Characteristics of Tibetan medicine preparations used in the Chinese-Tibetan Hospital of Derong County

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Abstract

Purpose: To investigate the Tibetan medicine preparations used in Derong Chinese-Tibetan Hospital.

Methods: In this study, 115 preparations were collected from the Chinese-Tibetan Hospital of Derong County. A statistical table of information on medicine preparation was prepared in Excel format, and it included information on the forms of preparations, medicinal materials, medicinal parts used, frequency of use, and clinical applications.

Results: The 115 preparations were mainly pills. In clinics, they were used for treating liver disease, stomach-ache, gastric ulcer, nephrotic pain and fever. It was found that 226 medicines were used in various preparations. The plant components used varied from whole herbs, fruits, seeds, roots, rhizomes, and animal-based medicines, to flowers. The most frequently used plants/herbs were Terminalia chebula Retz., Carthamus tinctorius L., Aucklandia lappa Decne., Alpinia katsumadai Hayata and Phyllanthus emblica L. The most commonly used drug combinations involved three fruits (Terminalia chebula Retz., Terminalia bilterica (Gaertn.) Roxb and Phyllanthus emblica L.). The preparations and medicinal materials used for liver and stomach diseases are described in detail in this article. These include Terminalia chebula Retz., Aucklandia lappa Decne., and Carthamus tinctorius L.

Conclusion: The study has analysed the characteristics and clinical uses of Tibetan medicine preparations and summarised the diseases and medicinal materials in the Tibetan area. These preparations and medicinal materials, with their many years of clinical use, may become invaluable gifts of Tibetan medicine to the world.

Keywords: Tibetan medicine, Medical preparations, Terminalia chebula, Aucklandia lappa, Carthamus tinctorius, Derong County, Digestive tract disease

INTRODUCTION

Tibetan medicine has a long history of textual research. It has incorporated the essence of ancient Indian medicine, Chinese medicine and Greek-Arab medicine, and it occupies a unique position in the world's traditional medical system [1].

In the 15th century, based on the theoretical system of the classic Tibetan medicine Four
Medicine Tantra (གཟའ་ཟིམ་པར་ཀྲུང་བོད་), Tibetan medicine was divided into two major schools of north and south, as functions of regional climate and mastering direction. The features of northern Tibet medicine are rheumatism treatment and the use of warm medicine and moxibustion. In contrast, the southern Tibetan medicine is characterized by use of cold medicines, and the prescription medicines are generally few [2]. Tibetan medicine is usually used for treating gastritis, gastric ulcer, hepatitis, cholecystitis, cirrhosis, rheumatism, stroke, paralysis and high-altitude diseases of the heart and lung characterised by alternating cold and heat [3].

The preparations of 114 medical institutions in Derong County in Ganzi Prefecture have been used in clinical practice for many years, with definite curative effects, low toxicity, minimal side effects, as well as good development and utilisation value. At present, more than 80 % of the medicines used in Tibetan medical clinics are pharmaceutical preparations of medical institutions. Hospital preparations are the major drugs used clinically in Derong Tibetan Medicine Hospital. This study used data mining of prescription information to analyse the characteristics, dosage forms, diseases treated, frequently-used medicinal materials, and other information on prescriptions.

METHODS

Data were manually retrieved from the China National Food and Drug Administration Domestic Drug Database, Classification and Code of Diseases 2016 (GB/T 14396-2016), Catalogue of Preparations and Drugs of Derong Chinese-Tibetan Hospital (DCTH), The Naming Basis of Preparations of DCTH, The Source of Preparations of DCTH, and The Quality Standard of Preparations of DCTH.

Data were collected from Jingzhu Materia Medica, Dictionary of Chinese Ethnic Medicine, Drug Standards of Tibetan Medicine, and other literature.

The data comprised the name, disease treated, species of plants, family, medicinal parts, traditional usage, and modern pharmacological research.

The botanical names of plants were validated using the Chinese Flora database (http://frps.eflora.cn/). Plant List database (http://www.thepantlist.org/) was also used to standardise the Latin names of the plants [4].

RESULTS

A total of 115 preparations are used in DCTH. The preparations called Zaga Sangpe Ribu were from Notes on Clinical Knowledge; Darcy Dezma Ribu and Zota Dezma Ribu which appeared in the book Mi Pang Medicine. The others were recorded in Mi Pang Medicine, The Four Medical Tantras and The Secrets of Medicine. These preparations had only two dosage forms pill and powder, which were the more frequently-used forms (93.91 %). The number of medicinal species in the preparations ranged from 3 to 35, but most preparations comprised 25 species, while others had 7 species (Figure 1). Several medicines in the preparations (67 %) had between 3 and 15 species, so as to avoid repeated drug use and reduce waste of medicinal resources.

![Figure 1: Distributions of medicines contained in the preparations](image)

Modern medical names were used in the descriptions for diseases in DCTH. In the course of clinical applications, the characteristics of Chinese, Western and Tibetan medicines were integrated. Preparations were widely used to treat various diseases within the same systems, or to treat diseases from different systems, including the digestive system and urinary system. Preparations were also used to treat typical Tibetan diseases, especially liver disease, dyspepsia, stomach-aches, vomiting and diarrhoea, gastric ulcers and nephropathy pain. Statistical analysis showed that the preparations were targeted at treating 17 different kinds of diseases. The types of diseases included characteristic diseases of the digestive system, urogenital system, respiratory system, musculoskeletal system and connective tissues, as well as Tibetan medicine. A total of 24 types of preparations were used for the treatment of liver diseases, followed by 16 preparations for fever, and 14 each for nephropathy and dyspepsia. The clinical classification of the preparations is shown in Figure 2.
Botanical medicines were the most frequently used drugs amongst the 226 different types of medicines, with a total of 170 species (72.96 %), followed by 25 species of animal medicines (10.73 %), 23 species of mineral medicines (9.87 %), and 8 other species (3.43 %).

A total of 226 medicinal materials were involved, with the most commonly used drugs being Terminalia chebula Retz., Carthamus tinctorius L., Aucklandia lappa Decne, Alpinia katsumadai Hayata and Phyllanthus emblica L. (Table 1). There was consistency in rankings of the most frequently used five-dish Tibetan medicines obtained by the Institute of Tibetan Medicine Preparations, based on the quality standards of medicines [5].

The commonly used drug combinations were Terminalia chebula Retz. and Terminalia billerica (G aertn.) Roxb and Phyllanthus emblica L. (The fruits of these three plants are often used together and are customarily the so-called “three fruits”), C. tinctorius L. and A. lappa Decne (Table 2).

The most frequently used plant materials were whole plant (21.24 %), fruits and seeds (19.47 %), and roots and rhizomes (16.81 %; Figure 3).

**Digestive diseases and common drugs**

Digestive tract diseases have always been the most common diseases in Tibet. As a result of the cold climate and lack of oxygen in residential areas, Tibetans have developed particular habits and dietary patterns. They tend to eat yak meat, mutton, yak butter tea and other high-calorie and high-protein foods, and also drink barley wine in large quantities to keep out the cold. They eat less of fruits and vegetables. Long-term maintenance of these dietary habits lead to high incidence of digestive tract diseases. Gastric and liver problems are the main diseases of the digestive system. Liver and gastric cancers accounted for 75.2 % of all cancer deaths in 2004 - 2005 [6]. Gastric diseases were recorded in detail as early as in *The Four Medical Tantras* and Yue Wang Yao Zhen [7].

In modern Western medicine, gastric diseases comprise superficial gastritis, chronic atrophic gastritis, peptic ulcer and *Helicobacter pylori* infection. In addition to gastric diseases, the number of preparations for the treatment of liver diseases is particularly prominent in the category of digestive diseases. Data on the use of Tibetan medicine in the treatment of liver diseases indicate the involvement of 193 different medicines comprising 181 types of plant-based drugs, 7 different animal-derived drugs, and 5 mineral drugs [8]. Through data mining of preparations in Derong Hospital, some frequently used preparations and plants for the treatment of gastric and liver diseases were identified and briefly introduced. These preparations may be potential candidate drugs for the treatment of digestive tract diseases.
<table>
<thead>
<tr>
<th>Latin name</th>
<th>Tibetan name</th>
<th>Family</th>
<th>Part used</th>
<th>Life form</th>
<th>Traditional clinical application</th>
<th>Modern Pharmacological Research</th>
<th>Used Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminalia chebula Retz.</td>
<td>ཨ་རུ་ར་།</td>
<td>Combretaceae</td>
<td>Fruit</td>
<td>Tree</td>
<td>Bacon’s disease, yellow water, chronic dysentery, aphonia, hemorrhage.</td>
<td>Protecting liver and heart, neuroprotection, antibacterial and antineoplastic activities.</td>
<td>70 (4.41)</td>
</tr>
<tr>
<td>Carthamus tincotorius L.</td>
<td>གུར་ཀུམ</td>
<td>Compositae</td>
<td>Flower</td>
<td>Herb</td>
<td>Dysmenorrhea, dystocia, traumatic injury, blood stasis.</td>
<td>Improving myocardium, antioxidant, anti-apoptotic, anti-inflammatory, and anti-tumor.</td>
<td>52 (3.28)</td>
</tr>
<tr>
<td>Aucklandia lappa Decne.</td>
<td>རུ་ད་</td>
<td>Compositae</td>
<td>Root</td>
<td>Herb</td>
<td>Qi stagnation, chest and abdomen pain, vomiting and diarrhea, pneumonia, and Long disease.</td>
<td>Improving gastrointestinal (GI) motility, protecting gallbladder contraction, vasodilation, inhibiting platelet aggregation.</td>
<td>51 (3.21)</td>
</tr>
<tr>
<td>Aucklana lappa Decne.</td>
<td>རུ་ད་</td>
<td>Compositae</td>
<td>Root</td>
<td>Herb</td>
<td>Qi stagnation, chest and abdomen pain, vomiting and diarrhea, pneumonia, and Long disease.</td>
<td>Improving gastrointestinal (GI) motility, protecting gallbladder contraction, vasodilation, inhibiting platelet aggregation.</td>
<td>51 (3.21)</td>
</tr>
<tr>
<td>Phyllanthus emblica L.</td>
<td>སྐྱུ་རུ་ར་།</td>
<td>Euphorbiaceae</td>
<td>Fruit</td>
<td>Tree</td>
<td>Blood heat, hepatobiliary disease, indigestion, cough</td>
<td>Anti-inflammatory, hypoglycemic, inhibition of GI motility, anti-aortic atherosclerosis, anti-fatigue.</td>
<td>39 (2.46)</td>
</tr>
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<td>Carthamus tincotorius L.</td>
<td>གུར་ཀུམ</td>
<td>Compositae</td>
<td>Flower</td>
<td>Herb</td>
<td>Dysmenorrhea, dystocia, traumatic injury, blood stasis.</td>
<td>Improving myocardium, antioxidant, anti-apoptotic, anti-inflammatory, and anti-tumor.</td>
<td>52 (3.28)</td>
</tr>
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<td>Aucklandia lappa Decne.</td>
<td>རུ་ད་</td>
<td>Compositae</td>
<td>Root</td>
<td>Herb</td>
<td>Qi stagnation, chest and abdomen pain, vomiting and diarrhea, pneumonia, and Long disease.</td>
<td>Improving gastrointestinal (GI) motility, protecting gallbladder contraction, vasodilation, inhibiting platelet aggregation.</td>
<td>51 (3.21)</td>
</tr>
<tr>
<td>Alpinia katsumadai Hayata</td>
<td>སྐྱུ་རུ་ར་།</td>
<td>Zingiberaceae</td>
<td>Fruit</td>
<td>Herb</td>
<td>Stomach cold, abdominal pain, vomiting, nausea, abdominal distension,</td>
<td>Protecting gastric mucosa, promoting GI motility, antiemetic.</td>
<td>42 (2.65)</td>
</tr>
<tr>
<td>Phyllanthus emblica L.</td>
<td>སྐྱུ་རུ་ར་།</td>
<td>Euphorbiaceae</td>
<td>Fruit</td>
<td>Tree</td>
<td>Blood heat, hepatobiliary disease, indigestion, cough</td>
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<td>རུ་ད་</td>
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<td>Root</td>
<td>Herb</td>
<td>Qi stagnation, chest and abdomen pain, vomiting and diarrhea, pneumonia, and Long disease.</td>
<td>Improving gastrointestinal (GI) motility, protecting gallbladder contraction, vasodilation, inhibiting platelet aggregation.</td>
<td>51 (3.21)</td>
</tr>
<tr>
<td>Moschus berezovskii Flerov.</td>
<td>འཁྲ་བ།</td>
<td>Moschidae</td>
<td>Secretion</td>
<td>Animal</td>
<td>Stroke, phlegm, convulsion, heartburn, abdominal blowout, pain, kidney</td>
<td>Bidirectional regulation of sleep, enhanced hypoxia tolerance, protection, brain damage.</td>
<td>34 (2.02)</td>
</tr>
<tr>
<td>Myristica fragrans Houtt.</td>
<td>འཁྲ་བ།</td>
<td>Myristicaceae</td>
<td>Fruit</td>
<td>Herb</td>
<td>Deficiency diarrhea, cold dysentery, abdominal pain, vomiting</td>
<td>Antibacterial, antioxidant, anti-cancer, liver protection, hypoglycemia.</td>
<td>34 (2.02)</td>
</tr>
<tr>
<td>Corydalis stricta Steph.</td>
<td>འཁྲ་བ།</td>
<td>Plantaginaceae</td>
<td>Whole plant</td>
<td>Herb</td>
<td>Blood fever, liver fever, Chiba disease, tingling and injury</td>
<td>Antioxidant, anti-bacterial activities and in vitro coagulation, antithrombus.</td>
<td>32 (2.02)</td>
</tr>
<tr>
<td>Syzygium aromaticum (L.) Merr. E Perry</td>
<td>འཁྲ་བ།</td>
<td>Myrtaceae</td>
<td>Bud</td>
<td>Herb</td>
<td>Spleen and kidney deficiency, vomiting, diarrhea, heart and abdominal cold pain</td>
<td>Antibacterial, analgesic and digestive system protection.</td>
<td>32 (2.02)</td>
</tr>
</tbody>
</table>
Table 2: Commonly used medicinal combination in Derong Chinese-Tibetan Hospital

<table>
<thead>
<tr>
<th>Medicinal combination</th>
<th>Number of preparations (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminalia chebula Retz. and Phyllanthus emblica L.</td>
<td>32 (27.83)</td>
</tr>
<tr>
<td>Terminalia chebula Retz. and Terminalia billerica (Gaertn.) Roxb and Phyllanthus emblica L. (Three fruits)</td>
<td>25 (21.74)</td>
</tr>
<tr>
<td>Carthamus tinctorius L. and Aucklandia lappa Decne</td>
<td>21 (18.26)</td>
</tr>
<tr>
<td>Carthamus tinctorius L. and Syzygium aromaticum (L.) Merr. EtPerry</td>
<td>19 (16.52)</td>
</tr>
<tr>
<td>Syzygium aromaticum (L.) Merr. EtPerry and Bambusa tertilis McClure</td>
<td>16 (13.91)</td>
</tr>
<tr>
<td>Carthamus tinctorius L. and Syzygium aromaticum (L.) Merr. EtPerry and Bambusa tertilis McClure</td>
<td>12 (10.43)</td>
</tr>
<tr>
<td>Symplocos caudata Wall and Rubia cordifolia L. and Lacciferacca Kerr.</td>
<td>10 (8.70)</td>
</tr>
</tbody>
</table>

**Terminalia chebula Retz**

Terminalia chebula Retz. is called A-Ru-Re (Å) in Tibetan, and Hezi in Chinese. Hezi is derived from the dried ripe fruit of the Gentianaceae plant T. chebula Retz. or T. chebula Retz. var. tomentella Kurt. Terminalia chebula is widely used in southern Tibetan medicine for balancing Long, Chiba and Bacon (‘three factors’). It is often used for treating prolonged diarrhoea and dysentery, bloody stool, anal prolapse, asthma and cough due to lung deficiency, prolonged cough and laryngitis. In Tibetan medicine, the dominant dogma centers on balancing the three fires of the stomach which mediate gastric diseases. Data mining revealed that T. chebula Retz. was the most frequently used medicinal material data on the treatment of stomach ailments and gout [9]. Tannins are the main bioactive compounds in the fruits of T. Chebula. The tannins comprise ellagic acid, terchebin, chebulinic acid, punicalagin, corilagin, terflavin, chebulagic acid and terchebulin. Tannins also contain phenolic acids (gallic acid, ethyl gallate and transcinnamic acid), triterpenoids (chebupentol, β-sitosterol and terchebin), and flavonoids (rutin, querocerin dihydrate and querocerin-3-O-rhamnoside). Their pharmacological effects comprise antioxidative, neuroprotective, anti-carcinogenic, bacteriostatic and antiviral effects [10].

It has been reported that the ethanol extract of T. chebula suppressed acetylcholine chloride-induced excitation of intestinal smooth muscles, inhibited gastric emptying and intestinal motility in normal mice, prevented contraction of isolated intestinal smooth muscles, and reduced serum motillin content in rats [11]. Moreover, serum containing T. chebula extract mitigated CCl4-induced morphological changes in cells, significantly increased cell viability, effectively inhibited CCl4-induced lipid peroxidation in hepatocytes, and enhanced the activities of lipid peroxidase, SOD and GSH-Px [12].

**Carthamus tinctorius L.**

Carthamus tinctorius L. is a commonly used herb in China. It is grown mainly in Henan, Hunan, Sichuan, Xinjiang and Tibet Provinces. The medicinally-used parts of C. tinctorius are the dried flowers which are known as Ku-gong in Tibetan, Honghua in Chinese, and safflower in English. Carthamus tinctorius L. is used for the treatment of dysmenorrhoea, dystocia, traumatic injury and blood stasis in TTM and TCM. Ku-gong is also used in Tibetan medicine for treating hepatitis and hepatic heat. Modern pharmacological studies have shown that safflower has pharmacological properties that protect the myocardium, as well as antioxidant, anti-apoptotic, anti-inflammatory and anti-tumor effects. Hydroxysafflor yellow A, the effective bioactive component in safflower, is the material basis for its pharmacological effects [13]. Studies have shown that safflower exerts protective effect against acute liver injury induced by CCl4 in rats as a result of its anti-inflammatory and antioxidative properties; it inhibits activation of JNK signaling pathway and regulates the expression of apoptotic factors [14]. A study determined the effect of safflower on the expressions of Bax and Bcl-2 and their ratios in rats with acute liver injury induced by lipopolysaccharide (LPS)/D-galactosamine (D-GaIN) [15]. Compared with the traditional hepatoprotective drug (reduced glutathione (GSH)), safflower significantly protected the rats from LPS/D-GaIN-induced hepatocyte injury. Moreover, extract of C. tinctorius exerted significant inhibitory effect on diethylnitrosamine-induced liver cirrhosis in rats [16].

**Aucklandia lappa Decne.**

Aucklandia lappa Decne is a Compositae plant, and its medicinal value resides in its dried roots, commonly known as Ru-da in Tibetan or Muxiang in Chinese. It is native to India, and it grows on high mountains. The plant was introduced to, and is cultivated in Shanxi, Gansu,
In this study, a total of 115 preparations used in Derong medical institutions were collected, mainly from Fanbian Medical Works, The Four Medical Tantras and Secret Prescriptions of Medicine. Traditionally, the preparations were in only two formulations: pills and powders. The primary health issues for which these preparations were used were digestive system diseases, urogenital system diseases, characteristic diseases of Tibetan medicine and respiratory system diseases. The doses used for 67.83% of the preparations did not exceed 5 g per day. A total of 226 kinds of medicines were involved in the 115 preparations, with the use of botanical medicines being the most common, followed by animal-based medicines. The medicinal parts used were roots, stems, leaves, flowers and some parts of flowers and fruits, as well as animal bones, horns, organs, excreta and blood. Fruits and seeds were the most commonly used medicinal materials, followed by roots and rhizomes. Based on frequency of use, the top five drug plants were T. chebula, C. tinctorius L., A. lappa Decne., A. katsumadai Hayata and P. emblica. T. chebula, safflower, Muxiang, Yuganzi and pomegranate were introduced, including their traditional uses, phytochemistry and pharmacological effects.

This study summarizes the characteristics and clinical uses of Tibetan medicine preparations. It is one of the few countries with relatively complete preservation of the southern Tibetan medicine culture. The selected areas have limited research data on Tibetan medicine preparations. Further research is needed to improve research on Tibetan medicine.

CONCLUSION

This study has provided vital information on the characteristics and clinical uses of Tibetan medicine preparations and summarized the common diseases and medicinal materials in the Tibetan area. These preparations and medicinal materials, with their many years of clinical use, may become invaluable contributions of Tibetan medicine to the modern world.

DECLARATIONS

Funding

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Ethical approval

None provided.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

No conflict of interest associated with this work.

Contribution of Authors

We declare that this work was done by the authors named in this article, and all liabilities pertaining to claims relating to the content of this article will be borne by the authors. Meiling Zhao and You Zhou participated in the establishment of the database, statistics and writing of...
manuscript. Ke Fu, Xiaoli Li and Min Xu participated in the establishment of the database for the study. Yuan Liang, Xuemei Zeng, Gang Fan and Jing Zhang participated in statistical analysis of data. Qupi Arong, Zhenzhu Liuqiong and Zhang Wang collected data from the Chinese-Tibetan Hospital of Derong County. Meiling Zhao and You Zhou contributed equally to this work.

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