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Popular medicinal uses of *Calea uniflora* Less. (Asteraceae) and its contribution to the study of Brazilian medicinal plants

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ABSTRACT

Calea uniflora Less. is widely used in southern Santa Catarina (Brazil), but there are no scientific studies which support its use. Then, this study was proposed to determine of the percentage use of *C. uniflora* in a city of southern Brazil and documentation of the knowledge that the population has about this species. The survey was conducted with semi-structured interviews using a questionnaire applied to 372 participants. In analyzing the results, it was observed that of the 94.1% who recognized *C. uniflora*, 74.3% utilize it as a medicinal plant and 65.4% of such knowledge originates in childhood, mainly through the family (84.6%). 93% reported using inflorescences macerated in alcohol or rum; this extract is generally used topically for wound healing and muscle pain. Furthermore, some reported using small quantities of this extract orally to treat cold and flu. Regarding effectiveness and safety, 97% stated an improvement in symptoms with the use of the plant, while 98.5% stated that it has no toxicity. In light of these results, future phytochemical, pharmacological and toxicological analyses should be designed in order to ensure rational and safe use of this species.

Key words: Brazil, *Calea uniflora*, ethnobotanical studies, semi-structured interviews, traditional medicine.

INTRODUCTION

Saslis-Lagoudakis et al. (2014) claim that an important point for change in history is the ability of humans to learn from others and transmit this knowledge to those who live around them, thus ensuring the transmission and conservation of information. In the context of medicinal plant use this is no different, as traditional knowledge is usually transmitted orally and associated with families, communities or ethnic groups (Hamilton 2004, Abbet et al. 2014). However, lifestyle change associated with lack of ethnobotanical surveys and recording of information, may result in the loss of

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traditional knowledge for future generations (Dovie et al. 2008, Simbo 2010, Maroyi 2011, Wambugu et al. 2011).

Such observations under in the importance of ethnobotany, as studies in this discipline are intended to investigate for what purposes plants are used, while recording and ensuring the preservation of information (Sargin et al. 2013, Liu et al. 2014). In addition, these studies may also support the evolution of phytochemical and pharmacological analyses, since plant extracts present a promising resource for the discovery of substances with pharmacological activity (Nascimento and Oliveira 2004, Heinrich et al. 2014).

Among the diverse plant kingdom is the family Asteraceae, with approximately 1.535 genera and 23.000 species distributed in cosmopolitan fashion, but occurring predominantly in tropical and subtropical regions (Maia et al. 2011, Nascimento and Oliveira 2004).Within this family is found the *Calea* genus of plants, comprising around 110 species, including the medicinal species *Calea uniflora* Less., a perennial herb with yellow inflorescences, popularly known as arnica-da-praia (Nascimento et al. 2002, 2004). As described by (Mondin et al. 2015), *C. uniflora* is heliophytic and develops in a subtropical climate. This species is native to Paraguay, Argentina, Uruguay and Brazil. In Brazil, is found in the center-south of the country (Mato Grosso do Sul, Minas Gerais, São Paulo, Paraná, Santa Catarina and Rio Grande do Sul (Mondin et al. 2015). In particular, the plant is well distributed in the south of Santa Catarina in the coastal area in well-drained soil regions, appearing spontaneously in Balneário Rincão city, where usually is collected by the local population and neighboring municipalities.

Some scientific studies have been developed to determine the phytochemical and pharmacological activities. Phytochemical studies reported to date with *C. uniflora* have identified a range of secondary metabolites including *rel*-2-methyl-2,3,4-trihydroxybutanoic acid-1,4-lactone, 5-deoxyflavone glycoside, 3',4',7-trihydroxyflavone-7-*O*-β-glucopyranoside, 2',4-dihydroxy-3-methoxychalcone-4'-*O*-β-glucopyranoside and quercetin-3-*O*-β-galactopyranoside (Nascimento and Oliveira 2004). Also, Lima et al. (2016) describes the presence of nine phenolic compounds in leaves of *C. uniflora*, identified as noreugenin, ethyl caffeate, a mixture of butein + orobol, α-hydroxy-butein, caffeic acid, butein 4›-O-glucopyranosyl, quercetin 3-O-glucopyranosyl and 3,5-di-O-caffeoylquinic acid. The same authors demonstrate the trypanocidal effect of ethyl caffeate, a mixture of butein + orobol obtained by this plant. Furthermore, Nascimento et al. (2007) demonstrated that chromanones, uniflorol-A and uniflorol-B, isolated from *C. uniflora* inhibited the growth of promastigote forms of *Leishmania major*. In another study, both a dichloromethane extract of the roots and two isolated compounds derived from *p*-hydroxyacetophenone also showed trypanocidal properties. All compounds tested were also active against dermatophyte fungi (*Trichophyton rubrum* and *T. mentagrophytes*), but only three against *Candida albicans* and *C. glabrata* (Nascimento et al. 2004). The dichloromethane extracts of both xylopodia and aerial parts showed *in vitro* trypanocidal activity against trypomastigotes of *Trypanosoma cruzi* (Nascimento et al. 2002).

According to local knowledge transmitted orally, this plant is widely used as a medicinal plant in southern Brazil, but to date scientific studies to support this use are lacking, an important factor in motivation of this research. Fundamentally, this research project aimed to determine the percentage use of *C. uniflora* in a city of Santa Catarina state in southern Brazil and establish the extent of knowledge that the population has about this species. Based on this information, we glimpse subsidize studies on phytochemistry and the pharmacology of this plant.

MATERIALS AND METHODS

STUDY AREA

This research was conducted in the city of Balneário Rincão, which is located in the state of Santa Catarina, southern Brazil, between geographic coordinates 28°49›53.0»S and 49°14›06.7»W (Fig. 1). With 13 km of coastline, it has two fishing platforms and six freshwater ponds, being located between the municipalities of Araranguá (South), Jaguaruna (north) and Içara (west), and the Atlantic Ocean (east). As a coastal city with a subtropical climate, it has in most of the year a much smaller population when compared to the summer months, which it reaches 150.000 inhabitants (Balneário Rincão 2014, Santa Catarina 2014). We chose this area of study due to its favorable characteristics for the development of *C. uniflora*, which can be found naturally in the region.

STUDY POPULATION AND SAMPLE CALCULATION

The sample was composed of men and women housed in Balneário Rincão, aged over 18 years, selected at random by knocking on doors. According to 2012 estimates, the population of this city was about 11.136 inhabitants (IBGE 2012). Thus, in calculation of the required sample size the following formula was applied (Jesus et al. 2009, Silva et al. 2010): $n = Np(1 - p) / (N - 1)(d / z)^2 + p(1 - p)$; where n is the sample size, z (1.96) corresponds to the 95% confidence coefficient, d (0.05) sampling error, p (0.5) a ratio to be estimated and N (11.136) the total population, reaching a representative sample (n) of 372 people.

DATA COLLECTION

For obtaining data, semi-structured interviews were conducted (Albuquerque et al. 2010), by applying an adapted form (Supplementary Material) of Silva et al. (2010), Allabi et al. (2010) and Rossato et al. (2012) between December 2013 and March 2014. We conducted a pilot survey to test the interviews. This form was composed of questions related to socio-demographic characteristics of participants (gender, age, education, etc.), and also the plant *C. uniflora* (part used, time and place of collection, method of preparation, administration, etc.).

An exemplar of *C. uniflora* was collected at Vereador Custódio Borges, Bairro Pedreira, city of Balneário Rincão, identified botanically by Dr. Vanilde Citadini-Zanette and Dr. Mara Rejane Ritter, and a herbarium sample deposited in the Herbarium of Pe. Raulino Reitz at the Universidade do Extremo Sul Catarinense (UNESC) as CRI 10.304.

The holding of interviews began after the participants gave informed consent, pursuant to

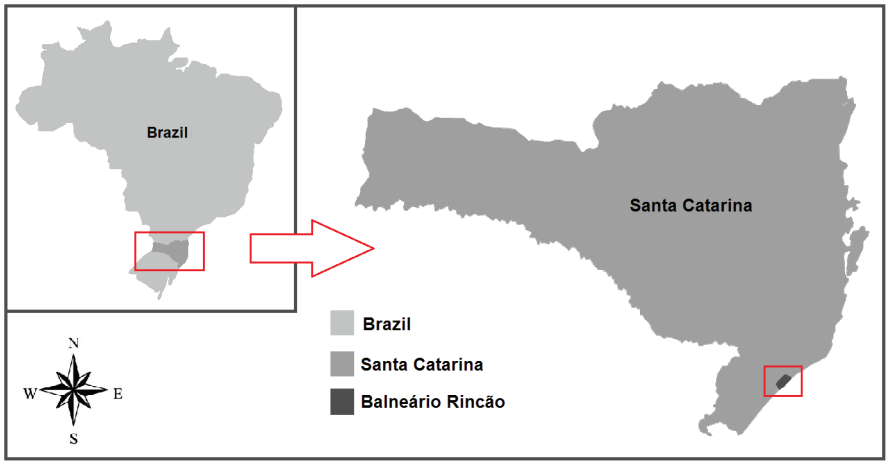

Figure 1 - Location of the city of Balneário Rincão. Font: Adapted Google Maps.

Resolution No. 466 of December 12, 2012 of the National Council of Health (Brasil 2012). The implementation of this work was approved by the Research Ethics Committee of the Universidade do Extremo Sul Catarinense, registered under the No. 278.216.

Initially, socio-demographic information on the participants was collected, and then the participants were asked whether they know arnica, and them an exemplar of plant was shown to each participant in order to confirm their recognition of the species, mentioning its popular name (arnica-da-praia) in situations where there was difficulty in recognition. All completed and signed interviews were collated, including those in which the participants reported not knowing or not using the plant.

RESULTS

Of the sample of 372 participants, the age profiles panned from 18 to over 70 years, with 37.1% between 30 and 50 years and 46.5% over 50 years. It was observed that women represented 74.2% of interviewees. The majority of *C. uniflora* users reported a monthly household income of no more than two minimum wages. Regarding time spent in formal education, it was observed that approximately 73% of *C. uniflora* users had completed primary education. However, over 20% also reported completion of high school or third level education (Table I).

On data relating to the study species, 50% of respondents recognized *C. uniflora* directly by the image, 44.1% by its popular name and only 5.9% reported not knowing it. Of the 94.1% (n = 350) familiar with it, 74.3% (n=260) use it as a medicinal plant. Of those who use it, 65.4% said they knew it or used it since childhood, with an additional 13.8% reporting knowledge acquired in adulthood but retained for20 years or longer. When asked about the origin of their knowledge, 84.6% said they learned of the plant through their family, 12.3% through friends or neighbours, and 3.1% from other sources.

Considering the sourcing of the plant for consumption, 81.5% reported its collection in the region of Balneário Rincão in fields or in the bush, and while 56.5% said that the ideal harvesting period was from December to March, 25.8% could not identify the optimal harvesting time.

In relation to its popular name, 97% knew *C. uniflora* only as arnica-da-praia, while the remaining 3% mentioned other names as arnica-do-campo and arnica-do-mato, which may be related to plant collection sites.

In the preparation of the extracts and use of *C. uniflora*, multiple approaches were commonly encountered, including use of more than one part

TABLE I
Economic status and Educational level of *C. uniflora* users.

Economic status	Number	%
No personal income	15	5.8
Less than1minimum wage	14	5.3
Between1and 2 minimum wages	171	65.8
Between 3 and 5 minimum wages	56	21.5
Above 5 minimum wages	4	1.6
Educational level	**Number**	**%**
Illiterate	12	4.5
Primary and middle	189	72.8
Secondary qualification	48	18.5
Undergraduate	6	2.3
Graduate	5	1.9

of the plant, more than one mode of preparation and more than one route of administration (Table II). A majority of users employed the plant's inflorescences, which are macerated in alcohol or rum by 93% of users. It was also observed that 75% preferred use of the fresh plant, with 19.6% drying it before use and 5.4% did not specify.

Upon analyzing the popular indications described by *C. uniflora* users, 39 different therapeutic uses were identified (Tables III and IV), the most cited being summarized in Figure 2. However, it is important to note that a majority of participants did not mention just one therapeutic use, but a combination of them.

TABLE II

Plant parts used, modes of preparation and routes of administration cited by *C. uniflora* users.

Plant part used	**Number**	**%**
Inflorescences	246	94,6
Roots	18	6,9
Leaves	10	3,8
Stems	4	1,5
Whole plant	3	1,2
Shoots	1	0,3
Mode of preparation	**Número**	**%**
Maceration	259	99,7
Decoction	9	3,5
Infusion	7	2,7
Poultice	1	0,3
Route of administration	**Número**	**%**
Topic	255	98,1
Oral	88	33,8
Otologic	4	1,5
Inhalatory	1	0,3

TABLE III

Indications for popular use with topical *C. uniflora*.

Mode of preparation	**Part plant used**	**Indication***	**Mode of use**
Maceration	Inflorescences	Allergy, anti-inflammatory, antiseptic, hematoma, wound healing, circulation, itching, muscle pain, back pain, joint pain, swelling, urinary tract infection, vaginal infection, mycosis, snake bites, insect bites, rheumatism, torsions and varices.	Apply to the affected area 1-5 times a day until disappearance of symptoms.
		Aphthae and sore throat.	Gargle, 2-3 times a day until the disappearance of symptoms
	Flowers or leaves	Toothache.	Use cotton soaked with the extract or use a gargle, rinse or apply a macerated flower when in pain.
	Flowers or leaves and roots	Headache.	Pass the extract on the forehead, 2 times a day until the disappearance of symptoms
	Leaves	Wound healing, muscle pain and swelling.	Apply to the affected area 2-3 times a day or when in pain until the disappearance of symptoms.
	Flowers or roots	Wound healing, muscle pain and rheumatism.	Apply to the affected area 2 times a day until disappearance of symptoms.

TABLE III (continuation)

Mode of preparation	Part plant used	Indication*	Mode of use
Maceration	Stems	Wound healing.	Apply to the affected area once daily / 3 times a week for 1 month.
	Shoots	Wound healing and torsions.	Apply to the affected area 2 times a day until disappearance of symptoms.
	Whole plant	Wound healing, hematoma and muscle pain.	Apply to the affected area 2 times a day until disappearance of symptoms.
Poultice	Inflorescences and leaves	Wound healing.	Apply to the affected area once daily until cicatrization.
Infusion	Flowers and roots	Muscle pain, urinary tract infection and thrombosis.	Apply to the affected area 2 times a day until disappearance of symptoms.
	Roots	Sore throat.	Gargling, once daily until relief of pain.
Decoction	Roots	Pain in the broken foot.	Apply a compress once a day for 6 months

Mode of preparation: Macerations are made with rum or alcohol. Infusions are prepared through aqueous decoction. Poultices are prepared with lard. Note: Information about the plant parts used, methods of preparation, therapeutic indications and methods of use present in this Table are described as reported by the study participants.

TABLE IV

Indications for popular use orally, otologically and via inhalation of *C. uniflora.*

Administration	Mode of extraction	Part of plant	Indication	Posology-mode of use
Oral use	Maceration	Inflorescences	Colic, headache, toothache, sore throat, muscle pain, bladder pain, flu, throat infection, urinary tract infection, kidney stones, lung problems, reflux, cold, cough and stomach ulcer with *Helicobacter pylori*.	Drink 1-2 teaspoons of extract diluted in coffee or water, 1-2 times a day until disappearance of symptoms.
	Maceration		Expectorant and in the treatment of sinusitis.	Mix 30% water + 30% extract + 40% lemon juice, drink 1 glass 3-4 times a day until disappearance of symptoms.
	Infusion		Anti-inflammatory, colic, stomach pain, flu, infection.	Drink 1-3 cups of infusion at night until disappearance of symptoms.
	Decoction		Anti-inflammatory, wound healing, swelling, rheumatism and after surgical removal of the ovaries.	Drink half to 1 cup, 1-3 times a day for 7 days.
	Maceration	Flowers and roots	Colic and bladder pain.	Drink 10-15 drops diluted in coffee, 2 times a day until disappearance of symptoms.
	Infusion		Colic and headache.	Drink 1 cup, 2 times a day until disappearance of symptoms.
	Maceration	Roots	Urinary infection.	Drink 2 tablespoons diluted in tea/ coffee or water, 2 times a day until disappearance of symptoms.
	Decoction		Diabetes.	Drink 1 liter per day in small doses, every day.
	Maceration	Roots and leaves	Flu, infection and cold.	Drink 1 teaspoon of extract diluted in coffee or water, once a day.
	Decoction		Urinary infection.	Drink 1 cup, 3 times a day, for 7 days.
	Infusion	Leaves	Wound healing, infection and rheumatism	Drink 1 teaspoon, 3 times a day, for 15 days.

TABLE IV (continuation)

Administration	Mode of extraction	Part of plant	Indication	Posology-mode of use
Otological use	Maceration	Inflorescences	Earache.	Use cotton wetted with extract or instill 3-4 drops, 1-3 times a day
Inhalational use	Decoction	Flowers	Rhinitis.	Simmer the flowers with water and salt and inhale steam, once daily until disappearance of symptoms.

Mode of preparation: Macerations are made with rum or alcohol. Infusions are prepared through aqueous decoction. Note: Information about the parts of the plant used, methods of preparation, therapeutic indications and methods of use present in this Table are described as reported by the study participants.

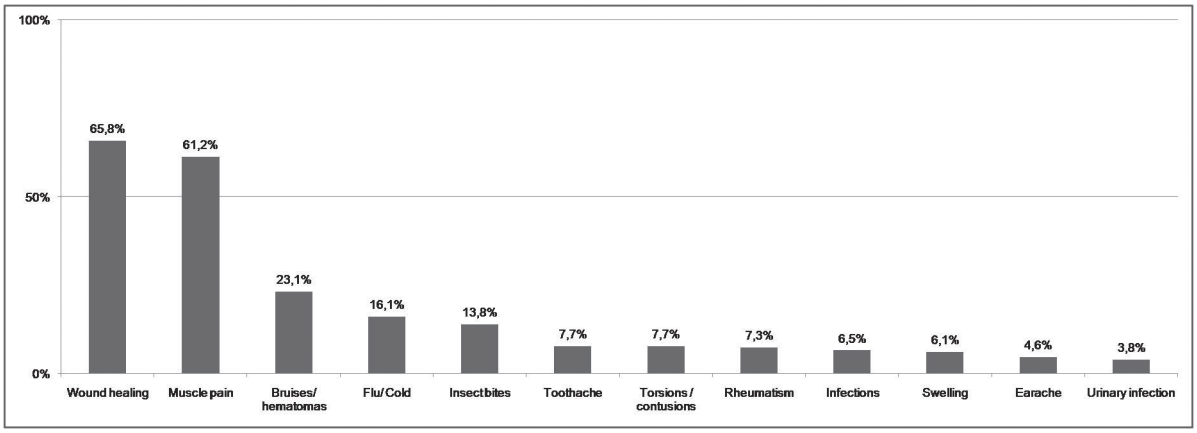

Figure 2 - Main therapeutic indications cited by *C. uniflora* users.

In relation to the recommendation of use of *C. uniflora* by health professionals, only 6.2% of users reported using the plant on the advice of these sources. Concerning the perceptions of effectiveness with *C. uniflora*, 97% of informants who used the plant said they experienced improvement with its use. When questioned about the safety of the plant, 98.5% of respondents said that it has no toxicity and approximately 85% that it has no contraindications or drug interactions.

DISCUSSION

The demographic characteristics of the participants in this study have many parallels with published work. Age profiles of respondents in this study match closely with those in the literature; in the work of Gbolade (2012), 43% of respondents were between 30 and 50 years, and 49% were over 50 years (compared to 37% and 47% respectively). Liu et al. (2014) observed an age range of respondents of 16 to about 70 years, which again represents a similar age profile to that seen in the present work. The average age of *C. uniflora* users was also similar to that found in the work of Muthee et al. (2011) and Bulut and Tuzlaci (2013) with other plants, where the average ages were 55 and 53, respectively. It is important to highlight the influence of older people in the dissemination of knowledge through the generations, as such people are a source of potential information on the use of medicinal plants (Rokaya et al. 2010, Silva et al. 2010, Dovie et al. 2008). According to some authors, younger people know less about medicinal plants than older people (Juárez-Vázquez et al. 2013). Gakuya et al. (2013) reported an average age of participants of 60 years, suggesting that the new generation is not fully engaged in the practice of traditional medicine, due to a decline in the dissemination of knowledge across generations.

Interestingly however, it was found in this study that approximately 30% of who use *C. uniflora* were less than 40 years, showing the use of this species by newer generations also.

Ethnobotanical studies describing self-selection of medicinal plants often show that the female sex predominates with such use, as observed herein where 74% participants were female. This may be related to the fact that men are working outside the home and women more involved with domestic responsibilities (Al-Adhroey et al. 2010, Jesus et al. 2009, Liu et al. 2014, Sivasankari et al. 2014) claim that women have a greater interest in the use of medicinal plants. Moreover, it is common for them to have accumulated more information on plant use than men, reflecting their traditional roles in the care of home and children, in order to preserve family and community health (Abe and Ohtani 2013). In the present study, 34.1% of participants identified as female homemakers and 22.3% were retired, including some women. In contrast, in ethnobotanical studies of plant use by traditional healers, in some cultures it may be more common for the repository of knowledge to lie predominantly with men (Ngarivhume et al. 2015).

One of the factors commonly cited to explain the ongoing widespread use of medicinal plants in the world is the affordable cost of such therapy, which is usually associated with developing countries and low income (Yabesh et al. 2014, Maroyi 2011). Individuals with lower educational levels may also have more contact with the use of medicinal plants when compared to people with a higher education level (Kayani et al. 2014). In the present study, almost 80% of participants did not proceed to secondary education. These percentages were very similar to those observed by Gakuya et al. (2013) and Kaval et al. (2014) in analogous studies with other plant species. The economic situation of the majority of respondents (Table I) was similar to that found by Santos et al. (2009); however the economic status does not directly predict use of *C. uniflora* as clearly, as 21.5% reported their monthly income as between 3 and 5 wages.

As with other studies (Juárez-Vázquez et al. 2013, Jesus et al. 2009), a majority of participants collected *C. uniflora* directly from its natural habitat. Mondin (2015) describes that *C. uniflora* is appearing on the southern coast of Santa Catarina in sandy well-drained soils. Flowering usually occurs from September to March and May to July, predominantly in October and November, matching the most common time of harvesting reported by users. Such information is very valuable, as the production of chemical substances can vary depending on stages of growth and collection period, in addition to other environmental factors, exposure to pesticides and heavy metal contamination (Padma 2005). Furthermore, the availability of nutrients, carbon dioxide, ozone, light and appropriate temperature, also can change the production of secondary metabolites (McKiernan et al. 2014).

A lack of standardization in the preparation and use of plant extracts seems to be one of the main drawbacks of traditional medicine, as there is often no well-defined ratio between the quantity of plant material and solvent to be used (Al-Adhroey et al. 2010). In the present study this was also observed, since many different forms of preparation of *C. uniflora* extracts were documented (Tables III and IV). Regarding maceration, many said that the plant should stay in contact with the liquid (alcohol or rum) for a few days or until the liquid is yellowish. After this period, the extract can then be used, and may be subsequently stored until it runs out. In contrast, if employing a decoction or infusion, users leave the plant in contact with the solvent (water) only for a few minutes, with such extracts being completely consumed after preparation. Clearly, use of different solvents and preparation methods may likely afford extracts with varying phytochemical fingerprints.

Studies performed with both aerial and underground parts of *C. uniflora* have revealed

interesting biological activities (Nascimento et al. 2002, 2004, 2007). These investigations, coupled with the observations of this study regarding methods of use of *C. uniflora*, may suggest a higher concentration of active compounds in inflorescences and roots. However, more studies are needed to afford a complete chemical profile of the species.

Constituents responsible for the therapeutic action of plants are typically secondary compounds such as alkaloids, phenolic compounds, essential oils and others (Halberstein 2005, Gurib-Fakim 2006, Wink 2013). These metabolites, in most cases, exhibit some biological activity. Polyphenols, for example, are generally pharmacologically active, with diverse actions including antioxidant, anti-inflammatory, antibacterial, antifungal and antiviral activities (Wink 2013).

In the present study, none of the biological activities described by the literature were specifically described by *C. uniflora* users, although the reference to use in vaginal infection may correlate with observed anti-fungal effects. But this affirmation is merely speculative. Interestingly however, in our laboratory, a study showed that alcoholic extracts of the inflorescences of *C. uniflora* have antinociceptive activity in mice (unpublished data), which may pharmacologically validate the use of this plant as an anti-inflammatory and analgesic. In light of these observations, further studies are needed to clarify whether the therapeutic actions mentioned by the user population of *C. uniflora* in souther Brazil are due to reported or as yet uncharacterized constituents.

Other published ethnobotanic studies show that other plants of the family Asteraceae are used for the same therapeutic purposes as *C. uniflora* in southern Brazil (Rokaya et al. 2010, Abe and Ohtani 2013, Gakuya et al. 2013, Juárez-Vázquez et al. 2013, Bulut and Tuzlaci 2013, Leto et al. 2013, Kayani et al. 2014). It remains to be ascertained whether the active constituents of these species overlap with those of *C. uniflora* or are distinct. Besides, southern region of Brazil is colonized by European immigrants who were decisive in the cultural habits of the region. So it is important to note that Arnica-da-praia may have been confused by Spanish immigrants with *Arnica montana* L., since they are very similar morphologically in size and inflorescence, because both are small herbs and have chapters with yellow flowers. This idea is supported by the therapeutic indications of *A. montana*, which is known worldwide and used for the same medicinal purposes described in this survey for *C. uniflora* as analgesic, for contusion, bowels ache, common cold, cough, hematoma, headache, phlebitis, rheumatism and others applications (for review, see Obón et al. 2012).

In this study, only a minority of participants reported the use of *C. uniflora* pursuant to recommendation from a healthcare professional. A lack of access to modern health services is often cited as a factor that leads people to choose medicinal plants as a primary resource for the treatment of their health problems, which may partly account for this finding (Kayani et al. 2014, Simbo 2010). Another factor that may explain the low rate of use of the plant as directed by healthcare professionals is the fact that many have acquired knowledge of the species through their family. However, as emphasized by Rossato and Chaves (2012), only those medicinal plants that have been validated with the National Agency of Sanitary Vigilance (ANVISA) should be indicated by health professionals in Brazil. No information was found on *C. uniflora* in RDC No. 26 of May 13, 2014, or in Instruction No. 2 of May 13, 2014, or in the monographs on herbal traditional use of the European Community (*Community herbal monographs with traditional use*). Notably however, the vast majority of *C. uniflora* users expressed confidence in its efficacy without fear of significant side effects. Such beliefs undoubtedly motivate ongoing confidence in the medicinal use

of this species. It is estimated that 70-80% of people worldwide rely mainly on traditional medicines, usually herbal medicines, to meet their basic health needs (Hamilton 2004). Many people prefer the use of medicinal plants to allopathic drugs as they consider that they have fewer side effects than synthetic drugs (Gakuya et al. 2013, Kayani et al. 2014). However, the secondary metabolites of plants do not always provide benefits, and may cause toxicity depending on the concentration present or through inappropriate use (Turolla and Nascimento 2006). Furthermore, they can trigger adverse reactions by interacting with other drugs or food, or due to patient characteristics such as age, gender, physiological conditions, genetic traits, etc (Balbino and Dias 2010). Thus, care in the therapeutic use of plants is essential due to a lack of knowledge about the interactions between plant extracts and synthetic drugs (Rossato and Chaves, 2012, Juárez-Vázquez et al. 2013); this is particularly of concern for little-studied species such as *C. uniflora*.

CONCLUSIONS

In this study, it was found that *C. uniflora* is widely known and used in Brazil, considering that of the 94.1% of respondents who recognized it, 74.3% utilize it as a medicinal plant.

In relation to popular indications, it was noted that the plant is most commonly used for wound healing, muscle pain, bumps and hematomas, flu and cold, insect bites and toothache. Furthermore, it was found that people have great confidence in the use of this plant, 98.5% considering it to be nontoxic and 85% asserting that it has no contraindications and drug interactions.

In conclusion, in light of its widespread recognition and utilization as a medicinal plant for a range of diverse indications, future phytochemical, pharmacological and toxicological analyzes informed by the results of this study are warranted, in order to ensure safe use of the species and validate its popular use.

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