question & Correct Answer/Response	Total response	Correct response	Incorrect response
1	Identify Following snake 	905	775 (85.63%)	130 (14.37%)
	B. Cobra/ Naag			
2	Identify Poisonous Snake from following/ 	905	351 (38.78%)	554 (61.22%)
	C. Viper/ घोणस			
3	Identify Poisonous and Non-poisonous snake bite from following images/ 	906	785 (86.64%)	121 (13.36%)
	I. II. A. I - Poisonous; II - Non-poisonous/			
4	Only non-Poisonous snake among following is/ D. Rat snake/	906	581 (64.12%)	335 (35.88%)
5	Which among the following is a Poisonous snake? / B. Coral Snake/B.	905	456 (50.38%)	449 (49.62%)
6	Which is the most Poisonous snake in India? C. Common Krait/	906	330 (36.42%)	576 (63.58%)
7	Poisonous sea-snakes identified with/ A. Compressed tail/A.	904	370 (40.92%)	534 (59.08%)
8	Most of the Poisonous snakes have/ D. Wide transverse scales as broad as belly/	905	270 (29.83%)	635 (70.17%)
9	What percentage of snakes have ability to kill Human by biting? A. Less than 10% / A. 10% पेक्षा कमी	905	415 (45.85%)	490 (54.15%)
10	Which of the following is an antidote for a poisonous snake bite? / B. Anti-snake venom/B.	906	743 (82%)	163 (18%)
11	How is hearing capacity of snakes? C. Weak/Doubtful/C.	906	501 (55.29%)	405 (44.71%)
12	Appropriate site for tourniquet is/ A. 2 inches above/ proximal the site of bite/	903	244 (27.02%)	659 (72.98%)
13	Snakebite mark should be covered with tight dressing/ B. No	905	475 (52.48%)	430 (47.52%)
14	When a snake bites a person, you will do/ D. Reassure, calm the patient and shift to hospital/D.	905	442 (48.83%)	463 (51.17%)
15	Reassuring and calming of the snakebite victim helps to/ A. Prevent anxiety and helps observing signs-symptoms/A.	906	550 (60.70%)	356 (39.30%)
16	Cobra venom mainly causes/ B. Neurotoxic effect	905	551 (60.88%)	354 (39.12%)
17	Viper snakebite mainly causes/ C. Hemotoxic effect	905	424 (46.85%)	481 (53.15%)
18	Can snakes identify and remember humans by vision/ B. No	906	595 (65.67%)	311 (34.33%)
19	Important symptom of neurotoxic snakebite is/ B. Drooping of eyelids/B.	904	514 (56.85%)	390 (43.15%)
20	Infection risk in snakebite wound increases by C. Cutting the wound/	903	460 (50.94%)	443 (49.06%)

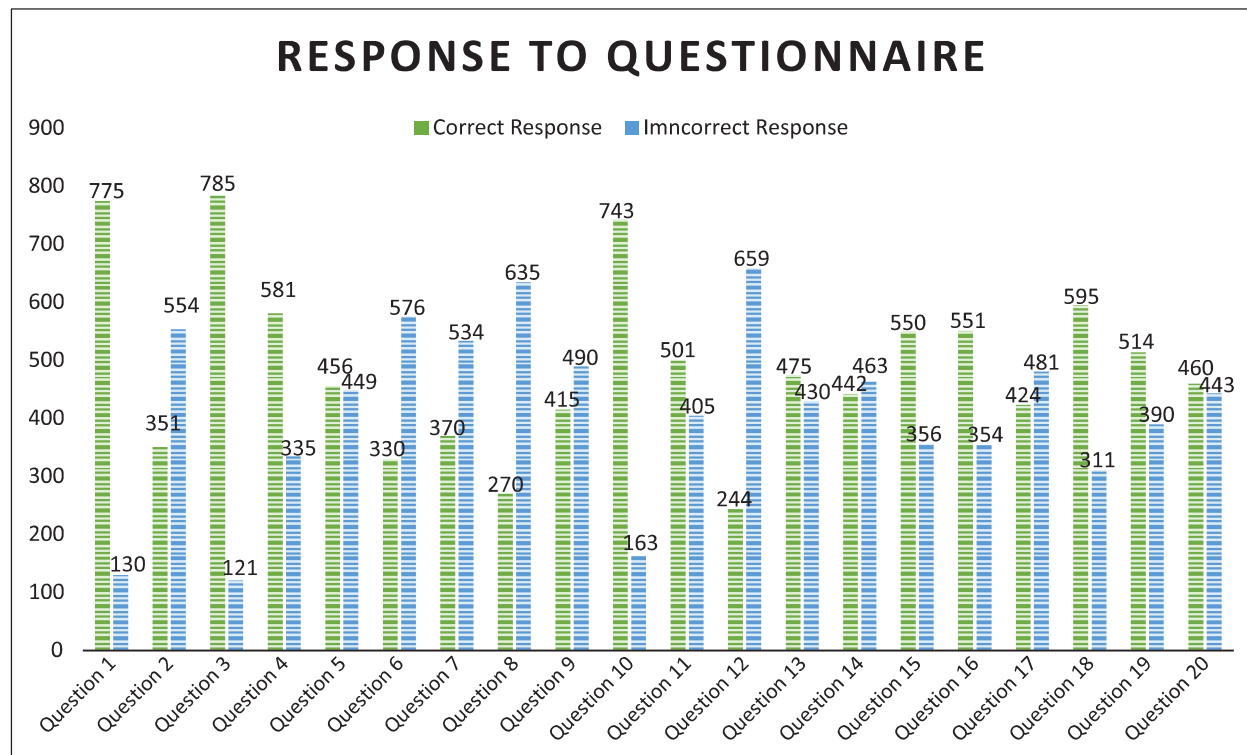


Chart 5: Response to questionnaire

775 (85.63%) participants correctly identified snake image as Cobra, but only 351 (38.78%) identified Viper as Poisonous Snake from images provided and 456 (50.38%) correctly mentioned Coral Snake as poisonous snake from options.

Snake bite mark identification is important for early and effective treatment. 785 (86.64%) persons identified poisonous and non-poisonous snake bite from two images. Non-Poisonous snake Dhaman/Rat snake can be confused with cobra but 581 (64.12%) participants replied rightly it as non-poisonous. Proportion of poisonous snakes is less than 10% and hence most snake bites are non-venomous, decreasing ability to kill Human by biting. Only 415 (45.85%) participants were aware of this.

Most Poisonous snake in India is Common Krait with highest potency, mere 330 (36.42%) could answer it correctly. In coastal areas sea snakes are threat to people, being different mechanism of action and treatment. Poisonous sea-snakes identified with different morphological feature like compressed tail useful for swimming in water. Only 370 (40.92%) persons could tell this differentiating feature.

Wide transverse scales as broad as belly is a physical feature of the poisonous snakes, which only 270 (29.83%) participants knew.

Anti-snake venom is mainstay of treatment for a poisonous snake bite. 743 (82%) of persons were aware of it. There are many misconceptions about snakes hearing, vision and memory capabilities. 501 (55.29%) of participants rightly said that hearing capacity of snakes is weak/doubtful and 595 (65.67%) replied negatively to a question 'Can snakes identify and remember humans by vision?'

Cobra venom mainly causes neurotoxic effect in body and Viper snakebite mainly causes hemotoxic effect which was correctly answered by 551 (60.88%) & 424 (46.85%) participants respectively.

Identifying important early symptom of neurotoxic snakebite is paramount for quick life saving measures. 514 (56.85%) identified drooping of eyelids as early warning sign in these cases.

Awareness about first aid measures is crucial for first responders. Appropriate site for tourniquet being 2 inches above/ proximal the site of bite and it should not be tight enough to obstruct blood flow was rightly replied by only 244 (27.02%) and 475 (52.48%) participants respectively.

Reassurance, calming the patient and quickly shifting to hospital creates big difference in outcome of life & death. 442 (48.83%) persons chose this option over other misconceptions. Reassuring and calming of the snakebite victim helps to prevent anxiety and helps correctly observing signs-symptom. 550 (60.70%) participants agreed to this reasoning. Wrong first aid treatment rather than helping can cause complications and increase morbidity. Infection risk in snakebite wound increases by cutting the wound which is not recommended now. Nearly half participants were unaware of this, 460 (50.94%) responded correctly.

DISCUSSION

South Asia is the most affected region for snake bite, due to its high population density, widespread agricultural activities, numerous venomous snake species and lack of functional snake bite control programs. Although 'poisonous' and 'venomous' words have some different meaning for the sake of simplicity/ understanding of participants they have been used interchangeably in this survey. Snakebite remains an important but underestimated cause of accidental death in India. An accurate measure of the global burden of snakebite & reliable figures on incidence, morbidity, and mortality are scarce.⁶

Awareness among general population regarding identification of poisonous snakes, first aid treatment and removing misconceptions is important. Various awareness studies had been conducted in different parts of India but this study is one of the first in Pune region. A total of 906 people, aged 15 years and above, belonging to various demographic backgrounds participated in this survey and answered 20 questions. The identification of snake species is crucial for optimal clinical management, as it allows clinicians to choose the appropriate treatment, anticipate complications, and thereby reducing mortality. 775 (85.63%) participants correctly identified snake image as Cobra, but only 351 (38.78%) identified Viper as Poisonous Snake from images provided and 456 (50.38%) correctly mentioned Coral Snake as poisonous snake from options. Wide transverse scales as broad as belly is a physical feature of the poisonous snakes, which only 270 (29.83%) participants knew.

If a poisonous snake is identified then appropriate treatment measures can be started earliest and patient can be monitored for progress or deterioration. Most of the studies report that in many cases the biting snake is not seen, and if it is, its description by the victim is often misleading⁷ Even if poisonous snake couldn't be identified; bite mark of venomous snake can be differentiated from that of non-venomous. 785 (86.64%) persons identified poisonous and non-poisonous snake bite from two images. It suggests good awareness among Pune population.

Not all snakes are venomous, majority are non-venomous. Bites by non-venomous snakes are common and bites by venomous species are not always accompanied by the injection of venom (dry bites). Proportion of poisonous snakes is less than 10% and hence most snake bites are non-venomous, decreasing ability to kill Human by biting. Only 415 (45.85%) participants were aware of this. Most complications arise due to fear of death. Removing this fear and reassurance helps decrease complications. Reassurance, calming the patient and quickly shifting to hospital creates big difference in outcome of life & death. 442 (48.83%) persons chose this option over other misconceptions. Reassuring and calming of the snakebite victim helps to prevent anxiety and helps correctly observing signs-symptom. 550 (60.70%) participants agreed to this reasoning.

Most poisonous snake in India is Common Krait with highest potency, mere 330 (36.42%) could answer it correctly. In coastal areas sea snakes are threat to people, being different mechanism of action and treatment. Poisonous sea-snakes identified with different morphological feature like compressed tail useful for swimming in water. Only 370 (40.92%) persons could tell this differentiating feature.

Appropriate first aid decreases complication rates. Wrong first aid treatment rather than helping can cause complications and increase morbidity. According to a detailed review study about snake bites in South Asia, popular traditional treatments include chanting, incisions, attempts to suck venom from the bite site, and the application of herbal medicine or snake stones. The most important thing is for the people to recognize the symptoms of snake bite and take medical help.⁵ People

should know that poisonous snake bites are fully curable if the patient is given appropriate medical treatment without wasting time. Infection risk in snakebite wound increases by cutting the wound which is not recommended now. Nearly half participants were unaware of this, 460 (50.94%) responded correctly.

Appropriate site for tourniquet being 2 inches above/ proximal the site of bite and it should not be tight enough to obstruct blood flow was rightly replied by only 244 (27.02%) and 475 (52.48%) participants respectively. A venous tourniquet can be beneficial when kept below a pressure of 30mm Hg (2 fingers under band), limiting spread of systemic absorption; however, improper application limits its use in the field. Wound compression, which involves wrapping the affected extremity distal to proximal at an optimal pressure of 55mm Hg, has been shown to be error prone and is not recommended.⁷

Patients of snake bite should be transported as quickly as possible to a medical centre where they can be clinically evaluated by qualified medical staff, and where anti venoms are available. In fact, time of transport was shown to be a crucial determinant of snake bite mortality.

Anti-snake venom is mainstay of treatment for a poisonous snake bite. 743 (82%) of persons were aware of it. Despite increasing knowledge of snake venoms' composition and mode of action, good understanding of clinical features of envenoming and sufficient production of antivenom by Indian manufacturers, snake bite management remains unsatisfactory in this region. There are many misconceptions about snakes hearing, vision and memory capabilities. 501 (55.29%) of participants rightly said that hearing capacity of snakes is weak/doubtful and 595 (65.67%) replied negatively to a question 'Can snakes identify and remember humans by vision?'

Monitoring of patients for danger signs is very important for timely intervention and favourable outcome. In snake bite cases type of venom identification and clinical features help in appropriate & optimal treatment. To a question regarding effect of cobra venom's neurotoxic effect in body and Viper snakebite mainly causes hemotoxic effect; was correctly answered by 551 (60.88%) & 424 (46.85%) participants respectively. Identifying important early symptom of neurotoxic

snakebite is paramount for quick life saving measures. 514 (56.85%) identified drooping of eyelids as early warning sign in these cases.

Overall analysis shows that most of the participants were able to identify commonly known snakes like cobra, venomous bite mark and common treatment methods, but many were unaware about features of uncommon sea snakes, misconceptions regarding treatment and complications. Almost all participants were satisfied after participation in survey and said it helped increase their awareness regarding snake bite response. Many of them assured that they will spread this knowledge to other people.

785 (86.64%) persons identified poisonous and non-poisonous snake bite from two images. It suggests good awareness among Pune population. Proportion of poisonous snakes is less than 10% and hence most snake bites are non-venomous, decreasing ability to kill Human by biting. Only 415 (45.85%) participants were aware of this. Reassurance, calming the patient and quickly shifting to hospital creates big difference in outcome of life & death. 442 (48.83%) persons chose this option over other misconceptions.

Identifying important early symptom of neurotoxic snakebite is paramount for quick life saving measures. 514 (56.85%) identified drooping of eyelids as early warning sign in these cases.

Overall analysis shows that most of the participants were able to identify commonly known snakes like cobra, venomous bite mark and common treatment methods, but many were unaware about features of uncommon sea snakes, misconceptions regarding treatment and complications. More such surveys and awareness campaigns are required to be undertaken in rural, coastal and tribal areas.

Almost all participants gave positive feedback that this survey increased their awareness and removed misconceptions regarding snakebite response measures to be undertaken. More such surveys and awareness campaigns needed to be undertaken in society.

CONCLUSION & RECOMMENDATIONS

This snakebite response awareness survey among population of Pune region shows that although most of the participants were able to identify commonly known

snakes like cobra, venomous bite mark and common treatment methods, but many were unaware about features of uncommon sea snakes, misconceptions regarding treatment and complications. Most of the surveyed population was urban & literate. Snake bite awareness level might be lower in rural areas, hence such surveys and awareness campaigns are required to be undertaken in rural, coastal and tribal areas on mass level. Inclusion of snakebite first aid measures in educational curriculum at early level might help to improve outcomes.

Strengths & limitations: Study successfully assessed awareness regarding snake bite and response that can be given when encountered such scenario. As for limitation, study was conducted in health centre premises; hence in proportion to general population more health workers became study participants.

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