



# Ethnobotanical study of medicinal plants used by Miao people in Jijiezi, Yunnan, China

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## Research

### Abstract

**Background:** The Miao ethnic group is an indigenous group in China with a long history of traditional medicine utilization and owns rich traditional knowledge related to biodiversity utilization and conservation. In Jijiezi village, Yunnan, the Miao ethnic group is the main ethnic group and retains a rich traditional culture. The area is rich in plant resources and the custom of using Miao medicine is still retained. It is important to evaluate the inheritance of the knowledge of Miao medicine in the region and the development prospects of Miao medicine culture.

**Methods:** The data was collected in different seasons in 2014, with a total of 200 informants interviewed using free listing and semi-structured interviews.

**Results:** This study recorded the ethnobotanical importance of Miao medicine in Jijiezi, Yunnan, China. 42 species from 26 families and 37 genera were identified. For each species scientific and Miao names, distribution, and use knowledge were recorded and analyzed which can help the assessment the current status of Miao traditional medicine. The results show that the traditional knowledge of Miao medicine is very rich and has a good therapeutic effect on a variety of diseases, and that there is a homology of medicine and food. However, the traditional knowledge of Miao medicine is more and more getting lost and needs urgent protection.

**Conclusions:** It is important to protect the traditional Miao medicine knowledge and promote sustainable development of Miao medicine culture. We propose to protect and develop local Miao medicine

knowledge, and suggest (1) documentation of species used in this practice may provide basic information for conservation, and further use, and will help to preserve local traditional knowledge, (2) training of practitioners in Miao medicine to maintain Miao medicine culture, (3) encourage local governments to adopt relevant policies to protect the culture of Miao medicine, and (4) bring Miao medicine into the market and promoting the development of Miao medicine.

**Keywords:** Miao nationality, traditional knowledge, Medicinal plants, Yunnan, Biodiversity

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### 摘要 (Abstract in Chinese):

**背景:** 苗族是中国的一个世居民族, 有很悠久的传统药利用历史和丰富的传统知识。云南的鸡街子村中主体民族为苗族, 保留了很丰富的传统文化。该地区有丰富的植物资源, 村民主要以种植植物和养殖业为生, 发展较为落后。因此, 该地区依然保留了使用苗药的风俗习惯。评价该地区对苗药知识的传承程度, 以及苗药文化的发展前景是十分有意义的。

**方法:** 在2014年的不同季节, 采用自由列举法和半结构化访谈, 对200个当地苗族进行采访来获得数据。

**结果:** 本研究记录了在中国云南鸡街子村的苗药在民族植物学方面的重要性。鉴别了26科37属的42种植物, 记录和分析了每种物种的学名和苗名, 分布和使用的经验, 这些能够帮助我们评估苗族传统药物的现状。结果表明, 苗药传统知识十分丰富, 对于当地疾病有较好的治疗效果, 且存在着药食同源的现象, 但是目前苗药传统知识流失严重, 亟需对此进行保护。

**结论:** 保护这个地区的传统苗药知识以及实现其可持续是非常重要的, 因此提出了保护和发展当地苗药知识的建议: (1) 通过将这些植物物种信息编纂成册能够为利用这些植物提供基础资料, 同时也能保护当地传统知识; (2) 寻找苗药的继承人, 将苗药文化传承下去; (3) 当地政府应采取相关政策来保护苗药文化; (4) 将苗药引入市场, 通过经济促进苗药发展。以此为苗族非物质文化遗产的传承提供帮助。

**关键词:** 苗族; 传统知识; 药用植物; 云南; 生物多样性

### Background

Even with increasing industrialization, traditional medicine is attracting more and more attention in the world (Jäger *et al.* 2006, Tsai *et al.* 2008). At the same time, the knowledge of traditional medicine in many regions of China is widely disappearing because of the impact of Western medical culture and the Han medical culture in China (Janes 1999). The Miao ethnic group is one of the most ancient ethnic groups in China and regarded as the first ethnic group in China Miao rice (Pan, 1996). A long history of farming and settlement have made the Miao famous for their discoveries and domestication

of medicinal plants. Even as migrants the Miao are well known to keep their home medicinal gardens traditions (Wu, 2004). Many medicinal plant resources are widely used by Miao people (Anderson *et al.* 2005, Long & Rong 2004, Shen *et al.* 2010, Zhang *et al.* 2015). The Miao have inhabited their homeland of Yunnan and Guizhou provinces for thousands of years. Over time the population has accumulated rich traditional medical knowledge. Miao people from Jijiezi village (Yunnan Province) belongs to the Weining branch of the ethnic group, calling themselves the "base branch". The old ways of village folk customs, slash-and-burn agriculture, hemp weaving and batik embroidery still exist. Because Miao people in Jijiezi have been isolated from other parts of the ethnic group for a long time, they have developed different uses of many medicinal plants. For example, Miao people in Guizhou province use "herbal medicine bath" frequently, but Miao people in Jijiezi do not have this tradition based on our observations and interviews. Among Chinese ethnic groups, Miao has more branches than any other groups. The Miao people from Jijiezi village (Yunnan Province) belongs to the Weining branch, they call themselves "basic branch". This basic branch is likely to have been suppressed after failure in fighting against the Qing Dynasty in the east and west of Guizhou province, and then moved to the Jijiezi village in Yunnan Province. The old traditions such as village folk customs, swidden agriculture, natural fiber woven products and batik embroidery still exist. Since the Miao people in Jijiezi have been isolated from other branches for a long time, the use of many medicinal plants and pharmaceutical operating methods are divergent now. Many traditional medicinal herbs have limited distributions in Guizhou, and when they moved to Yunnan, fewer herbs available, so they lost some old medicinal species and try to explore new plants in Yunnan local areas. Another example, the Miao people in Guizhou province use "herbal medicine bath" frequently, but the Miao people in Jijiezi do not have this tradition.

Miao medicine is regarded as simple, convenient, effective and inexpensive and has had far-reaching influence in local medicinal culture. Its unique curative effects (Cheng *et al.* 2013, Xiong *et al.* 2010) are based on plant material from the natural environment, and it is closely linked to local people's lifestyle, which can make a significant contribution to health. According to the relevant research (Zheng 2006) documentation of Yunnan Miao medicine is greatly lacking. There is an urgent need to protect this valuable ethnic medicine knowledge for the

world.

The aim of this study was to: (1) record traditional Miao medicine used by local people in Jijiezi, (2) discover the cultural heritage passed down from generations to generations by local Miao people, (3) document associated ethnobotanical knowledge, and (4) give some suggestions about protection of local valuable medicinal system.

## Materials and methods

### Study area

Jijiezi village is located in Yunnan Province, Southwestern China. It has over 3000 residents from three ethnic groups: Miao, Yi and Han, with Miao people accounting for more than 95% of the population. This area has a mean elevation of 2160 m, an annual average temperature of 19.5°C, and an annual average rainfall of 650 mm (Fig. 1).

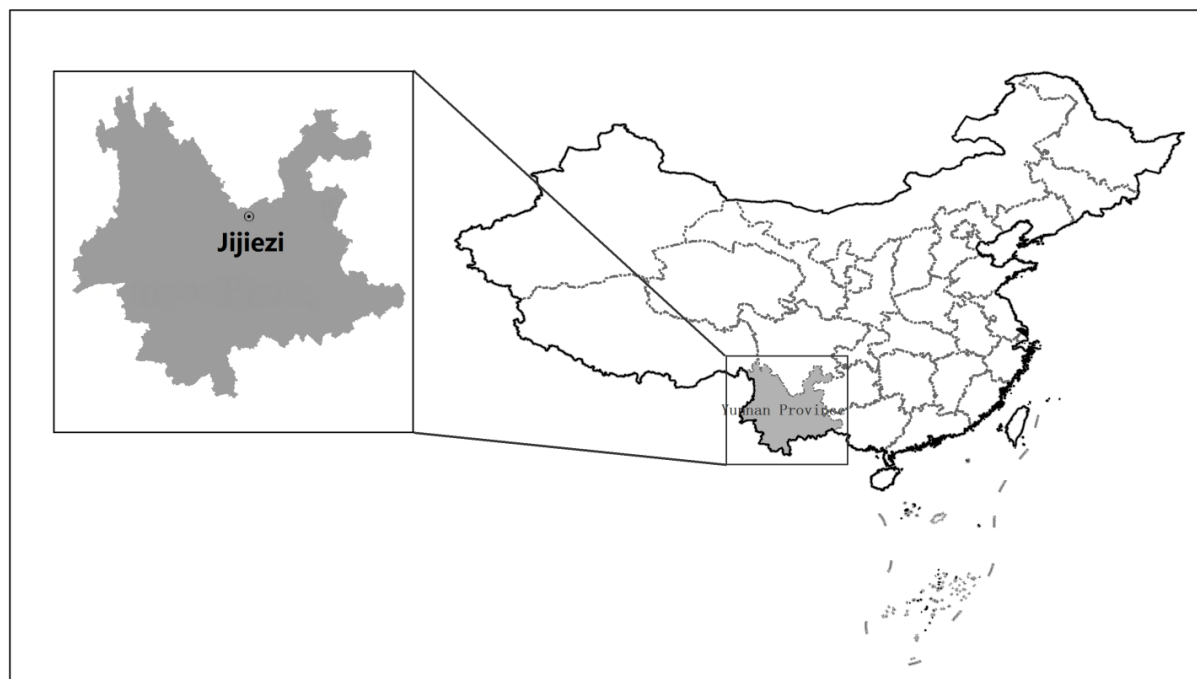


Fig. 1. Location of Jijiezi village, Yunnan, China

To conduct the study we first obtained permission from Yunnan government, and collected general geological and historical information on distributions of Miao people, and their traditions. On the basis of this information, we selected Jijiezi village as a representative village for our research. Jijiezi village is famous for its rich plant resources, and its forest coverage reached 46.64%. Most people still keep the traditional Miao customs.

### Research methods

A total of 200 local Miao people including 100 men and 100 women were interviewed after obtaining prior informed consent. The demographics of the participants are given in Table 1. Local herb markets were also visited in different seasons in 2014 (Fig. 2). Key informants included local guides, drivers and five local Miao practitioners.

From the interviews, we obtained information on vernacular names and uses of medicinal plants, collection localities, production data, common diseases treated, medicinal plant related habitats and harvesting time (Table 1 & Table 2). Voucher specimens have been collected and stored in the herbarium of Minzu University of China.

## Results and discussion

### The most popular medicinal plants

Local medicinal plant species in Jijiezi are very diverse. In our study, we found 42 species frequently used as Miao medicine by local practitioners (Table 2). The most frequently used plants by Miao people include *Houttuynia cordata* Thunb., *Lonicera japonica* Thunb., *Platycodon grandiflorus* (Jacq.) A. DC., *Arisaema heterophyllum* Blume, and *Sophora flavescens* Alt.



Fig. 2. Miao medicine market in Jijiezi village

*Phyllanthus emblica* L., *Chloranthus japonicus* Siebold, *Paris polyphylla* Sm., *Chloranthus japonicus* Siebold were mentioned by almost each interviewee. *Allium sativum* L., *Allium tuberosum* Rottler ex Spreng and *Phyllanthus emblica* L. were used both as medicinal and edible plants, which indicates that the homology of medicine and food is very popular. Some local Miao medicines like *Paris polyphylla* Sm., are one of the main components in the drug Yunnan Baiyao (Chinese: 云南白药) for traumatic injuries. Because of its good therapeutic effects and large demand, wild *Paris polyphylla* Sm. suffers from over-exploitation. and is in danger of extinction. An overview on plant parts used is given in (Fig. 3). This result are similar to other investigations, such as a study of the wild edible plants used by Tibetans in Shangri-la region, Yunnan, China (Yan *et al.* 2012).

Table 1. Demographic features of the participants n=200

	Number	Percentage
<b>Gender</b>		
Adolescents (aged under 18 years)	40	20%
Adult men (aged 18-45 years)	40	20%
Adult women (aged 18-45 years)	40	20%
Elderly men (aged over 45 years)	40	20%
Elderly women (aged over 45 years)	40	20%
<b>Origin</b>		
Local Miao farmers	164	82%
Local other farmers	36	18%

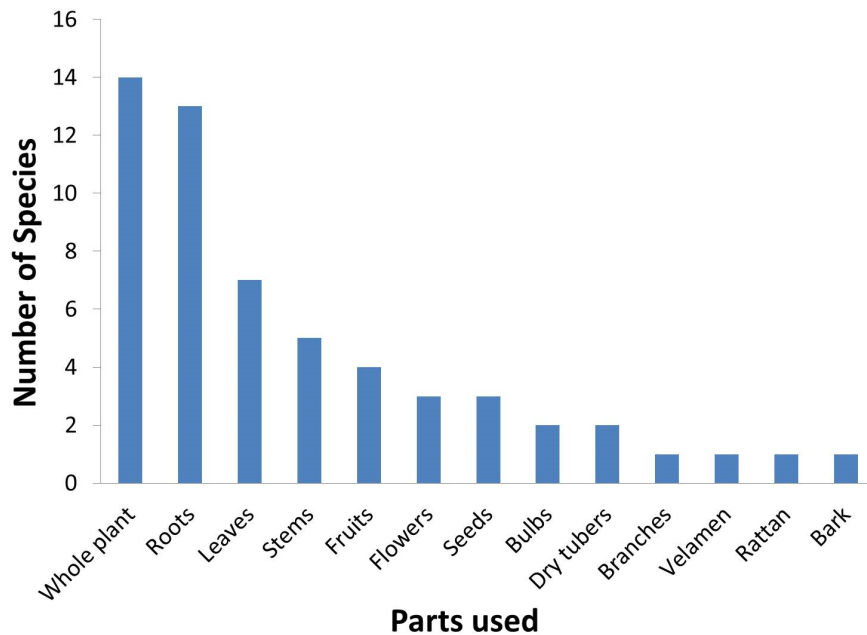


Fig. 3. Use frequency of Miao medicinal herb parts.

Table 2. Miao medicinal plants used in Jijiezi village

Family and Scientific name	Miao and Chinese name	Parts used	Habitat	Main chemical compounds	Traditional use and applications	Voucher specimen
<b>Amaryllidaceae</b>						
<i>Allium sativum</i> L.	Miao: da suan 蒜 suan	Bulbs	Farmland	Allicin (Baghalian et al. 2005; Blania and Spangenberg 1991)	Resistance of cold, cough. Harvest time: throughout the year	Liu Dongyang, Guo Zhiyong et al. 1
<i>Allium tuberosum</i> Rottler ex Spreng.	Miao: jiu cai 韭 jiu	Seeds, leaves	Farmland	Sulfides, glycosides (Wu and Zhang 2005)	Treat nocturnal emission, enuresis, frequent urination (Hu et al. 2013). Harvest time: throughout the year	Liu Dongyang, Guo Zhiyong et al. 2
<i>Lycoris aurea</i> (L'Hér.) Herb.	忽地笑 hu di xiao	Bulbs	Humid areas	Lycorine, alkaloids (Tong et al. 2011)	External use for itch, rheumatism and joint pain. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 9
<b>Apiaceae</b>						
<i>Ligusticum sinense</i> Oliv.	Miao: xiang gao ben 藁本 gao ben	Roots, stems	Grows in forests and river bank		Treat acariasis and neurodermatitis	Liu Dongyang, Guo Zhiyong et al. 4
<b>Araceae</b>						
<i>Arisaema heterophyllum</i> Blume.	Miao: ma ti jue ming 决明 jue ming	Whole plant	Thickets on slopes	Seeds contain anthracene glycosides substances and xanthones (Murshid et al. 2007)	Treat hypertension, headaches and constipation. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 5
<b>Asteraceae</b>						
<i>Bidens pilosa</i> L.	Miao: zhan ren cao 鬼针草 gui zhen cao	Whole plant	Villages, roadsides, wasteland.	Hyperoside, gallic acid, flavonoids	Treat appendicitis, gastroenteritis, arthralgia, External used treat boils.	Liu Dongyang, Guo Zhiyong et al. 22

<b>Campanulaceae</b> <i>Platycodon grandiflorus</i> (Jacq.) A. DC.	Miao: ling dang hua 桔梗jie geng	Roots	At around 2000 m in mountains		Anticancer and antidiabetics	Liu Dongyang, Guo Zhiyong et al. 26
<b>Capparaceae</b> <i>Capparis masaikai</i> Levl.	Miao: tai ji zi 马槟榔ma bing lang	Seeds	Valleys or hillsides	Emodin, chrysophanic acid	Nourishing lung and throat and expedite delivery. Harvest time: winter	Liu Dongyang, Guo Zhiyong et al. 7
<b>Caricaceae</b> <i>Carica papaya</i> L.	Miao: yang qie zi 番木瓜 fan mu gua	Fruits, leaves	Widely cultivated in the south of Yunnan province	Phenolic compounds, coumarin (Canini et al. 2007)	Treat stomachache. Harvest time: throughout the year	Liu Dongyang, Guo Zhiyong et al. 8
<b>Chloranthaceae</b> <i>Sarcandra glabra</i> (Thunb.) Nakai	Miao: zhu jie cao 草珊瑚cao shan hu	Whole plant	Hillsides, shade of the valley	Volatile oil, tannin	Treat influenza. In recent years, it has also been used to treat pancreatic cancer and stomach cancer, which has no side effects.	Liu Dongyang, Guo Zhiyong et al. 3
<b>Convolvulaceae</b> <i>Cuscuta chinensis</i> Lam.	Miao: wu niang teng 菟丝子tu si zi	seeds	Mountain slopes	Resin glucoside, vitamins, carotene	Nourish liver and kidney; enhance the energy, anti-diarrhea.	Liu Dongyang, Guo Zhiyong et al. 11
<b>Eucommiaceae</b> <i>Eucommia ulmoides</i> Oliver	Miao: jiao shu 杜仲du zhong	Bark	Valleys		Nourish liver and kidney, strengthen the bones and muscles	Liu Dongyang, Guo Zhiyong et al. 12
<b>Euphorbiaceae</b> <i>Phyllanthus emblica</i> L.	Miao: wang guo 余甘子 yu gan zi	Fruits, roots, leaves	Tolerance of drought and barren, like light and warmth	Gallic acid, ellagic acid et al. (Zheng et al. 2013)	Fruits relieve cough and sore throat, roots and leaves treat fever and eczema. Harvest time: summer, autumn	Liu Dongyang, Guo Zhiyong et al. 13
<b>Fabaceae</b> <i>Albizia julibrissin</i> Durazz.	Miao: ma ying hua 合欢he huan	Velamen, flowers	Thickets	Velamen contains saponins and tannins (Xu et al. 2008)	Treat neurasthenia, insomnia and forgetfulness. Harvest time: summer, autumn	Liu Dongyang, Guo Zhiyong et al. 14
<i>Alysicarpus vaginalis</i> (L.) DC.	Miao: xiao dou 链荚豆lian jia dou	Whole plant	Open slopes, dry field edge, roadside		Promote blood circulation, treat wounds, snake bite and fracture	Liu Dongyang, Guo Zhiyong et al. 33
<i>Bauhinia brachycarpa</i> Wall. ex Benth.	Miao: da fei yang 鞍叶羊蹄甲an ye yang ti jia	Roots, leaves	Forest edges		Roots treat diarrhea, young leaves relieve pain of fungal diseases. Harvest time: summer, autumn	Liu Dongyang, Guo Zhiyong et al. 16
<i>Caesalpinia decapetala</i> (Roth) Alston.	Miao: lao hu ci jian 云实yun shi	Roots, stems, fruits	Thickets	The bark contains tannins	Roots treat cold and rheumatic pain, seeds are toxic. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 17

<i>Senna tora</i> (L.) Roxb.	Miao: ma ti jue ming 决明jue ming	Whole plant	Thickets on slopes	Seeds contain anthracene glycosides substances and xanthenes (Murshid et al. 2007)	Treat hypertension, headaches and constipation. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 18
<i>Sophora flavescens</i> Alt.	Miao: ye huai 苦参ku shen	Roots	Sandy slopes	Matrine, cytisine et al.(Lai et al. 2003)	Diuresis, antiseptis and treat indigestion	Liu Dongyang, Guo Zhiyong et al. 37
<b>Lamiaceae</b>						
<i>Agastache rugosa</i> (Fisch. et Mey.) O. Ktze.	Miao: tu huo xiang 藿香huo xiang	Whole plant	On acidic soil, moist, hot climate	Volatile oils	Antiemetic, treat abdominal pain. Harvest time: summer	Liu Dongyang, Guo Zhiyong et al. 20
<i>Ajuga pantantha</i> Hand.-Mazz.	Miao: dan cao散瘀草 san yu cao	Whole plant	Dry slope		Anti-inflammatory	Liu Dongyang, Guo Zhiyong et al. 21
<b>Lardizabalaceae</b>						
<i>Sargentodoxa cuneata</i> (Oliv. ) Rehd. et Wils.	Miao: da huo xue大 血藤da xue teng	Roots, stems	Hillside thickets, forest edges	Lignans (Han et al. 1986)	Activate collaterals, trichomonacida	Liu Dongyang, Guo Zhiyong et al. 10
<b>Liliaceae</b>						
<i>Paris polyphylla</i> Sm.	Miao: chong lou七叶一枝 花qi ye yi zhi hua	Roots, stems	River banks, forests, 2000-3000 m	Polyphyllin (Nohara et al. 1973)	Treat appendicitis. Harvest time: throughout the year	Liu Dongyang, Guo Zhiyong et al. 23
<b>Magnoliaceae</b>						
<i>Illicium verum</i> Hook. f.	Miao: ba jiao hui xiang 八角ba jiao	Fruits, leaves	Mountain climate	Anisylacetone, fatty oil, protein, resin, shikimic acid.(Zheng- Cai et al. 2013)	Regulate breath, treat neurasthenia. Harvest time: spring, autumn	Liu Dongyang, Guo Zhiyong et al. 24
<b>Oleaceae</b>						
<i>Fraxinus chinensis</i> Roxb.	Miao: nv zhen 白蜡树bai la shu	Whole plant	Mixed forests		Seeds nourishing liver and kidney, leaves treat stomatitis, bark treats burns, roots treat rheumatism. Harvest time: summer, autumn	Liu Dongyang, Guo Zhiyong et al. 25
<i>Fraxinus malacophylla</i> Hemsl.	Miao: bai qiang gan 白枪杆bai qiang gan	Roots	Forests	Tannins (Guo et al. 2012)	Diminish inflammation, diuretic, aperient, digestion and stomachic. Harvest time: autumn, winter	Liu Dongyang, Guo Zhiyong et al. 6
<i>Jasminum sambac</i> (L.) Aiton	茉莉mo li	Flowers, roots	Thickets	Benzyl alcohol and ester (Gmm et al. 2014)	Flowers treat fever and are used to detoxification. Roots are toxic, which have analgesic effect. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 27
<b>Orchidaceae</b>						
<i>Bletilla striata</i> (Thunb. ex A. Murray) Rchb. f.	Miao: bai gen 白及bai ji	Dry tubers	Broad- leaved or coniferous forest	Militarine (Sakuno et al. 2010)	Treat gastrointestinal bleeding, traumatic bleeding. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 28

<i>Dendrobium officinale</i> Kimura et Migo.	Miao: yun nan tie pi 铁皮石斛 tie pi shi hu	Stems	Cultivated at the altitude of 1600 meters	Polysaccharides, alkaloids, amino acids (Hao 2013)	Nourishing lung and kidney, have activity of antioxidant and anticancer	Liu Dongyang, Guo Zhiyong et al. 29
<b>Ranunculaceae</b>						
<i>Clematis armandii</i> Franch.	Miao: shan mu tong 小木通 xiao mu tong	Stems	Hillsides		Treat urinary tract infections, dysuria, nephritis, edema. Harvest time: summer and autumn	Liu Dongyang, Guo Zhiyong et al. 30
<i>Clematis buchananiana</i> DC.	毛木通 mao mu tong	Whole plant	Woodlands	Akeboside	Treat tonsillitis and pharyngitis. Harvest time: summer, autumn	Liu Dongyang, Guo Zhiyong et al. 31
<i>Ranunculus chinensis</i> Bunge.	Miao: shui hu jiao 茵茵蒜 hui hui suan	Whole plant		Pulsatilla alkaloids (Qing-Sheng et al. 2010)	Treat hepatitis, pharyngitis, asthma, heart disease. Harvest time: summer, autumn	Liu Dongyang, Guo Zhiyong et al. 32
<i>Ranunculus japonicus</i> Thunb.	Miao: lao hu jiao 毛茛 mao gen	Whole plant	Mizobe	Pulsatilla alkaloids	External application for malaria and boils ringworm. Harvest time: summer, autumn	Liu Dongyang, Guo Zhiyong et al. 15
<b>Rubiaceae</b>						
<i>Gardenia jasminoides</i> Ellis	Miao: mu dan 梔子 zhi zi	Leaves, flowers, roots	Warm humid climate and acidic soil	Gardenoside and gardenin (Tsm et al. 2007)	Treat fever, promote blood circulation. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 34
<i>Hedyotis corymbosa</i> (L.) Lam.	Miao: shui xian cao 伞房花 er cao san fang hua er cao	Whole plant	Ridges	Stearic acid Palmitic acid Linolenic acid (Hong-Quan et al. 2015)	Treat cancer. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 35
<i>Hedyotis pinifolia</i> Wall. ex G. Don	Miao: wu she cao 松叶耳草 song ye er cao	Whole plant	Wilderness		External application for injury. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 36
<i>Rubia cordifolia</i> L.	Miao: da hong shen 茜草 qian cao	Roots		Alizarin (Kaur et al. 2010)	Treat hematemesis, rheumatoid arthritis and bruises. Harvest time: winter	Liu Dongyang, Guo Zhiyong et al. 19
<b>Saururaceae</b>						
<i>Houttuynia cordata</i> Thunb.	Miao: yu xing cao 蕺菜 ji cai	Whole plant	Forests and wetlands.	Volatile oil, flavonoids compounds. (Liang et al. 2005)	Treat hydronephrosis, mastitis and tympanitis. Harvest time: summer, autumn, winter	Liu Dongyang, Guo Zhiyong et al. 38
<b>Solanaceae</b>						
<i>Datura stramonium</i> L.	Miao: gou he tao 曼陀罗 man tuo luo	Whole plant	Roadsides	Alkaloids (Perharić et al. 2013)	Treat bronchitis, chronic asthmatic, stomach pain and toothache. Harvest time: autumn	Liu Dongyang, Guo Zhiyong et al. 39
<i>Solanum erianthum</i> D. Don	Miao: ye qie shu 假烟叶树 jia yan ye shu	Rootsleaves	Hillsides	Solanum nigrum glycosides (Chou et al. 2012)	Roots treat stomach pain. Leaves treat skin ulcers. Harvest time: summer, winter	Liu Dongyang, Guo Zhiyong et al. 40
<b>Vitaceae</b>						
<i>Tetrastigma planicaule</i> (Hook.) Gagnep.	Miao: yao dai teng 扁担藤 bian dan teng	Rattan	Valley forests or on rock slopes	Salicylic acid, vanillic acid, syringic acid (Jiachun et al. 2010)	Treat lumbar muscles injury	Liu Dongyang, Guo Zhiyong et al. 41



<b>Zingiberaceae</b>					
<i>Amomum tsaoko</i>	Miao: cao	Fruits	Cultivated	Digestive,	Liu
Crevost et Lemarie	guo zi 草果		or wild in	nourishing	Dongyang,
	cao guo		the forests	stomach.	Guo Zhiyong
				Harvest time:	et al. 42
				autumn, winter	

*Common diseases and common Miao botanical prescriptions in Jijiezi*

An overview on the most important illness categories treated and the plants used is given in Table 3. Commonly treated diseases are closely related to local environmental conditions, lifestyle and dietary

habit, and herbs for curing common diseases such as bruises, rheumatic disorders, cold and diarrhea, were used with a higher frequency. Meanwhile Miao medicine is mainly used for the treatment of snake bites, rheumatism, kidney stones, wounds and other tropical diseases.

Table 3. Common diseases treated by Miao medicines

Common symptoms	Main species used
Activating blood circulation, dissipate bruises	<i>Bauhinia brachycarpa</i> Wall. ex Benth., <i>Rubia cordifolia</i> L., <i>Hedyotis pinifolia</i> Wall. ex G. Don, <i>Solanum verbascifolium</i> L., <i>Alysicarpus vaginalis</i> (L.) DC., <i>Antenoron filiforme</i> (Thunb.) Rob. et Vaut., <i>Chloranthus japonicus</i> Sieb., <i>Sargentodoxa cuneata</i> (Oliv.) Rehd. et Wils., <i>Paris polyphylla</i> Sm., <i>Arisaema heterophyllum</i> Blume, <i>Tetrastigma planicaule</i> (Hook.) Gagnep., <i>Gardenia jasminoides</i> Ellis.
Anthelmintic	<i>Sargentodoxa cuneata</i> (Oliv.) Rehd. et Wils., <i>Sophora flavescens</i> Alt.
Antidiarrheal	<i>Caesalpinia decapetala</i> (Roth) Alston, <i>Bauhinia brachycarpa</i> Wall. ex Benth., <i>Allium sativum</i> L., <i>Ligusticum sinense</i> Oliv., <i>Carica papaya</i> L.
Antiphlogistic	<i>Phyllanthus emblica</i> L., <i>Fraxinus malacophylla</i> Hemsl., <i>Fraxinus chinensis</i> Roxb., <i>Ranunculus chinensis</i> Bunge, <i>Clematis buchananiana</i> DC., <i>Datura stramonium</i> L., <i>Ajuga pantanthera</i> Hand.-Mazz., <i>Paris polyphylla</i> Sm., <i>Bletilla striata</i> (Thunb. ex A. Murray) Rchb. f., <i>Ligusticum sinense</i> Oliv., <i>Platycodon grandiflorus</i> (Jacq.) A. DC., <i>Sophora flavescens</i> Alt.
Burns and scalds	<i>Fraxinus chinensis</i> Roxb., <i>Bletilla striata</i> (Thunb. ex A. Murray) Rchb. f.
Cold	<i>Phyllanthus emblica</i> L., <i>Caesalpinia decapetala</i> (Roth) Alston, <i>Allium sativum</i> L., <i>Ranunculus chinensis</i> Bunge, <i>Ranunculus japonicus</i> Thunb., <i>Chloranthus japonicus</i> Sieb., <i>Paris polyphylla</i> Sm., <i>Ligusticum sinense</i> Oliv., <i>Platycodon grandiflorus</i> (Jacq.) A. DC., <i>Capparis masaikai</i> Levl.
Fever, Detoxification	<i>Jasminum sambac</i> (L.) Aiton, <i>Ajuga pantanthera</i> Hand.-Mazz., <i>Arisaema heterophyllum</i> Blume, <i>Sophora flavescens</i> Alt., <i>Capparis masaikai</i> Levl., <i>Gardenia jasminoides</i> Ellis, <i>Paris polyphylla</i> Sm., <i>Chloranthus japonicus</i> Sieb.
Intestines and stomach disease	<i>Rubia cordifolia</i> L., <i>Phyllanthus emblica</i> L., <i>Fraxinus malacophylla</i> Hemsl., <i>Datura stramonium</i> L., <i>Agastache rugosa</i> (Fisch. et Mey.) O. Ktze., <i>Antenoron filiforme</i> (Thunb.) Rob. et Vaut., <i>Amomum tsaoko</i> Crevost et Lemarie, <i>Illicium verum</i> Hook. f., <i>Dendrobium officinale</i> Kimura et Migo, <i>Bletilla striata</i> (Thunb. ex A. Murray) Rchb. f., <i>Houttuynia cordata</i> Thunb., <i>Carica papaya</i> L., <i>Solanum verbascifolium</i> L.
Lowering blood pressure	<i>Phyllanthus emblica</i> L., <i>Senna tora</i> (L.) Roxb., <i>Dendrobium officinale</i> Kimura et Migo, <i>Platycodon grandiflorus</i> (Jacq.) A. DC., <i>Eucommia ulmoides</i> Oliver l. c.
Nephritis, calculi	<i>Clematis armandii</i> Franch., <i>Clematis buchananiana</i> DC., <i>Dendrobium officinale</i> Kimura et Migo, <i>Houttuynia cordata</i> Thunb., <i>Eucommia ulmoides</i> Oliver
Pulmonary tuberculosis	<i>Phyllanthus emblica</i> L., <i>Allium sativum</i> L.
Rheumatism	<i>Rubia cordifolia</i> L., <i>Lycoris aurea</i> (L'Hér.) Herb., <i>Caesalpinia decapetala</i> (Roth) Alston, <i>Bauhinia brachycarpa</i> Wall. ex Benth., <i>Fraxinus chinensis</i> Roxb., <i>Clematis armandii</i> Franch., <i>Chloranthus japonicus</i> Siebold, <i>Sargentodoxa cuneata</i> (Oliv.) Rehd. et Wils., <i>Tetrastigma planicaule</i> (Hook.) Gagnep.
Snakebite	<i>Alysicarpus vaginalis</i> (L.) DC., <i>Chloranthus japonicus</i> Sieb., <i>Paris polyphylla</i> Sm., <i>Arisaema heterophyllum</i> Blume.

Miao medicine is divided into cold medicine and hot medicine. It follows the principle "cold disease with hot drugs, fever with cold medicine". Sweet herbs are regarded as hot, bitter and astringent plants as cold. Miao medicine normally prefers fresh herbs. The local people plant commonly used medicinal plants around their houses.

#### **The status quo of local Miao knowledge**

##### *Prospect of Miao medicine*

With increasing demand in the domestic and international medicine markets, the Miao people have started to establish small production factories for medicinal plants commonly used in traditional medicine (Fig. 4), such as *Dendrobium officinale* Kimura et Migo, *Eucommia ulmoides* Oliver, *Gardenia jasminoides* Ellis, *Carica papaya* L., *Paris polyphylla* Sm., *Antenoron filiforme* (Thunb.) Rob. et Vaut.



Fig. 4. *Dendrobium officinale* Kimura et Migo

Our study found that many medicinal herbs were still abundant, including *Sargentodoxa cuneata* (Oliv.) Rehd. et Wils., *Antenoron filiforme* (Thunb.) Rob. et Vaut., *Chloranthus japonicus* Siebold, *Amomum tsaoko* Crevost et Lemarie, *Illicium verum* Hook. f., *Lonicera japonica* Thunb., *Paris polyphylla* Sm., *Dendrobium officinale* Kimura et Migo, *Bletilla striata* (Thunb. ex A. Murray) Rchb. f. and *Ligusticum sinense* Oliv.

Local people ate *Phyllanthus emblica* L. every day to reduce "pathogenic fire". *Capparis masaikai* Levl. is also used as a sweetener (Hu & He 1983).

#### *Potential crisis of local Miao medicine*

The development of the Miao is lagging behind the Han because of historical reasons. In recent history,

the Miao were included in the modern society, and traditional culture was influenced and interrupted by external forces.

The statistics of Miao medicine use by local farmers is shown in Fig. 5. In order to understand the statistics of cognizing Miao medicine by Miao people, we used the simple formula:

$$F = N_k / N_s$$

Where,  $N_k$  is the sum of people who know the number of types of Miao medicine in the interview,  $N_s$  is the total number of people who were interviewed.  $F$  is the proportion of cognizing the number of different types of Miao medicines in the total number of people. We can use "F" to describe the status of the Miao medicine because we can

know the status of local people's cognizing of Miao medicine from "F".

The participants showed a widely varying knowledge of medicinal plants. Most people knew 5 to 19 species, with 46% of the interviewees knowing less than 9 species. About 20% of the participants knew more than 20 species, 50% people recognized 10-29 species of medicinal herbs and a few (4%) recognize more than 30 medicinal herbs. In this study, we also noticed that almost all adolescents knew fewer than 10 (Fig. 5). Medicinal knowledge was mainly kept within individual families.

The frequency of using Miao medicine by Miao people depends on gender and age. In general, women use Miao medicine more frequently than men in the same age group, and older people with higher frequency than younger people (Fig. 6). The highest frequency group of people using traditional medicine were is the elderly women, followed by older men (28.4%), adult women (19.75%), adult men (13.58%), and adolescents with the lowest usage rate (6.17%), indicating a loss of interest in the knowledge of Miao medicine.

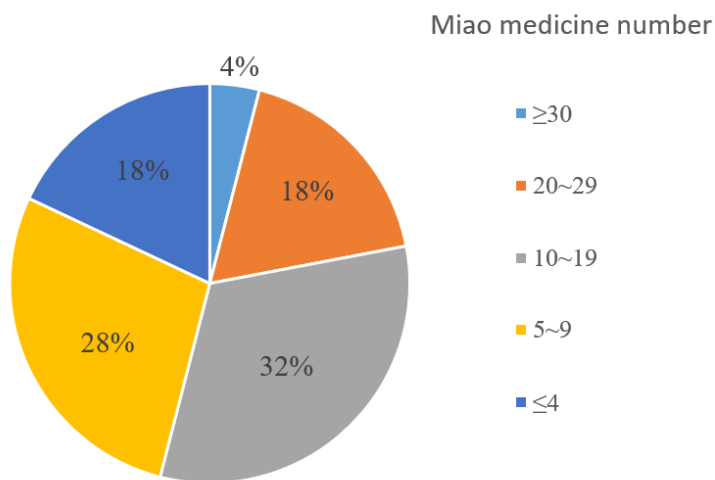


Fig. 5. Number of Miao medicinal plant species recognized by the 200 participants

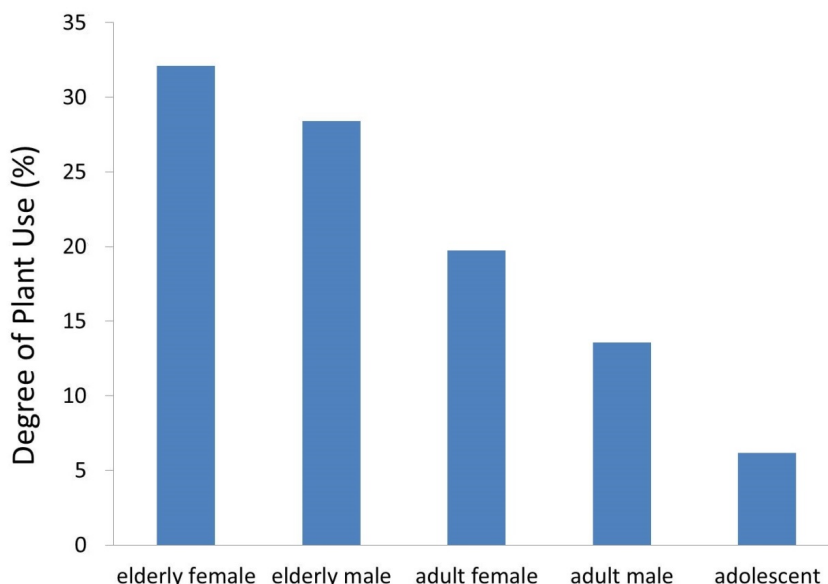


Fig. 6. Demographics of local people who used Miao medicines

Due to the strong impact of modern western medicine, as well as Traditional Chinese Medicine, many young people have lost interest in Miao medicine, and very few traditional Miao practitioners have apprentices at the moment. In addition, practitioners of Miao medicine normally have a very low income, and there is little economic incentive for the younger generation to learn the tradition, because other income sources are much more lucrative. The practitioners of Miao medicine are very traditional, conservative, and honor the value of the knowledge from their ancestors. Therefore, they do prefer to rather let the knowledge be lost, than to spread ancestral knowledge to strangers. The education level of most practitioners is low, and many practitioners of Miao medicine do not speak Chinese, which makes the documentation and translation of Miao medicine more difficult.

## Conclusions

Based on the investigation we give the following suggestions to provide the basis for the development of Miao medicine.

- (1) It is necessary to strengthen the documentation of Miao medicine prescriptions, diagnoses and treatment technology and efficacy. The knowledge of Miao medicine is declining due to lack of apprentices.
- (2) Establish an apprentice program for Miao medicine, because with the death of many Miao practitioners, as well as the influence of modern medicine, the knowledge of Miao medicine is being lost.
- (3) Through policy support, strengthening the search and protection of intangible cultural heritage.
- (4) Local government should bring Miao medicine to the market to promote the inheritance and continuation of Miao medicine cultural through economic mode.

## Declarations

**Ethics approval and consent to participate:** The semi-structured interviews were carried out anonymously, and all the participants involved in this study gave their informed consent. Permissions were provided by all participants in this study. Consent was obtained from the participants prior to this study being carried out. The authors have all copyrights. Institutional review board approval of Minzu University of China was obtained for this study.

**Consent for publication:** Not applicable

**Availability of data and materials:** We are willing to share data generated or analyzed during the current study.

**Competing interests:** The authors declare that they have no competing interests.

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## Authors' contributions

Conceived of the study: BL; Conducted surveys: DL, HC, ZG; Identified plant species: BL, HJH; Analyzed data: DL and HC; Wrote the manuscript: DL, HC, RB, ZG, BL; Edited the manuscript: BL, RB, DL, HC, ZG. All authors read and approved the final manuscript.

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