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Artigo

VENOMOUS SNAKES IN BRAZIL: AN INTEGRATIVE REVIEW

COBRAS PEÇONHENTAS NO BRASIL: UMA REVISÃO INTEGRATIVA

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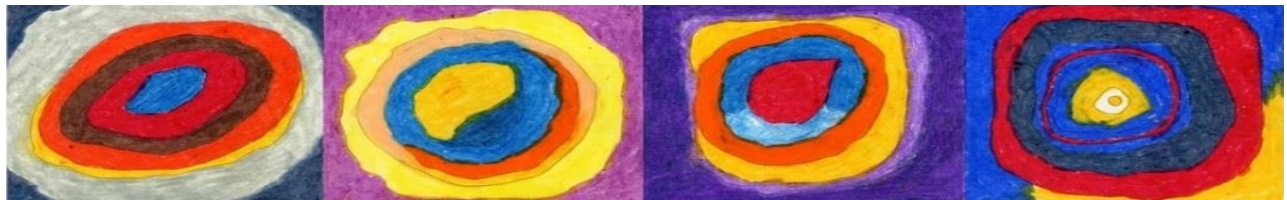
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RESUMO: Animais peçonhentos são capazes de produzir e inocular as toxinas produzidas, normalmente esse processo acontece quando ele se sente ameaçado, ou mesmo para conseguir o seu alimento, imobilizando as presas. No entanto, os acidentes que acontecem com esses animais são bem comuns, algumas causas podem ser relatadas como a expansão urbana, ou mesmo o acidente em zona rural, esta revisão tem como objetivo direcionar os principais estudos relacionados as serpentes no Brasil, a utilização das toxinas para fins médicos e até mesmo na pesquisa de novas drogas no âmbito farmacológico. Para tal, a metodologia utilizada neste trabalho, foi de uma revisão integrativa da literatura, utilizando como descritores (Decs) "Snake Bite" e "Pharmaceutical Assistance", com artigos científicos que fossem "open access"



e publicados em bases indexadas entre 2011/2021. Foram previamente encontrados 500 artigos e posteriormente aplicado os filtros de exclusão e restaram uma base de 16 artigos que foram utilizados na construção desta revisão.

PALAVRAS-CHAVE: Acidentes, Serpentes, Assistência Farmacêutica.

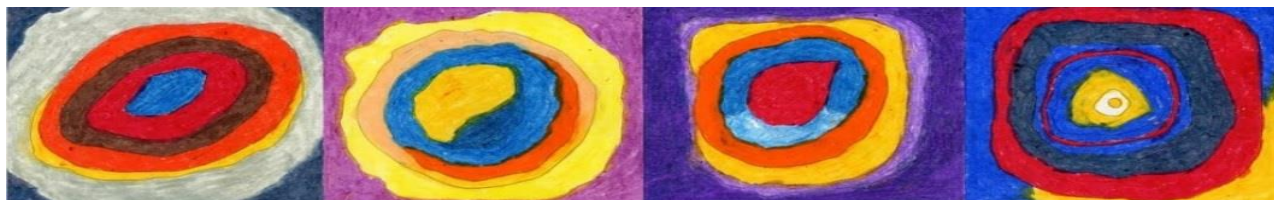
ABSTRACT: Venomous animals are able to produce and inoculate the toxins produced, usually this process happens when it feels threatened, or even to get its food by immobilizing the prey. However, the accidents that happen to these animals are quite common, some causes can be reported such as urban expansion, or even the accident in rural areas, this review aims to direct the main studies related to snakes in Brazil, the use of toxins for medical purposes and even in the research of new drugs in the pharmacological scope. For this, the methodology used in this work was an integrative review of the literature, using as descriptors (Decs) "Snake Bite" and "Pharmaceutical Assistance", with scientific articles that were "open access" and published in indexed databases between 2011/2021. 500 articles were previously found and the exclusion filters were applied and a base of 16 articles remained that were used in the construction of this review.

KEYWORDS: Accidents, Snakes, Pharmaceutical Assistance.



Introduction

Accidents caused by venomous animals such as: Scorpions, spiders, snakes and bees are considered public health problems worldwide, who estimates that this type of accident is included in the list of neglected tropical diseases, with about 1,841 million cases of poisoning worldwide, resulting in 94,000 deaths (MENDES et al., 2022). In Brazil, about 28,000 snake accidents are recorded on average, resulting in 120 deaths, although the numbers are lower than other venomous animals, snake accidents are the ones with the

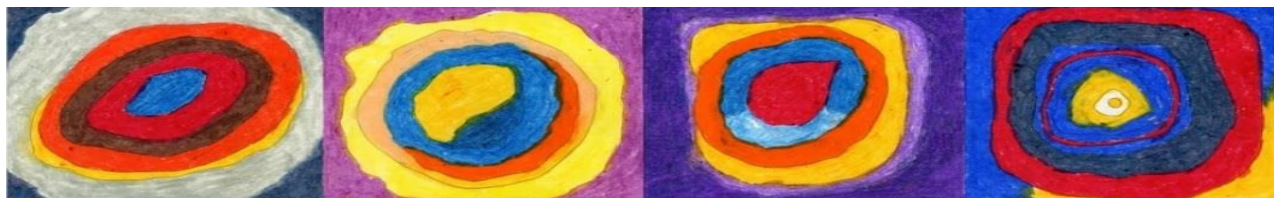


highest number of deaths, being of great concern to Brazilian public health (CHAVES et al., 2017).

Snakes or ophitades are popularly known in Brazil as "Snakes", and since and popular culture always finds in these animals a relationship of danger, however, scientifically, they are animals that use their venom only in cases where they feel attacked, or in danger (GOUVEIA et al., 2021). Venomous snakes are known not only for the production of the poison, but also for the ability to inject toxins into their prey (COSTA et al., 2021). Worldwide there are more than 3,500,000 described snake species, distributed in 27 families. In Brazil, there are approximately 442 described species, 75 genera and 10 families. Of these, only two families are considered of medical importance, being viperidae and elapidae. The family Viperidae encompasses four species that cause serious accidents: *Bothrops sp.* , (Known as Jararaca), *Crotalus sp.* (Known as rattlesnake), and *Lachesis sp.* (Known as surucucu-pico-de-jaca.) The snakes of the Elapidae family are grouped into two genera: *Micrurus* and *Leptomicurus* known as true corals. In view of this scenario, this article proposes to conduct an integrative review, compiling the main advances related to accidents and studies with venoms of Brazilian snakes.

Method

This is an integrative literature review, constituting a qualitative analysis method, based on secondary data (PEREIRA et al., 2018), performed from searches in the following databases: Medline, Lilacs, Pubmed, using the VHL (Virtual Health Library) search engine. The articles were selected using the following descriptors: Snake Bites, Pharmaceutical Assistance. The descriptors applied are in accordance with the Decs platform, and all terms were used in English. Some filters were previously applied so that the sample presented the



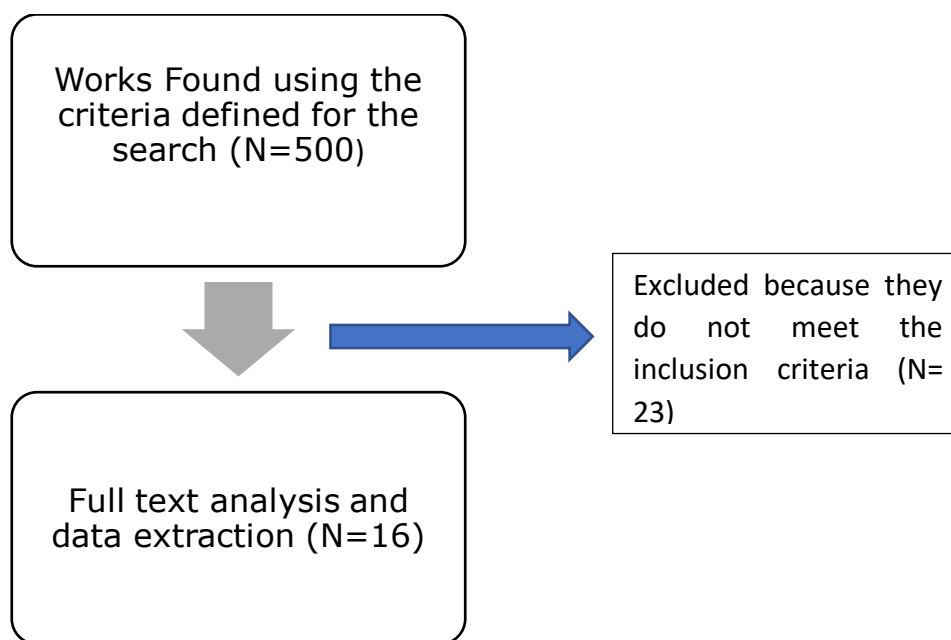
lowest number of possible interferors, using articles published in the last 5 (five) years (2011-2021), and that its content sit "open access".

From the articles found using the previously applied filters, those that were not articles published in indexed journals, or that did not correspond to the selected databases, or even publications that did not present the text of open aces that were not in the period described above were excluded.

The articles later selected for the sample were obtained the main information, which was organized in tables and analyzed categorically, basing the most relevant and frequent results in order to understand a profile of the most relevant results related to our objective.

Result and Discussion

Figure 1 represents the flowchart followed during the review, through which it is verified that the search in the databases allowed an initial identification of 500 articles, of which only 16 met the inclusion criteria of this review.



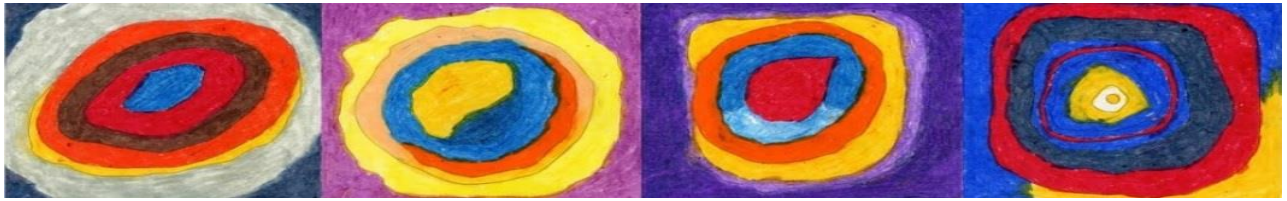
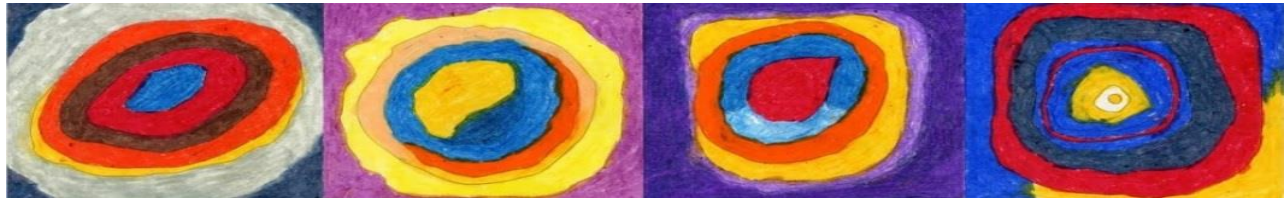


Figure 1. Flowchart adopted during review

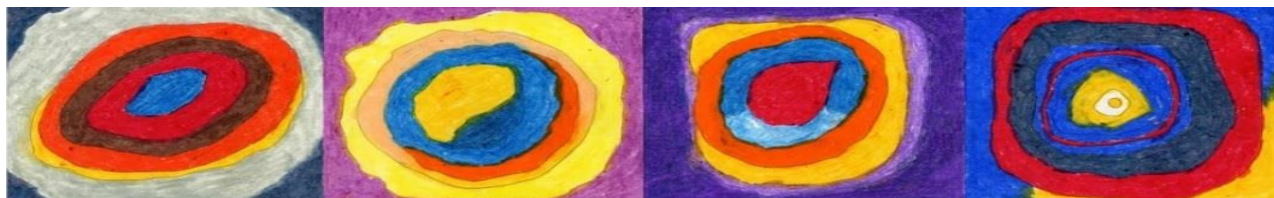


Figure 2 - Wordcloud integrative review

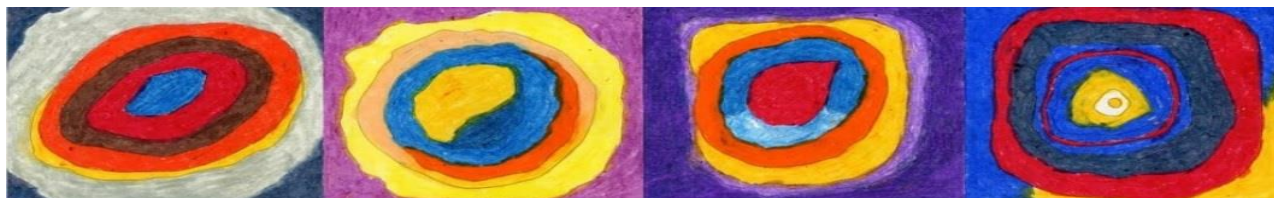
Table 1 contains relevant information on the studies found for the sample of this review.



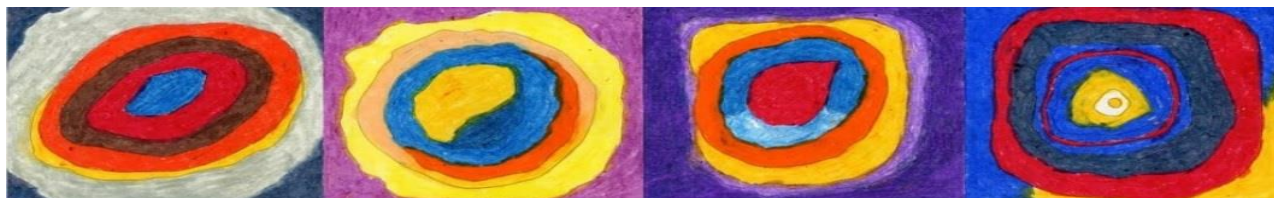
Author	Title	TWO	Objectives	Results
SANTOS, et al.	Proteomic analysis reveals rattlesnake venom modulation of proteins associated with cardiac tissue damage in mouse hearts	https://doi.org/10.1016/j.jprot.2022.104530	Analyze and describe the proteomic effects and changes in various cardiac proteins of mice after treatment with <i>c.d terrificus venom</i> .	Substantial changes in proteins related to damage to heart tissues were found in both the initial and late moments after the poison treatment.
OLIVEIRA, et al.	Geographical accessibility to the supply of antiophidic sera in Brazil: Timely access possibilities	https://doi.org/10.1371/journal.pone.0260326	evaluate the possibility of reaching the health units that are serum in Brazil from the relationship between population distribution and travel time, considering that the greatest care is serum administration as soon as possible.	It was seen that several issues influence the travel time and this can be developed for other health care networks.
Cavalcante, et al.	A fingerprint of plasma proteome alteration after local tissue damage induced by Bothrops leucurus snake venom in mice	https://doi.org/10.1016/j.jprot.2021.104464	Identify plasma proteins of mice that are quantitatively altered by <i>B. leucurus</i> poisoning. In addition, we evaluated the initial aspects of the biological and pathophysiological processes of this poisoning in relation to thrombo-inflammation associated with the in vivo model of local tissue injury.	Our findings suggest the induction of a thromboinflammation scenario already reported for Bothrops poisons through inflammatory stimuli, endothelial cells conduct binding molecules to promote the binding and transmigration of leukocytes, increasing their thrombogenic potential, through the transition to a more procoagulant phenotype.



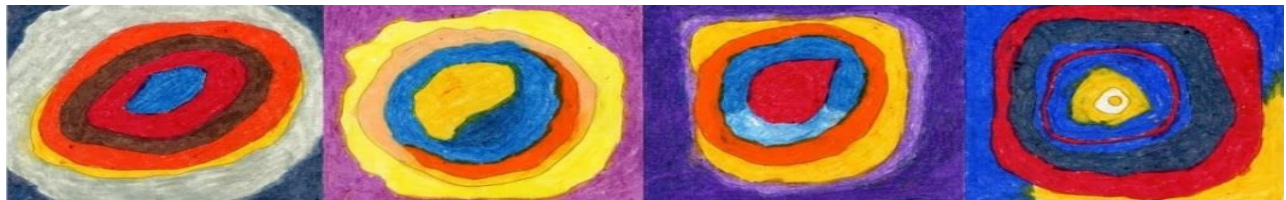
<p>HATAKEYAMA, et al</p>	<p>From birth to adulthood: An analysis of the Brazilian lancehead (Bothrops moojeni) venom at different life stages</p>	<p>https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0253050</p>	<p>Analyze and monitor the behavior/development of bothrops moojeni poison in the stages of your life.</p>	<p>At work it can be observed that snakes up to 1 year of age have a low collagenolic activity and a high procoagulant activity.</p>
<p>COSTA, et al.</p>	<p>Ethnozoology of snakebite victims in a risk area in Northeast Brazil</p>	<p>https://doi.org/10.1016/j.toxicon.2021.08.021</p>	<p>Do write and analyze the perceptions and attitudes of victims of odisidise accidents in the semi-arid region of the Brazilian Northeast.</p>	<p>The results revealed that the accidents occurred mostly during the development of their daily activities (during agricultural activities, in hunting activities in the mountains, in the care of farm animals, etc.).</p>
<p>GOUVEIA, et al</p>	<p>Case report of a coral snake bite (Micrurus ibiboboca) in the state of Pernambuco, northeast Brazil.</p>	<p>https://doi.org/10.25110/arqvet.v24i2cont.2021.8581</p>	<p>Increase knowledge about the toxicological action of snake venom and its effect on the injured, assisting in clinical evaluation and treatment</p>	<p>In reports of human poisoning by micrurus species it is observed as main symptomatology: headaches, local and thoracic pains, absence of difficulty of urination.</p>
<p>MUNIZ, et al.</p>	<p>Use of freeze-dried trivalent antivenom to neutralize the toxic activities of Bothrops atrox snake venoms from the Amazon.</p>	<p>https://doi.org/10.1016/j.toxicon.2021.06.015</p>	<p>Promotion of a new lyophilized trivalent antivenom, effective to neutralize the biological activities of bothrops atrox (Brazil) and Leticia (Colombia) poisons.</p>	<p>From the performance of an experiment using animal model and in vitro assays, in which fdtav antivenoms (freeze-dried trivalent antivenom), FDPVAV (Colombian commercial lyophilized polyvalent antivenom - LETÍCIA) and LBAVs (Brazilian liquid botropic antivenoms - MANAUS) extracted from adult species of B. atrox from each region, it was inferred that the FDTAV proved effective in</p>



				lethal neutralization, coagulating and defibrinogenating activities, hemorrhage and hydrolysis of PLA2 induced by b. atrox poisons from Manaus and Leticia when using a pre-clinical protocol based on pre-incubation of poison and antivenom before testing in experimental systems; as well, it had a neutralizing capacity against both poisons similar to LBAVs, suggesting that the variability of the biological activities of these poisons did not interfere in the efficacy of neutralization.
COSTA, et al.	Efficacy of the 20-minute whole blood clotting test (WBCT20) in the diagnosis of coagulation alteration related to snakebites in a Western Brazilian Amazon hospital	https://doi.org/10.1590/0037-8682-0091-2021	To evaluate the sensitivity of WBCT20 compared to LWCT in confirming the diagnosis of odididic accidents in a hospital in the Brazilian Western Amazon.	A total of 89 patients underwent both tests. The results of the WBCT20 werestandard is in 30 (33.7%) and unconsilable in 59 (66.3%) patients. LWCT results were normal in 21 (23.6%) and abnormal in 68 (76.4%) cases, of which 58 (65.2%) prolonged results and 10 (11.2%) uncoagulable.
SOUZA, et al.	Profile of snakebite victims reported in a public teaching hospital: a cross-sectional study	https://doi.org/10.1590/S1980-220X2020007003721	To know the epidemiological and clinical profile of victims of odididic accidents in a public teaching hospital	Of the 137 victims counted, 74.5% were male.



<p>SCHNEIDER, R, et al.</p>	<p>Snakebites in Rural Areas of Brazil by Race: Indigenous the Most Exposed Group</p>	<p>https://doi.org/10.3390/ijerph18179365</p>	<p>Identify which racial groups in rural Brazil are most exposed to ophitdic accidents and compare the most exposed group with the group less exposed by region. And also analyze possible differences in the outcome of an odidise accident.</p>	<p>In 2017, the total number of odididic accidents in Brazil reported to SINAN was 28,716, 58.52% of them recorded in the rural area.</p>
<p>Leandro S. Nascimento, et al.</p>	<p>Phytochemical composition, antsnake venom and antibacterial activities of ethanolic extract of <i>Aegiphila integrifolia</i> (Jacq) Moldenke leaves</p>	<p>https://doi.org/10.1016/j.toxicon.2021.05.004</p>	<p>This study aims to describe ophitdic accidents that are considered one of the main neglected tropical diseases, resulting in about 100,000 deaths per year, and that the treatment recommended by who is serotherapy, which has limited efficacy against toxins involved in local tissue damage.</p>	<p>Only one phytochemical study with this genus was previously carried out with the species <i>A. sellowiana</i> (Camargos et al., 1996). The results of the present work motivate further studies on applications of these natural products, since some of the compounds have been isolated in large quantities, which is not a common or easy occurrence in the chemistry of natural products.</p>
<p>Flavio Souza Silva, et al.</p>	<p>Severe tissue complications in patients of Bothrops snakebite at a tertiary health unit in the Brazilian Amazon: clinical characteristics and associated factors</p>	<p>https://doi.org/10.1590/0037-8682-0374-2020</p>	<p>This study aimed to identify risk factors for severe tissue complications (CTS) in patients with botropic accident in the state of Amazonas, Brazil</p>	<p>Odididic accidents classified as severe and female patients with comorbidities presented higher risks of developing SCT.</p>

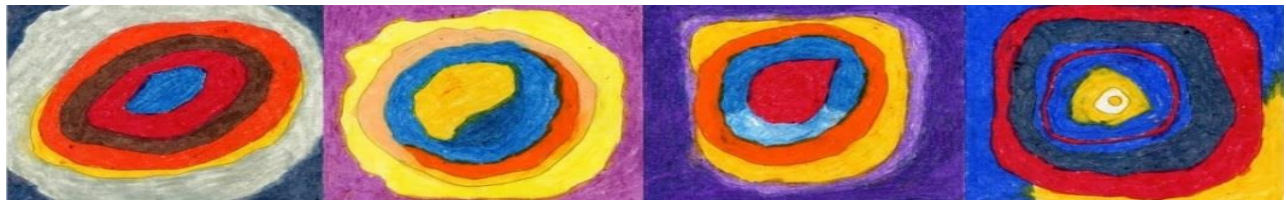


Within the data presented in the table, we can perceive how evidenced in the studies by (SANTOS et al., 2022), (CAVALCANTE et al., 2022), even within the treatment with antiophylic serum, the execution of the same should be performed and monitored correctly, as important and significant changes can be observed that can compromise the patient's life.

The studies of (DE OLIVEIRA; SILVA, U.S.; Silva, 2022), (HATAKEYAMA et al., 2021)(COSTA et al., 2021), demonstrate that snake accidents usually occur in the rural area and the time of care is essential to determine the severity of accidents and later all actions that can save the patient's life. (DE SOUZA et al., 2021; FEITOSA; MELO; MONTEIRO, 1997; SILVA et al., 2021), demonstrate that accidents related to snakes in northeastern Brazil have a greater relationship with severity, when the patient has important comorbidities, such as heart problems, tissue factors that may contribute to a worsening in symptoms, in addition to the time of care that needs to be fast and efficient to prevent the patient from presenting complications in treatment.

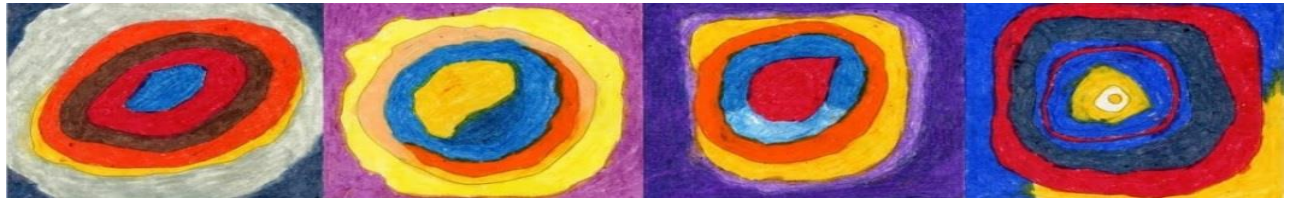
Conclusion

It is concluded, therefore, that accidents with venomous snakes is a relevant theme in the scientific community and that the amount of investigations with the subject is extensive and recurrent, showing the need for further studies and updates on the subject. Brazil is still one of the countries with the highest number of accidents, showing the importance of this theme within Brazilian public health. The findings show how these animals have an extensive biotechnological importance, since their venoms can be widely used in medicine for therapeutic purposes.



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