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Knowledge of Snake Bite Management among Farmers

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Abstract:
Snakebite is a global emergency that can result in death, especially among farmers. Knowledge of snakebite management for farmers can improve first aid skills and abilities. This study aims to analyze the importance of snakebite management on farmer safety. The method used in this research is a literature study by finding articles in 3 databases: Google Scholar (3,000 articles), Pubmed (4 articles), and ScienceDirect (196 articles). After that, the journals were sorted again with more specific keywords and years that met the criteria (2019-2024). The search keywords use two languages: the English keywords use "Knowledge" AND "Snakebite" AND "Management" AND "Farmers," and the Indonesian keywords use "Pengetahuan" AND "Manajemen" AND "Gigitan Ular" AND "Petani," then reviewed by reading the abstracts until finally reviewed by reading the abstract until finally a total of 10 titles were obtained. Based on these 10 articles, this study found that snakebite management education has an important effect on farmer safety. Snakebite first aid education and training have effectively improved farmers' knowledge and skills in handling snakebite cases. Approaches such as self-instructional modules, training workshops, and lectures have proven effective. Lack of first aid skills in snakebite incidents among farmers can be fatal. Therefore, nurses and health workers should educate farmers to reduce adverse outcomes and promote safer farming practices.

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INTRODUCTION

Many countries have a large agricultural sector, where many work as farmers (Lowder et al., 2021). Farmers spend much time working in the fields; while working, they have many risks that can endanger them, including snake bites (Wulandari et al., 2024). Snakebites are frequently referred to as an occupational hazard, significantly impacting farmers, livestock herders, and other agricultural laborers in impoverished rural areas (Schurer et al., 2022). Worldwide, the death rate from snakebites has been closely linked to the proportion of the population employed in agriculture (Martins et al., 2019).

Snakebite cases in farmers are dangerous because they can cause disability and even death, so it is important to be aware of them (Francis et al., 2023). According to WHO, there were 237,378-1,184,550 snakebite cases worldwide in 2008, with 15,385-57,638 deaths in the Asia-Pacific region. In Indonesia alone, the number of snakebite victims is around 135,000 per year due to snake bite-related diseases (Ryandini, 2020). Deaths due to snake bites can occur due to various factors; one of the main factors is knowledge about snake bite cases (Afroz et al., 2023).

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The lack of knowledge among farmers can be seen from their habits in taking precautions against snake bites (Wood et al., 2022). Many do not use personal protective equipment such as gloves, boots, and others (Sookhtanlou & Allahyari, 2021). In addition, farmers often engage in activities such as sleeping on the floor and open living areas, which puts them at risk of snake bites (Ooms et al., 2021). In treating snake bite victims, they have more confidence in using magical and traditional medicine than taking them to the hospital (Nann, 2021). As a result, snake bite victims experience delays in handling proper snake bite treatment (Haristiani et al., 2024).

Snakebite fatalities result from a multifaceted combination of factors beyond mere knowledge of snakes. The type of venom—whether neurotoxic, hemotoxic, or cytotoxic—determines the severity and progression of symptoms, as each toxin targets different bodily systems, necessitating tailored treatments (Fadadu et al., 2024). The patient's overall health, including pre-existing conditions like diabetes, hypertension, or compromised immunity, can amplify the venom's harmful effects and complicate recovery (Behl et al., 2022). Geographic and socioeconomic barriers often limit access to timely medical care, particularly in rural or underserved regions, where transportation delays or inadequate healthcare infrastructure delay critical interventions (Wercholuk et al., 2022). Even when care is accessible, the absence or scarcity of antivenom—a life-saving resource—due to production challenges, high costs, or logistical failures in distribution leaves victims vulnerable (Cristino et al., 2021). Compounding these issues is a shortage of healthcare professionals trained in snakebite management, leading to errors in diagnosis, delayed antivenom administration, or improper wound handling. Public awareness gaps further exacerbate risks, as misconceptions about first aid (e.g., applying tourniquets, incisions, or traditional remedies) and a lack of clarity about antivenom's availability or effectiveness delay prompt, evidence-based action (Fernanda et al., 2023). These interconnected systemic and societal challenges highlight the need for holistic strategies to enhance education, resource distribution, and healthcare capacity in high-risk areas.

Clinical manifestations in patients with venomous snake bites generally show localized tissue damage, cell necrosis, internal bleeding, loss of muscle function, swelling, decreased blood pressure, corneal damage, irritation, uveal swelling, and red blood cell lysis (Fernanda et al., 2023). The person accompanying the patient notes observing the characteristics of the snake at the site. Proficiency in providing initial aid may be influenced by readiness and confidence in taking action (Namami & Yunanto, 2022). Accidents among those who rescue snakes, often fatal, may be caused by a lack of knowledge and misidentification of snake species (Ratnarathorn et al., 2024). Improving public education and awareness can reduce the occurrence of snakebites and facilitate the prompt transfer of bitten people to medical facilities (Togridou et al., 2022).

Snakebite management involves several important steps in dealing with a snakebite incident. First aid is essential before seeking professional medical assistance (Ralph et al., 2022). First aid can be performed by the victim or someone knowledgeable about the proper procedures. Important first aid steps include keeping the victim calm, immobilizing the body in a stable position, and supporting the bitten limb with a sling, splint, or pressure bandage (Werner & Soffa, 2023). The victim should be taken to the nearest health facility, ideally one with facilities to treat snakebite cases (Barnes et al., 2021). Traditional methods, such as making an incision or sucking out the venom, are not recommended as they are potentially dangerous (Pandey et al., 2023). After first aid, the patient should be taken to a health center for evaluation, identification of the type of snake, and necessary laboratory tests (Alqahtani et al., 2022). Treatment may involve antivenom and other therapies depending on the type of snake. Proper wound care is essential, including draining large tension wounds to prevent rupture (Lai et al., 2024).

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METHOD

This literature review searches using three databases: Google Scholar (3.000 articles), Pubmed (4 articles), and ScienceDirect (196 articles). The articles raised were published in the last 5 years, from 2019-2024. This literature review raises the topic of "Knowledge Snakebite Management among Farmers" using the PRISMA 2020 method. In the database, the search keywords use two languages: the English keywords use "Knowledge" AND "Snakebite" AND "Management" AND "Farmers," and the Indonesian keywords use "Pengetahuan" AND "Manajemen" AND "Gigitan Ular" AND "Petani".

Articles were selected from national and international journals based on inclusion and exclusion criteria. The inclusion criteria used are articles that have not been literature reviewed, articles published in the last 5 years, in the range 2019-2024, full-text articles, and titles and abstracts by the topics raised. The exclusion criteria used are articles with the research method of literature review, articles published over 5 years, and the title and abstract of the article do not match the topic raised. From these results, 10 articles were found suitable for analysis.

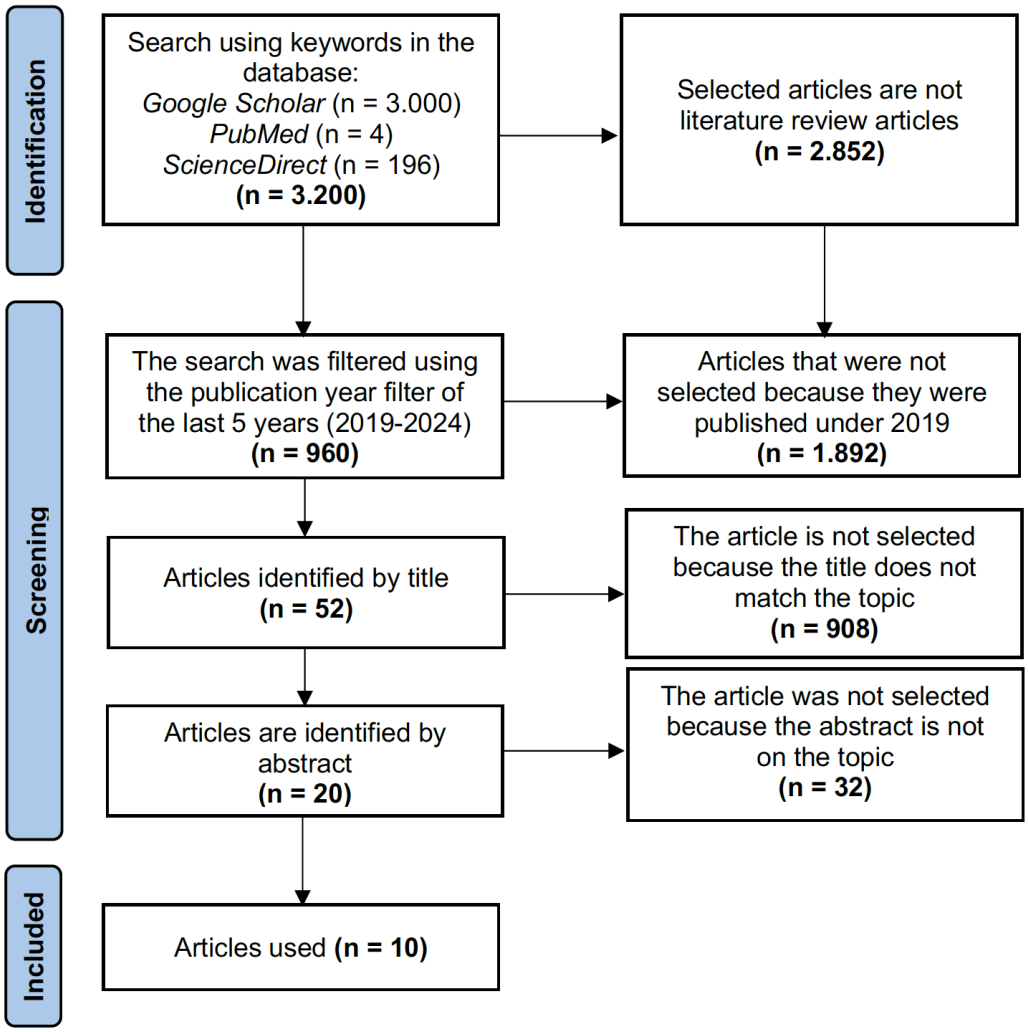

Figure 1. Flow Diagram based on PRISMA 2020

RESULT

Snakebites are a dangerous condition, especially when the biting snake is venomous. This is because venomous snake bites can cause several pathological complications of poisoning, both local and systemic, in the victim. In agricultural areas, incidents of farmers being bitten by snakes are widespread. However, despite these incidents, many farmers still do not know how to provide first aid and proper treatment in case of snakebite. This may be due to a lack of education and training on snakebite management.

Table 1. Results of Literature Review

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
A1	Author: Awaludin, M. D., & M. L. Ramdani. Journal Identity: Jurnal Promotif Preventifl/2024/ Vol.7(1): 116-122.	The Effect of Snakebite First Aid Education on Knowledge and Skills of Farmers in Larangan Village	The study aims to assess the impact of first aid education on snake bites on improving farmers' knowledge and skills in the Larangan Village.	30 farmers	Quantitative method with pre-experimental design with one group pre and post-test. Data collection techniques with interviews and questionnaires. The analysis test was done using the Paired T-test and Wilcoxon test.	The results showed that most respondents experienced increased knowledge and skills after educational socialization, with the percentage of respondents with good knowledge and skills increasing significantly.
A2	Author: Khandar, J. Journal Identity: Global Journal for Research Analysis//2019/ Vol.8 (7): 10-12.	Assessment of Effectiveness of Self-Instructional Module on Knowledge Regarding First Aid of Snakebite Among Farmers.	This study assessed farmers' knowledge of snakebite first aid with a self-instructional module.	50 farmers	Pre-post experimental design with a single group. Data was collected through structured questionnaires.	The study assessed farmers' knowledge of first aid for snake bites and determined that a self-instructional module effectively enhanced their understanding. The pre-test average percentage score was 39.53%, and the post-test average percentage score increased to 81%.
A3	Author: Ryandini, Tiara Putri Journal Identity: Prosiding Nasional FORIKES 2020: Ragam Perspektif dalam	Effect of Snake Bite Rescue Training on Victim Handling Injuries to Honey Belimbing Farmers in	The purpose of the study was to determine the effect of snake bite rescue training on the handling of injured victims of honey star fruit farmers	32 farmers	This research method is pre-experimental (one group pre-post test design).	Most respondents had poor behavior before being given snake bite rescue training in the Village. After snake bite rescue training, almost all respondents showed good

ID	Author and Journal Identity	Journal Title	Objective	Population and Sample	Method	Summary of Results
	Pembangunan Kesehatan	Tasikmadu Village, Palang Tuban				behavior, and snake bite rescue training affects the handling of injury victims to honey star fruit farmers in Tasikmadu Village, Palang Subdistrict, Tuban Regency.
A4	Author: Togridou, Anatoli et al Journal Identity: Herpetological Conservation and Biology 17(2):331–342.	Tackling Snakebite Through Training: an Indian example	In this study, the author worked with the State Forest Departments of Himachal Pradesh and Sikkim to provide training workshops on snakebite awareness and mitigation.	201 post-training participants	The research is based on pre and post-training questionnaires and previous peer-reviewed studies.	It was undertaken to understand the knowledge levels, attitudes, and behavior of those responsible for protecting the environment in India. Study findings indicated increased knowledge and environmentally friendly behavior that significantly differed between pre-and post-training.
A5	Author: Haristiani et al. Journal Identity: Jurnal Abdi Insani/2024/Vol.11 (1):567-577	Strengthening the Skills of the Farmer Group Association (GAPOKTAN) in Handling Snake Bite Victims in the Agricultural Area of Panti District, Jember Regency	Improving farmers' skills in handling snakebite victims through education and demonstrations on placing splints.	22 patients	The Wilcoxon statistical test research uses an educational method for snakebite first aid management using a practical lecture and demonstration model.	After being given education and a first aid demonstration by checking whether the snake is dangerous, moving the victim, mobilizing body parts using a splint, and taking the victim to hospital. The knowledge and skills of farmer groups in handling snakebite victims have increased
A6	Author: Rachmania & Ludyantil Journal Identity: Journal Pengabdian Masyarakat Bestari (JPMB)/2022/Vol. 1(7):641-650	Community Capacity Building in Snake Bite First Aid	Analyzing the participants' abilities to increase the understanding and ability of farming communities to provide first aid for snake bites.	40 patients	The research methods used are lecture, discussion, and demonstration methods. This research uses a purposive sampling technique, using	The community's ability to provide first aid for snake bites is influenced by panic, experience, knowledge, and age, as seen from the pre-post test results. Increasing the ability to

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					a Pre-Post Test Design.	provide first aid can be done by providing counseling using lecture, discussion, and demonstration methods.
A7	Author: Bhargava, Saurabh et al. Journal Identity: Nagoya J. Med. Sci/2020/Vol. 82(4) : 763–774	First-hand knowledge about snakes and snakebite management: An urgent need	Comprised of a pilot survey that assesses and evaluates the knowledge of people of different occupations about snakes and snakebite management.	100 subject	Diagnostic Test Accuracy Studies. Using the scenario of a patient in the geriatric ward who is at high risk of falling, experiencing a functional motor deficit, and being applied to the INBED technology.	A study found that snakebite cases are prevalent in Haryana and affect farmers and other groups. The study reported a total of 181 snakebite cases. Lack of knowledge of venomous snakes and proper first aid methods contributes to the problem. The study highlights the need for education and awareness of snakebites.
A8	Author: Fernanda et al. Journal Identity: Jurnal Surya/2023/Vol. 15(3): 80-85.	Effectiveness of Demonstration on Knowledge of Snake Bite First Aid in Farmers Group	This study aims to analyze the effectiveness of demonstrations on farmer groups' knowledge of snake bite first aid. snake bite first aid	65 farmer	Pre-experimental research design is one group pre-test-post-test. Data were collected using a knowledge questionnaire and analyzed using the Paired T-test, CI = 95%.	The results of data analysis p = 0.000 <0.05 means that there is an effect of the demonstration method on the level of knowledge of farmer groups in performing snake bite first aid.
A9	Author: Namami, I. Y, et al Journal Identity: e-Journal Pustaka Kesehatan, vol 10 (no.3)	The relationship between Self-Efficacy with Farmer Skill in Performing First Aid on Snake bites in Panti District, Jember Regency	This study aims to determine the relationship between self-efficacy and farmers' skills performing snake bite first aid in Panti District, Jember Regency.	100 farmers	This study's research method uses descriptive correlation with a cross-sectional approach.	The study revealed that farmers lack self-efficacy and proficiency in providing first aid for snake bites. The inadequate first aid skills among farmers were attributed to a lack of proper health education programs and knowledge on addressing workplace challenges.

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A10	Author: Herath P, Banneheka B, Marikar FMMT Journal Identity: Kasmera. 2024;52:e5241586.	Knowledge and application of first aid and treatment of snakebites among Sri Lankan North Central Province farmers	This study aimed to assess the current knowledge and application of snakebite first aid to help improve knowledge about snake bites and to help reduce mortality and morbidity in the community.	124 farmers	The research methods used are interviews. The questionnaire consisted of 45 questions.	This study shows a high awareness among farmers in three dry-zone districts regarding preventive and first aid measures for snake bites. However, they still experience a significant number of hospitalizations and fatalities from snakebites. Many prefer using a tourniquet as first aid but often misapply it, posing risks to victims. This ineffective practice may be attributed to the community's lack of proper implementation of snakebite prevention methods.

DISCUSSION

Agronursing, a specialized field of occupational health nursing, focuses on safeguarding the well-being of agricultural workers by addressing health risks unique to farming environments (Afandi et al., 2023). One critical intervention area is snake bite management, as farmers frequently encounter venomous snakes in fields, storage areas, or near water sources. Agronursing bridges this gap by educating farmers on preventive measures, such as wearing protective footwear, clearing debris, and recognizing snake habitats. It also emphasizes understanding local snake species and their behaviors, enabling farmers to mitigate risks through informed practices. By integrating healthcare strategies into agricultural workflows, agronursing reduces the likelihood of snake bites and fosters a culture of safety (Nur et al., 2023).

Furthermore, agronursing equips farmers with life-saving knowledge for emergency response. This includes training on proper first aid—such as immobilizing the bitten limb and avoiding harmful traditional remedies—and stressing the urgency of seeking professional medical care for antivenom treatment. Collaborations with local health agencies and community outreach programs amplify this impact, ensuring timely access to healthcare resources. Addressing snake bites as a health and occupational hazard, agronursing enhances farmers' resilience, reduces morbidity and mortality, and supports sustainable agricultural practices through informed, health-conscious decision-making (Kurniyawan et al., 2023).

Khandar (2019) found that the self-instruction module successfully improved farmers' understanding of the first treatment for snake bites. In addition, there was a significant difference in

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knowledge scores before and after the module's application, signifying the module's effectiveness. The results of the study by Awaludin and Ramdani (2024) also showed a significant increase in the knowledge and skills of farmers after being given educational demonstrations of first aid during snake bites in Larangan Village.

Togridou et al. (2022) conducted a study focusing on workshops to enhance knowledge, attitudes, and behaviors related to snakebite management. Their research underscored the positive impact of such training on improving participants' confidence and competence in dealing with snakebite incidents. Similarly, Ryandini (2020) explored the effects of snakebite rescue training on injury victim handling among honey starfruit farmers. Both studies highlight the pivotal role of training programs in equipping individuals, including farmers, with the necessary skills to effectively respond to snakebite incidents, thereby enhancing overall safety and well-being.

Many farmers still do not understand how to treat snakebite victims. Based on research by Haristiani et al. (2024) found that farmers in Pani District, Jember Regency, experienced a lack of knowledge in providing first aid to snakebite victims. After providing outreach and strengthening skills, the results showed that residents' knowledge of first aid increased significantly. This is also supported by research by Rachmania & Ludyanti (2022). Researchers conducted outreach through lectures, discussions, and demonstrations of providing first aid in treating snakebite victims. Participants' knowledge and abilities increased significantly.

A survey conducted by Bhargava et al. (2020) discovered a lack of understanding about snakes and snakebite treatment among participants, including medical professionals, in a pilot survey. Most participants were unfamiliar with important concepts like the 'big four,' 'dry bite,' and snake repellents commonly used in India. However, with only a hundred participants, the study's small sample size might not fully represent the broader population, and relying on self-reported knowledge could introduce bias. In contrast, using a demonstration method, Fernanda et al. (2023) focused on educating adolescents in a village about first aid for venomous snake bites. This approach, spread across three sessions weekly, effectively enhanced farmer groups' knowledge of snakebite first aid. Overall, both studies aimed to enhance understanding of snakebite management but employed different approaches.

In two journals by Herath et al. (2024) and Namami et al. (2022), it is shown that the journal by Herath et al. (2024) emphasizes the knowledge and attitudes of farmers towards venomous snakes and first aid practices, while the journal by Namami et al. (2022) highlights the relationship between self-efficacy and farmers' skills in administering first aid. This research provides valuable insights into efforts to improve farmers' knowledge and skills in handling snake bites.

Awaludin and Ramdani (2024) and Khandar (2019) have used the same research method in their studies. Both used quantitative research methods with a one-group pre and post-test pre-experimental design. The findings from both studies showed a significant improvement in the knowledge and skills of the respondents after the intervention and education.

Togridou et al. (2022) conducted a study titled "Addressing Snakebite Through Training: Insights from India," employing workshops to raise awareness and mitigate snakebite risks. They assessed participants' knowledge, attitudes, and behaviors before and after training via questionnaires. In contrast, Ryandini (2020) investigated the impact of snakebite rescue training on honey starfruit farmers' ability to handle snakebite victims. While Togridou et al. utilized pre-and post-training questionnaires, Ryandini's methodology used one group pre-post test design.

Haristiani et al. (2024) and Rachmania & Ludyanti (2022) used the same research method. Both use lecture, discussion, and demonstration methods using purposive sampling pre-post test design techniques. This method is very effective for evaluating the level of knowledge and abilities of respondents before and after being given counseling. The findings obtained from this research

were a significant increase in knowledge and ability to treat snakebite victims. There was a significant increase before and after the counseling, indicating that the demonstration method was very effective in increasing the knowledge and ability of respondents to provide first aid to snakebite victims.

Two studies, conducted by Bhargava et al. (2020) and Fernanda et al. (2023), aimed to improve understanding of snakebite management. Bhargava et al. (2020) utilized a structured open-ended questionnaire to assess knowledge about snakes and snakebite management among participants from different occupations. On the other hand, Fernanda et al. (2023) employed a demonstration approach to educating adolescents on first aid for venomous snake bites and effectively engaged the target audience. However, the study by Bhargava et al. (2020) had limitations, including a small sample size and reliance on self-reported knowledge, which could introduce bias. Similarly, the study by Fernanda et al. (2023) was limited in scope as it focused solely on adolescents in a specific village.

The research methods used in the last two journals are different. Herath et al. (2024) journal utilizes a questionnaire to assess farmers' knowledge and attitudes towards venomous snakes and their first aid practices. Meanwhile, Namami et al. (2022) employ a descriptive correlational approach with a cross-sectional design. This difference in research methods indicates varying approaches in data collection between the two journals.

CONCLUSION

Based on the results of the literature review article, it was found that farmers have poor knowledge and skills in handling snake bite victims. They still believe in what they believe in and the myths that exist. This is one of the causes of snakebite deaths in Indonesia. Therefore, several researchers conducted counseling to increase knowledge and conduct demonstrations on first aid handling of snake bite cases. Significant results were obtained regarding respondents' knowledge after being given educational materials and demonstrations. The lack of ability and knowledge among farmers in administering first aid during snake bite incidents can have dire consequences, potentially leading to fatalities, with the gravest outcome being death. Such incidents are common, mainly in tropical regions where farmers are prevalent. In such circumstances, it becomes imperative for health workers, including nurses, to step in and provide comprehensive education and practical demonstrations illustrating the correct procedures and actions to be undertaken. Enhancing farmers' understanding and competence in managing snakebite cases can significantly reduce the likelihood of adverse outcomes, ultimately contributing to safer agricultural practices and improved community health.

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