

Ethnopharmacological Survey of Medicinal Plants in Baotou, Inner Mongolia, China

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Abstract: **Objective** To document the knowledge and the use of indigenous medicinal plants by traditional healers in Baotou, Inner Mongolia, China. **Methods** Data were collected from 112 randomly-selected interviewees using semi-structured interviews in wild herbal plant collected from 2007 to 2010. The data from the interviewees were analyzed with two quantitative tools. With the informant consensus factor, the information homology was evaluated and with the fidelity level the most important species from the categories were found. **Results** One hundred and fifty-two species belonging to 112 genera in 48 families with medicinal values were recorded. The reported medicinal plants species were used to treat 63 kinds of diseases. And the medicinal plants in this district possessed significant potentials for their pharmacological activities in the context of ethnopharmacological knowledge, especially in the treatments of gastrointestinal, dermatological, and cardiovascular diseases. **Conclusion** In this work, 152 medicinal plants with their ethnopharmacological information are reported. This study demonstrates that many species play an important role in healing practices among inhabitants from Baotou. More ethnopharmacological information of Mongolian medicinal plants should be gathered and documented in further studies, which is a fundamental step toward developing efficacious natural drugs for various diseases.

Key words: ethnopharmacology; indigenous medicinal plants; informant consensus factor; pharmacological activities; traditional Mongolian medicine

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Introduction

In the past decades, traditional healing methods of non-European societies, mainly of Asian origin, have become more popular in the West. Traditional Chinese medicines (TCM), such as Ayurveda, Unani (Yunani) in Arabic, Hindi-Urdu, and Persian, represent the better-known traditional systems but are rather unknown to the public (Kletter *et al.*, 2008), which is known as a part of traditional Mongolian medicine (TMM) in wide definition. Mongolian medicines have a history of more than 1000 years, and the Mongolian developed their system of medicines based on their own culture, and created many medical therapies based upon 1000 years of observations and beliefs. The Mongolian medical system also integrated some aspects of other

oriental medicines such as traditional Tibetan medicine, TCM, and Ayurveda (Gige, 1988; Gerke, 2004; Luo, 2006; Na, 2007).

Although modern medicine is popular in Inner Mongolian region, TMM is also a key element among many rural regions of Inner Mongolia for the provision of primary healthcare, especially where there are inadequate primary healthcare systems. More than 1340 Mongolian drugs are used for the treatment of various diseases, and among them about 500 Mongolian drugs are frequent in the clinical applications. The Mongolian drugs derive from plants, animals as well as mineral origin, and at least 70% of the Mongolian drugs are from plant origin (Luo, 2006; Na, 2007). The information of the origin of Mongolian medicines is showed in Table 1.

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Table 1 Different sources of Mongolian drugs

Sources	Parts used	Numbers
plants	herbs	256
	roots and rhizomes	231
	fruits and seeds	203
	flowers	83
	leaves	54
	vines	36
	roots and stem barks	35
	bacteria and algae	14
	resin	14
	others	28
animals		290
minerals		98
total		1342

Many Mongolian herbal medicines (MHM) have remarkable therapeutic effects. One of the most well-known MHM is *Hippophae Fructus*, the fruit of *Hippophae rhamnoides* L. (Mongolian name Suanci), which is employed in folk to treat cardiovascular diseases, cough, dyspepsia, and so on (Liu and Wu, 2004). In some studies, the total flavonoids from *Hippophae Fructus* could significantly improve cardiac function and decrease cholesterol levels (Zhang, 1987; Cheng *et al.*, 2003; Xiao *et al.*, 2003). *Hippophae Fructus* has been also reported to have the potent anti-oxidative and anticancer activities, which may be attributed to its flavonoids and vitamin C (Agrawala and Goel, 2002; Rösch *et al.*, 2004; Grey *et al.*, 2010). *Terminalia chebula* Retz. (Mongolian name Arula) is another important Mongolian drug. Its frequently clinical application was for the treatment of heart diseases and diarrhea (Cangdu, 1987). In the recent studies, *T. chebula* was reported to possess anti-oxidative, anti-anaphylactic, antimicrobial, antitumor, hypoglycemic, and cardiogenic activities (Sabu and Kuttan 2002; Saleem *et al.*, 2002; Naik and Priyadarsini, 2003; Rao and Nammi, 2006; Cai, Xie, and Du, 2008; Kannan, Ramadevi, and Waheeta, 2009). *Xanthoceras sorbifolia* Bge. (Mongolian name Wenguanmu) is also a valuable MHM. The drug has been used to relieve pain for the treatment of rheumatic arthritis in Mongolia medicine (Liu and Wu, 2004; Luo, 2006). It was reported that the methanol extract of *X. sorbifolia* exhibited potent inhibitory effects against HIV-1 reverse transcriptase *in vitro*. Triterpenoids from the natural drug were the major constituents responsible for the biological activity (Ma *et al.*, 2000; Dong *et al.*,

2008). These compounds would hold promise as a novel class of therapeutic drugs for AIDS.

About 50% of MHM come from Inner Mongolia region which is an area of more than 1 180 000 km² with a population of only 25 million people. However, until now, only a few scientific surveys (Song, 2010) have been done in Inner Mongolia region, and a large number of MHM and associated indigenous uses still need proper documentation. The purpose of this study is to assess and document the knowledge of TMM and the uses of medicinal plants used by the Mongolian in Baotou, Inner Mongolian, which is a part of an initiative to document the baseline data for future pharmacological and phytochemical studies.

Materials and methods

Study area

The present investigation was carried out during the period of 2007–2010 in one part of Baotou City (40°23'–41°07'N, 109°14'–110°52'E) of the Inner Mongolia Plateau, China (Fig. 1). Baotou has a continental monsoon climate, the annual mean temperature is 4.8 °C and the frost-free period is about 120 d. The rainfall is around 300–400 mm for each year, 60% of which is in July and August. The insolation duration is more than 3100 h each year. The study area is covered by two ridges of Yinshan Mountain, namely the Daqing Mountain and the Ula Mountain, with altitudinal gradient from 997 to 2338 m. Four sites were chosen to investigate, namely, Guyang County, Shiguai County, Donghe Area, and Tumoteyou Banner of Baotou. There are abundant medicinal materials in these regions. Furthermore, some herbs are cultivated in these regions, e.g., Guyang County and Tumoteyou Banner.

Data collection

Ethnopharmacological information was obtained by semi-structured interviews and personal conversations. One hundred and twelve interviewees (36 females and 76 males, and 96 of them were Mongolian) were interviewed. Thirty-five interviews were Mongolian healers, 32 were medicinal herb collectors, and 45 were medicinal herb growers. All the interviewees have the ability to identify some medicinal plants in field and to know traditional Mongolian knowledge of plants. The age of the respondents ranged from 45 to 85 years old,



Fig. 1 Locations of survey areas in Baotou

with an average of 58 years old. The interviews ranged from 15 to 60 min. The data acquired for each medicinal plant comprised the local name, growing environment, therapeutic effects, medicinal parts, preparation, and the dosage. The medicinal plant information was accepted as valid only if it was mentioned by at least five separate interviewees.

Voucher specimens of each medicinal plant species were collected during the field investigation. The plants were identified by the professional experts and scientific names of plant species were recorded in the first edition of *Flora of Inner Mongolian* (Ma, 1977). The vouchers were deposited at Department of Pharmacy, Baotou Medical College.

Data analysis

For the analysis of the general use of plants, informant consensus factor (ICF) (Heinrich *et al*, 1998) was employed. The factor was originally used to highlight the plants of particular intercultural relevance and the agreement in the use of plants. According to the analytical data, the reported remedies and diseases were grouped into eleven categories (including 63 medical uses): (1) gastrointestinal diseases, (2) muscular or skeletal problems, (3) cardiovascular diseases, (4) liver and gall bladder diseases, (5) gynecological diseases, (6) dermatological diseases, (7) diabetes and urological diseases, (8) ears, nose, throat, mouth, and eyes illness, (9) respiratory diseases, (10) cold and fever, and (11) other diseases.

The ICF was calculated for each category to identify the agreements of the informants on the reported cures for the group of diseases. The ICF was

calculated as in the following formula (Gazzaneo, Lucena, and Albuquerque, 2005; Andrade-Cetto, 2009).

$$ICF = (N_{ur} - N_i) / (N_{ur} - 1)$$

Where N_{ur} is the number of use citations in each category and N_i is the number of species used

ICF values ranged from 0.00 to 1.00. High ICF values were obtained when only one or a few plant species were reported to be used by a high proportion of informants to treat a particular ailment, whereas low ICF values indicated that informants disagree over which plant to use (Heinrich *et al*, 1998; Aburjai *et al*, 2007).

Moreover, the fidelity level (FL), the percentage of informants claiming the use of a certain plant for the same major purpose, was calculated for the most frequently reported diseases or ailments.

$$FL = N_s / N$$

Where N_s is the frequency of citation of a species for a specific ailment and N was the total number of citations of that species (Phillips *et al*, 1994; Gazzaneo, Lucena, and Albuquerque, 2005; Andrade-Cetto, 2009)

Results

Diversity of medicinal plants

One hundred and twelve interviewees mentioned 152 medicinal plants and their uses for medicinal purposes. According to the taxonomical work, the 152 medicinal plants were distributed across 112 genera in 48 families (Table 2).

The overwhelming majority of these medicinal plants (134 species) were wild, while 15 medicinal plant species [*Codonopsis pilosula* (Franch.) Nannf., *Platycodon grandiflorum* (Jacq.) A. DC., *Sambucus buergeriana* Blume ex Nakai, *Pharbitis purpurea* (L.) Voigt, *Sedum aizoon* L., *Elaeagnus angustifolia* L., *Hippophae rhamnoides* L., *Menthe arvensis* L., *Astragalus membranaceus* (Fisch.) Bge., *A. membranaceus* var. *mongholicus* (Bge.) Hsiao, *Glycyrrhiza uralensis* Fisch., *Althaea rosea* L., *Paeonia lactiflora* Pall., *Lycium halimifolium* Mill., and *Armeniaca sibirica* (L.) Lam.] were both wild and cultivated and only three species (*Robinia pseudoacacia* L., *Sophora japonica* L., and *Inula britannica* L.) were cultivated.

Use of medicinal plants

The reported medicinal plants species are used to treat 63 kinds of diseases (Table 3).

Table 2 Species of proportion of each family

Families	Numbers of species	Proportion / %	Families	Numbers of species	Proportion / %	Families	Numbers of species	Proportion / %
Amaranthaceae	1	0.65	Verbenaceae	1	0.65	Iridaceae	3	1.95
Asdepiadaceae	1	0.65	Campanulaceae	2	1.30	Orobanchaceae	3	1.95
Balsaminaceae	1	0.65	Elaeagnaceae	2	1.30	Caryophyllaceae	4	2.60
Bignoniaceae	1	0.65	Equisetaceae	2	1.30	Convolvulaceae	4	2.60
Caprifoliaceae	1	0.65	Geraniaceae	2	1.30	Cruciferae	4	2.60
Ephedraceae	1	0.65	Malvaceae	2	1.30	Scrophulariaceae	4	2.60
Linaceae	1	0.65	Papaveraceae	2	1.30	Solanaceae	4	2.60
Moraceae	1	0.65	Polygalaceae	2	1.30	Umbelliferae	4	2.60
Nyctaginaceae	1	0.65	Polygonaceae	2	1.30	Valerianaceae	4	2.60
Plantaginaceae	1	0.65	Urticaceae	2	1.30	Gentianaceae	5	3.25
Plumbaginaceae	1	0.65	Zygophyllaceae	2	1.30	Ranunculaceae	7	4.55
Polemoniaceae	1	0.65	Boraginaceae	3	1.95	Rosaceae	7	4.55
Portulacaceae	1	0.65	Chenopodiaceae	3	1.95	Liliaceae	8	5.19
Primulaceae	1	0.65	Crassulaceae	3	1.95	Leguminosae	11	7.14
Scabious	1	0.65	Euphorbiaceae	3	1.95	Labiatae	14	9.09
Thymelaeaceae	1	0.65	Gramineae	3	1.95	Compositae	16	10.39

Table 3 N_{ur} of pharmaceutic categories

Categories	Major therapeutic applications	N_{ur}
gastrointestinal diseases	stomachache, diarrhea, constipation, chronicgastritis, dyspepsia, enteritis, gastric cancer, gastritis, stomach convulsion	32
muscular or skeletal problems	fracture, arthritis, rheumatic arthritis	9
cardiovascular diseases	hypertension, hyperlipidemia, heart diseases, Angina	16
liver and gall bladder diseases	hepatitis, jaundice, cholecystitis, cystitis	17
gynecological diseases	mastitis, irregular menstruation, metrorrhagia, mammitis, breast cancer, cervical cancer, Amenorrhea	29
dermatological diseases	eczema, herpes, scald, urticaria, tinea, Measles, carbuncle, impetigo, burn	21
diabetes and urological diseases	diabetes, nephritis, urethritis	23
ears, throat, mouth, and eyes illness	conjunctivitis, laryngopharyngitis, toothache, keratitis	17
respiratory diseases	cough, tracheitis, rhinitis, tonsillitis, stomatitis	30
cold and fever	cold, fever, influenza	28
other diseases	snakebite, improving sexual function, insomnia, lymphadenitis, headache, scrofulaicterohepatitis, heat stroke, snake bite, neurasthenia, arthroplogosis, over bleeding after parturition, hemochezia, hemafrica	29

Plant parts used and mode of preparation

The most widely used plant parts in the preparation of remedies are the herbs and roots, followed by seeds, fruits, leaves, flowers, rhizomes, and the least used plant parts are root barks, bulbs, and aerial parts (Table 4).

It was well known that the plant parts generally contained the active constituents at various concentration. In addition, the different parts of plants contained totally different phytochemical substances (Bruneton, 1999). In our survey, most of the medicinal plants have only one part to be used in the preparation of remedies, and few medicinal plants have two or more than two parts to be used for treating different diseases. For example, the herbs of *Amaranthus*

Table 4 Species number and species proportion of each medicinal part

Used parts	Numbers of species	Proportion / %
herbs	63	37.95
roots	55	33.13
seeds	15	9.04
fruits	10	6.02
leaves	5	3.01
flowers	5	3.01
rhizomes	5	3.01
root barks	3	1.81
bulbs	3	1.81
aerial parts	2	1.21

retroflexus L. were used to treat constipation and diarrhea, while its seeds were employed to treat hypertension.

The percentage of internal uses (82.7%) was much higher than that of external uses (17.3%). Decoction was almost a common method for the preparation of medicinal plants to be used internally, while linimentum was the major preparation way externally.

These medicinal plants were used in the preparations with single treatments, or multiple treatments (Based on combination of more than one medicinal plant), or both single and multiple treatments. For example, the herbs of *Incarvillea sinensis* Lam. were used in decoction to wash topically at site of illness for the single treatment of rheumatic arthritis. The roots of *C. pilosula* were used in combination with other medicinal plants for management of cough, metrorrhagia, and hematochezia. The herbs of *Scutellaria baicalensis* Georgi were used as tea to prevent and treat hypertension, while its roots were used in combination with other medicinal plants for treatment of cough and tracheitis. The percentage of multiple treatments (61.2%) was much higher than that of single treatments (23.0%) and both single treatments and multiple treatments (15.8%).

ICF and FL

The results of the ICF showed that the gastro-

intestinal diseases category had the greatest agreement (Table 5).

We calculated FL of all the medicinal plants in every category and the medicinal plants which are used in the treatment for more types of diseases have a lower FL than those cited for one or fewer treatments. In order to highlight the valuable medicinal plants in every category, we listed the species with the FL values under 1.00 in Table 6.

Table 5 ICF of pharmaceutic categories

Diseases categories	N_t	Proportion / %	N_{ur}	ICF
gastrointestinal diseases	44	14.38	32	0.76
muscular or skeletal problems	7	2.29	9	0.55
cardiovascular diseases	14	4.58	16	0.68
liver and gall bladder diseases	17	5.56	17	0.53
gynecological diseases	31	10.13	29	0.46
dermatological diseases	28	9.15	21	0.69
diabetes and urological diseases	24	7.84	23	0.58
ears, throat, mouth, and eyes illness	17	5.56	17	0.52
respiratory diseases	47	15.36	30	0.41
cold and fever	29	9.48	28	0.71
other diseases	48	15.69	29	0.35

Table 6 Medicinal plants in Baotou, Inner Mongolia, China

Families	Plant species (local name)	Used parts	Medicinal uses and FL value	Preparation
Amaranthaceae	<i>Amaranthus retroflexus</i> (Aribaizhaga)	herbs seeds	constipation (0.70 ST), diarrhea (0.60 ST), hypertension (0.33ST)	IU: 30 g herbs or 3–9 g seeds used in decoction
Asdepiadaceae	<i>Cynanchum sibiricum</i> (Temgenhu)	herbs	laryngopharyngitis (0.81 MT) stomatitis (0.63 MT)	IU: 6–18 g used in decoction
Balsaminaceae	<i>Impatiens noli-tangere</i> (Zahamuqiqige)	herbs	irregular menstruation (1.00 MT)	IU: 6–18 g used in decoction contraindicated during pregnancy
Bignoniaceae	<i>Incarvillea sinensis</i> (Wulantaolama)	herbs	rheumatic arthritis (1.00 ST)	EU: 30 g used in decoction for washing topically at site of illness
Boraginaceae	<i>Arnebia guttata</i> (Xiriborimoge)	roots	scald (0.80 ST) eczema (0.68 ST)	EU: 3–9 g powder mixed with edible oil applied topically at affected parts
	<i>Lithospermum erythrorhizon</i> (Birmaoge)	roots	scald (0.83 ST) eczema (0.73 ST)	EU: 3–9 g powder mixed with edible oil applied topically at affected parts
	<i>Eritrichium rupestre</i> (Bata)	herbs	fever (1.00 MT), cold (0.65 MT)	IU: 3–9 g used in decoction
Campanulaceae	<i>Codonopsis pilosula</i>	roots	cough (0.75 MT)	TO: 6–15 g used in decoction
Caprifoliaceae	(Xilaaorihaodi)		metrorrhagia (0.50 MT) hematochezia (0.50 MT)	
	<i>Platycodon grandiflorum</i> (Huridunzhaga)	roots	cough (1.00 MT)	IU: 6–15 g used in decoction
	<i>Sambucus buergeriana</i> (Baogeyinbaoleidi)	roots barks	fracture (0.91 ST) arthritis (0.82 ST) nephritis (0.35 MT)	IU: 15–30 g used in decoction EU: 3–9 g dry root powders mixed with edible oil applied topically at illness site

(To be continued)

(Continued Table 6)

Families	Plant species (local name)	Used parts	Medicinal uses and FL value	Preparation
Caryophyllaceae	<i>Arenaria juncea</i> (Caoenheilagana)	roots	fever (1.00 MT)	IU: 3—9 g used in decoction Contraindicated during pregnancy
	<i>Dianthus chinensis</i> (Baxikaqiqige)	herbs	cystitis (0.78 MT) urethritis (0.63 MT)	IU: 3—9 g used in decoction Contraindicated during pregnancy
	<i>D. superbus</i> (Gaoyaoanaxika)	herbs	cystitis (0.80 MT) urethritis (0.75 MT)	IU: 3—9 g used in decoction Contraindicated during pregnancy
	<i>Stellaria dichotoma</i> var. <i>lanceolata</i> (Tumenzhanlaga)	roots	fever (0.88 MT) hepatitis (0.76 MT)	IU: 3—9 g used in decoction Contraindicated during pregnancy
Chenopodiaceae	<i>Chenopodium album</i> (Naoyile)	herbs	eczema (1.00 ST)	EU: 50 g used in decoction for washing topically at site of illness
	<i>C. aristatum</i> (Zuoga)	herbs	eczema (1.00 ST)	EU: 50 g used in decoction for washing topically at site of illness
	<i>Kochia scoparia</i> (Suguriwubus)	seeds	urethritis (0.61 MT) cystitis (0.80 MT) eczema (1.00 ST)	IU: 3—9 g used in decoction EU: 30 g used in decoction for ashing topically at site of illness
Compositae	<i>Artemisia annua</i> (Xilaxirileji)	herbs	fever (0.77 MT) hepatitis (0.56 MT)	IU: 3—9 g used in decoction
	<i>A. lavandulaefolia</i> (Zheriligesuiha)	herbs	jaundice (0.78 MT) diabetes (0.48 MT)	IU: 3—9 g used in decoction
	<i>Aster ageratoides</i> (Labaiqiqige)	herbs	jaundice (0.84 MT) mammitis (0.66 MT)	IU: 15—30 g used in decoction.
	<i>A. altaicus</i> (Baorilabo)	herbs	herpes (0.39 ST)	IU: 6—9 g roots used in decoction
		roots	cough (0.76 ST)	EU: 30 g fresh herbs crushed for applying topically at site of illness
	<i>A. tataricus</i> (Hurongwendusu)	roots	cough (1.00 ST)	IU: 6—9 g used in decoction
	<i>Echinops latifolius</i> (Zhariaola)	roots	mastitis (0.77 ST) lymphadenitis (0.63 ST)	IU: 4.5—9 g used in decoction EU: 30 g fresh roots crushed for applying topically at site of illness
		roots	mastitis (0.67 ST) lymphadenitis (0.58 ST)	IU: 6—9 g used in decoction EU: 30 g fresh roots crushed for applying topically at site of illness
	<i>Helianthus annuus</i> (Narenqiqige)	leaves	hypertension (1.00 ST)	IU: 10 g used for tea
	<i>Inula britannica</i> (Alatusuqiqige)	roots	cough (0.80 MT) cold (0.67 MT)	IU: 6—9 g used in decoction
	<i>Ligularia fischeri</i> (Taogurigezhayahai)	roots	cough (1.00 MT) tracheitis (0.76 MT)	IU: 6—9 g used in decoction
	<i>L. sibirica</i> (Tuowu)	roots	cough (1.00 MT) tracheitis (0.80 MT)	IU: 6—9 g used in decoction
		herbs	nephritis (0.91 MT) urethritis (0.66 MT)	IU: 9—12 g used in decoction
	<i>Leontopodium</i> <i>leontopodioides</i> (Wulbusi)	herbs	nephritis (0.88 MT) urethritis (0.76 MT)	IU: 9—12 g used in decoction
	<i>Scorzonera albicaulis</i> (Habisiganna)	roots	mastitis (0.75 ST MT) cold (0.75 MT)	IU: 6—9 g used in decoction EU: 30 g fresh roots crushed for applying topically at site of illness
		herbs	mastitis (0.95 ST), lymphadenitis (0.75 ST), chronicgastritis (0.70 MT), dyspepsia (0.40 MT)	IU: 15—30 g used in decoction EU: 30 g fresh roots crushed for applying topically at site of illness
<i>Xanthium strumarium</i> (Haoniyinzanggu)	fruits	headache (0.31 MT), urticaria (0.60 MT), rheumatic arthritis (0.31 MT), rhinitis (0.57 MT)	IU: 3—9 g power with water	

(To be continued)

(Continued Table 6)

Families	Plant species (local name)	Used parts	Medicinal uses and FL value	Preparation
Convolvulaceae	<i>Cuscuta chinensis</i> (Xiriyiaoriyangu)	seeds	improving sexual function (1.00 ST)	IU: 9—12 g power with water
	<i>C. japonica</i> (Taomuxiriaoriyigu)	seeds	improving sexual function (1.00 ST)	IU: 9—12 g power with water
	<i>Pharbitis purpurea</i> (Baorihudaqiige)	seeds	constipation (0.9 MT) dyspepsia (0.78 MT)	IU: 3 g power with water Contraindicated during pregnancy
	<i>P. hederacea</i> (Baorihudaqiige)	seeds	constipation (0.83 MT) dyspepsia (0.78 MT)	IU: 3 g power with water Contraindicated during pregnancy
Crassulaceae	<i>Orostachys fimbriatus</i> (Siqinebusi)	herbs	scald (1.00 ST) burn (1.00 ST)	EU: 15 g fresh herbs crushed for applying topically at site of illness
	<i>O. malacophyllus</i> (Maohuirisiqinebusi)	herbs	scald (1.00 ST) burn (1.00 ST)	EU: 15 g fresh herbs crushed for applying topically at site of illness
	<i>Sedum aizoon</i> (Mugaiyinyide)	herbs	metrorrhagia (0.90 MT) insomnia (0.50 MT)	IU: 6—9 g used in decoction
Cruciferae	<i>Capsella bursapastoris</i> (Abuganaoga)	herbs	dyspepsia (0.46 MT), enteritis (0.59 MT), conjunctivitis (0.81 MT)	IU: 15—30 g used in decoction
	<i>Erysimum cheiranthoides</i> (Gaoentaoge)	herbs	dyspepsia (1.00 ST)	IU: 3—6 g used in decoction
	<i>E. aurantiacum</i> (Wulagoentoge)	herbs	dyspepsia (1.00 ST)	IU: 3—6 g used in decoction.
	<i>Lepidium apetalum</i> (Luyinsuwubusi)	seeds	tracheitis (0.74 MT) nephritis (0.67 MT)	IU: 3—6 g used in decoction
Elaeagnaceae	<i>Elaeagnus angustifolia</i> (Jigeda)	fruits	stomachache (0.67 ST)	IU: 6—15 g fruits or 3—6 g root barks used in decoction
		roots	diarrhea (1.00 MT)	
	barks	diarrhea (1.00 MT)		
	<i>Hippophae rhamnoides</i> (Chajirigana)	fruits	cough (1.00 MT) tracheitis (0.80 MT)	IU: 3—9 g used in decoction
Ephedraceae	<i>Ephedra sinica</i> (Zherigen)	herbs	cold (1.00 MT), cough (1.00 MT)	IU: 3—9 g was used in decoction
Equisetaceae	<i>Equisetum arvense</i> (Narisongwubusi)	herbs	irregular menstruation (0.69 MT) metrorrhagia (0.77 MT)	IU: 6—9 g used in decoction
		herbs	keratitis (0.61 MT) metrorrhagia (0.76 MT)	
	<i>E. hiemale</i> (Zhuligeriwubusi)	herbs	metrorrhagia (0.76 MT)	IU: 6—9 g used in decoction
Euphorbiaceae	<i>Euphorbia lunulata</i> (Chagantarinu)	herbs	scrofula (0.80 MT), gastric cancer (0.85 MT), breast cancer (0.75 MT)	IU: 3—9 g used in decoction
	<i>E. bialfischeriana</i> (Tarinu)	roots	tinea (1.00 ST)	EU: 3—9 g dry root powders mixed with edible oil applied topically at illness site
	<i>E. bialfischeriana</i> var. <i>cyparissoides</i> (Xilemusutetanu)	herbs	scrofula (0.9 MT), gastric cancer (0.83 MT), breast cancer (0.67 MT)	IU: 3—9 g used in decoction
Geraniaceae	<i>Erodium stephanianum</i> (Manjiuhai)	herbs	enteritis (1.00 MT) diarrhea (0.95 MT) irregular menstruation (0.65 MT)	IU: 9—15 g used in decoction
	<i>Geranium sibiricum</i> (Xibiriximudgela)	herbs	enteritis (0.85 MT) diarrhea (0.85 MT) irregular menstruation (0.70 MT)	IU: 3—9 g used in decoction
Gentianaceae	<i>Gentiana triflora</i> (Luyinsusi)	roots	dyspepsia (0.81 MT), gastritis (0.91 MT), icterohepatitis (0.47 MT)	IU: 3—9 g used in decoction
	<i>G. dahurica</i> (Huhelususi)	roots	rheumatic arthritis (1.00 MT) icterohepatitis (0.19 MT)	IU: 3—9 g used in decoction
	<i>Gentianopsis barbata</i> (Timurdigeda)	herbs	hepatitis (0.67 MT) fever (1.00 MT)	IU: 3—9 g used in decoction
	<i>Gentianella acuta</i> (Aguteqiige)	herbs	angina (1.00 ST) fever (0.83 MT)	IU: 1—3 g used for tea
	<i>Halenia corniculata</i> (Zhanggutuiqiige)	herbs	hepatitis (0.91 MT) fever (0.86 MT)	IU: 3—9 g used in decoction

(To be continued)

(Continued Table 6)

Families	Plant species (local name)	Used parts	Medicinal uses and FL value	Preparation	
Gramineae	<i>Eragrostis poaeoides</i> (Jijgehuralaji)	herbs	nephritis (1.00 MT)	IU: 3—6 g used in decoction	
	<i>E. pilosa</i> (Hurigalaji)	herbs	nephritis (1.00 MT)	IU: 3—6 g used in decoction	
	<i>Phragmites communis</i> (Hulusengwubusi)	rhizomes	cough (0.83 MT) tracheitis (0.64 MT)	IU: crushed 50 g fresh rhizome with water and drunk the juice	
Iridaceae	<i>Iris dichotoma</i> (Haiqiwbusi)	herbs	tonsillitis (0.70 MT) mastitis (0.83 MT)	IU: 6—15 g used in decoction	
	<i>I. lactea</i> var. <i>chinensis</i> (Chaheiledege)	roots	laryngopharyngitis (1.00 MT) tonsillitis (0.83 MT)	IU: 3—9 g used in decoction	
	<i>I. tenuifolin</i> (Aohansahala)	roots	laryngopharyngitis (1.00 MT) tonsillitis (0.67 MT)	IU: 3—9 g used in decoction	
	<i>Dracocephalum moldavica</i> (Biryangu)	roots	fever (1.00) headache (0.87 MT) jaundice (0.74 MT)	IU: 3—9 g used in decoction	
	<i>D. rupestre</i> Hance. (Hadunbiryangu)	roots	fever (1.00) headache (0.68 MT) jaundice (0.74 MT)	IU: 3—9 g used in decoction	
	<i>Leonurus sibiricus</i> (Nalinebus)	herbs seeds	mastitis (0.95 MT) irregular menstruation (0.90 MT) conjunctivitis (0.85 MT) keratitis (0.55 MT) hypertension (0.65 MT)	IU: 9—15 g herbs or 3—9 g seeds used in decoction	
	<i>L. manshuricus</i> (Bolejibus)	aerial parts seeds	mastitis (0.92 MT) irregular menstruation (0.95 MT) conjunctivitis (0.61 MT) keratitis (0.71 MT) hypertension (0.68 MT)	IU: 9—15 g herbs or 3—9 g seeds used in decoction	
	Labiatae	<i>Menthe arvensis</i> (Jirugeba)	herbs	heat stroke (0.84 MT) stomatitis (0.69 MT) laryngopharyngitis (0.65 ST)	IU: 3—9 g used in decoction 1—3 g used for tea. Chewed the fresh herbs for laryngopharyngitis
		<i>Phlomis umbrosa</i> (Caganwugalguri)	roots	cold (1.00 MT) cough (0.70 MT)	IU: 3—9 g used in decoction
<i>P. tuberosa</i> (Zhaosu)		roots	cold (0.90 MT), cough (0.80 MT)	IU: 3—9 g used in decoction	
<i>P. mongolicus</i> (Mogozhaosu)		roots	cold (0.94 MT) cough (0.81 MT)	IU: 3—9 g used in decoction	
<i>Schizonepeta multifida</i> (Harijirugeba)		roots	cold (0.83 MT) measles (0.64 MT)	IU: 3—9 g used in decoction	
<i>S. tenuifolia</i> (Jingjie)		roots	cold (0.83 MT), measles (0.64 MT)	IU: 3—9 g used in decoction	
<i>Scutellaria baicalensis</i> (Hunqin)		roots herbs	cough (0.71 MT), tracheitis (0.8 MT). hypertension (0.69 ST)	IU: 3—9 g roots used in decoction or 1—3 g herbs used for tea	
<i>S. viscidula</i> (Nilichegaihunqin)		roots herbs	cough (0.65 MT), tracheitis (0.73 MT). hypertension (0.54 ST)	IU: 3—9 g used in decoction or 1—3 g used for tea	
<i>S. scordifolia</i> (Haosiqiqige)		herbs	hepatitis (0.65 MT) snake bite (0.87 ST)	IU: 9—15 g used in decoction EU: 30 g fresh herbs crushed for applying topically at the site of wound	
<i>Thymus mongolicus</i> (Ganggaebusi)		herbs	cold (0.83 MT), cough (0.64 MT), toothache (0.64 ST)	IU: 3—9 g used in decoction Chewed the fresh herbs for toothache	
Leguminosae		<i>Astragalus membranaceus</i> (Haoenqiri)	roots	hypertension (0.69 ST), diabetes (0.73 ST), insomnia (0.87 MT)	IU: 9—15 g used in decoction or 3—6 g used for tea
		<i>A. membranaceus</i> var. <i>mongholicus</i> (Mengulehaoenqiri)	roots	hypertension (0.85 ST) diabetes (0.75 ST) insomnia (0.80 MT)	IU: 9—15 g used in decoction or 3—6 g used for tea
	<i>Caragana microphylla</i> (Wuheriharitagana)	fruits	laryngopharyngitis (1.00 MT)	IU: 3—9 g used in decoction	

(To be continued)

(Continued Table 6)

Families	Plant species (local name)	Used parts	Medicinal uses and FL value	Preparation	
Leguminosae	<i>Glycyrrhiza uralensis</i> (Xiheriebusi)	roots	cough (1.00 MT)	IU: 3—9 g used in decoction	
	<i>Hedysarum polybotrys</i> (Wulanhunqiri)	roots	diabetes (0.90 ST) insomnia (0.80 MT)	IU: 9—15 g used in decoction or 3—6 g used for tea	
	<i>Medicago sativa</i> (Baoricharigasu)	roots	urethritis (1.00 MT)	IU: 6—9 g used in decoction	
	<i>Oxytropis myriophylla</i> (Dalanrituze)	herbs	cold (0.85 MT) influenza (0.90 MT)	IU: 6—9 g used in decoction	
	<i>Robinia pseudoacacia</i> (Wurigesutuhuaizi)	leaves, roots	hemafecia (1.00 MT)	IU: 9—15 g leaves or 6—9 g roots used in decoction	
	<i>Sophora japonica</i> (Honghurichaogemue)	flowers	hemafecia (0.87 MT) burn (0.74 ST)	IU: 9—15 g used in decoction EU: 30 g used in decoction for washing topically at the site of illness	
	<i>S. alopecuroides</i> (Hulanbaoya)	roots	cough (0.90 MT) toothache (0.57 MT)	IU: 9—15 g used in decoction	
	<i>Thermopsis lanceolata</i> (Taribaganxiri)	herbs	cough (1.00 MT)	IU: 6—9 g used in decoction Contraindicated during pregnancy	
	Liliaceae	<i>Allium macrostemon</i> (Taokedasu)	bulbs	gastritis (0.91 MT) diarrhea (0.84 MT) cold (0.06 MT)	IU: 3—9 g used in decoction
		<i>Anemarrhena asphodeloides</i> (Taolayimageini)	rhizomes	cough (1.00 MT) constipation (0.76 MT)	IU: 6—9 g used in decoction
<i>Hemerocallis minor</i> (Zeriligexiriqiqige)		roots	hepatitis (1.00 MT) irregular menstruation (0.58 MT)	IU: 3—9 g used in decoction	
<i>H. flava</i> (Xiriqiqige)		roots	hepatitis (1.00 MT) irregular menstruation (0.60 MT)	IU: 3—9 g used in decoction.	
<i>Lilium pumilum</i> (Sarialeng)		bulbs	cough (1.00 MT)	IU: 6—15 g used in decoction	
<i>L. concolor</i> (Caoharisarina)		bulbs	cough (1.00 MT)	IU: 6—15 g used in decoction	
<i>Polygonatum officinale</i> (Cagawendusu)		rhizomes	cough (0.60 MT) diabetes (0.80 MT) insomnia (0.80 MT)	IU: 6—12 g used in decoction	
<i>P. sibiricum</i> (Chaganhuri)		rhizomes	diabetes (0.90 MT), insomnia (0.75 MT), hypertension (0.80 MT)	IU: 9—15 g used in decoction	
Linaceae		<i>Linum stelleroides</i> (Zeriligemgalinggu)	seeds	constipation (1.00 ST) laryngopharyngitis (0.80 ST)	IU: 6—9 g powder used in form of infusion with hot water
Malvaceae		<i>Althaea rosea</i> (Halouqiqige)	roots seeds	urethritis (1.00 MT)	IU: 9—15 g roots or seeds used in decoction
	<i>Hibiscus trionum</i> (Haobingwubusi)	herbs	scald (1.00 ST) burn (1.00 ST)	EU: 30 g fresh herbs crushed for applying topically at site of illness	
Moraceae	<i>Morus alba</i> (Yilama)	roots	cough (0.30 MT)	IU: 3—6 g root barks, or 3—9 g leaves, or 9—15 g fruits used in decoction	
		barks	cold (0.39 MT)		
		leaves fruits	insomnia (0.74 MT)		
Nyctaginaceae	<i>Mirabilis jalapa</i> (Baorimilika)	roots	metrorrhagia (0.73 MT) mastitis (0.48 MT)	IU: 15—30 g used in decoction Contraindicated during pregnancy	
		Orobanchaceae	<i>Orobanche caeruleascens</i> (Temugensule)	herbs	improving sexual function (1.0 MT), diarrhea (0.55 MT)
<i>O. pycnostachya</i> (Xiritemugensule)	herbs			improving sexual function (1.0 MT), diarrhea (0.65 MT)	IU: 6—9 g used in decoction
Papaveraceae	<i>Chelidonium majus</i> (Sutuhuanglun)	herbs	cough (0.83 MT) stomachache (0.67 MT) snakebite (1.00 ST)	IU: 3—6 g used in decoction. EU: 30 g fresh herbs crushed for applying topically at the site of wound	
		<i>Papaver nudicaule</i> (Zheriligenamu)	fruits	diarrhea (1.00 MT), cough (0.91 MT), stomachache (0.84 MT)	IU: 3—6 g was used in decoction

(To be continued)

(Continued Table 6)

Families	Plant species (local name)	Used parts	Medicinal uses and FL value	Preparation
Plantaginaceae	<i>Plantago depressa</i> (Wuheriwuregena)	leaves	hypertension (1.00 MT)	IU: 3—9 g used in decoction
Plumbaginaceae	<i>Limonium bicolor</i> (Yilayinhuaer)	leaves	gastric cancer (1.00 MT) cervical cancer (0.83 MT)	IU: 3—9 g used in decoction
Polygalaceae	<i>Polygala tenuifolia</i> (Jiruhenqiige)	roots	neurasthenia (0.80 MT)	IU: 3—9 g used in decoction
		herbs	insomnia (1.00 MT) nephritis (0.55 MT)	
Polygonaceae	<i>P. sibirica</i> (Xibirihenqiige)	roots	neurasthenia (0.80 MT), insomnia	IU: 3—9 g used in decoction
		herbs	(1.00 MT), nephritis (0.55 MT)	
	<i>Polygonum aviculare</i> (Buduneyinsule)	aerial parts	urethritis (0.70 MT) jaundice hepatitis (0.67 MT)	IU: 6—15 g used in decoction
	<i>Rheum franzenbachii</i> (Gexigune)	roots	hyperlipidemia (1.00 MT) scald (0.67 ST)	IU: 3—9 g used in decoction EU: 3—9 g powder mixed with edible oils applied topically at illness site
Polemoniaceae	<i>Polemonium liniflorum</i> (Deyinhuaer)	roots	cough (0.46 MT) insomnia (0.69 MT) stomachache (0.51 MT)	IU: 3—9 g used in decoction
Portulacaceae	<i>Portulaca oleracea</i> (Narenaoga)	herbs	hyperlipidemia (0.79 ST) snakebite (0.69 ST) eczema (0.93 ST)	IU: 6—9 g used for tea EU: 30 g fresh herbs crushed for applying topically at the site of wound
Primulaceae	<i>Androsace filiformis</i> var. <i>glandulosa</i> (Dabqi)	herbs	laryngopharyngitis (0.85 MT) tonsillitis (0.62 MT) stomatitis (0.69 MT)	IU: 9—30 g used in decoction
Ranunculaceae	<i>Aconitum ochranthum</i> (Batagehaori)	roots	rheumatic arthritis (1.00 ST)	EU: 5—10 g powder mixed with edible oil applied topically at site of illness.
	<i>Paeonia lactiflora</i> (Chanaqiige)	roots	amenorrhea (1.00 MT) carbuncle (0.25 MT)	IU: 3—12 g used in decoction
	<i>P. obovata</i> (Chagananaqiige)	roots	amenorrhea (1.00 MT) carbuncle (0.25 MT)	IU: 3—12 g used in decoction
	<i>Pulsatilla turczaninowii</i> (Gulagahaer)	herbs	diarrhea (1.00 MT)	IU: 9—15 g used in decoction
	<i>Thalictrum petaloideum</i> (Chacunqiige)	roots	stomachache (0.58 MT) diarrhea (0.69 MT) dyspepsia (0.65 MT)	IU: 3—9 g used in decoction
	<i>Trollius chinensis</i> (Alatanhuaqiige)	flowers	laryngopharyngitis (1.00 ST)	IU: 6—9 g used for tea
Rosaceae	<i>Armeniaca sibirica</i> (Guilesencumo)	seeds	cough (1.00 MT)	IU: 3—9 g used in decoction
	<i>Chamaerhodos erecta</i> (Yaganbaotule)	herbs	arthrophlogosis (1.00 ST)	EU: 30 g used in decoction for washing topically at the site of illness
	<i>Potentilla chinensis</i> (Xilinlaiyintanai)	herbs	enteritis (0.88 MT) cold (0.37 MT)	IU: 15—30 g used in decoction
	<i>P. bifurca</i> (Akatolaiyintangnai)	herbs	over bleeding after parturition (1.00 MT) irregular menstruation (0.80 MT)	IU: 9—15 g used in decoction
	<i>Rosa xanthina</i> (Zhamuri)	flowers fruits	dyspepsia (0.88 MT) hypertension (0.68 ST)	IU: 3—6 g flowers or 6—9 g fruits used for tea
	<i>Sanguisorba officinalis</i> (Sude)	roots	hematochezia (1.00 MT) scald (0.80 ST)	IU: 30 g used in decoction EU: 3—9 g powder mixed with edible oil applied topically at affected parts
	<i>Sorbus pohuashanensis</i> (Haotubori)	fruits	cough (1.00 MT) tracheitis (0.75 MT)	IU: 9—15 g used in decoction

(To be continued)

(Continued Table 6)

Families	Plant species (local name)	Used parts	Medicinal uses and FL value	Preparation
Scabious	<i>Scabiosa comosa</i> (Wuherixilus)	flowers	fever (0.90 ST) jaundice (0.75 ST)	IU: 3 g powder used in form of infusion with hot water
Scrophulariaceae	<i>Cymbaria dahurica</i> (Xinmaba)	herbs	arthrophlogosis (1.00 ST) irregular menstruation (0.31 MT)	IU: 3—9 g used in decoction EU: 30 g used in decoction for washing topically at the site of illness
	<i>A. mongolica</i> (Hatunebusi)	herbs	arthrophlogosis (1.00 ST) irregular menstruation (0.31 MT)	IU: 3—9 g used in decoction EU: 30 g used in decoction for washing topically at the site of illness
	<i>Linaria vulgaris</i> (Haonizhajiluxi)	herbs	influenza (0.85 MT) scalds (0.60T) burns (0.60ST)	IU: 3—9 g was used in decoction. EU: 9—15 g herbs mixed with edible oil is applied topically at affected parts
	<i>Rehmannia glutinosa</i> (Huriguboqinqiqige)	rhizomes	diabetes (1.00 MT) insomnia (0.80 MT)	IU: 9—15 g used in decoction
Solanaceae	<i>Datura stramonium</i> (Mandalatuqiqige)	flowers	stomach convulsion (1.00 ST)	IU: 1 g powder used in form of infusion with hot water
	<i>Hyoscyamus niger</i> (Tenegewubusi)	seeds	stomach convulsion (1.00 ST)	IU: 1—2 g powder used in form of infusion with hot water
	<i>H. agrestis</i> (Liangdang)	seeds	stomach convulsion (1.00 ST)	IU: 1—2 g powder used in form of infusion with hot water
	<i>Lycium halimifolium</i> (Xiruyinwenjilega)	fruits	diabetes (0.88 ST) neurasthenia (0.72 MT)	IU: 6—9 g used for tea
Thymelaeaceae	<i>Stellera chamaejasme</i> (Dalunturu)	roots	tinea (1.00 ST)	EU: 3—9 g dry root powders mixed with edible oil applied topically at illness site
Umbelliferae	<i>Bupleurum pekinense</i> (Zegerenxila)	roots	irregular menstruation (0.80 MT) fever (1.00 MT)	IU: 3—9 g used in decoction
	<i>Coriandrum sativum</i> (Wunurizuoga)	seeds	dyspepsia (1.00 ST)	IU: 3—6 g powder used in form of infusion with hot water
	<i>Ferula rigida</i> (Zaorigudasu)	roots	tonsillitis (1.00 ST)	IU: 15—30 g used in decoction
	<i>Saposhnikovia divaricata</i> (Haonishuri)	roots	cold (1.00 MT) fever (1.00 MT)	IU: 6—9 g used in decoction
Urticaceae	<i>Urtica cannabina</i> (Halagai)	herbs	snake bite (1.00 ST)	EU: 30 g fresh herbs crushed for applying topically at the site of wound
	<i>U. angustifolia</i> (Aocunhaolagai)	herbs	snake bite (1.00 ST)	EU: 30 g fresh herbs crushed for applying topically at the site of wound
Valerianaceae	<i>Patrinia heteropylla</i> (Aodolekeqiqige)	roots	metrorrhagia (1.00 MT)	IU: 9—15 g used in decoction
	<i>P. rupestris</i> (Hadunlegeqiqige)	herbs	enteritis (1.00 MT) hepatitis (0.67 MT)	IU: 6—15 g used in decoction
	<i>Valeriana stubendorfi</i> (Zulegehuji)	roots	neurasthenia (1.00 MT) insomnia (1.00 MT)	IU: 3—9 g used in decoction
	<i>V. officinalis</i> (Bamuboebusi)	roots	neurasthenia (1.00 MT) insomnia (1.00 MT)	IU: 3—9 g used in decoction
Verbenaceae	<i>Caryopteris mongolica</i> (Yimanebure)	herbs	impetigo (1.00 ST)	EU: 30 g fresh herbs crushed for applying topically at the site of illness
Zygophyllaceae	<i>Peganum harmala</i> var. <i>multisecta</i> (Arigaliyid)	herbs	rheumatic arthritis (1.00 ST)	EU: 50 g used in decoction for washing topically at the site of illness
	<i>Tribulus terrestris</i> (Yimanzhangu)	Fruits	conjunctivitis (0.70 MT) improving sexual function (0.59 ST)	IU: 6—9 g used in decoction or 3—6 g powder used in form of infusion with hot water

Abbreviations: MT= multiple treatments; ST=single treatments; IU= internal uses; EU= external uses

Conservation and threats of medicinal plants

The natural resources of medicinal plants have been threatened mainly due to deforestation, over-exploitation, overgrazing, destructive harvesting ways, unsustainable trade, and urbanization. Sustainable harvesting would be helpful in the conservation of medicinal plants. It was important to note that the popularity of these parts (herbs and roots) had serious consequences from both ecological point of view and from the survival of the medicinal plant species. Sustainable harvesting would be helpful in the conservation of medicinal plants.

For example, a part of the collected medicinal plants were cultivated before they were medicinally used, which enabled the plants to regenerate. Also, we found some medicinal herb growers had started to protect medicinal plants by growing them in home gardens. However, the problem of conservation and cultivation of endangered medicinal plants has not been easily addressed, 95 plants have been listed endangered in Inner Mongolia and over 20 of them are used in TMM, such as *Amygdalus mongolica* (Maxim.) Ricker, *Cistanche deserticola* Ma, *G. acuta* (Michx.) Hulten (Zhao, 1992). Most of these endangered medicinal plants are mainly growing in remote areas and will be very difficult to be cultivated. The preservation of the plant of Mongolian species was a fundamental and important step toward developing efficacious Mongolian remedies used for various diseases. Therefore it is urgent to draw up the necessary programs for medicinal resource utilization and conservation in further studies. For example, some endangered Mongolian medicinal plants should be conserved by wild tending (Chen *et al*, 2004). And also, germplasm bank of these endangered Mongolian medicinal plants should be established for protecting germplasm resources.

Conclusion

The major goals of our ethnopharmacological survey are to document the TMM before their ethnopharmacological information was lost and enrich the knowledge of the medicinal plants in a region for performing further phytochemical and pharmacological studies. In this work, 152 medicinal plants with their ethnopharmacological information were reported. Two

quantitative tools (ICF and FL) were employed to analyze the data from the interviewees. With the ICF, we evaluated how homogenous the information was, and with the FL, we found the most important species for the treatments of the diseases categories.

It was necessarily noted that some medicinal plants which were known to be used for the treatment of various illnesses were not mentioned at all by those interviewees although these plants were native in the study area. For example, Paonangcao, the herbs of *Physochlaina physaloides* (L.) G. Don, was recorded in *Pharmacopoeia of Mongolian Medicine*; However, no interviewees mentioned this medicinal plant in this survey. We found that the knowledge on TMM was mainly passed verbally from generation to generation in this district, and the people with expert knowledge are getting old and the young have shown less interest in this accumulated medicinal plants knowledge. The valuable information could be lost whenever the old knowledgeable people passes away without conveying their knowledge on TMM. These situations highlighted the fact that much of the ethnopharmacological heritage in Inner Mongolia has been lost within successive generations. Clearly, the medicinal plants in this district possess the significant potentials for their pharmacological activities in the context of ethnomedicinal knowledge, especially in the treatments of gastrointestinal diseases, dermatological diseases, cardiovascular diseases, etc. Therefore, more ethnopharmacological information of Mongolian medicinal plants should be gathered and documented in further studies, which will be a fundamental step toward developing efficacious natural drugs for various diseases.

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