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KNOWLEDGE OF SNAKEBITE FIRST AID AND MANAGEMENT AMONG NURSING UNDERGRADUATES IN SELECTED UNIVERSITIES IN SRI LANKA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Sri Lanka experiences a substantial burden of snakebite incidents, particularly among rural communities and agricultural populations. Nurses frequently function as frontline healthcare providers and community educators; therefore, adequate knowledge regarding snakebite first aid and management is essential. A descriptive cross-sectional study was conducted among second- and third-year nursing undergraduate students from the University of Sri Jayewardenepura (UOSJ) and General Sir John Kotelawala Defence University (KDU), Sri Lanka. using a validated self-administered questionnaire. Descriptive and inferential statistics were applied. Statistical significance was established at $p < 0.05$. A total of 274 nursing undergraduates participated in the study. The mean overall knowledge score was 41.61 ± 9.27. Most participants demonstrated moderate knowledge (65.0%), while 17.9% demonstrated good knowledge and 17.2% demonstrated poor knowledge. Students from KDU demonstrated significantly higher knowledge scores than students from UOSJ (43.05 ± 9.41 vs. 39.21 ± 8.54, $p < 0.001$). Male students scored significantly higher than female students (46.10 ± 9.36 vs. 40.03 ± 8.73, $p < 0.001$). Third-year students demonstrated significantly higher scores than second-year students (42.90 ± 9.43 vs. 40.40 ± 8.98, $p = 0.026$). Knowledge deficiencies were identified in snake identification, venom toxicity, antivenom use, and evidence-based first aid practices Incorporating structured snakebite management education into undergraduate nursing curricula may improve preparedness for managing snakebite emergencies.

Keywords: Snakebite; First Aid; Nursing Students; Knowledge; Antivenom; Nursing Education; Sri Lanka

1 INTRODUCTION

Snakebite envenoming remains a major public health challenge in tropical and subtropical regions worldwide. The World Health Organization recognizes snakebite envenoming as a neglected tropical disease because of its substantial contribution to mortality, disability, and socioeconomic burden, particularly among populations living in rural and resource-limited settings (1). South Asia accounts for a considerable proportion of the global burden of snakebite-related morbidity and mortality (2).

Sri Lanka is recognized as one of the countries with a high incidence of snakebite envenoming. Several medically important venomous snake species are responsible for clinically significant envenomation, including the cobra (*Naja naja*), Russell's viper (*Daboia russelii*), common krait (*Bungarus caeruleus*), Ceylon krait (*Bungarus ceylonicus*), hump-nosed viper (*Hypnale spp*.), and saw-scaled viper (*Echis carinatus*) (3,4). Snakebite incidents are particularly common among agricultural workers and rural communities, where occupational and environmental exposure increase the likelihood of encounters with venomous snakes (5).

The clinical manifestations of snakebite depend on venom composition and toxicity. Snake venoms contain complex mixtures of bioactive proteins and peptides capable of causing neurotoxic, hemotoxic, cytotoxic, and myotoxic effects (6). Understanding the toxicity profiles of venomous snakes is essential for effective clinical management and appropriate administration of antivenom therapy (7).

Appropriate first aid and early medical intervention are critical determinants of patient outcomes following snakebite. Evidence-based first aid aims to reduce complications, minimize venom spread, and facilitate rapid transfer to an appropriate healthcare facility. However, harmful traditional practices, including wound incision, venom suction, application of tourniquets, and administration of alcohol or herbal remedies, continue to be reported in many communities despite limited scientific evidence supporting their effectiveness (5,8).

Nurses frequently serve as frontline healthcare providers responsible for emergency care, patient monitoring, and community health education. Consequently, adequate knowledge regarding snake identification, venom toxicity, antivenom administration, and evidence-based first aid practices is essential. Previous studies conducted among healthcare professionals and healthcare students have reported variable levels of knowledge regarding snakebite management, with significant gaps identified in snake identification, first aid practices, and antivenom use (9,10).

In Sri Lanka, evidence regarding snakebite-related knowledge among nursing undergraduates remains limited. A recent study among Sri Lankan nursing students reported deficiencies in the identification of venomous snakes despite moderate knowledge regarding first aid practices (11). Given the important role of nurses in emergency care and community health promotion, assessing current knowledge levels is necessary to identify educational gaps and support curriculum development.

Therefore, this study aimed to assess the knowledge and awareness regarding snakebite first aid and management among second- and third-year nursing undergraduate students in selected universities in Sri Lanka.

2 METHODS

2.1 Study Design

A descriptive cross-sectional study was conducted. The study was conducted among second- and third-year nursing undergraduate students enrolled at the University of Sri Jayewardenepura and General Sir John Kotelawala Defence University, Sri Lanka.

2.2 Data Collection Instrument

Data were collected using a validated self-administered questionnaire consisting of four sections, which were, Sociodemographic characteristics, Personal experience regarding snakebite, Knowledge regarding snakebite first aid and management, Myths and beliefs regarding snakebite.

Data collection was conducted between 16 December 2024 and 21 January 2025. Both online and paper-based questionnaires were utilized to maximize participation.

2.3 Statistical Analysis

Data were analyzed using SPSS version 25. Descriptive statistics included frequencies, percentages, means, standard deviations, medians, and interquartile ranges.

Knowledge scores were calculated using total questionnaire scores. The mean knowledge score was 41.61 ± 9.27.

Independent-sample t-tests and one-way ANOVA were used to compare knowledge scores between participant groups. Statistical significance was defined as $p < 0.05$.

3 RESULTS

3.1 Sociodemographic Characteristics of Participants (N = 274)

Table 1: Sociodemographic and academic characteristics of the study participants (N = 274)

Characteristic	Category	Frequency (n)	Percentage (%)
University	KDU	171	62.4
	UOSJ	103	37.6
Gender	Female	203	74.1
	Male	71	25.9
Age (years)	18–22	33	12.0
	23–27	235	85.8
	28	6	2.2
Academic year	Second year	142	51.8
	Third year	132	48.2

A total of 274 students participated in the study. Of these, 171 (62.4%) were from KDU and 103 (37.6%) were from UOSJ. The majority of participants were female (74.1%), while males accounted for 25.9%. Most participants (85.8%) were aged 23–27 years. Regarding academic year, 51.8% were second-year students and 48.2% were third-year students.

3.2 Overall, Knowledge Scores

Table 2: Descriptive Statistics of Overall Knowledge Scores (N = 274)

Statistical measure	Value
Mean ± Standard deviation	41.61 ± 9.27
Median (Interquartile range)	40 (34–47)
Minimum score	23
Maximum score	74

Table 3: Distribution of Knowledge Levels among Participants (N = 274)

Knowledge level	Frequency (n)	Percentage (%)
Poor knowledge	47	17.2
Moderate knowledge	178	65.0
Good knowledge	49	17.9
Total	274	100.0

3.3 Knowledge levels were categorized according to the predefined scoring criteria.

The mean overall knowledge score among participants was 41.61 ± 9.27, with a median score of 40 (IQR: 34–47). Scores ranged from 23 to 74. Regarding knowledge categorization, the majority of participants demonstrated moderate

knowledge of snakebite first aid and management (65.0%). Meanwhile, 17.2% demonstrated poor knowledge, while 17.9% demonstrated good knowledge.

3.4 Factors Associated with Knowledge Scores

Only 23.7% of participants reported confidence in distinguishing venomous from non-venomous snakes, while 48.9% indicated that they were unable to properly identify venomous snakes.

Approximately one-third of participants reported no knowledge regarding venom toxicity (32.4%). Knowledge regarding antivenom therapy was also limited, with 30.3% reporting no knowledge of antivenom.

Although 69.3% of participants recognized the importance of administering first aid following a snakebite, only 29.9% demonstrated adequate overall first-aid knowledge.

4 DISCUSSION

The present study assessed knowledge and awareness regarding snakebite first aid and management among nursing undergraduates in two Sri Lankan universities. The findings demonstrated a moderate overall level of knowledge, with a mean score of 41.61 ± 9.27 and the majority of participants classified within the moderate knowledge category.

Knowledge regarding snake identification was notably limited. Less than one-quarter of participants reported confidence in differentiating venomous from non-venomous snakes. Similar findings were reported by Jayathilaka and Weeratunga (2024), who identified substantial deficiencies in venomous snake identification among nursing students. Accurate identification of medically important snakes remains important for risk recognition and timely referral, particularly in rural settings.

Deficiencies were also identified regarding venom toxicity and antivenom therapy. Approximately one-third of participants reported limited knowledge in these areas. Similar knowledge gaps among healthcare students have been reported in Saudi Arabia and other countries, highlighting the need for improved educational interventions regarding snakebite management (9,10).

A positive finding was that most students recognized the importance of providing first aid following a snakebite. However, detailed knowledge regarding evidence-based first aid measures remained inadequate. These findings are consistent with previous reports indicating that healthcare students often possess general awareness but lack comprehensive practical knowledge regarding snakebite management (8,12).

Students from KDU demonstrated significantly higher knowledge scores than students from UOSJ. Furthermore, third-year students achieved significantly higher scores than second-year students, suggesting that increased academic exposure and clinical experience contribute to improved knowledge acquisition. Similar associations between educational exposure and improved knowledge have been reported previously among healthcare trainees (9).

Male students demonstrated significantly higher knowledge scores than female students. Although this finding was statistically significant, the underlying reasons remain unclear and warrant further investigation. Cultural, environmental, and experiential factors may contribute to these differences.

The findings of the present study have important implications for nursing education in Sri Lanka. Snakebite remains an important public health issue, particularly in rural communities where nurses frequently serve as frontline healthcare providers. Incorporating structured educational modules on snakebite management into undergraduate nursing curricula may improve preparedness for clinical practice.

5 CONCLUSIONS

The present study demonstrated that nursing undergraduates possessed moderate overall knowledge regarding snakebite first aid and management. Significant deficiencies were identified in snake identification, venom toxicity, antivenom therapy, and evidence-based first aid practices. Significant differences in knowledge were observed according to university, gender, and academic year. These findings support the integration of structured snakebite management education into undergraduate nursing curricula and continuing professional development activities for future nursing professionals.

Strengths and limitations

This study included participants from two universities and assessed multiple dimensions of snakebite knowledge. However, the cross-sectional design limits causal interpretation. Furthermore, the final sample size was lower than the calculated sample size, potentially affecting generalizability.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

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Disclosure of conflict of interest

All authors declare no financial or non-financial conflicts of interest.

Statement of ethical approval

Ethical approval was obtained from the Ethics Review Committee of the Faculty of Medicine, General Sir John Kotelawala Defence University (RP/S/2024/33).

Statement of informed consent

Written informed consent was obtained from all participants. Participation was voluntary and confidentiality was maintained throughout the study.

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