Use of snuff and its main constituents for religious purposes in an alternative community with shamanic practices in the south of Brazil

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ABSTRACT

Snuff is a fine aromatic powder composed of dried and thin leaves combined with tobacco, roots, peels, and seeds. Its use for indigenous religious purposes has appeared since pre-Columbian period in various localities of American continent. Practice is considered sacred in indigenous culture and suffered from trivialization of consumption due to influence of colonizers, which triggered subsequent industrialization of this complex for commercial purposes. Commercial snuff is essentially made from industrialized tobacco without addition of other medicinal plants and without therapeutic or spiritual purposes beyond its indiscriminate and inappropriate use, causing health risks. Therefore, this study aimed to make a review on snuff in Brazilian culture and a tour of a local community. In shamanism, plants are used as access vehicles to other religions of cosmos and its inhabitants, from where experts dialogue, bring songs, news, omens, and acquire new knowledge. The plants used in shamanic composition of snuff vary with the locality of indigenous villages in America and are essential ingredients of this interaction between humans and non-humans, a special mediator of intersubjective interactions. Several studies show the use and meaning of *Erythroxylum coca* used in different communities of the Amazon, besides Chacrona and Mariri, popular names of plants used in manufacture of Ayahuasca drink by doctrine Santo Daime. Because of this, it is essential to establish differences between recreational snuff and shamanic and their effects on body as well as studies on use of shamanic snuff should be directed according to their applications and plants employed by communities.

KEYWORDS

snuff, shamanism, medicines plants, religious purposes, alternative communities

INTRODUCTION

Snuff is a thin and aromatic powder complex made of droughts leaves combined with tobacco (*Nicotiana tabacum*), roots, barks, and, or seeds of other plants finely ground (Wassén, 1993). Indigenous people have used snuff for religious purposes was represented in pre-Columbian archaeological records found in the most diverse locations on the American continent. Its use can also be seen in the first historical reports of the European’s arrival in America. The practice
considered sacred in indigenous culture later suffered from the trivialization of consumption due to the influence of the colonizers, which triggered the subsequent industrialization of this complex for commercial purposes. The commercial snuff is made essentially of industrialized tobacco without adding other indigenous medicinal plants and has no therapeutic or spiritual purposes. Besides, its indiscriminate and inappropriate use poses risks of damage to health (Moreno-Coutiño & Bello, 2012).

Preserving their cultural importance, several ethnic groups use snuff to present medicinal and ceremonial properties related to increasing physical vigor, cleaning the airways, communication with a metaphysical world, and purification of the body and spirit (Santos & Soares, 2015).

There are reports of snuff without the presence of tobacco. However, tobacco is an essential element in traditional snuff. Depending on the indigenous/shamanic or alternative communities with shamanic practices, different plants are used together with tobacco to prepare snuff powder. The compositional survey of snuff and their respective pharmacological properties of molecules used for religious purposes have been few explored (Melquior & Silva, 2016) and often confused with commercial snuff.

Due to a wide variety of plants with pharmacological value involved, this study seeks to survey the main constituent components of snuff for religious purposes in an alternative community with shamanic practices in the south of Brazil.

**METHODOLOGY**

**Casuistry**

The study carried out is based on data collection in the alternative community with shamanic practices (n=28) in south of Brazil (Fig. 1 – Santa Maria- RS; Coordinates: 29° 41’ 02” S 53° 48’ 25” O) in the preparation and composition of snuff for religious purposes used. Subsequently, a review in the scientific literature of data published in articles, theses and books using databases from online platforms such as Scielo, Elsevier, Science Direct, PubMed and Google through the search of pre-defined keywords such as “snuff”, “shamanism”, “plants”, “religion”, “community of spiritual growth”, “constitution”, “composition”, “tobacco”, “rape”, “pereirine” and corresponding names in Portuguese and Spanish.

The primary plants constituting the snuff used for religious purposes were researched, selecting those with the highest incidence in the different communities. A theoretical study was carried out on the main molecular characteristics of the plants that constitute snuff for religious purposes, more prevalent in different previously selected communities, and the constituents of snuff for religious purposes in south of Brazil (Santa Maria-RS).

**Inclusion criteria**

The selected articles expatiate on the ritualistic and religious use of indigenous snuff in Brazil. The essential plants constituting snuff in that territory were carried out, selecting those with the highest incidence in different communities. Volunteers who agreed to participate in this study from the alternative community were interviewed, and posteriorly the collected data were evaluated. All volunteers were over 18 years of age and had no psychiatric disorders.

**Exclusion criteria**

Individuals who consume industrialized snuff and use it for recreational purposes were excluded from the study. Also, it was excluded individuals under the age of 18 or with

![Fig. 1. A) Map of South America with the location of the respective alternative community with shamanic practices. B) Geographic location of the respective alternative community with shamanic practices in the south of Brazil. (Source: Google Maps®)](image-url)
psychiatric disorders. The same is equivalent to those who refused to accept the conditions described in the free and informed consent form.

**Ethical considerations**

The study protocol was previously approved by the Federal University of Santa Maria Ethics Committee, Brazil (Ethics Protocol Approval No. 86672518.0.0000.5346).

**SCIENTIFIC LITERATURE REVIEW**

**Religious/ shamanic culture**

Shamanism is called the ethnomedical practice of a religious and philosophical nature, seeking to heal through transmutation and contact with other entities such as mystical beings, animals, and the dead. The transmutation, trance, or ecstasy states are achieved by using elements extracted from nature. Thus, it is highlighted the use of entheogens compounds (from the Greek, "manifestation of the inner God"), psychoactive substances capable of altering the individual’s state of consciousness, elevating them to a shamanic state (Bartolomé & Barabas, 2013).

In general, plants are used as vehicles of access to other regions of the cosmos and its inhabitants, from where (and through which) specialists acquire new knowledge, engage in dialogues, bring songs, news, and omens. Therefore, the plants involved are essential ingredients of this interaction between humans and non-humans, in other words, a special mediator of intersubjective interactions. Several studies show the use and meaning of *Erythroxylum coca* known as *ipadu*, in the Upper Rio Negro River and *katsupari* among different communities of Amazon; Chacrona and Mariri, popular names for the plants used in the manufacture of the *Ayahuasca* drink for the doctrine of Santo Daimé. In this context, snuff proves to be one of the essential practices commonly used during shamanic ceremonies (Goulart, 1996; Santos & Soares, 2015).

**Snuff**

Snuff is the vegetable vehicle of this cosmic journey for most indigenous groups, a consolidated product of culture based on forest plants and cultivated tobacco. The different groups that inhabit this region are found in snuff the transport that takes them to the world from captive souls and intelligible communication with the spirits and representatives of animals, birds, fish, and plants. The snuff also fulfills, in some cases, the role of antivenom, neutralizing and appeasing the desire and the wrath of those who seek the natural principles of timbó or tingui for death and transformation into the non-human other (Santos & Soares, 2015).

The delicate and aromatic powder is a mixture of dry tobacco leaves with roots, bark, and seeds from other ground plants, depending on the ancestral knowledge of the community where it is prepared and the expected effect. Different people of the American continent historically use the product during religious cults in search of communication with a metaphysical world, spiritual elevation, purification of the soul, and energetic alignment (Moreno-Coutinho & Bello, 2012).

Considering the religious aspects of snuff consumption, it is required a mediator intituled shaman. A shaman is a traditional priest of shamanism who has contact with the world of spirits. During the ceremonies, the community enables the shaman to employ herbs and other compounds to promote the capacity of invocation of the spirits or/and healing. The sessions promoted by the shaman are considered forms of communication with ancestral entities and spirits, as well as it is a remedy for the body, helping to expel impurities present in the organism, causing increased physical vigor. In this sense, the presence of a shaman is significant for the ceremony and promotes the snuff effects (Santos & Soares, 2015).

**Types of snuff and their use.** According to its compositions, different types of snuff promote different effects on the body. It is made with different mixtures according to the knowledge of the community and its locality; however, tobacco (*N. tabacum*) is an essential compound. The main snuff prepared by different people maintains a pattern in your composition, revealing some main types of snuff used for religious purposes (Melquior & Silva, 2016). The *N. tabacum* plant is native to South and North America, having its first record written in 1492, when Christopher Columbus verified the use of this unknown plant by American Indians. Jean Nicot was responsible for taking the plant to France, and from his name came the name of the genus *Nicotiana*. The name of the species, *tabacum*, is due to the Haitian word that designates the pipe used to smoke the plant (Kishore, 2014).

An essential type of snuff is called “*Tsunu,*” which, in addition to tobacco, also presents bark from the Pau-Pereira tree (*Geissospermum vellosii*) in your composition. Similar to the Pau-Pereira tree (*G. vellosii*), drug prepared with ash from the bark/trunks of the Canela-de-Velho tree (*Miconia albicans*), also known as “*Canela-de-Velho snuff,*” can be used for this purpose, and it has effects stronger than Pau-Pereira tree (*G. vellosii*). In 1845, Freire Allemão published a study in which he described several aspects related to the pau-pereira plant (*G. vellosii*), including attribution to Ezequiel Corrêa dos Santos, a Brazilian pharmacist, as the first to undertake the plant and obtain an alkaloid from it, naming it as “pereirinha”. The name of the genus *Geissospermum* derives from the arrangement of the plant’s seeds, and the name of the species is due to Velloso, the first to recognize it as a new species. In that document from 1845, it was reported that the bark of pau-pereira is a precious antifebrile tonic (Da Silva, Da Lima Filho, & Ferreira, 2016).

Another essential preparation is “*Queen snuff,*” where be observed the presence of Cipó-Mariri (*Banisteriopsis caapi*) and Queen Chacrona leaves (*Psychotria viridis*), the same ingredients for the preparation of the entheogen Ayahuasca drink. It is also known to use Cumaru seeds (*Amburana cearensis*) to prepare the snuff known as “*Cumaru.*” Other snuff preparations are reported less frequently than those
previously mentioned (Canuto & Silveira, 2006; Melquior & Silva, 2016; Souza, 2009; TIPOS de rapé, 2015).

Richard Spruce, an English naturalist and important botanist, 1849 made a trip to South America in order to study the Amazonian flora. Many species were described and his research became a reference when dealing with Amazonian plants, their uses and preparation techniques used by the Indians, being widely used in later studies, such as that of Richard Schultes, an American scientist (Dos Santos-Fonseca et al., 2019). Spruce’s account was inclusive of used for scientific studies on ayahuasca, which was described by missionaries of the time as a drink with diverting and healing powers. According to the literature, Spruce and Alfred Russel Wallace are responsible for the initial research, both botanical and pharmacological, related to B. caapi and its use in rituals (Araújo, 2018).

Virola spp. is another genus used in the preparation of snuff, and the species used for this purpose are Virola theiodora (Spruce ex Benth.) Warb., Virola elongata (Benth.) Warb. and Virola calophylla (Spruce) Warb., species exclusive to the Amazon region. The bark of trees of this genus contains the compound N,N-dimethyltryptamine (DMT), an alkaloid with psychoactive properties that causes an altered mode of consciousness. Such a compound is considered a natural serotonergic agonist, acting on serotonin receptors with consequent visual, somatosensory and auditory effects (Faria, 2016).

For the administration of snuff, it is recommended the participation of another individual blow the snuff powder with the help of “Tipi.” This specific device allows one to allocate the snuff powder at one end that is in contact with the nostril while the other is available for blowing. During the procedure, the breathing of the person receiving the snuff must be stopped, allowing the drug to reach the nasal shells and the olfactory region. There is the possibility of self-application of snuff through the apparatus “Kuripe,” a small V-shaped object, and it is treated with great personal importance. Both instrumentation intended for the application of snuff are typically made of bamboo or poultry bones (Melquior & Silva, 2016; Wasséen, 1993). The production of snuff for religious purposes varies according to the local culture, materials, and preparation form. In general, the powder snuff is made by drying and grinding the plants in a clay pot, shell, rock, or bone placed over coals. Subsequently, a sift ing process is carried out, and posteriorly snuff powder is stored in a vessel or snail shell (Wasséen, 1993).

**Snuff phytochemical composition.** Snuff for religious purposes is prepared from herbs from organic cultivation, and tobacco (N. tabacum) is the main plant. Consequently, nicotine is the primary active substance (Melquior & Silva, 2016; Olson, 2014). Another vital component commonly added to tobacco is the bark of the Pau-Pereira tree (G. vellosii). It is considered an important medicinal plant in Brazil, and it is used against malaria, fever, and constipation (Melquior & Silva, 2016).

The presence of the Pau-Pereira tree in religious snuff is known as “Tsunu.” It is constituted for active alkaloids group named pereirine, stemming from geissosolosimine hydrolysis. The significant alkaloids that have biological activity found in the barks of the G. vellosii are geissoschizoline and geissospermine (Janet et al., 1958; Rapoport et al., 1958; Rapoport et al., 1960).

Considering “Queen snuff,” Cipó-Mariri (B. caapi) has β-carbolines compounds such as harmine, harmaline, and tetrahydroharmine. Meanwhile, psychoactive compound dimethyltryptamine (DMT) is the bioactive substance from the chacrone plant (P. viridis), and it is also present in the composition of this snuff (Souza, 2011).

“Canela-de-Velho snuff” from M. albicans, a component of one more type of snuff, there are large concentrations of flavonoids and triterpene compounds. However, most molecules found in this plant are triterpenes class, such as ursolic acid and their respective isomers and oleanolic acid (Pieroni et al., 2011).

For Cumaru/Emburana compound (A. cearensis), coumarin and mainly dicoumarol molecules are predominant. Secondary substances are also found in this compound, such as isocampferid flavonoid and ambroseide A (Silveira & Pessoa, 2005). Other plants with active principles could be employed for religious snuff; however, a minority of the preparations. All these related compounds are shown in Fig. 2.

**Biological activity and clinical manifestations from snuff phytochemical composition.** The biological effects of snuff will depend on the plants adopted for the drug. In this regard, tobacco derivates are the most crucial component of snuff. Initially, tobacco (N. tabacum), so nicotine is the primary substance responsible for biological effects. This molecule produces effects in the organism from the junction of nicotine with cholinergic receptors, which stimulates the sympathetic nervous system, stimulating the production of adrenaline and noradrenaline, accelerating the heartbeat, releasing glucose and mydriasis. In high doses, stimulation of the parasympathetic system and ganglionic and neuromuscular block may occur, resulting in reduced heart beating, gallbladder stimulation, and miosis. Nevertheless, the tobacco plant has shown anti-inflammatory and anti-parasitic properties (Almeida et al., 2009; Mishra et al., 2015; Olson, 2014; Riba et al., 2003; Santos & Soares, 2015; Vechia, Gnaotto, & Gosmann, 2009).

Pereirine alkaloids from the Pau-Pereira tree (G. vellosii) act by inhibiting acetylcholinesterase (AChE) and butrylcholinesterase (BChE) (Rapoport et al., 1960), resulting in vasodilation, hypotension, reduced heart beating, miosis, among other effects. Besides, these alkaloids act by depolarizing the membrane of muscle fibers without affecting neuromuscular transmission, proving to be a paralyzing agent (Bochefonteine & Freitas, 1877).

Canela-de-Velho plant (M. albicans) has essential antioxidant and anticarcinogenic activity. This activity is attributed to the flavonoids’ intense ability to remove free radicals. However, its benefits are mainly related to the ursolic acid and oleanolic acid, which can modulate the NF-kB transcription factor, critical for inducing enzymes
involved in inflammatory processes and activating the p53 transcription factor that acts as a tumor suppressor (Vechia et al., 2009).

For “Queen snuff,” Cipó-Mariri (B. caapi) and its respective β-carbolines compounds are reversible inhibitors of the enzyme monoamine oxidase (MAO) and central nervous system stimulant. Inhibitory action of MAO enzyme allows the psychoactive action of the dimethyltryptamine (DMT) from Chacrona plant (P. viridis) considering MAO enzyme degrades DMT in the liver and intestine. DMT produces visual effects, somatosensory, auditory effects, sweating, nausea, diarrhea, hypertension, and tremors due to oscillations in the prefrontal cortex resulting from its non-selective agonist action on serotonin receptors 5-HT1A/5-HT2A-R (Riba et al., 2003; Shanon, 2003).

Cumaru plant (A. cearensis) has anticoagulant, anti-inflammatory, antioxidant, analgesic, antispasmodic, and bronchodilator activity, being used in popular medicine mainly against diseases such as rheumatism, bronchitis, and asthma (Silveira & Pessoa, 2005). The essential coumarin found in this plant is dicoumarol, which acts competitively with vitamin K by inhibiting blood clotting synthesizers. Besides, an anti-inflammatory activity attributed to coumarins seems to be related to the inhibition of neutrophil migration and the increase in vascular permeability in the inflammatory focus (Jain & Joshi, 2012). On the other side, the flavonoid isocampferide and the phenolic glycoside amburoside A are important in the anti-inflammatory, antispasmodic, and antioxidant activities attributed to cumaru. The anti-inflammatory property seems to be related to the ability to inhibit the migration of cells to the inflammatory focus and to block neutrophil degranulation, while the relaxing effect is attributed to several intracellular actions, mainly opening K+ channels (Leal et al., 2006).

DATA COLLECTED FROM ALTERNATIVE COMMUNITY WITH SHAMANIC PRACTICES

Interview/ anamnesis aimed at volunteers

Familiar and professional life. All the interviewed volunteers (n = 8 women and 12 men) live in the alternative community with shamanic practices and report well-being within the community. Activities are distributed in gardening, planting and cultivation, cleaning, cooking, handicraft, and building services, constantly worrying about ecological sustainability. They develop their practices based on bio construction and permaculture, following earth care, people care, and sharing de surplus principles.

Spirituality. Volunteers follow the Santo Daime doctrine based on the sacramental use of the entheogen Ayahuasca drink to aid in searching for self-knowledge, clarity, divine connection, and personal development. Shamanic practices provide an experience of trance and contact with animal’s deities and spirits, which was also described in the interviews where the volunteer reports talking to guides and traveling to other planes with his eyes closed.

The spiritual development provided by culture for community residents assists them in human evolution with conscious beings freed from bad influences. Most of the volunteers (n=18) have learned about snuff for medicine and shamanic purpose through Santo Daime ceremonies realized in different locations in Brazil.

Physiologic effects reported after snuff administration. The physiological effects reported after snuff administration involve nausea/vomiting, abdominal pain/diarrhea, elevated body...
temperature/sweating, low blood pressure, intracranial pressure, and chills (Fig. 3A). Despite initial discomforts after snuff administration, volunteers declared well-being in a second step.

No one individual reported constant necessity or compulsive administration of snuff with exclusive use in consecration moments. All interviewed volunteers declared vehemently rebuke the indiscriminate use of snuff or when it is not applied for religious or medical purposes within the shamanic culture.

**Spirituals effects reported after snuff administration.** Snuff spiritual action is described with the sensation of well-being, positive thoughts, tranquility, lightness, interior peace, serenity, and increased inner awareness (Fig. 3B). According to the volunteers were interviewed, snuff for shamanic purposes is observed as an aid to harmonic balance between physical body and soul.

**Preparation of the snuff used in the shamanic and alternative community**

**Cultural aspects related to snuff.** Snuff employment by indigenous people is considered millenary knowledge described as a drug for respiratory system diseases, antipyretic activity, and native Americans used it before hunting activities to stimulate an alert state (Tushingham, Snyder, Korey, Damitio, & Gang, 2018). According to volunteers from this alternative community, snuff is faced as one of the main cure instruments because of the presence of tobacco, considered a sacred plant for the culture of shamanic snuff. Snuff administration is applied when necessary, commonly before prayers and meetings associated with sacred chants to guide the positive energies.

The first participation for an individual in the ritual of shamanic snuff requires an evaluation process to observe if he/she can receive the drug. Each community has its evaluation mode. Unfortunately, the rules established by the interviewed community did not allow the dissemination of the evaluation that is carried out. Nevertheless, the snuff practice is treated with respect and great importance for spiritual evolution, and it’s inappropriate and recreational use is scolded.

**Manual aspects of snuff preparation and conservation.** The basic principle of snuff is that tobacco and other snuff components are prepared in the local community following organic cultivation. Tobacco is dried in the sun or in plates on the fire, subsequently ground in a pestle made of wood and sifted through the sheer fabric. The result is a refined powder that will be essential to other medicinal or aromatic herbal mixtures. The manual powder preparation process can be viewed in Fig. 4A–D.

Beyond tobacco (N. tabacum), this community’s snuff comprises Cumaru/Emburana (A. cearensis) seeds. Clove (Syzygium aromaticum) and ash from the bark/trunk of the Canela-do-Mato tree (Nectandra nitidula) can still be added. Posteriorly, the shaman is responsible for preparing the snuff in his community, which is used instead of the Pau-Pereira tree because of the possibilities of cultivation in the region.

The preparation of these herbs takes the same process as tobacco powder, having dried, milling, and sifting steps. The carefully refined powders that result from an individual’s process can be mixed in quantities determined by the community. The final product, ready for application, is preserved in glass containers or small transparent plastic containers destined for community goers. About the phytochemistry of the plants from community snuff, beyond tobacco N. tabacum and cumaru/embrunana (A. cearensis) consumed previously reported in the literature review (topic 3.2.2), clove (S. aromaticum) is employed for snuff preparation. The main chemical compounds of clove are carvophyllene and eugenol (primary compound) (Ascenção & Filho, 2013). This plant demonstrates a necessary antifungal and antimicrobial activity, probably by damage occurrence in cell wrap (Oliveira et al., 2016).

Canela-do-Mato tree (N. nitidula) belongs Lauraceae family, which is known for the presence of lignans and neolignans, aporphine and benzylquinoline alkaloids, flavonoids, and sesquiterpenes. The literature reports several biological activities attributed to these structures of plant

![Fig. 3. A) Reports frequency about physic-physiologic effects observed after snuff administration; B) Frequency of reports about spiritual effects observed after snuff administration](image-url)
origin, demonstrating neuroprotective, antioxidant, anti-inflammatory, analgesic, and anti-tumor effects (Barbosa-Filho, 2000; Umezawa, 2003).

**Snuff application instrument.** Drug application during ceremonials and other consecrated moments is made with traditional Tipi (Fig. 4E). This instrument needs the help of a second person; however, to perform this practice, it needs an intense study with strong snuff applications to get to know the medicine deeply. This preparation is the intense exchange of energy that occurs during the application of snuff, especially for those who receive it.

Before snuff application, Tipi is purified with tobacco energy in a ritual using tobacco smoke by a shaman to accommodate an aliquot of snuff powder in an extremity of the Tipi (Fig. 4H) which will have contact with the nostril. The other end of the Tipi will be free for the shaman to blow, making the snuff powder invade the nostril, reaching the olfactory system and promoting its effects (Fig. 4I). According to the alternative community, the handling of snuff powder influences the compound’s activity in the body, and therefore sacrament steps are essential to obtain the desired results. Self-application of snuff could be practiced using an object called Kuripe (Fig. 4F), which proves to be a vital instrument for identifying personal power with this compound.

**DISCUSSION**

Snuff is historically used in indigenous culture by your medicinal and religious properties (Santos & Soares, 2015) and its composition varies depending on the community’s customs in which it is prepared. According to the present compounds, it is possible to predict the probable activities of the organism (Canuto & Silveira, 2006; Melquior & Silva, 2016; Souza, 2009; TIPOS de rapé, 2015).

Tobacco (*N. tabacum*) is an essential element in most snuffs used for religious purposes for being considered a sacred plant in indigenous culture as a source of purification for body and spirit. Nicotine is the molecule with primary pharmacologic importance and shows a higher concentration on this plant species (Melquior & Silva, 2016; Trilha, 2009).

Initially, the nicotine from tobacco has a stimulating effect on the sympathetic nervous system, followed by a depressant effect when in high doses (Olson, 2014). Regardless of the situation, nicotine is a molecule capable of promoting addiction (ANVISA, 1072; Olson, 2014). Most studies related toxic effects from tobacco considering smoking or cigarette exposition (Balbani & Montovani, 2005; Mishra et al., 2015; Moreno-Coutinho & Bello, 2012; Olson, 2014; Trilha, 2009), and there are no studies on tobacco exposition from shamanic snuff.

Snuff application implies variations in the amount of tobacco and, consequently, the active ingredient administered. Whereas the religious/shamanic habit employs a relatively high amount of tobacco, the characteristic stimulation of this compound is suppressed, and the depressive characteristics are heightened (nausea, vomiting, dizziness, peripheral weakness, etc.) (Shanon, 2003). Such clinical manifestations were observed in the interviewees’ reports in data collection. In general, the physiological effects reported...
by residents from the alternative community are shown to follow those seen in scientific literature.

It is impossible to precisely define the amount of snuff placed on a Tipi or Kuripe because of the manual procedure that confines variations in the quantity conducted. So, nicotine levels show variations for each application. Nevertheless, Russell, Jarvis, Devitt, and Feyerabend (1981) evaluated nicotine levels from a colony of keen snuff users. Their results showed that within 10 min after snuffing blood, nicotine concentrations were comparable to those obtained after the 10 min or so that it takes to smoke a cigarette. In daily and occasional snuffers, nicotine plasma concentrations averaged 12.6 and 2.0 ng mL\(^{-1}\), respectively, while the novices showed no appreciable increase. Peak nicotine levels in the daily snuffers were similar to the heavy smokers (36.1 and 36.7 ng mL\(^{-1}\), respectively), and the rapid absorption of nicotine from snuff confirms its potential as an acceptable and relatively harmless substitute for smoking. However, these individuals did not consume snuff for shamanic/religious purposes as well, as it was not described in snuff application forms such as Tipi or Kuripe.

Hergens et al. (2007) demonstrated that snuff use is associated with an increased risk of fatal myocardial infarction. This study was conducted in nonsmoking men (\(n = 118,395\)) without a history of myocardial infarction followed through 2004. Natvig Norderhaug et al. (2005) promoted a systematic review on health effects and dependency associated with snuff consumption which evaluated 140,000 individuals who used snuff every day. Their findings indicated that nicotine is absorbed similarly to when smoking tobacco, and there is limited evidence of cancer and pre-eclampsia or reduced birth weight. Despite the increased risk of myocardial infarction study related to snuff, this systematic review evaluated four other studies, and none of them have found an increased risk for myocardial infarction or stroke. Similarly, there was no increased risk for diabetes among snuff users; however, oral mucosal changes were related to reversible lesions while gingival retractions were irreversible.

Carlens et al. (2010) related that smokeless tobacco such as moist snuff does not increase the risk of chronic inflammatory diseases, suggesting that inhaled non-nicotinic components of cigarette smoke are more critical than nicotine itself and the etiology of these diseases. Other studies on snuff use demonstrated an association between increased risk of preterm delivery and pre-eclampsia, which does not appear to be a safe alternative to cigarettes during pregnancy (Levine, Mills, Klebanoff, Yu, & Cnattingius, 2003); Snuff users after long-term abuse developed a form of chronic rhinitis and nasal snuff is not suitable for smoked tobacco (Sreedharan et al., 2005); indiscriminate snuff use can cause dependence and health damages, mainly by nicotine and nitrosamines (Carlens et al., 2010); In the middle-aged and elderly population, snuff consumption was linked to an increased risk of stroke in never tobacco smokers (Titova et al., 2021).

The vast majority of scientific studies have evaluated individuals/communities that do not follow shamanic/religious snuff rituals with their respective application forms. Consequently, snuff abuse was related to snuff-taking competitions (Sreedharan et al., 2005) or the daily use of snuff (Cronquist, 1992; Titova et al., 2021). Similarly, these studies considered recreational snuff use while tobacco plantations could have been cultivated under external chemical agent influences (fertilizers and pesticides). These factors cannot be related to religious/shamanic snuff use because of several factors such as cultivation, preparation, manipulation, application, doses, and frequency of use.

Furthermore, snuff uses the religious context and/or abuse form to be scolded by indigenous/shamanic culture. In the interview for the alternative community volunteers, no member reported the constant need for snuff use, using only in “consecrate” moments. Besides that, different plants are used in the snuff with religious/shamanic goals for this community.

Tsunu snuff that contains the pereirina alkaloids from the Pau-Pereira tree (G. vellrosii) (Jain & Joshi, 2012) is not present in the compound produced by the community. This plant is considered exotic in the south of Brazil. The community members interviewed replaced Pau-Pereira with Canela-do-Mato tree (N. nitidula), belonging to the Lauraceae family, which includes the genus Nectandra, composed of 2,500–3,000 species distributed in 49–50 genera. The family is widely distributed in tropical and subtropical regions of the world, predominantly in Southeast Asia and Brazil (Cronquist, 1992). Ethnobotanical research has determined different uses of these species, including antifungal, anti diarrheal, analgesic, anti rheumatic, anti inflammatory, antipyretic, energizing, and hypotensive agents (Macías-Villamizar, Cuca-Suárez, & Coy-Barrera, 2015).

In a review study promoted by Macías-Villamizar et al. (2015) on genus Nectandra, specific secondary metabolites have been determined, such as sesquiterpenes phytosterols, polyalcohols, arylyphenolic acid derivatives, flavonols, arylpropanoids, furofuran lignans, dihydrobenzofuran neo lignans, and certain norlignans. Also, they have reported the presence of indole alkaloids, tannins, diterpenes, and components of essential oils. However, despite the variety of metabolites in the genus, the chemotaxonomic characteristics are determined by the presence of lignan-type compounds, some of which possess chemotherapeutic biological activity (Macías-Villamizar et al., 2015). However, phytochemical characteristics of N. nitidula are not thoroughly studied. Thus, until this moment, it is impossible to determine that Canela-do-Mato has Pereirina alkaloids or other molecules with similar activities.

In the snuff prepared by the shamanic and alternative communities, beyond the Canela-do-Mato tree (N. nitidula) and dry tobacco leaves (N. tabacum) and clove seeds (S. aromaticum), the probable biological effects resulting from the administration of this type of snuff will possibly include depressant characteristics from tobacco since this is an essential element in such formulation. Cumaru/Emburana seeds give the formulation anticoagulant, anti inflammatory, analgesic, antispasmodic, and bronchodilator properties.
(Jain & Joshi, 2012). Therefore, cytotoxicity of kaempferol, isoquercitrin, ambroside A, and protocatechuic acid against leukemia (HL-60 and CEM), breast (MCF-7), colon (HCT-8), and skin (B-16) cancer cells (Costa-Lotufo et al., 2003). Also, another study demonstrated that isoquercitrin from A. cearensis is responsible for the relaxation of the guinea-pig trachea (Leal et al., 2006). So, bronchodilator action associated with the tracheal relaxation capacity from this plant consumption could influence the activity of snuff, enhancing its effects without the need to increase the amount of tobacco.

Despite coumarins in A. cearensis, no member of the alternative community-related anticoagulant events. Coumarins act as a vitamin K antagonist, inhibiting reductases involved in hydroxyquinone synthesis from an epoxide, particularly epoxide reductase. Inhibition of the cyclical conversion of vitamin K induces hepatic production and secretion of decarboxylated or partially carboxylated proteins (Teles, Fukuda, & Feder, 2012). The absorption through the nasal mucosa probably does not trigger this type of metabolism and/or the amount of these compounds are not capable of promoting the anticoagulant effects related to these molecules. Since the liver is the main vitamin K storage organ, first-pass metabolism must promote anticoagulant activity.

Clove seeds (S. aromaticum) employ antifungal, antimicrobial, anesthetic, and anti-inflammatory activity (Affonso et al., 2012; Leal et al., 2006). Eugenol is the principal constituent and exhibits in vivo anti-inflammatory action in lipopolysaccharide-induced lung injury (Magalhães et al., 2010). Also, eugenol avoided changes in lung mechanics, pulmonary inflammation, and alveolar collapse elicited by diesel particles, improving lung static elastance, viscoelastic and total resistive pressures, and a viscoelastic component of elastance. However, these effects are not related to the decrease in oxidative stress, suggesting other mechanisms to promote these activities (Zin et al., 2012). Also, clove seeds were employed as a flavoring to facilitate the application of snuff (Stanfill et al., 2015). So, the flavoring action and pulmonary activity allow for the excellent acceptance of cloves as one of the constituents of snuff. Similarly, the interviewed community members reported using cloves seed as a flavoring in the snuff for better acceptance by the individual at the time of application by Tipi or Kuripe.

Meanwhile, Queen snuff presents psychoactive effects from the alkaloid dimethyltryptamine (DMT), which, due to its structural properties very similar to serotonin, competes with it for its receptors (Almeida, Silva, & Assis, 2018). The administration of this alkaloid intranasal allows a rapid onset of action, also considering its direct activity in the central nervous system. The inhibitory activity of the monoamine oxidase (MAO) enzyme by β-carbolines present in Cipó-Mariri (B. caapi) (Almeida et al., 2018) does not appear to trigger a significant metabolic effect through this administration route, since these enzymes are only present in the liver and intestine. However, these β-carbolines also act by inhibiting the activity of the serotonin-receiving enzyme (Pires, Oliveira, & Yonamine, 2010), which increases the availability of this neurotransmitter potentiating the psychoactive effects of Queen snuff.

Therefore, it is essential to consider the shamanic snuff’s administration route. Being blown through the nostrils (without inhalation), the snuff should be absorbed into the nasal mucosa, a route that is not influenced by first-pass metabolism. This mucosa comprises three functional areas: nasal vestibule, respiratory region, and olfactory region. The respiratory region is the most important for systemic absorption since it is predominant in extension and highly vascularized (Gizurarson, 2012).

However, the olfactory region is only about 5 cm² (0.3 m² including the microvilli), which there are 6 cell types and 2 types of glands, and it is located more profound in this organ, is essential for the direct passage of substances to the central nervous system (Fig. 5). This behavior occurs because of the first cranial nerve (olfactory nerve), and this is the only site in our body where the central nervous system is directly expressed on the mucosal surface. For better absorption in that place, the structures must have low molecular weight, lipophilic characteristics, and the absence of electrical charges (Balbani, 2007; Gizurarson, 2012).

In addition, blow intensity, and the amount of snuff applied to seem to influence its activity and bioavailability. Blows performed with force take the particles in greater quantity to the olfactory region, which probably significantly affects the central nervous system. The amount applied and the contact time with the snuff particles may have a direct relationship with the absorption capacity of the active principles of this compound (Balbani, 2007; Gizurarson, 2012).

CONCLUSION

There are many differences between recreational snuff and shamanic snuff, which has an entheogenic proposal and is used exclusively in certain rituals for moments of consecration and spiritual elevation and promoting bodily healing.

The interviewed community from the south of Brazil used Canela-do-Mato tree (N. nitidula) to replace Pau-Perreira tree (G. vellosii) in the preparation of snuff. However, this equivalence between species is not proven in the scientific literature, revealing the need for further studies on
these species. Also, the paper form of the shamanic snuff allows fast absorption of the substances in the olfactory region. Studies involving recreational snuff did not approach the application form; however, Tipi and Kuripe are considered essential instruments for shamanic culture.

So, it is crucial to establish the differences between recreational and shamanic snuff and, consequently, its respective effects on the body. In this context, further studies on the use of shamanic snuff should be directed according to its applications and plants employed by shamanic and alternative communities to understand the substances responsible for their effects.

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