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Ethnobotanical Investigation of Traditional Pediatric Sedative and Anti-Stress Herbal Teas in Ilam City, Western Iran: Cultural Practices and Therapeutic Applications

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A B S T R A C T

Objective: The pediatric population represents one of the most vulnerable demographic groups in healthcare systems due to ongoing physical, cognitive, and emotional development. Children's unique physiological and developmental characteristics necessitate tailored therapeutic approaches, especially when addressing stress, anxiety, and sleep disorders. Traditional knowledge systems have long embraced the use of herbal teas prepared from locally available botanicals, whose safety profiles have been validated through generations of use. This study was conducted to identify, document, and investigate the medicinal plants employed for sedative and anti-stress purposes in children by the indigenous communities of Ilam City, western Iran through an ethnobotanical lens.

Methodology: A cross-sectional ethnobotanical survey was conducted in city of Ilam, western Iran. Data were collected via semi-structured, face-to-face interviews and structured questionnaires with 25 traditional healers and herbal practitioners selected for their expertise and community recognition. Herbarium specimens of the cited plants were then authenticated at the Biotechnology and Medicinal Plants Research Center, Ilam University of Medical Sciences. Quantitative analysis, including Use Report (UR), Relative Frequency of Citation (RFC), and Informant Consensus Factor (ICF) were employed to assess the cultural significance and therapeutic relevance of the identified species.

Results: The survey revealed 14 medicinal plant species used as pediatric sedative and anti-stress herbal teas, spanning 9 botanical families. Among these, families such as Lamiaceae dominated the practice, with leaves being the most commonly utilized plant part (35%) and infusion the predominant method of preparation (50%). Among the identified botanicals, several notable species include *Thymus vulgaris*, *Salvia officinalis*, *Matricaria chamomilla*, *Lavandula angustifolia*, *Mentha piperita*, *Echium amoenum*, *Crocus sativus*, *Cinnamomum verum*, *Valeriana officinalis*, *Rosmarinus officinalis*, *Camellia sinensis*, *Zingiber officinale*, *Origanum majorana*, and *Foeniculum vulgare*. *Echium amoenum* emerged as the leading candidate with a Usage Report (UR) of 8, Relative Frequency of Citation (RFC) of 0.32, and a Percentage of Frequency of Use (PFU) of 32.0%, underscoring its cultural prominence and therapeutic claim in the region.

Conclusion: This study highlights the rich ethnobotanical heritage of Ilam City, demonstrating that locally used pediatric sedative and anti-stress herbal teas represent a viable, culturally integrated alternative to conventional pediatric therapies. The findings underscore the importance of preserving traditional knowledge and suggest that further scientific validation of these plant-based remedies could contribute to safer therapeutic options in pediatric healthcare.

Keywords: Ethnobotany, Medicinal plants, Herbal therapeutics, Pediatric care, Sedative herbs, Anti-stress herbs

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Introduction

The pediatric population represents one of the most vulnerable demographic groups requiring special attention in healthcare systems worldwide due to their ongoing physical, cognitive, and emotional development [1]. Children's physiological, psychological, and developmental characteristics differ significantly from adults, necessitating tailored therapeutic approaches that consider their unique needs [2]. Pediatric stress, anxiety, and sleep disorders affect approximately 20-30% of children globally, with potentially serious consequences for cognitive development, emotional regulation, and overall well-being [3, 4]. These conditions may manifest as behavioral problems, academic difficulties, compromised immune function, and disruptions in growth patterns [5]. Conventional treatment modalities for these disorders often involve pharmacological interventions that, while effective, may present challenges in pediatric populations due to age-dependent pharmacokinetic and pharmacodynamic variations [6]. The developing nervous system in children exhibits heightened sensitivity to neuroactive compounds, leading to unpredictable responses and potentially increased vulnerability to adverse effects [7]. Furthermore, pediatric treatment compliance presents unique challenges, influenced by taste preferences, administration difficulties, and dependence on caregivers for medication management [8].

Despite advances in pediatric pharmacology, conventional anxiolytic and sedative medications pose considerable concerns in children, including risk of dependency, cognitive impairment, paradoxical reactions, and potential impacts on neurological development when used long-term, necessitating exploration of gentler, plant-based alternatives with favorable safety profiles [9].

Ethnobotany, as a scientific discipline, examines the complex relationships between human cultures and their botanical environments, focusing particularly on indigenous knowledge systems regarding plant utilization for medicinal, nutritional, and cultural purposes [10]. This field employs methodological approaches from anthropology, botany, and pharmacology to document, analyze, and preserve traditional plant knowledge that might otherwise be lost through globalization and cultural homogenization [11]. Ethnobotanical research serves both conservation and pharmaceutical discovery functions, identifying potentially valuable medicinal plants while supporting the cultural heritage of communities with extensive botanical knowledge [12].

The traditional use of sedative and anti-stress herbal preparations represents one of the oldest and most widespread applications of medicinal plants across diverse cultures [13]. Historical records from ancient Mesopotamia document the use of Hyoscyamus niger (henbane) and Papaver somniferum (opium poppy) for inducing sleep as early as 4000 BCE [14]. The Greek physician Hippocrates (460-370 BCE) recommended Valeriana officinalis and Passiflora incarnata for anxiety and insomnia, remedies that continue in contemporary use [15]. Islamic medical texts from the medieval period, particularly those by Ibn Sina (Avicenna), elaborated sophisticated herbal formulations for calming children, incorporating plants like *Melissa officinalis* (lemon balm) and *Lavandula angustifolia* (lavender) [16]. This extensive historical pharmacopeia of anxiolytic and sedative botanicals often focused particularly on pediatric applications, recognizing children's distinct physiological responses and developing specialized preparation methods and dosages accordingly.

Ilam Province, situated in the Zagros Mountains of western Iran, represents a region of exceptional botanical diversity and cultural significance [17]. Its varied topography encompasses elevations ranging from 50 to 3,000 meters above sea level, creating distinct microclimates that support approximately 1,500 plant species, including an estimated 400 with documented medicinal properties [18, 19]. This remarkable biodiversity is attributed to the province's position at the convergence of Mediterranean, Irano-Turanian, and Euro-Siberian phytogeographical regions [18]. Indigenous communities in the region, particularly those maintaining traditional agropastoral lifestyles, have preserved extensive botanical knowledge through generations, developing specialized applications for local flora that address common health concerns, including pediatric conditions requiring gentle sedative and anxiolytic interventions.

The present study aims to document and analyze traditional knowledge regarding pediatric sedative and anti-stress herbal teas in Ilam City and surrounding areas. The objectives are divided into several parts. First, the study identifies plant species traditionally used for pediatric sedative and anti-stress purposes. Second is documenting the methods for preparing these teas, the administration protocols, and the reported efficacy. Third is analyzing the cultural context and the patterns of knowledge transmission related to these remedies. Finally, the study evaluates the potential scientific basis for the therapeutic effects by comparing them with the existing pharmacological literature on these plant species.

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Materials and Methods

Study Area

This ethnobotanical investigation was carried out in Ilam City, the capital of Ilam Province, western Iran. Covering around 2 million hectares, Ilam Province shares a 425-kilometer border with Iraq to the west. It is flanked by Kermanshah Province to the north, Lorestan Province to the east, and Khuzestan Province to the south. Ilam City, located at 33°38′ N, 46°25′ E and approximately 1,427 meters above sea level, is nestled within the Zagros Mountain range. The region's rugged topography, featuring high mountains, deep valleys, and seasonal rivers, supports a rich biodiversity, making it an ideal location for ethnobotanical research (Figure 1). The 2024 Iran Statistics Center census reports a provincial population of approximately 650,000, with 260,000 residing in the city of Ilam. The primary language is "Pahli Kurdish", spoken by a predominantly Kurdish population with a deep-rooted tradition of herbal medicine. This cross-sectional study focused on documenting medicinal plants used for pediatric sedative and anti-stress purposes, leveraging the region's biodiversity and ethnobotanical heritage.

Selection of Informants

Informants were systematically selected to document expertise in traditional pediatric sedative and anti-stress herbal teas. Face-to-face interviews and structured ethnobotanical questionnaires were administered to 25 traditional healers and herbal practitioners in Ilam City, chosen for their experience and community recognition. A complete list of herbal druggists was sourced from the Food and Drug Deputy of Ilam to ensure representative sampling. The questionnaire recorded demographic data, local and scientific plant names, utilized plant parts, preparation techniques, administration methods, and reported therapeutic benefits. Interviews were conducted in Kurdish, Persian, and Luri to enhance clarity and precision, with oral consent obtained and responses diligently documented to preserve traditional knowledge integrity.

Plant Authentication

Herbarium specimens of cited medicinal plants were collected and authenticated at the Biotechnology and Medicinal Plants Research Center, Ilam University of Medical Sciences, Iran. Botanical identities were verified using credible online databases and morphological keys from Dr. Valiallah Mozaffarian's flora, with confirmation by two authors (K.S. and A.P.). Validated specimens were archived in a herbarium collection, assigned unique codes for reference.

Data Processing and Statistical Analysis

The ethnobotanical data were analyzed using quantitative methods to evaluate the significance of medicinal plants used in herbal teas for pediatric sedative and anti-stress purposes. Responses from structured questionnaires, administered to 25 traditional healers and herbal practitioners, were entered into a spreadsheet database and analyzed using SPSS software. Descriptive statistics were employed to summarize the data, and key ethnobotanical indices, including the Use Report (UR), Relative Frequency of Citation (RFC), and Informant Consensus Factor (ICF), were calculated to assess the cultural importance and consensus among informants regarding the use of specific plant species.

Use Report (UR)

The UR was determined as the total number of times each plant species was cited by informants for its use in herbal teas for pediatric sedative and anti-stress purposes.

Relative Frequency of Citation (RFC)

The RFC was calculated for each species using the formula:

$$RFC = \frac{FC}{N}$$

where FC is the number of informants who mentioned the species, and N is the total number of informants (25). RFC values range from 0 to 1, with higher values indicating greater cultural importance.

Informant Consensus Factor (ICF)

The ICF was computed to assess the agreement among informants regarding the use of plants for pediatric sedative and anti-stress purposes, using the formula:

$$ICF = (Nur - Nt) / (Nur - 1)$$

where Nur is the total number of use reports for the specified purpose, and Nt is the number of plant species used for that purpose. An ICF value close to 1 suggests high consensus among informants.

These indices were used to identify the most culturally significant and frequently utilized plant species, providing a foundation for future research into their phytochemical and pharmacological properties.

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Ethical Considerations

The study was conducted anonymously without collecting identifiable data, it secured approvals from local health authorities and traditional medicine representatives. Written informed consent was obtained, ensuring voluntary participation, confidentiality, and the right to withdraw.

Limitations and Mitigation Strategies

Several challenges inherent to ethnobotanical fieldwork were anticipated and addressed in this study. First, informant recall bias and variability in traditional knowledge transmission could affect data consistency. To mitigate this, we employed semi-structured interviews complemented by repeat visits, ensuring that at least two independent accounts were obtained for each reported use. Second, language and dialect differences between researchers and local healers posed potential communication barriers. A trained local interpreter facilitated dialogues, and all interviews were cross-checked against Persian and Ilam dialect glossaries. Third, seasonal availability of plant material risked incomplete species documentation; we therefore scheduled field visits across both flowering and non-flowering seasons. Fourth, taxonomic misidentification was minimized by collecting voucher specimens for each species and confirming identifications with a regional herbarium. Finally, potential reluctance of some practitioners to disclose proprietary remedies was countered by guaranteeing anonymity and obtaining informed consent under ethical guidelines. Collectively, these strategies enhanced the reliability, validity, and cultural sensitivity of our findings.

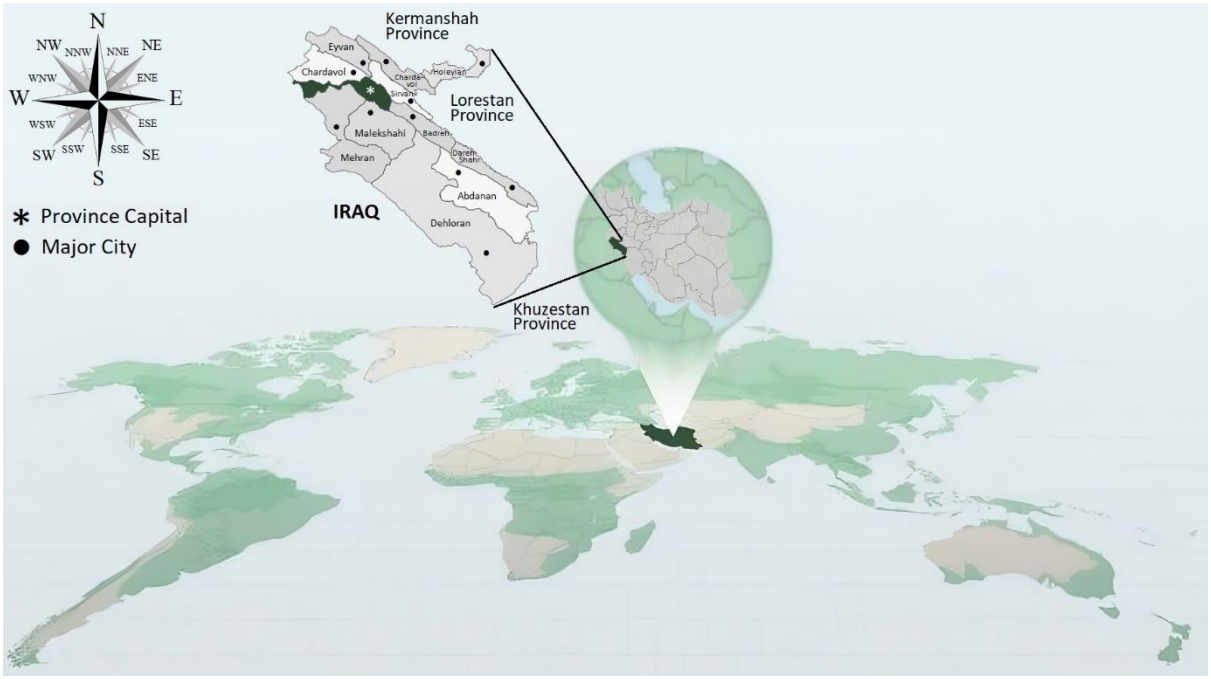

Figure 1: Map of Ilam Province, Iran, highlighting City of Ilam (Province Capital)

Results

Participant Demographics

A total of 25 informants (Table 1) participated in this study, comprising both male (80%) and female (20%) traditional healers with diverse educational backgrounds (diploma to master's degree), ages ranging from 22 to 29 years, and speakers of Persian (4%), Kurdish (92%) and Lori (4%) dialects. This demographic distribution underscores the heterogeneity of knowledge holders contributing to the conservation and transmission of pediatric ethnobotanical practices in Ilam City.

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Botanical Inventory

Field and interview data yielded 14 medicinal plant species across 9 botanical families traditionally administered as sedative and anti-stress remedies for children (Table 2). The Lamiaceae family was most prominently represented, accounting for 42.8 % of all taxa documented (Figure 2). Leaves were the principal plant organ employed (35%, Figure 3), followed by flowers, roots, and other organs, while infusion was the dominant preparation method (50%), with decoction, syrups, and inhalations comprising the remainder of traditional uses (Figure 4).

Table 1: Demographic characteristics of study informants contributing to the documentation of pediatric sedative and anti-stress ethnobotanical knowledge in Ilam City

Characteristics			Frequency	Percentage
	Gender	Male	20	80%
		Female	5	20%
	Education level	Diploma	19	76%
		Associate degree	2	8%
		Bachelor's degree	3	12%
		Master's degree	1	4%
		Minimum age	22	
		Maximum age	29	
	Language	Kurdish	23	92%
		Lori	1	4%
		Persian	1	4%

Table 2: List of medicinal plant species used as sedative and anti-stress herbal teas for children in Ilam City, Western Iran, with botanical details

Persian Name	Scientific name	Plant family	Common name	Organ used	Traditional method of using	Main compounds
Avishan	Thymus vulgaris	Lamiaceae	Thyme	Flowering branch	Infusion	Thymol, Carvacrol
Maryam Goli	Salvia officinalis	Lamiaceae	Sage	Leaf	Infusion & Decoction	Rosmarinic acid, Carnosic acid, Thujones

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Babouneh	Matricaria chamomilla	Asteraceae	German chamomile	Flower	Infusion	Apigenin, α-Bisabolol, Chamazulene
Ostokhodous	Lavandula angustifolia	Lamiaceae	Lavender	Flower	Infusion & Steam inhalation	Linalool, Linalyl acetate
Na'na'	Mentha piperita	Lamiaceae	Peppermint	Leaf	Infusion & Herbal syrup	Menthol, Menthone
Goleh-Gav-Zaban	Echium amoenum	Boraginaceae	Iranian borage	Flower	Infusion with adjuncts (lemon)	γ-Linolenic acid, Rosmarinic acid
Za'feran	Crocus sativus	Iridaceae	Saffron	Floral stigma	Infusion with adjuncts (milk)	Crocin, Safranal, Picrocrocin
Darchin	Cinnamomum verum	Lauraceae	Ceylon cinnamon	Stem bark	Infusion with adjuncts (milk)	Cinnamaldehyde, Eugenol
Sonbol Tib	Valeriana officinalis	Caprifoliaceae	Valerian	Root	Decoction & Herbal powder/capsule	Valerenic acid, Valerenol, Hesperidin
Rozmari	Rosmarinus officinalis	Lamiaceae	Rosemary	Leaf	Infusion	Rosmarinic acid, Carnosic acid, 1,8-Cineole
Chayeh Sabz	Camellia sinensis	Theaceae	Green tea	Leaf	Infusion	Epigallocatechin gallate (EGCG), Caffeine
Zanjeh-bil	Zingiber officinale	Zingiberaceae	Ginger	Rhizome	Infusion with adjuncts (honey)	[6]-Gingerol, [6]-Shogaol
Marzanjoush	Origanum majorana	Lamiaceae	Sweet marjoram	Leaf	Infusion	Terpinen-4-ol, Sabinene hydrate
Razianeh	Foeniculum vulgare	Apiaceae	Fennel	Seed	Infusion	Trans-Anethole, Estragole, Fenchone

Ethnobotanical Quantification

Quantitative analysis using use reports (UR), relative frequency of citation (RFC), and percentage frequency of use (PFU) revealed that Echium amoenum was the most culturally significant species, with a UR of 8, an RFC of 0.32, and a PFU of 32.0% (Table 3). Other frequently cited taxa

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included Matricaria chamomilla (German chamomile) and Valeriana officinalis (valerian), each noted by multiple informants for their reliable sedative and anxiolytic properties. The concordance between high citation indices and widespread traditional endorsement highlights these species' central roles in local pediatric phytotherapy.

Table 3: Quantitative ethnobotanical indices for the medicinal plant species recorded in the pediatric sedative and anti-stress survey in Ilam City

The name of the plant	PFU	UR	RFC
Thymus vulgaris	16.0%	4	0.16
Salvia officinalis	16.0%	4	0.16
Matricaria chamomilla	28.0%	7	0.28
Lavandula angustifolia	24.0%	6	0.24
Mentha piperita	12.0%	3	0.12
Echium amoenum	32.0%	8	0.32
Crocus sativus	20.0%	5	0.20
Cinnamomum verum	20.0%	5	0.20
Valeriana officinalis	28.0%	7	0.28
Rosmarinus officinalis	24.0%	6	0.24
Camellia sinensis	16.0%	4	0.16
Zingiber officinale	12.0%	3	0.12
Origanum majorana	16.0%	4	0.16
Foeniculum vulgare	20.0%	5	0.20

Abbreviations: PFU: percentage of frequency of use, UR: usage report index, RFC: relative frequency of citation

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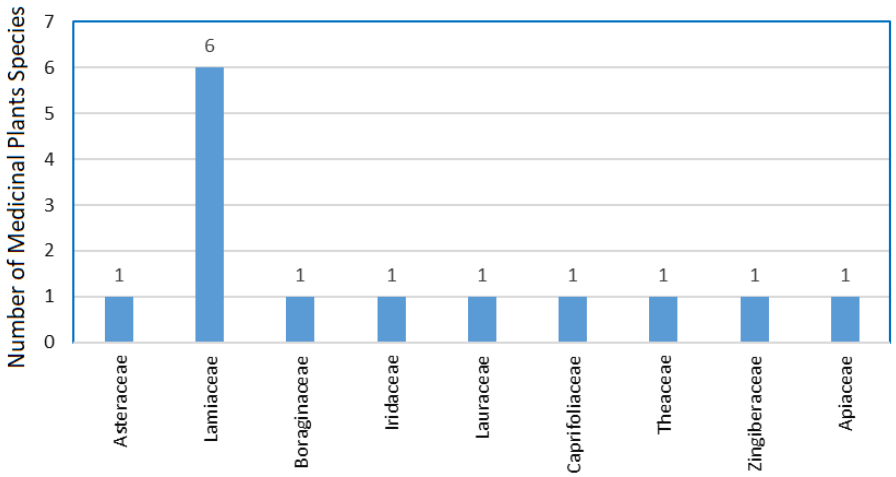

Figure 2: Distribution of medicinal plant usage across botanical families

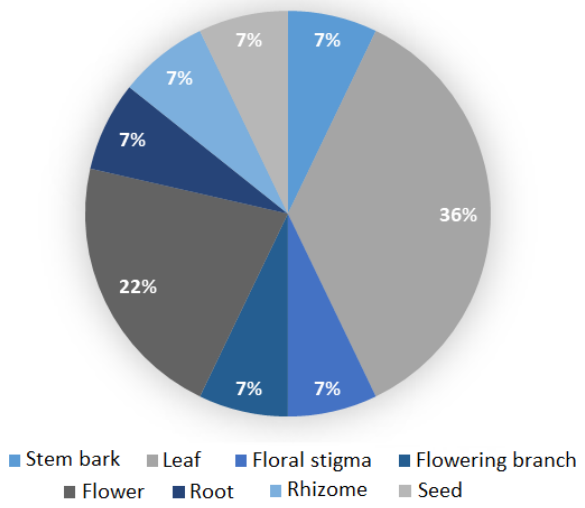

Figure 3: Percentage distribution of plant organs used in traditional pediatric sedative and anti-stress preparations in Ilam City, Western Iran

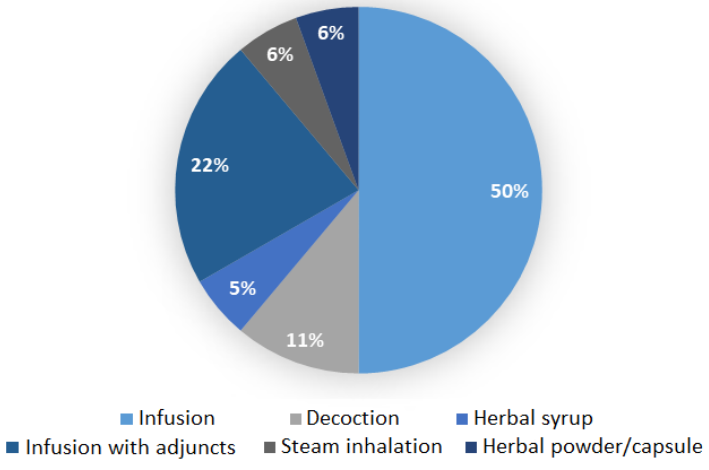

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Figure 4: Proportion of traditional preparation methods employed for pediatric sedative and anti-stress herbal teas in Ilam City, Western Iran

Discussion

The global rise in complementary and alternative medicine (CAM) reflects increasing demand for natural, plant-based therapies, particularly for pediatric care where safety is a top priority [20]. Phytomedicine, the scientifically validated application of plant extracts, is emerging as a crucial complement to traditional treatments by offering targeted and effective natural remedies [21]. Herbal teas, valued for their sedative and anti-stress properties, provide a gentle alternative to synthetic pharmaceuticals for children [22, 23]. This trend is particularly relevant in Ilam City, Western Iran, where traditional ethnobotanical knowledge is deeply embedded in the community's approach to healthcare, especially for pediatric purposes. Nestled within the ecologically rich Ilam Province, Ilam City draws on a diverse array of flora that has been harnessed for generations to craft herbal teas with sedative and anti-stress benefits. These plant-based remedies, rooted in both ecological abundance and cultural heritage, align with the worldwide shift toward CAM while offering valuable insights for modern science [24]. By systematically documenting and validating the bioactive compounds in these plants, recognized for their anxiolytic, sedative, antioxidant, and neuroprotective effects; this study bridges indigenous wisdom with contemporary pharmacology, paving the way for safe, effective, and culturally resonant therapeutic options in pediatric healthcare.

The findings from this study resonate with a broader body of ethnobotanical research conducted across Iran and beyond, underscoring the consistent use of medicinal plants for similar therapeutic purposes. Ethnobotanical research across Iran demonstrates a strong continuity in the use of certain plant species for sedative and anti-stress effects, reflecting a shared cultural and medicinal heritage. For example, Abbaszadeh et al. (2019) in Shahrekord, Iran, documented the use of *Matricaria chamomilla*, *Lavandula angustifolia*, *Valeriana officinalis*, and *Echium amoenum* (Iranian borage) as sedative medicinal plants [25]. Three of these; Matricaria chamomilla, Lavandula angustifolia, and *Valeriana officinalis* are directly replicated in the Ilam City study, while *Echium amoenum* is closely related to *Borago officinalis*, both belonging to the Boraginaceae family and recognized for their calming properties. Similarly, Saki et al. (2014) in Urmia, northwest Iran, reported *Valeriana officinalis* and *Echium amoenum* for treating psychiatric and neurological disorders, further aligning with the Ilam findings [26]. Additionally, Bahmani et al. (2019), in a review of Iranian ethnobotanical documents, noted the use of *Lavandula angustifolia* in Khuzestan and Nain, and Echium amoenum across regions like Khuzestan, Erin Neka, Sirjan, and Razovergola for sedation [27]. These overlaps suggest that these plants are staples in Iran's traditional pharmacopeia, widely valued for their sedative effects across diverse communities.

Globally, many of the plants identified in Ilam City are also utilized for similar therapeutic purposes, highlighting a universal reliance on certain species for stress relief and sedation. Matricaria chamomilla is a well-known sedative in Europe, the Middle East and South America, often administered as a tea to promote relaxation and sleep, particularly in children [28-31]. *Lavandula angustifolia* enjoys worldwide popularity, used in herbal teas, aromatherapy, and essential oils for its calming and anxiolytic effects [32-35]. *Valeriana officinalis* is another globally recognized sedative, employed in both traditional and modern herbal medicine to alleviate anxiety and improve sleep quality [36-38]. These three species represent a core group of plants with near-universal application for sedative purposes.

Beyond this core trio, other plants from the Ilam study also appear in various cultural contexts. *Mentha piperita* (peppermint), for instance, is commonly used in North America, Europe, and the Middle East for its soothing effects on the digestive system, which can indirectly reduce stress [39, 40]. *Thymus vulgaris* (thyme) and *Salvia officinalis* (sage) are frequently incorporated into Mediterranean herbal traditions for their mild sedative and anti-inflammatory properties [41-44]. In Nigeria, Abubakar and Haque (2019) documented a repertoire of 82 medicinal plants with anxiolytic and sedative activities, including *Curcuma longa* (turmeric) and *Zingiber officinale* (ginger). While *Curcuma longa* does not appear in the Ilam study, *Zingiber officinale* also from the Zingiberaceae family, is present, suggesting a shared reliance on this plant family for therapeutic effects across continents. However, the Nigerian study also lists unique species like *Nymphaea lotus* and *Securinega virosa*, indicating regional specificity alongside broader parallels [45].

A growing body of pharmacological and clinical evidence supports the sedative and anxiolytic effects of many of the plant species identified in the present study. Matricaria chamomilla, one of the most frequently used herbs in

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pediatric calming teas, has been validated in both animal and human studies [46, 47]. Apigenin, one of its major flavonoids, binds to benzodiazepine receptors in the brain, exerting mild sedative and anxiolytic effects without strong dependency risks [48]. Similarly, *Lavandula angustifolia*, rich in linalool and linalyl acetate, has demonstrated anxiolytic and calming effects in clinical trials, including reduced anxiety levels in children undergoing dental procedures and improved sleep quality [34, 49]. Its mechanisms are thought to involve modulation of the GABAergic system and serotonin receptors [32].

Valeriana officinalis, long used for sleep and nervous disorders, has shown efficacy in both animal models and randomized controlled trials [36, 50, 51]. Its primary compounds, including valerenic acid and valerenol, enhance GABA activity, contributing to its sedative properties [52]. *Borago officinalis* (borage), which contains γ-linolenic acid and rosmarinic acid [53], has been investigated for its mood-stabilizing and anti-inflammatory properties, though its direct sedative effects require further study in pediatric populations [54].

Thymus vulgaris, with thymol and carvacrol as active components [55], shows mild sedative effects and has demonstrated neuroprotective properties in animal models [56, 57], possibly through antioxidant pathways and modulation of neurotransmitter activity [58]. Likewise, *Salvia officinalis*, which contains rosmarinic acid and thujones [59, 60], has exhibited both cognitive-enhancing and calming effects in human trials, likely through cholinesterase inhibition and antioxidant action [61].

Crocus sativus (saffron), used traditionally in milk-based infusions for children, has been confirmed in multiple human trials to possess antidepressant and anxiolytic properties [62, 63], largely attributed to crocin and safranal. These compounds may influence serotonin reuptake and oxidative stress markers [64]. Similarly, *Zingiber officinale*, while more commonly recognized for antiemetic effects [65, 66], also possesses mild anxiolytic activity via [6]-gingerol and [6]-shogaol, which influence inflammatory pathways and neurotransmission [67].

In many diseases and disorders [], turning to nature and embracing traditional or natural therapeutic approaches can serve as a beneficial and complementary strategy helping to alleviate symptoms, support overall well-being, and enhance patients' quality of life []. Altogether, these findings reinforce the pharmacological plausibility of traditional practices, suggesting that these herbs act through diverse but converging mechanisms, such as GABA modulation, serotonergic regulation, and antioxidant activity to achieve gentle sedation and stress reduction in children. These studies not only validate ethnobotanical knowledge but also highlight the therapeutic potential of these species in integrative pediatric care.

Conclusion

This study has documented the rich ethnobotanical knowledge of Ilam City, Iran, concerning the use of medicinal plants in herbal teas for sedative and anti-stress purposes in children. Key species identified, such as *Matricaria chamomilla*, *Lavandula angustifolia*, and *Valeriana officinalis*, are integral to local practices and align with both regional and global traditional uses. These findings highlight unique local preferences while reinforcing the widespread application of these plants for their calming effects.

The significance of this research lies in its ability to bridge traditional wisdom with modern pharmacology. Many of these plants have been scientifically validated for their anxiolytic, sedative, and neuroprotective properties, offering a foundation for their potential integration into pediatric healthcare. By preserving cultural heritage and providing evidence for the efficacy of these natural remedies, the study underscores their value as safe and effective alternatives or complements to synthetic pharmaceuticals.

Looking ahead, future research should prioritize rigorous clinical trials to confirm the safety and efficacy of these herbal teas in children. Additional studies could explore their mechanisms of action in greater depth and investigate the feasibility of developing standardized, culturally resonant herbal products. Such efforts could enhance the role of traditional knowledge in evidence-based healthcare, offering holistic solutions for managing stress and anxiety in pediatric populations.

Competing interests

The authors have no competing interests to declare that are relevant to the content of this article.

Ethics approval

This study was performed in line with the principles of the Declaration of Helsinki.

Consent to participate

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Informed consent was obtained from all individual participants included in the study.

Author contributions

KS: Conceptualization, the original draft writing, investigation, writing including reviewing and editing and investigation and formal analysis; AP: Conceptualization, supervision, and project administration; AP and KS Conceptualization, the original draft writing, investigation, writing including reviewing and editing.

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