An ethnobotanical study on the Chuanqing People of China based on an herbal market survey at the Dragon Boat Festival

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Research

**Keywords:** Chuanqing People, the Dragon Boat Festival, herbal market, medicinal plant, traditional knowledge

**DOI:** https://doi.org/10.21203/rs.3.rs-49577/v3

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Abstract

Background: The Chuanqing (川慶) are an ethnic group native to the Guizhou Province of China, with a unique culture and rich knowledge of traditional medicinal plants. The herbal market at the Dragon Boat Festival (DBF) plays an important role in the inheritance of traditional medicinal knowledge among the Chuanqing. This study aims to record the profile of medicinal plants of the Chuanqing, discuss the dilemmas faced by its inheritance and propose strategies. Such information is important for the inheritance and protection of the Chuanqing's traditional medical knowledge.

Methods: Data were collected through key informant interviews, semi-structured interviews and free listing. The collected voucher specimens were identified and deposited in the herbarium. The medicinal plants were compared with the Information System of Chinese Rare and Endangered Plants of the Chinese Academy of Sciences. The results were compared with those of the pharmacopeia of the People's Republic of China (ChP) and the Quality Standard of TCM, and National Medicine in Guizhou Province (QSG) and traditional medicines of Southeast Asian countries. Data were analyzed with use-value (UV) and cultural importance index (CI) values.

Results: A total of 102 species from 53 families and 92 genera were recorded, with Orchidaceae and Asparagaceae (6 species each), Berberidaceae and Asteraceae (5 species each) as the predominant families. Whole plant (36%) was the most common medicinal part. Decoction (44%) was the most common preparation method. Seventy-one investigated human ailments were grouped into 12 categories. Diseases of the musculoskeletal system (34 mentions) were the most frequently mentioned in this study. Moreover, the most frequently used taxon was Hedera sinensis (Tobler) Hand.-Mazz. (UV and CI=0.29). A total of 9 medicinal plants were recorded in the Information System of Chinese Rare and Endangered Plants of the Chinese Academy of Sciences. The Chuanqing's medicine had high similarity with ChP and QSG. While it had a high similarity in preparation method, and low similarity in medicinal parts, plant families and disease treatments with traditional medicines in Southeast Asian countries.

Conclusions: The traditional herbal market at the DBF is an important platform for communicating traditional medicinal plant knowledge of the Chuanqing. There are some differences and connections between the Chuanqing's medicine, Chinese traditional medicines, and traditional medicines in Southeast Asian countries. The Chuanqing's traditional medicine is facing many difficulties in the inheritance and development. More scientific research and policies planning are needed to solve it. This study highlights the traditional medicinal knowledge of the Chuanqing, providing basic data for further research on and protection of minority medicine.

Background

In most developing countries, medicinal plants constitute the main materia medica for 70 to 95% of citizens [1-3]. Due to outdated medical facilities and unaffordable medical expenses, traditional medicinal plants have become the first choice or supplement for medical alternatives in most developing countries.
And in developed countries, there are more and more people utilized them to treat diseases. With today's globalized development, traditional medicine keeps pace with the times, which is of great value in the protection of human health; for example, in 2015, Tu Youyou won the Nobel Prize in physiology or medicine for the discovery of artemisinin which was an extract from traditional Chinese medicine (TCM) *Artemisia annua* L.. In 2018, China's Tibetan medicinal bathing was listed as Intangible Cultural Heritage. To prevent COVID-19, the National Health Protection Commission of China had written the proprietary Chinese medicine Lianhua Qingwen Capsule and Qingfei Paidu Decoction into the guidelines for clinical diagnosis and treatment. All of these cases have shown the important role played by traditional medicine in modern society. Therefore, Chinese ethnic medicines have also attracted the attention of researchers [6-11].

Moreover, due to the value of medicinal plants are getting higher, the traditional market has been an important source of income to the citizen, and the herbal market at the Dragon Boat Festival (DBF) is one of cases. The herbs collected at the DBF are considered to be of higher quality than those collected at other times [12]. Therefore, people will take advantage of DBF to collect herbs for use and for sale. Additionally, in Southwest China, the DBF has become a peculiar opportunity for local farmers to exhibit and sell local medical resources. Meanwhile, it is also a communication platform for local medical knowledge and experience. The herbal market at the DBF of the Chuanqing in Guizhou is just such a typical case. Many studies about the traditional herbal markets have been made, such as the herbal markets in Hunan Province [13,14], Yunnan Province [15,16], and even in Africa and Europe [17,18].

The Chuanqing are a native ethnic group with a large population in China. They live mainly in Nayong County and Zhijin County of Guizhou Province [19]. According to the genetic relationship and formation, the Chuanqing is similar to the south Han, Miao, She and Tujia [20,21], it is a community with multiple ethnic groups. On the fifth day of the fifth month of the Chinese lunar calendar every year, the Chuanqing in Nayong County prepares a grand herbal market at the DBF. People trade herbs, share the experience of using herbs and treating diseases at the herbal market of the DBF. Therefore, it has become an integral part of the medical culture of the Chuanqing. This spontaneous traditional activity plays an important role in the inheritance and protection of local traditional medicinal knowledge and sustainable development.

So far, there was a lack of ethnobotanical research on the traditional medicinal plant knowledge of the Chuanqing in China. Therefore, based on the theories and methods of ethnobotany, this study investigated the medicinal plants of the Chuanqing in Guizhou to answer three questions: (i) what is the profile of the Chuanqing's traditional medicinal knowledge? (ii) what are the differences and connections with ChP, QSG and traditional medicines of Southeast Asian countries? (iii) what are the dilemmas and problems faced the Chuanqing in inheritance and development of traditional medicine?

**Methods**

*Location of the study site*
The study was conducted in Nayong County of Guizhou Province, China (105 ° 38 ′ 04 ″ E and 27 ° 05 ′ 54 ″ N) (Fig. 1). The area has a wide karst landform, which is the transition zone from the Yunnan-Guizhou Plateau to the Wumeng Mountain area. The elevation ranges from 1050 to 2476 m, and the average elevation is 1685 m. The mean annual temperature is 13.7 °C, the mean sunshine duration is 1346.3 h, and the mean annual precipitation is 1203.0 mm. It experiences synchronization of rain and heat, giving it a subtropical monsoon climate. The vegetation is luxuriant, and the forest coverage rate is 47.05%.

According to official data, Nayong County is a vegetation transition zone and has a northern subtropical humid monsoon climate. The vegetation of the karst area is composed of evergreen broad-leaved forest, evergreen deciduous mixed forest and deciduous broad-leaved forest [22]. A total of 1857 plant species from 277 families and 772 genera, as well as 174 species of wild vertebrates from 56 families and 26 orders, have been recorded in Nayong County. Nayong County is rich in biodiversity, as it is surrounded by the provincial dove tree nature reserve, which includes rare animals and plants, such as Tetracentron sinense Oliv., Prionodon pardicolor Hodgson, and Tylototriton kweichowensis Fang and Chang [23,24]. This diversity is conducive to the survey of medicinal ethnobotany and specimen collection. The county is a multi-ethnic place located in the core area of the distribution of the Chuanqing. The traditional customs and habits of the Chuanqing are well preserved. The ethnic characteristics of traditional culture and medical knowledge are distinct and representative. Nayong is one of the key poverty-stricken counties receiving national poverty alleviation work in China, with an incidence of poverty of 6.04% [25].

The location of the herbal market at the DBF is centered on the Qianwanjia Agriculture Trade Fairs and extends to two streets, Xinjie Road and Gongmao Road in Nayong County.

Fig. 1 The location of Nayong County, Guizhou Province, China

**Ethnobotanical data collection**

This survey was conducted from June 2018 to June 2019 at the DBF. In this survey, 52 informants were investigated, of whom 33 were males and 19 were females, aged from 25 to 80 years old, with an average age of 56 years. The sold medicinal materials included 1 to 25 kinds per informant, 90% of which were wild medicinal materials, mainly obtained through self-collection. Key informant interviews, semi-structured interviews, and free listing were used to obtain information about the ages of the vendors, the names of the medicinal materials, the medicinal parts, the preparation methods, and the functions, indications, sources and collection methods of the medicinal materials (Appendix 1). After collecting the basic information, the medicinal materials were bought from the vendors and regarded as plant vouchers. Each exsiccate was identified by the Flora of China [26] and Flora of Guizhou [27]. The taxonomic identification of plant families and species followed the World Flora Online (http://www.worldfloraonline.org/) and was used to provide a uniform nomenclature after identification. All the voucher specimens were identified by Hongxiang Yin, Associate Professor of the Chengdu University of TCM and Yuxiang Shen, Associate Professor of Anshun College. The voucher specimens were preserved at the Specimen Center of Chengdu University of TCM (CDCM). At the same time, the collected plant information was compared with the pharmacopeia of the People's Republic of China (ChP) [28] and the Quality Standard of TCM, and National Medicine in Guizhou Province (QSG) [29]. The
protection status of the collected medicinal plants was identified by the Information System of Chinese Rare and Endangered Plants [30] of the Chinese Academy of Sciences.

**Data analysis**

The quantitative statistical indexes of ethnobotany were calculated by Microsoft Excel 2010, including use-value (UV) and cultural importance index (CI). According to the International Classification of Primary Care (ICPC-2, http://www.who.int/classification/icd/adaptations/icpc2/en/), 71 diseases of the Chuanqing in Nayong County were classified into 12 categories. The UV of a medical plant species, a quantitative parameter that demonstrates the relative importance of species known by local people, was also calculated as follows:

\[ UV = \frac{\sum UP}{n} \]

where \( UP \) refers to the number of mentions per species by each informant and \( n \) is the total number of informants [31].

The cultural importance index (CI) was used to indicate the spread of the use (number of informants) of each species as well as to determine the diversity of uses.

\[ CI_s = \frac{\sum_{u=1}^{U} \sum_{i=1}^{I} \frac{UR_{ui}}{N}}{N} \]

where \( N \) is the total number of informants and \( NC \) is the total number of use categories. CI is the sum of the proportion of informants that mentioned each of the use categories for a given species. A higher CI value indicates more uses of a species [32].

**Results**

**Age and gender structure of the mastery of medical knowledge**

According to the survey, the number of medicinal materials that were mastered by men was much higher than that mastered by women (Fig. 2). The data showed that 299 herbs were provided by men, while only 128 herbs were provided by women. The number of herbs provided by women was less than half of that provided by men. In addition, men aged 61-80 years provided the most medicinal materials, while men aged 21-40 years provided the least (Fig. 2). The number of medicinal materials provided by women aged 41-60 years was the most, and the number of medicinal materials provided by women aged 21-40 years was the least (Fig. 2). The knowledge of medicinal plants of the Chuanqing was mainly mastered by middle-aged and older males (aged from 41 to 80 years).

**Taxonomic characteristics of the medicinal plants**
A total of 102 medicinal plant species belonging to 92 genera and 53 families were provided by the Chuanqing (Fig. 3). The dominant families of the Chuanqing’s medicinal plants were Orchidaceae and Asparagaceae (6 species each), including species such as *Bletilla striata* (Thunb.) Rchb.f., *Reineckea carnea* (Andrews) Kunth, and *Asparagus filicinus* Buch.-Ham. ex D.Don, followed by Berberidaceae and Asteraceae (5 species each), including species such as *Senecio analogus* DC. and *Dysosma delavayi* (Franch.) Hu., and Apocynaceae, Ranunculaceae, Rosaceae, and Polygonaceae (4 species each). The remaining families were represented by 3 or fewer entities.

**Analysis of medicinal parts**

Sixteen medicinal parts of medicinal plants were used by the Chuanqing, of which the whole plant was the most common (36%), such as *Dendrobium catenatum* Lindl. and *Taraxacum mongolicum* Hand. -Mazz., etc. This was followed by roots (25%), rhizomes (12%), root tubers (9%), leaves (4%), fruits (2%), flowers (2%), stems (2%), aerial parts (2%) and others (7%) (Fig. 4). The proportion of plants for which roots and whole plants were used as medicinal parts reached 61%.

**Preparation methods**

Eighteen preparation methods of the Chuanqing were recorded. Decoction (44%) was the most commonly used preparation method, as observed for *Disporopsis fuscopicta* Hance, *Verbena officinalis* L., and *Polygonum aviculare* L.. This was followed by alcohol maceration (19%), bath (6%), cooked with pork (6%), mashed (5%), cooked with chicken (3%), powder with boiled water (3%), steamed with honey (3%), sliced (2%), vinegar maceration (2%) and others (6%) (Fig. 5). Additionally, there were some special medical methods used by the Chuanqing, such as souping with glutinous rice and firing with eggs.

**Functions and indications**

According to the International Classification of Primary Care (ICPC-2, [https://www.who.int/classifications/icd/adaptations/icpc2/en/]), the herbs sold by the herbal market were used to treat 71 human ailments, which divided into 12 categories (Table 1). Most medicinal materials were used to treat diseases of the musculoskeletal system (34 mentions). This was followed by diseases of the digestive system (18 mentions), certain infectious and parasitic diseases (17 mentions), diseases of the urinary and genital system (16 mentions), diseases of the respiratory system (15 mentions). The remaining number of categories of ailments were represented by 1 to 5 mentions.

**Table 1. The Number of Categories of Aliments**
Analysis of the UV and CI values of medicinal plants of the Chuanqing

The UV of medicinal plants used by the Chuanqing ranged from 0.02 to 0.29, while many species had low UV and CI values. It showed that the highest UV and CI values were calculated for *Hedera sinensis* (Tobler) Hand.-Mass. (UV and CI=0.29), *Aconitum carmichaelii* Debeaux, *Plantago major* L., *Persicaria capitata* (Buch.-Ham. ex D.Don) H.Gross, *Paris polyphylla* Sm, *Potentilla discolor* Bunge (UV and CI=0.13) (Appendix 1). *Geum aleppicum* Jacq. (UV and CI=0.12), *Artemisia argyi* H.Lév. & Vaniot, *Epimedium acuminatum* Franch., *Lysimachia paridiformis* var. *stenophylla* Franch. (UV and CI=0.10). The UV values of ten medicinal plants (UV = CI>0.10) were high (Appendix 1).

Analysis of the rare and endangered status

A total of 9 medicinal plants were recorded in the Information System of Chinese Rare and Endangered Plants (Table 2), and 9 species were recorded as nationally protected plants (8.8%). Among them, 4 species were protected by the Convention on International Trade of Endangered Species of Wild Fauna and Flora (CITES), and 5 species were recorded in the International Union for Conservation of Nature (IUCN), including least concern (1 mention), near threatened (1 mention), vulnerable (3 mentions) species. Five medicinal species were endemic to China.

| Scientific name | National protection | CITES | IUCN | Distribution area |
|-----------------|--------------------|-------|------|------------------|
| *Magnolia officinalis* Rehder & E.H.Wilson | NT | | | Only in China |
| *Rhodiolayun nanensis* (Franch.) S. H. Fu | LC | | | Only in China |
| *Pleione yunnanensis* (Rolfe) Rolfe | VU | | | |
| *Cibotium barometz* (L.) J. Sm. | VU | | | Only in China |
| *Aristolochia tuberosa* C. F. Liang et S. M. Hwang | | | | Only in China |
| *Paris polyphylla* Sm | | | | Only in China |
| *Citrus cavaleriei* H. Lév. ex Cavalier | | | | |
| *Taxus wallichiana* var. *chinensis* (Pilg.) Florin | VU | | | |
| *Gastrodia elata* Blume. | | | | |

NT: Near threatened; LC: Least Concern; VU: Vulnerable
Comparison of the Chuanqing medicine with the ChP, QSG and traditional medicines in Southeast Asian countries

While the traditional medical uses of some plants were similar to TCM and those of other ethnic groups in China. Comparing with the ChP [28] and QSG [29], Thirty-nine medicinal plants (38.2%) were documented by the ChP [28]. Thirty-one medicinal plants (30.4%) were documented by the QSG, and 11 species were also recorded in the ChP, the QSG and the Chuanqing's medicine simultaneously (Appendix 1). These plants were Aconitum carmichaelii Debeaux, Cynanchum paniculatum (Bunge) Kitag. ex H.Hara, Geum aleppicum Jacq., Gleditsia sinensis Lam., Iris tectorum Maxim, Ligusticum striatum DC., Lysionotus pauciflorus Maxim., Paris polyphylla Sm, Reynoutria multiflora (Thunb.) Moldenke, Sanguisorba officinalis L., Tinospora sagittata Gagnep.

The traditional medicinal knowledge of the Chuanqing was compared with the studies in recent years in Thailand, Laos, Vietnam and Myanmar. The differences in the dominant families, medicinal parts, preparation methods and diseases treated by traditional medicinal plants were analyzed as follows(Table 3). It showed that Leguminosae was the dominant family in the four countries, while Asparagaceae and Orchidaceae were the most commonly used families in the Chuanqing. Leaves were the most common medicinal part in Thailand, Vietnam and Myanmar, and roots and rhizomes were the most common medicinal part in Laos, while the whole plants were the most common medicinal part of the Chuanqing. The decoction was the most common preparation method among the traditional medicines of four countries and the Chuanqing. In terms of disease treatment, digestive system diseases were the most common in Thailand, Laos and Myanmar, while eye diseases were the most common in Laos, and musculoskeletal system diseases were the most common in the Chuanqing.

Table 3. Comparison of traditional medicine between Chuanqing and Southeast Asian countries
| Country   | Families              | Medicinal parts                          | Preparation method | Diseases                                           | References |
|-----------|-----------------------|------------------------------------------|--------------------|----------------------------------------------------|------------|
| Thailand  | Leguminosae, Asteraceae | Leaves, Stem                            | Decoction          | Digestive system, infections, nutritional disorders | 33-36      |
| Laos      | Leguminosae, Zingiberaceae | Roots and rhizomes, woody part of plants | Decoction          | Gastrointestinal conditions, gynecological conditions and sexually transmitted diseases, skin affections | 37-39      |
| Vietnam   | Asteraceae, Leguminosae | Leaves, Roots                           | Decoction          | Eye diseases, Musculoskeletal disorders, endocrine/metabolic and nutritional disorders | 40-41      |
| Myanmar   | Leguminosae, Asteraceae | Leaves, roots                           | Decoction          | Digestive system, urological, respiratory           | 42-44      |

Listed in the table were the two most frequently used families, two most frequently used medicinal parts, one most frequently used preparation method and three most treated diseases in the four countries.

**Discussion**

*The knowledge of traditional medicinal plants of the Chuanqing*

The traditional medicinal knowledge in the Chuanqing was mastered mainly by men aged 61-80 years (Fig. 2). According to the data of the National Bureau of Statistics, in 2010, the illiteracy rate of men in the rural areas was 29%, and that of women was 71%. Men who received higher education might learn more medicinal plant knowledge. Moreover, the family collaboration model in the local Chuanqing's areas was "men work outside and women stay home" [45], so men had more opportunities to identify and collect medicinal plants in the field.

The main families of medicinal plants in the Chuanqing were the Orchidaceae and Asparagaceae families. As one of the typical karst areas in the world, Guizhou's unique geographical location and
complex natural environment provided suitable conditions for wild orchids [46]. Moreover, Orchidaceae plants were widely used in TCM. There are 1,240 species of orchids in 171 genera in China, of which 343 species of 82 genera were used for medicinal purposes [47,48]. In addition, most plants in Asparagaceae, such as *Polygonatum kingianum* Collett & Hemsl., and *Asparagus filicinus* Buch.-Ham. ex D.Don were used frequently because their thick root tubers were attractive to herb collectors. Moreover, the two plants were traditional Chinese herbal medicine widely used by Chinese Han people. Therefore, a large amount of TCM was used in the Chuanqing due to the Chuanqing had been influenced by the traditional Chinese medical system for a long time.

Roots, rhizomes and tubers were frequently used as medicinal parts in TCM, more than one-fourth of the medicinal plants added in over 400 preparations were derived from roots and/or rhizomes [49]. Underground parts (the sum of roots, rhizomes, and root tubers) of the Chuanqing medicine accounted for 46%. Therefore, underground parts were frequently used. The whole plant (accounted for 36%) was a commonly used medicinal part because of the whole plant was easy to obtain and convenient for them to use by local people. In addition, local people had no systematic knowledge of drug use, so they did not usually subdivide medicinal parts to treat diseases.

Decoction (44%) was the most common preparation method for the Chuanqing. The decoction was the most commonly used TCM compound dosage form by traditional Chinese doctors, and it was also the longest and most widely used preparation in the history of China [50]. Therefore, the Chuanqing’s medicine was affected by TCM, the decoction was also the most commonly used preparation method for the Chuanqing. Alcohol maceration was the second commonly preparation method (accounting for 19%). Alcohol maceration was also a traditional Chinese medicinal preparation in China, with unique curative effect, convenient preparation and wide application [51]. So it was widely used. In addition, the Chuanqing also had some other special usages, such as making a soup with glutinous rice wine and steaming with eggs.

Most medicinal materials were used to treat diseases of the musculoskeletal system (34 mentions). According to statistics, the diseases with the fastest increase in hospitalization and expenses in 2015 were musculoskeletal diseases in China [52]. Moreover, people lived in humid climates and engaged in agriculture, which led to a variety of musculoskeletal systems diseases, such as rheumatism [53], traumatic injuries and other diseases, as does the Chuanqing. For instance, *Artemisia argyi* H.Lév. & Vaniot (UV=0.10), *Hedera sinensis* (Tobler) Hand.-Mazz. (UV=0.29), and *Lysimachia paridiformis* var. *stenophylla* Franch. (UV=0.10) were all used to treat rheumatism. *Liparis campylostalix* Rchb.f., *Rhodiola yunnanensis* (Franch.) S. H. Fu, and *Cynanchum inamoenum* (Maxim.) Loes. ex Gilg. & Loes. were used to treat traumatic injuries.

In the long-term struggle with the natural environment and diseases, the Chuanqing made use of rich plant resources to treat diseases. In addition, they utilized places such as the herbal market at the DBF to constantly exchange traditional medicinal knowledge among the surrounding ethnic groups, and gradually formed a unique traditional medicinal knowledge system for the Chuanqing.
Comparison with ChP, the QSG and Southeast Asian medicines

The existing studies on the Chuanqing showed that it was closely related to the Han and the local ethnic groups in Guizhou such as the Miao in their social culture [20,21,54] or medical research [55]. Eleven medicinal plants were also recorded in the ChP, the QSG and the Chuanqing's medicine co-constantly. The result indicated the diseases treated with medicinal plants by the Chuanqing were similar to those found in ChP, the QSG. For example, *Aconitum carmichaelii* Debeaux was used to treat noxious sore and had the function of restoring yang for resuscitation, *Tinospora sagittata* Gagnep. was used to treat neck pain, laryngitis, dysentery, abdominal pain, and *Ligusticum striatum* DC. was used to relieve pain in ChP, QSG and the Chuanqing's medicine. However, the diseases treated with some medicinal plants of the Chuanqing were different from both ChP and QSG. For example, *Cynanchum paniculatum* (Bunge) Kitag. ex H.Hara was used to relieve pain in ChP and QSG, but it was used to treat gynaecopathy in the Chuanqing's medicine and some researchers found it could treat gynecological inflammation disease because of anti-inflammatory effects [56]. *Gleditsia sinensis* Lam. was used to treat osteoodynia, arthralgia rather than psychiatric disorders in ChP and QSG, and some studies found its analgesic effects [57]. *Lysionotus pauciorus* Maxim. was firstly found to treat rheumatism, *Paris polyphylla* Sm was firstly found to treat cardiopathy. *Sanguisorba officinalis* L. was firstly found to treat diarrhoea in the Chuanqing, and this function had been proved in the reports of being used to treat diarrhea of humans and livestock [58-60].

In general, after thousands of years of development, TCM had formed a mature theoretical system, such as “the theory of Four Qi and Five Flavors, the theory of Visceral Manifestation, and the theory of Yin-Yang and Five Elements”. According to our survey, the Chuanqing’s medicine was still in the stage of summarizing specific knowledge and experience, such as circulated in form of rhymes.

Some studies showed many cross-border ethnic groups in Southeast Asia, such as Han and Miao [61,62], and there were also a large number of the Han and the Miao lived in the Chuanqing's living area[63]. Therefore, the Chuanqing and Southeast Asian countries may have a similarity in medicinal plants to a certain extent. Leguminosae was widely used in traditional medicines of the Southeast Asian countries, and Asparagiaceae and Orchidaceae were widely used by the Chuanqing. The reason for this difference was that Leguminosae was widely distributed in tropical flora and provided many medicinal species in these countries [33-42]. The living area of Chuanqing people was a typical karst landform, with the most plants distributed in Asparagaceae and Orchidaceae [46-48]. Leaves were frequently used in Southeast Asian countries, because Southeast Asia had a subtropical rainforest climate and many evergreen plants grew up there, the leaves were abundant and easy to obtain. The Chuanqing's residential areas in Guizhou Province had a northern subtropical monsoon climate, with high altitude (1050 to 2476 m) and distinct four seasons. In autumn and winter, the whole plant and underground parts could be used without leaves. In Southeast Asian countries, the most common diseases treated by traditional plants were digestive system diseases. Some studies pointed out that it was mainly related to living conditions, living habits and health facilities. For example, in Southeast Asian countries, people who worked in agriculture and lived in poverty were prone to the diseases of digestive system, such as gastritis and...
diarrhea [33,38]. Moreover, alcoholism was also the reason for digestive system diseases [42].

The reasons why the Chuanqing's medicine mainly treat musculoskeletal diseases had been discussed above. Although Thailand, Laos, Vietnam and Myanmar in Southeast Asia were different from the Chuanqing in dominant family, medicinal part and treatment of diseases, but the most common preparation method among them was decoction. Because the decocting was the most convenient and easy way. Therefore, the similarity between the Chuanqing's medicine and traditional medicine of South Asian countries was low.

The dilemmas and solution of the traditional medicine culture of the Chuanqing

The traditional medicinal knowledge in the Chuanqing was mastered by people aged from 61 to 80 years. This led to the serious aging of people who mastered the knowledge of medicinal plants in the Chuanqing. In addition, a large number of rural young people had chosen big cities for work and living in recent years, which aggravated the problem of the aging population. These were not conducive to the inheritance and development of traditional medicinal plant knowledge in the Chuanqing. Meanwhile, people's lifestyle had been changed by the impact of modern industrial civilization, and people's medical choices had been changed by the popularization of modern medicine. These led to the decline of the social recognition of traditional medical knowledge and the decrease of users, which further endangers the application and protection of this knowledge. It's significant to strengthen the collection and protection of the local traditional medicinal knowledge, conduct a comprehensive interview with the older generation of ethnic doctors, and collect the diagnosis and treatment methods with ethnic characteristics.

In recent years, with the increasing demand for natural medicines, many wild medicinal materials had been plundered without scientific protection and development measures. For example, the whole plant and underground parts as the most commonly used medicinal part was not conducive to the regeneration of wild plant populations. Moreover, we found the phenomenon of selling wild protected animals and plants, such as Paris polyphylla Sm, Taxus wallichiana var. chinensis (Pilg.) Florin and Tylototriton kweichowensis Fang and Chang (listed as Vulnerable (IUCN, 2012) and as Category II State Major Protected Wildlife in China). It indicated that the locally rare wild plant and animal resources had been destroyed, and legal risk existing in the herbal market of DBF. In the face of this situation, the government and non-governmental agencies should strengthen the natural protection of wild species by increasing law enforcement and strengthening the popular science education of local people. For the species with significant economic value, scientific institutions should speed up the scientific research of artificial breeding and cultivation, instead of utilizing wild populations.

Due to the lack of modern scientific and technological means & government guidance, the development of industrialization and modernization planning of the Chuanqing's medicine were almost absent. To a certain extent, the situation led to the loss of cultural knowledge of the Chuanqing’s medicine and the dilemmas of sustainable development. We had noticed that China's DBF was added to the United Nations Educational, Scientific, and Cultural Organization's Intangible Cultural Heritage list in 2009. Moreover, many regions had upgraded traditional ethnic medicinal markets at the DBF into well-known cultural
tourism products. For example, the DBF medicinal market of the Zhuang in Jinxi County had been selected as the intangible cultural heritage of the Guangxi Zhuang autonomous region [64]. Pu'er City of Yunnan Province promoted the local herbal market at the DBF as a "Baicao Gen Food and Cultural Tourism Festival" [16]. These examples provided the reference for inheriting and promoting the traditional medical culture of the Chuanqings.

Conclusions

This is the first study to document the traditional medicinal knowledge of the Chuanqings in China. A total of 102 species from 53 families and 92 genera were recorded to treat 71 human ailments; these ailments were divided into 12 categories. Most medicinal materials were used to treat diseases of the musculoskeletal system (34 mentions). A total of 9 medicinal plants were recorded in the Information System of Chinese Rare and Endangered Plants. Many plants with high UV and CI values needed more attention and further research. The herbal market at the DBF is an important platform for the Chuanqings to inherit their traditional medicinal knowledge. The Chuanqings are rich in medicinal plant species, knowledge and experience, which reflects their own ethnic and regional characteristics. There are some differences and connections between ChP and QSG. The Chuanqings and Southeast Asian countries have high similarities in preparation method, low similarities in medicinal families, medicinal parts and diseases. The inheritance and development of traditional medicine in the Chuanqing faced many difficulties, such as aging, the impact of modern civilization, exhaustion of resources, legal risks and lack of policies planning. Therefore, it is necessary that more people conduct in-depth research on the Chuanqing's medicinal plants, and formulate policies and practices to protect the knowledge of traditional medicinal plants.

List Of Abbreviations

DBF: Dragon Boat Festival; TCM: Traditional Chinese Medicine; UV: Use-Value; CI: cultural importance index; ChP: Pharmacopoeia of the People's Republic of China; QSG: the Quality Standard of TCM and National Medicine in Guizhou Province.

Declarations

*Ethics approval and consent to participate*

The authors asked for permission from the local authorities and the people interviewed to carry out the study.

*Consent for publication*

The people interviewed were informed about the study’s objectives and the eventual publication of the information gathered, and they were assured that the informants’ identities would remain undisclosed.
Availability of data and materials

All data generated or analysed during this study are included in this published article and its supplementary information files.

Competing interests

The authors declare that they have no competing interests.

Funding

This work was financially supported by the National Natural Science Foundation of China (81573545).

Authors’ contributions

Qinghe Wang was involved in the study design, literature search, and analysis of the data. Chi Gao, Lin Zhao, Jiawen Zhao and Zixuan Ren analysed part of the data. Yuxiang Shen and Hongxiang Yin provided botanical identification. Hongxiang Yin and Ruyu Yao supervised the study and reviewed and revised the manuscript. All authors read and approved the final manuscript.

Acknowledgments

We are very grateful to all the enthusiastic vendors at the herbal medicine market of the Dragon Boat Festival in Nayong County, Guizhou Province, as well as the local people who came to buy the herbal medicine. We thank Zhengxian Guo for his help in medicine identification and traditional medical knowledge, Ting Kang for her help in the survey, and Keru Wang for her help in the analysis of data.

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