

Natural Resources for Therapeutic Use: Evidence from Brazil

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ABSTRACT

Aim and Objective: Identify plants used for insect stings in self-care practices in the situation of suffering by people living in a rural location of Santa Maria municipality, Southern Brazil.

Material and Methods: To achieve the proposed objective, there were semi-structured interviews and participant observation (N-17) in the period from 2015 to 2017. The thematic axis emerged in the content analysis to treat the material.

Results and Discussion: The results show that five respondents reported using plants to treat insects or spiders' injuries. Seven plant species from different angiosperms families were mentioned: (I) *Ruta graveolens* L., (II) *Sida rhombifolia* L., (III) *Citrus × sinensis* (L.) Osbeck, (IV) *Plantago tomentosa* Lam., (V) *Allium sativum* L., (VI) *Eucalyptus globulus* Labill and (VII) *Mirabilis jalapa* L. This study revealed the popular use of herbal therapy for insect and spider stings in health care. Also, it showed the importance of knowledge and recognition of health professionals about popular knowledge for scientific advances.

Final Considerations: We conclude that the self-care practices in situations of suffering refer to certain social, economic, and cultural contexts, showing the need to insert the health professional in this reality and establish a therapeutic alliance, aiming to reduce the distances between scientific and popular knowledge.

INTRODUCTION

The use of natural resources for therapeutic purposes is a traditional practice developed in health care since ancient civilizations and this millennial knowledge is passed between generations ^[1]. Among these resources, plants stand out for being the first-choice rural families employ when they present some health problems ^[2]. Such use may be associated with the fact that these people reside far away from urban centres, allied to the precarious conditions of mobility, which hinder the access to health services. These factors promote autonomy in care forms, making decisions, facing situations of severity, using resources that go beyond those found in healthcare professionals' care system ^[2].

The World Health Organization (WHO) estimates that 80% of the world population uses medicinal plants ^[3]. The Brazilian Ministry of Health took an important step in 2006 after approving the National Policy on Complementary and Integrative Therapies in the Unified Health System (PNPIC-SUS) and the National Policy of Medicinal Plants and Phytotherapy (PNPMF), which was approved in 2008 ^[4-6]. In 2009, the Ministry of Health published the National List of Medicinal Plants of Interest to the SUS (Renisus), which contains 71 plant species used by popular wisdom and confirmed scientifically ^[7].

In 2010, there was the creation of the Resolution of the Board of Directors of the Health Monitoring National Agency, which regulates the notification of plant drugs along with the Health Monitoring National Agency (ANVISA). In 2013, in Rio Grande do Sul State (RS), the State Policy of Complementary and Integrative Therapies (PEPIC/RS) was approved, aiming to implement the Health Complementary and Integrative Practices (HCIP) in the Unified Health System (SUS) (Rio Grande do Sul, 2013). In 2016, the Phytotherapeutic Memento of the Brazilian Pharmacopoeia was approved ^[8].

In the context, self-care practices in situations of suffering stand out, which, according to this author ^[9], are employed by the population at both individual as group levels. Such practices are used to diagnose, explain, answer, control, alleviate, support, heal, resolve or prevent the processes that affect their health, in real or imagined terms, or even without the direct and intentional intervention of professional healers, even when these may be a reference at this activity.

This study is based on the assumption that plants' use is part of the self-care practice in situations of suffering and can provide an opening to other care forms, respecting their peculiarities. The recognition of knowledge relating to plants' use on the part of health professionals and users approaches the scientific knowledge to the popular knowledge. Accidents with poisonous animals can cause suffering, for example, bees, ants, or wasps, among others. It is important to mention that insects, especially wasps and bees, often result in mild injuries. However, in allergic people, the multiple stings compose emergencies and lack specialized care for life maintenance ^[10].

Accidents with poisonous animals are an important public health problem, especially in tropical countries, due to their high frequency of occurrence and significant lethality. In 2019, there were 265,701 accidents caused by poisonous animals in Brazil, being 22,113 of these by bees. In Rio Grande do Sul State, Southern Brazil, in the same year, there were 7,820 notified cases of accidents caused by poisonous animals, being 886 caused by bees ^[11]. In most cases, these events affect economically vulnerable populations living in rural areas, with accidents caused by poisonous animals one of the injuries most recorded on the Notifiable Diseases Information System (SINAN) ^[11].

According to data from the Brazilian Ministry of Health about spider accidents, the incidence rate of accidents is around 1.5 cases per 100,000 inhabitants, with a record of 18 deaths in the period 1990-1993. Most of the notifications also come from the South and Southeast regions ^[12].

The incidence of accidents by insects of the order Hymenoptera, the ones that have true stingers, is unknown. There are three families of importance in the health area among the Hymenoptera Apidae (bees and bumblebees), Vespidae (yellow wasp, spider wasp, and wasp or social wasp) and, Formicidae (ants). The hypersensitivity caused by insect stings of these groups has been estimated, in literature, in values of 0.4% through 10% in the studied populations. The reports of serious accidents and deaths from the sting of African-like bees are a consequence of the increased aggressiveness of this species (massive attacks) and not from the differences in the composition of its venom ^[12].

Considering the importance of incorporating the integrative practice of phytotherapy in health and the need for researches in this area, aiming to enrich the knowledge of health professionals, as well as make Phytotherapeutic Memento of the Brazilian Pharmacopoeia practices safer and more effective, this study sought to know the plants used to relieve symptoms of insect and spiders stings as self-care practices in situation of suffering.

Considering the above, the question that guided this research was: what are the plants used for insect stings in the self-care practices in suffering situations?

The goal was to identify plants used for insect stings in the self-care practices in situations of suffering by people living in a rural location in Southern Brazil.

MATERIALS AND METHODS

Design

This is a qualitative, exploratory, descriptive study [13,14] with ethnographic orientation [15,16] to identify the plants used for insect and spide stings self-care practices in situations of suffering. This research was realized out in three rural locations belonging to the municipality of Santa Maria, Rio Grande do Sul - Brazil (**Figure 1**).

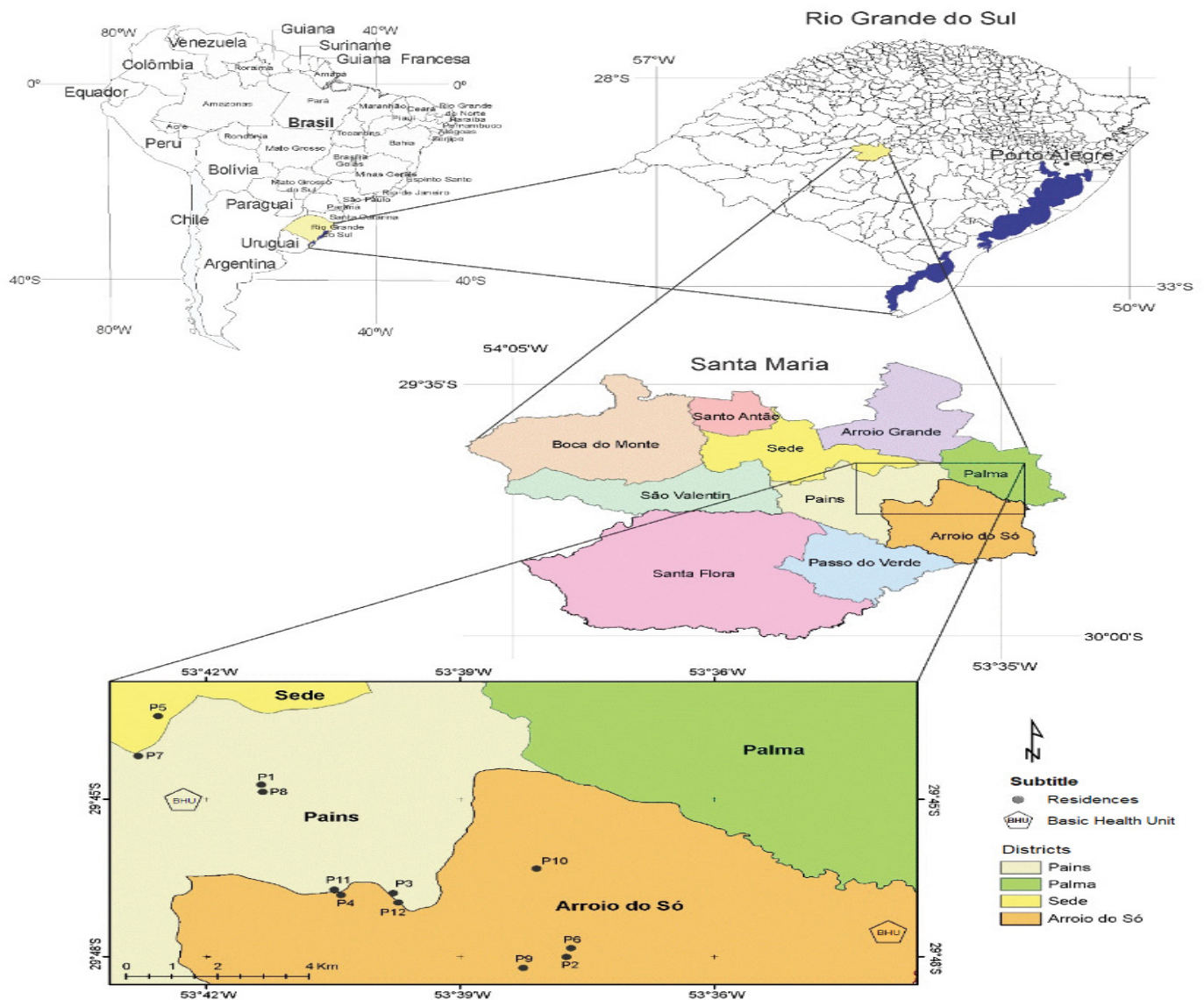


Figure 1. Map of the three rural locations belonging to the municipality of Santa Maria, Rio Grande do Sul, Brazil.

Sample

The selection of interlocutors to the survey was performed by an indication of the network of social relations [17], also known as “Snow Ball” method [18]. In this process, each participant indicates another person that is part of his/her network of relations for the researcher, thus forming a network of social relations to be investigated.

The research was carried out, first, with 17 informants domiciled in rural location. The network of social relations began with the secretary of the Basic Health Unit (UBS) of this rural location, who is a resident and knowledgeable of the region, and indicated the first participant. To maintain anonymity, this received the identification (P1). After granting the first interview, (P1) indicated (P2), who, according to the interlocutor, used plants in the health care, at the end of the interview (P2) indicated (P3), and so on, thus forming a network of relations, until enough formed to meet the objectives here proposed. The research presented here was covered by data saturation, with five of the 17 participants identified as follows: P1, P3, P5, P10, P11. These four interlocutors' participation occurred because they had mentioned using plants for insect stings, excluding the other participants.

Data collection

The data collection occurred at the participants' homes, through the semi-structured interview [14] and participant observation

^[16], performed from April 2015 to January 2017. An interview guide was created, consisting of two parts. The first contains questions about the interviewees' profile. The second consists of open questions duly drawn up to meet the research objectives. The first author (Ph.D., teacher and researcher, with experience in nursing and Integrative Therapies: medicinal plants), and each lasted approximately two hours. A tape recorder was used to record the interviews, and they were transcribed in full. The field notes were made during and after the interviews. After, the transcripts returned to participants for comment and correction.

For the participant observation, a guide (field journal) was created containing the items to be observed, such as:

- (i) In what situations and ways plants are used,
- (ii) The people involved in the self-care practices in situations of suffering,
- (iii) The most cited plants and their purpose. The observations were made per shift, with an average of five shifts for each participant. Furthermore, there was a photographic record of the plants and the filming during the observations.

During the interviews and observations, only the researcher was present. Before starting the investigation, a pilot test was carried out. Additionally, there were collection procedures and preparation of the botanical material for exsiccates, and the collection and photographic record of botanical materials listed in each residence. Whenever possible, there was the collection of materials in the leaf reproductive phase, according to the current practice of collecting and preparation for exsiccate for phanerogams ^[19]. When the fertile material could not be acquired in the first visit. A new visit was conducted in a different period, totalling two collection visits.

Data analysis

To interpret the results extracted from the various data collection instruments, content analysis was used ^[20]. According to the author, this analysis is considered one of the content analysis techniques, whose operability is distinguished in three stages:

- (i) Pre-analysis,
- (ii) Exploration of the material,
- (iii) Treatment of the results, inference and interpretation.

The fertile materials (with flowers and/or fruits) collected were selected for assembly of exsiccates and inclusion in the SMDB herbarium (Herbarium of the Botanical Garden of the Federal University of Santa Maria) as vouchers. The materials that were not fertile were prepared for exsiccates, identified, and shall be maintained in the Laboratory of Taxonomy of the Biology Department of Federal University of Santa Maria for a period of five years and, after this period, the non-fertile materials will be discarded.

The identification of species was performed by observing the characteristics (during the field visits) and laboratory analysis, using analytical keys and reference literature. The scientific names were applied following the division of the List of Species of the Brazilian Flora ^[21], and the names of the authors followed the abbreviation available on the database "Tropicos.org." The Classification for families followed the Classification System of Angiosperm Phylogeny Group - APG IV ^[22].

Ethical considerations

The present study followed the Resolution n. 466 of 2012 of competence of the National Health Council of the Ministry of Health that emanates guidelines on researches involving human beings ^[23], being approved by the Research Ethics Committee of the Federal University of Santa Maria, with Opinion number: 981.660. The participants were informed about the research objectives and authorized the use of the information by signing the Informed Consent Form (ICF) in two copies, one for the participant and the other for the researchers.

RESULTS

The results were organized into categories; firstly, interviewees' profile was presented in **Table 1** and, subsequently, the plants mentioned for insect stings were allocated in **Table 2**.

Table 1. Profile of the four interlocutors of the research.

Participant (sex, age)	Marital status	Reported Origin	Religion	Education	Occupation
P1 (Feminine, 76 years)	Widow	Native	Catholic	5 th grade of basic education	Rural retiree
P3 (Feminine, 62 years)	Married	Brazilian/Italian	Catholic	5 th grade of basic education	Rural retiree
P5 (Male, 83 years)	Married	Afro-descendant	Evangelical	Not literate	Rural retiree
P10 (Male, 83 years)	Married	Brazilian/French	Spiritist	1 st grade of basic education	Rural retiree
P11 (Feminine, 64 years)	Married	Native	Catholic	2 nd grade of basic education	Rural retiree

No. of collection	Common name	Self-care practices in situations of suffering
Species		
Family (as APG IV)		
2	Rue, herb-of-grace	- I "bless" spider bite with rue, because the spider bite can only heal with "benzedura" [a kind of traditional blessing], I pass the rue over and pray and then the person heals. We bless during the day, before the sun sets, never at night (it needs clarity / sun to work). I pray with the rue branch in the place that has a problem, I cannot teach, because the ancients say that we teach more of three people I will lose the healing power, so I have to think carefully who wants to continue this practice of blessing. When I finish praying, I throw the branch back without looking and that's it. Everything that sucks goes out (P3).
<i>Ruta graveolens</i> L.		
(Rutaceae)		
3	Sida	-When an insect stings you, we chew the sida leaf and put it chewed on the sting until the pain is gone (P1).
<i>Sida rhombifolia</i> L.		- I chew sida leaf and put it directly on the insect sting, it relieves the pain right away (P10).
(Malvaceae)		
14	Orange tree	-you take the very fresh orange tree leaf (new sprout) heat it up to wither on the wood stove plate with a little lard and tie it with a bandage on the spot, pull the spider's poison out, you can leave it for a few 2 hours and check how it is (P3).
<i>Citrus × sinensis</i> (L.) Osbeck		
(Rutaceae)		
15	Common water-plantain	- I use the macerated plant to put on an insect sting, it relieves pain right away (P5).
<i>Plantago tomentosa</i> Lam.		- I cook the leaf with lard or mocotó oil and place the leaf still hot on the spider sting, it cleans and pulls everything up (P11).
(Plantaginaceae)		
22	Garlic	- I cut the garlic, crush it well and sit at the crack of the spider's bite and let it improve, if necessary, change it for a new one (P1)
<i>Allium sativum</i> L.		
(Amaryllidaceae)		
44	Southern blue gum	- in an almost boiling water, I put 3 leaves and cover it for about 10 minutes until it gets warm, when it is colder, I use the water of this tea to wash wounds, it is also used for insect stings (P11).
<i>Eucalyptus globulus</i> Labill.		
(Myrtaceae)		
52	Marvel of Peru, "maravilha"	- you take the "maravilha" leaf and heat it until it wilts on the wood stove plate with a little bit of lard, the product of which you tie with a bandage on the spot, thereby pulling spider venom (P3).
<i>Mirabilis jalapa</i> L.		
(Nyctaginaceae)		

Table 2. List of plants cited by respondents, collection number, species, family, common name and self-care practices in situations of suffering.

DISCUSSION

In the interviewees' characterization, half of them were male and the other half female, which, in part, demystify most studies with plants, in which the initial care is usually carried out by the female-figure^[24]. Three were married and one, widow, with ages ranging from 62 years to 83 years, and all were rural retirees. Concerning religion, two were Catholic, one was Evangelical, and the other was Spiritism. The educational level ranged from not being literate to 5th grade of basic education. Regarding the reported origin, two were natives, one was Afro-descendant, and one reported Brazilian and French origin. The term "native" was used to designate the inhabitants already existing in Brazil, called indigenous by European colonizers. This profile of respondents reaffirms what other scholars have already mentioned, that Brazil is the country of the miscegenation of different peoples and cultures, and cultural diversity is a strong characteristic of the Brazilian people^[25].

This study^[26] mentions that, in Brazil, the "native" peoples use the plants to cure diseases or to make potions that "purified" the spirit and that, according to records from the Ministry of the Environment, at least 150 plant-based products are recognized by the WHO, demonstrating effective therapeutic value.

As can be seen in the results of the three plants identified *Sida* (*Sida rhombifolia* L.), Common water-plantain (*Plantago tomentosa* Lam.) and Southern blue gum (*Eucalyptus globulus* Labill), displayed in **(Figures 2-8)** respectively, all citations of their use were for insect stings.



Figure 2. *Ruta graveolens* L.



Figure 3. *Sida rhombifolia* L.



Figure 4. *Citrus x sinensis* (L.) Osbeck.



Figure 5. *Plantago tomentosa* Lam.



Figure 6. *Allium sativum* L.



Figure 7. *Eucalyptus globulus* Labill.



Figure 8. *Mirabilis jalapa* L.

In this context, this search ^[27] found a prevalence of 44% of insect stings in occupational accidents with children and young people who helped the family in the rural environment. This finding corroborates the importance of self-care practices in suffering situations, especially among the rural population, and reinforces the plants' importance in these situations.

Two respondents mentioned putting the leaf in the mouth, chewing a bit, and putting it chewed directly on the sting. One macerates the leaf to put on the lesion and another makes a tea from the leaves, lets it cool, and puts on the insect sting. In this sense, the research ^[28] mentions the popular use of the plant *Sida rhombifolia* (*Sida*) in emergency situations in the field to treat insect stings, similarly to the study here presented, which also verified its use as a local anti-inflammatory in sprains and pains in the joints. These authors ^[29] reported the use of leaves in the treatment of injuries in the community. Others researchers ^[30] demonstrated the use of this species as an anti-inflammatory, among many other uses in Indian folk medicine.

The use of *Sida rhombifolia* stands out in studies that investigated its antimicrobial ^[31-33] and anti-inflammatory efficacy ^[34,35]. The use of extracts from the aerial part of the plant (leaves) presented several bioactive components, such as alkaloids, flavonoids, terpenoids, polyphenols, and quinine, which act in the pharmacological activity of the plant ^[32]. This research ^[34] showed that these extracts are capable of reducing the inflammatory signs and symptoms, and the other study ^[36] showed a strong inhibitory activity of prostaglandins in the species. Prostaglandins are related, among other activities, to hyperalgesia, thus justifying the popular use of extracts from *sida* on wounds and stings also as potential pain reducer.

The ethanolic extract of dried leaves of Common water-plantain (*Plantago tomentosa* Lam.) was presented in a survey, with anti-inflammatory and healing indications in dogs submitted to the ovary-hysterectomy ^[37]. Ethnobotanical searches ^[38,39] allude to the use of the *Plantago tomentosa* Lam in inflammatory and infectious treatments, mainly of throat, in cystitis, and helping to fight body acne.

The use of Southern blue gum (*Eucalyptus globulus* Labill) was documented in an ethnobotanical study, being its leaves indicated for treating eye infections and cough ^[40]. Some indications of *E. globulus* are listed in the Board's Resolution (DRC), which brought the plant's use in cases of flu, colds, clearing of the airways, and as adjuvant in the treatment of bronchitis and asthma ^[8]. Tests with essential oil of *E. globulus* on *Enterococcus faecalis*, commonly associated with urinary tract infection, showed significant antimicrobial effect ^[41]. Antimicrobial effect of phenolic extracts was also demonstrated in a previous study ^[42], which demonstrated antimicrobial effect against various microorganisms, including *Staphylococcus aureus*, gram-positive bacteria that commonly cause skin infections.

Garlic (*Allium sativum* L.) was cited as used for treating spider bites. Additionally, this species was documented to be used for treating itching, wounds and coughing. A recent study ^[43] demonstrated effects of garlic against hypertension. In literature, there have been reports of other species used for spider bites, like *Becium grandiflorum* (Lam.) Pic. Serm, and *Polygala abyssinica* Fresen.

This study ^[44] mentioned the popular use of tea from the plant *Boerhavia hirsuta* Willd., popularly known in the quilombo community "Saco Grande, Kalunga" - Monte Alegre de Goiás as "pega-pinto", indicated for snakebite. The study also mentioned

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that popular knowledge served and still serves as a resource for first aid in cases of illness, accidents, simple everyday injuries, such as insect bites and venomous animals.

About insects, such as the wasp, this study ^[45] mentioned the popular use as wet-wrap dressing of leaves of *Eupatorium triplinerve* Vahl for the sting of this insect, not finding, at that moment, scientific evidence to prove such practice.

The study of the therapeutic effects of the medicinal plants is of utmost importance for health professionals, who are responsible for guiding people about the indiscriminate use of plants and clarifying the doubts of the population regarding the correct use, which requires evidence-based information. In this way, scientific knowledge combined with popular knowledge enables the development of health care strategies for people, based on comprehensive care.

Moreover, economically and environmentally correct, since it contributes to the Sustainable Development Goals (SDG), of Agenda 2030, through the promotion of terrestrial life, health and well-being ^[46].

Regarding nursing, it is important to recognize that the care actions performed in the family core of rural communities, based on the use of medicinal plants, are effective and allow these families to have better health conditions. This understanding is essential to achieve assistance that allows expanding health care practices. This construction should be carried out in conjunction with the subjects to include their interpretations and meanings to health care using medicinal plants ^[2].

Finally, studies show as reasons for the growing use of complementary therapies, in particular the use of medicinal plants in health care in rural communities, namely: difficulty of access to health services, low income, cultural traditions, the feeling that conventional medicine has not been able to offer effective solutions to the health problems of the population; as well as the need that users have to play a more active role in their health-disease process ^[47,48].

An important limitation of the study is the reduced participation of informants, although achieving the proposed objectives could have been greater. Furthermore, there is a lack of publications about the theme, which, in a certain way, hindered the search for scientific references. On the other hand, the survey enabled the expansion of knowledge about these self-care practices in the suffering of these people.

CONCLUSION AND FUTURE CONSIDERATIONS

This study aimed to identify plants used for insect and spider injuries in self-care practices in the situation of suffering by people living in a rural location in Southern Brazil. There were semi-structured interviews and participant observation (N-17) in the period from 2015 to 2017. The results revealed the self-care practices in a situation of suffering by insect and spider. This plant-based therapy appeared to be a viable possibility since seven plant species of different angiosperm families were cited: (I) *Ruta graveolens* L., (II) *Sida rhombifolia* L., (III) *Citrus × sinensis* (L.) Osbeck, (IV) *Plantago tomentosa* Lam., (V) *Allium sativum* L., (VI) *Eucalyptus globulus* Labill and (VII) *Mirabilis jalapa* L. The species of plants cited expose evidence of effectiveness for some treatments in traditional medicine, according to the existing pharmacological evaluations. Due to the multitude of active compounds in the kingdom Plantae, thorough scientific research is necessary to assess their potential for a cure to derive natural products therapeutically effective.

More studies are necessary in the areas of chemistry, pharmacology, biology, nursing, among others, to accomplish a better service to the population. The integration between health professionals and people from rural areas, whose popular knowledge and frequently exclusive dependence on the healing power of plants are of utmost importance for the scientific advances on the topic. The self-care practices in situation of suffering refer to certain social, economic and cultural contexts, and of the findings is the need for health professionals to improve the service when entering the local realities aiming to establish a therapeutic alliance with the subjects and social collectives that shortens the distances between scientific and popular knowledge.

With this research, we emphasize the importance of the professional be inserted in the socioeconomic and cultural context of the people he/she cares for, aiming to enable the promotion of health and care integrality.

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