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Antipyretic Medicinal Plants Used by the Nasa People: An Ethnobotanical Study in the Colombian Andes

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ABSTRACT

Background and Objective: The Nasa people of the Colombian Andes possess rich traditional knowledge concerning medicinal plants and their therapeutic uses. This study aimed to document the medicinal plants traditionally used for fever management among Nasa communities and to characterize their botanical diversity, preparation methods, and modes of administration.

Methods: The study was conducted in the Jambaló Indigenous Territory of the Colombian Andes, predominantly inhabited by Nasa and Misak communities, at elevations ranging from 1,600 to 3,800 m above sea level. Ethnobotanical data were collected through semi-structured interviews, direct field observations, and four field expeditions conducted in August 2016 and between March and July 2025. Medicinal plant specimens were collected, taxonomically identified, and deposited at the Herbarium of the University of Cauca (CAUP). Information on scientific nomenclature, habitat, geographic distribution, and traditional medicinal uses was documented and compared with the *Colombian Vademecum of Medicinal Plants* and relevant scientific literature.

Results: A total of 18 medicinal plant species belonging to 12 botanical families were identified as Seven medicinal plant species belonging to four families were documented as traditionally used for fever management among the Nasa people. *Asteraceae* was the most represented family, with three species (42.9%), followed by *Verbenaceae* with two species (28.6%). Infusion was the most frequently reported preparation method and mode of administration, being documented for five species (71.4%). Other reported practices included poultices, herbal baths, and the topical application of plant gel.

Conclusions: This study documents a diverse set of medicinal plants traditionally used for fever management among the Nasa people and highlights the cultural importance of Indigenous knowledge in maintaining information on medicinal plant resources. Systematic documentation of such knowledge may contribute to the preservation of culturally important plant resources and provide a basis for future investigations into the phytochemical composition and biological activities of the documented species.



Introduction

Fever is one of the most common clinical manifestations in humans and generally occurs in response to infections, inflammation, autoimmune disorders, certain malignancies, and other systemic conditions (Mackowiak, 1998). It is characterized by a regulated elevation of core body temperature mediated by the thermoregulatory center of the hypothalamus (Ogoina, 2011). Although an increase in body temperature may form part of the host's natural defense response, persistent or high-grade fever, particularly when accompanied by symptoms such as altered consciousness, seizures, dehydration, or severe weakness, may warrant medical evaluation and appropriate treatment (Ogoina, 2011). Bacterial, viral, and parasitic infections are among the major causes of fever (Atkins, 1960), although their prevalence and underlying causes vary according to geographic location, sanitary conditions, age, immune status, and access to healthcare services (Moltz, 1993). The management of fever generally involves addressing the underlying cause and, when clinically indicated, using antipyretic medications together with supportive measures such as adequate fluid intake and rest (Klein & Cunha, 1996).

Although modern medicine offers effective approaches for diagnosing and treating the underlying causes of fever, limited access to healthcare services, treatment costs, and the continued practice of traditional medicine have contributed to the persistent use of medicinal plants in many communities (Wang et al., 2009). In such settings, medicinal plants may constitute an important component of primary healthcare and traditional approaches to disease management (Nilima et al., 2021).

Medicinal plants have long been an integral component of traditional healthcare systems worldwide. Knowledge concerning their identification, preparation, and therapeutic use has largely developed through generations of experience and has been transmitted within communities over time (Wang et al., 2009). Ethnobotanical research plays an important role in documenting and preserving this knowledge. Beyond recording the plant species used by local communities, ethnobotanical studies provide

information on the plant parts utilized, preparation techniques, routes of administration, and therapeutic applications (El-Radhi, 2019). Such information can enhance understanding of the cultural significance of medicinal plants, support the conservation of traditional knowledge, and help identify species that may warrant further investigation of their phytochemical constituents and biological activities (El-Radhi, 2019).

Colombia represents an important setting for research on traditional plant knowledge because of its exceptional biological diversity and the presence of numerous Indigenous and other ethnic communities. Among these groups, the Nasa people, who predominantly inhabit the mountainous regions of the Andes, particularly in the Department of Cauca, possess extensive traditional botanical and medicinal knowledge (Kamsani et al., 2020). This knowledge has developed through longstanding interactions with the natural environment and is closely connected to local culture, healing practices, and the use of both wild and cultivated plant species. It has been maintained and transmitted across generations. Nevertheless, environmental changes, the depletion or transformation of natural resources, and broader social changes may contribute to the gradual erosion of traditional knowledge systems (Kamsani et al., 2020).

Given the cultural and medicinal importance of plants within Nasa communities and the need to document traditional knowledge that may be vulnerable to loss, investigating plants used to manage fever can provide valuable insights into local plant diversity and traditional healthcare practices. Therefore, the present study aimed to document the medicinal plants traditionally used by the Nasa people to manage fever in the Colombian Andes and to characterize the recorded species, botanical families, plant parts, and methods of preparation and administration.

Methods

Study Area

The study was conducted in Jambaló, an Indigenous territory located in northeastern Cauca in the Colombian Andes. The territory is predominantly inhabited by Nasa and Misak

communities and comprises 35 settlements distributed across an altitudinal range of approximately 1,600–3,800 m above sea level. The marked variation in elevation and environmental conditions creates a diverse range of habitats that support the occurrence, collection, and traditional use of medicinal plant species.

Data Collection

Ethnobotanical data were obtained through semi-structured interviews, direct field observations, and field-based documentation of medicinal plants. Initial fieldwork was undertaken in August 2016, followed by additional field visits conducted between March and July 2025. Four field expeditions were carried out during the study period. Participants included traditional healers, herbal vendors, and community members recognized for their knowledge and experience regarding the identification and traditional use of medicinal plants.

During the interviews, information was recorded on vernacular plant names, medicinal indications, plant parts used, methods of preparation, and modes of administration. Whenever possible, vernacular names were documented in Nasa Yuwe and Namtrik (Mpsc, 2008). Before each interview, the objectives and procedures of the study were explained to the participants, and informed consent was obtained prior to data collection.

Medicinal plants were observed and, when appropriate, collected from their natural habitats during the field expeditions. Voucher specimens were prepared, taxonomically identified, and deposited at the Herbarium of the University of Cauca (CAUP). For each documented species, scientific nomenclature, taxonomic classification, habitat, geographic distribution, and native or non-native status were recorded.

The documented medicinal uses were subsequently compared with information available in the Colombian Vademecum of Medicinal Plants and relevant peer-reviewed scientific literature. Where appropriate, internationally recognized pharmacopoeial sources, including the United States Pharmacopeia (USP), were also consulted to provide additional information on the documented medicinal plants and their reported uses.

Sociodemographic Characteristics of Participants

A total of 50 participants were included in the study, comprising 31 men (62%) and 19 women (38%), with a mean age of 52.6 years. Regarding educational attainment, 21 participants (42%) were illiterate, 18 (36%) had completed primary education, and 11 (22%) had completed secondary education or a higher level of education. The participation of middle-aged and older community members provided substantial information on the traditional identification, preparation, and use of medicinal plants.

Results

A total of seven plant species belonging to four botanical families were documented... Asteraceae was the most represented family, comprising three species (42.9%), followed by Verbenaceae with two species (28.6%). Xanthorrhoeaceae and Lamiaceae were each represented by one species (14.3%). Detailed information on the recorded plant species, botanical families, vernacular names, and reported methods of preparation and use is presented in Table 1.

Table 2 presents the ethnobotanical uses, growth forms, and habitat characteristics of medicinal plants traditionally used by the Nasa people for fever management.

Table 1. Medicinal plants ethnobotanically used for fever management in Nasa healing practices in the Colombian Andes

Species	Family	Vernacular name	Method of preparation/use
<i>Aloe vera</i>	Xanthorrhoeaceae	Sábila	Plant gel; juice
<i>Artemisia absinthium</i>	Asteraceae	Ajenjo de páramo	Poultice
<i>Calendula officinalis</i>	Asteraceae	Caléndula	Infusion; poultice; herbal bath
<i>Lippia alba</i>	Verbenaceae	Pronto alivio	Infusion
<i>Lippia dulcis</i>	Verbenaceae	Orosul	Infusion
<i>Matricaria</i> sp.	Asteraceae	Manzanilla pequeña	Infusion
<i>Melissa officinalis</i>	Lamiaceae	Toronjil	Infusion

Table 2. Ethnobotanical uses, growth forms, and habitat characteristics of medicinal plants traditionally used for fever management among the Nasa people.

Species	Reported ethnobotanical uses	Growth form	Habitat and ecological characteristics
<i>Aloe vera</i>	Traditionally used for fever, skin disorders, wounds, burns, and some inflammatory conditions	Succulent perennial herb	Commonly cultivated around homes and in gardens; adapted to warm, relatively dry conditions and well-drained soils (Kumar & Yadav, 2014).
<i>Artemisia absinthium</i>	Traditionally used for digestive disorders, fever, inflammation, and various general health complaints	Aromatic perennial herb	Occurs mainly in cool, high-elevation areas, grasslands, open habitats, and disturbed sites; generally prefers well-drained soils (Goud et al., 2015).
<i>Calendula officinalis</i>	Traditionally used for skin inflammation, wounds, mild infections, fever, and some digestive complaints	Annual or short-lived herbaceous plant	Commonly cultivated in gardens and agricultural areas; grows in temperate regions and open, sunny habitats (Arora et al., 2013).
<i>Lippia alba</i>	Traditionally used for fever, digestive disorders, respiratory complaints, anxiety, and pain	Aromatic perennial shrub or subshrub	Occurs in tropical and subtropical regions, including forest margins, open areas, roadsides, and disturbed habitats (Valdiviezo-Campos et al., 2026).
<i>Lippia dulcis</i>	Traditionally used for fever, cough, and respiratory and digestive complaints	Aromatic perennial herb or subshrub	Occurs mainly in tropical and subtropical regions, particularly in open areas, forest margins, and disturbed habitats (Okhale et al., 2016).
<i>Matricaria</i> sp.	Traditionally used for fever, digestive disorders, the common cold, and some inflammatory conditions	Aromatic annual herb	Commonly found in open habitats, agricultural fields, roadsides, gardens, and other disturbed areas, particularly under temperate to montane conditions (Sohoo et al., 2024).
<i>Melissa officinalis</i>	Traditionally used for fever, digestive disorders, nervous complaints, the common cold, and various general health conditions	Aromatic perennial herb	Frequently cultivated in home and medicinal plant gardens; prefers fertile, moderately moist, well-drained soils (Benaicha et al., 2023).

Discussion

Ethnobotanical research provides valuable insights into indigenous knowledge of medicinal plants used to manage fever by documenting the species employed, plant parts utilized, preparation methods, and modes of administration. Such information can help identify plants of potential pharmacological interest and provide a basis for subsequent phytochemical and biological investigations. In addition, documenting traditional knowledge alongside plant diversity can contribute to the preservation of cultural heritage and the conservation of medicinal plant resources (Lakhdari et al., 2016).

The present study documented traditional Nasa knowledge concerning the use of medicinal plants for fever management in the Colombian Andes. A total of seven species belonging to four families were recorded. *Asteraceae* was the most represented family, with three species, followed by *Verbenaceae*, with two species, while *Lamiaceae* and *Xanthorrhoeaceae* were each represented by one species. The range of preparation and administration methods also illustrates the

diversity of practices used in traditional fever management. Infusion was the most frequently reported method, whereas poultices, herbal baths, and the topical application or consumption of plant gel were reported less frequently. These findings indicate that fever management within the studied Nasa communities involves several forms of plant preparation and administration, with practices varying according to the species and its reported traditional use.

The findings are broadly comparable with ethnobotanical studies conducted in other geographical regions, although the number of species recorded in the present study was lower than that reported in several previous investigations. Ahmadi et al. (2023), for example, documented 10 medicinal species belonging to seven families used for fever management in the Sajjasrud region of Zanzan Province, Iran. A variety of plant parts, including flowers, stems, fruits, seeds, leaves, aerial parts, tubers, roots, and bark, were reported, while decoctions and infusions were among the principal preparation methods. The frequent use of water-based preparations in both studies suggests that infusions and decoctions

are common forms of medicinal plant preparation in geographically and culturally distinct traditional healthcare systems. However, the species selected and preparation practices differed, potentially reflecting differences in local floristic composition, environmental conditions, availability of plant resources, and cultural traditions (Ahmadi et al., 2023).

Adeyemi et al. (2010) similarly reported substantial diversity in traditional approaches to fever management in Sagamu and Remo North, Nigeria. Among 70 participants, 116 herbal remedies were documented for the management and prevention of fever, with decoctions and infusions being the predominant preparation methods (Adeyemi et al., 2010). Frequently reported species included *Cymbopogon citratus*, *Citrus aurantifolia*, *Enantia chlorantha*, *Carica papaya*, *Morinda lucida*, and *Lawsonia inermis*. Compared with the present study, the Nigerian investigation documented a considerably greater diversity of species and herbal formulations. This difference may be associated with differences in study design, sample size, geographic coverage, local biodiversity, and the organization of traditional healthcare practices. In addition, the Nigerian study addressed several febrile conditions, including malaria, yellow fever, typhoid fever, and common cold, and frequently involved polyherbal preparations, whereas the present study focused specifically on plants traditionally used for fever among the Nasa people.

Phumthum and Sadgrove (2020) documented 125 plant species belonging to 52 families used for fever management among Karen communities in mountainous regions of Thailand. The plants were recorded across 25 villages, representing substantially greater species and family diversity than that observed in the present study. The authors also reviewed the phytochemical constituents reported for the documented species and identified several groups of compounds that may warrant further investigation in relation to fever and associated infectious conditions (Phumthum & Sadgrove, 2020). The plants documented in the present study may likewise provide useful starting points for future phytochemical and pharmacological research. Nevertheless, the existence of a traditional use

record should not be interpreted as evidence of established clinical efficacy or safety.

Several species documented in the present study, including *Aloe vera*, *Calendula officinalis*, *Lippia alba*, *Lippia dulcis*, and *Melissa officinalis*, have also been reported in other traditional healthcare systems for a range of medicinal purposes. However, their occurrence in previous ethnobotanical studies does not necessarily indicate that they have the same cultural meaning or therapeutic significance among the Nasa. Their relevance should instead be interpreted within the local context, taking into account traditional knowledge, preparation practices, plant parts used, and modes of administration. The recording of vernacular names in Nasa Yuwe and Namtrik further emphasizes the cultural dimension of this knowledge. Ethnobotanical documentation therefore extends beyond the identification of plant species and can also contribute to preserving linguistic and cultural knowledge associated with medicinal plant use.

From a pharmacological perspective, the antipyretic effects reported for some medicinal plants may be associated with modulation of inflammatory pathways involved in thermoregulation. Fever is closely related to the production of endogenous pyrogenic mediators and subsequent changes in hypothalamic thermoregulation, including the involvement of prostaglandin E₂ (PGE₂). Phytochemicals such as flavonoids, terpenoids, phenolic compounds, and alkaloids have been investigated for their potential effects on inflammatory pathways, including cyclooxygenase (COX) activity and the production of pro-inflammatory cytokines such as IL-1 β , IL-6, and TNF- α . However, these mechanisms cannot be assumed for the plants documented in the present study without experimental evidence. Their biological effects may vary according to species, phytochemical composition, plant part, dose, extraction method, and route of administration. Therefore, targeted phytochemical, pharmacological, and toxicological investigations are needed to determine whether the plants traditionally used by the Nasa possess measurable antipyretic activity and to clarify the mechanisms involved (Jia et al., 2013, Rawat et al., 2021). The results of a study on the traditional knowledge of

the Nasa ethnic group in the Jambaló region of Colombia regarding the use of medicinal plants showed that this community uses a diverse range of plant species to manage a broad spectrum of health conditions. Species such as *Hypericum goyanesii*, *Plantago major*, *Melissa officinalis*, *Mentha spicata*, and *Psidium guineense* had high use values. The informant consensus factor (ICF) ranged from 0.96 to 1.00 across disease categories, indicating a high level of agreement in traditional therapeutic knowledge. The highest ICF values were recorded for cancer and poisoning, whereas digestive, respiratory, and infectious diseases had the highest numbers of medicinal plant species and use reports. Stomachache and stomach discomfort, cough, influenza, and diarrhea were the most frequently managed health conditions using medicinal plants. The reported methods of preparation and administration included infusion, decoction, raw consumption, poultice, steam inhalation, and herbal baths. Overall, the findings highlight the richness of Nasa ethnobotanical knowledge and the important role of medicinal plants in the traditional healthcare system of this community (Paz-Perafán & Montenegro-Paz, 2024).

Conclusion

Comparison of the present findings with ethnobotanical studies from Iran, Nigeria, and Thailand indicates that medicinal plants are widely incorporated into traditional approaches to fever management, although the species used, diversity of preparations, and therapeutic contexts vary considerably among communities. Such variation is likely shaped by local biodiversity, resource availability, cultural practices, and the transmission of community-specific traditional knowledge. The documentation of seven medicinal plant species used for fever management among the Nasa therefore contributes to the broader record of traditional medicinal plant knowledge in the Colombian Andes. Preserving and systematically documenting this knowledge is particularly important in the context of environmental and social changes that may affect the availability of medicinal plants and the transmission of traditional knowledge between generations. The present findings may provide a

useful basis for future research on the phytochemical composition and biological activities of the recorded species. However, traditional use alone cannot establish therapeutic efficacy or safety. Further phytochemical, pharmacological, toxicological, and, where scientifically and ethically justified, well-designed clinical studies are required to evaluate their potential antipyretic effects, mechanisms of action, efficacy, and safety.

Declarations Conflict of Interest

The authors declare no conflicts of interest.

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Consent for Publications

The authors certify that that this work in its final form has been thoroughly reviewed and approved for publication.

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Ethical Considerations

The study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Ethical considerations were observed throughout

the research process, including respect for participants and their traditional knowledge.

AI Use Disclosure

The authors declare that AI tools were not used to generate or develop the scientific content of this manuscript. AI was used solely for English language editing, grammar correction, and improving sentence clarity and readability. The authors take full responsibility for the final content.

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