A comparative study on shared-use medicines in Tibetan and Chinese medicine

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Abstract

Background: Tibetan medicine (TM) and traditional Chinese medicine (TCM) are two independent traditional medical systems. Due to geographical factors, the development of Tibetan medicinal theory is relatively independent, but there are still many shared-use medicines in TM and TCM. However, a thorough and comparative study on those medicines is still absent. This study listed shared-use medicines by TM and TCM and analyzed the similarities and dissimilarities of these two medical systems. This paper also aimed to understand mutual influences like the shared history of TM and TCM and to roughly outline the exchanging process between them.

Methods: Shared-use medicines in TM and TCM were listed alphabetically. Information on the scientific name, material name, medicinal parts, and medical efficacy were extracted from publications. Shared-use medicines were grouped according to medicinal properties and medicinal parts used by TM and TCM. The historical origin and current status of clinical prescriptions of shared-use medicines were analyzed.

Results: A total of 136 shared-use medicines in TM and TCM were listed. Shared-use medicines that were used for a similar purpose in TM and TCM accounted for 14% of the total, while those used for different purposes accounted for 49% of the total, with some of the latter being commonly used in TCM. Shared-use medicinal herbs that originated from both Tibetan and Han regions accounted for 49% of the total, and those that were imported from South Asia and Southeast Asia were frequently observed in TM.

Conclusion: Owing to its unique geographical location and cultural diversity, the Tibetan region played a role as a development cradle for various traditional medicinal theories and knowledge. Medicinal knowledge was exchanged between TM and TCM during their parallel independent growth. Shared-use medicines in TM and TCM were mostly determined by flora similarity and medicinal trade, and they marked significant differences in their medicinal properties. However, medicines that were used for similar purposes in TM and TCM presented obvious commercial medicinal characteristic as well as the same chemical profile. The Tibetan region not only provided medicinal usage knowledge of TCM, but also served as a supply of medicinal resources attributing to “high altitude” locations.

Keywords: Tibetan medicine, Traditional Chinese medicine, Shared-use medicines, Comparative study

Background

Tibetan medicine (TM) is rich in medicinal resources, approximately 80% of which are produced in the Qinghai-Tibet Plateau, with significant ethnic culture and regional biological distinctness, which is reflected in it being a culturally traditional medicine. Tibetan medicine presents obvious characteristics of national culture and distinct ecological-geographic conditions [1]. It is generally believed in medical documents that during the inheritance and development process, TM has continuously acquired knowledge and absorbed beneficial ingredients from Chinese traditional medicine (TCM), Indian Ayurveda medicine, and Arabic medicine. Earlier research on the history of Tibetan medicine [2] showed that Chinese and Tibetan medicines were widely exchanged during the Tubo period, while there are few documents about medical communication occurring between Han and Tibetan people at a later period. Princess Wencheng of the early Tang Dynasty brought a hundred prescriptions for the treatment of four...
hundred and four diseases, five kinds of diagnostic methods, six kinds of medical devices, and four kinds of theory on medicine...” to Tibet, following her marriage with King Songtsan Gambo of Tibet. A Han doctor translated them into the Medical Encyclopedia, and later, traditional Chinese medicine (TCM) practitioner Han Wenhai contributed Small Sporadic External Therapy and Fearless Weapons coauthored with Scorpion and Persian Doctors during the period of Chi Dezu'an (704–745). Princess Jincheng dedicated a variety of medical books, such as Jumbo Drugs by Han doctor Zhang Song and Human Body Torso translated by doctor Zambia Laha from Yutian, in the Western Region, to the Tibetan king. During the period of Akamatsu Dezan, Yuewang Drug Clinic was translated into the Tibetan language, and three famous Chinese medical practitioners, including Dongsong Gangwa of the Tang Dynasty, were recruited. At the end of the eighth century, Yutuo Yuandan Gongbu was sent by the Tibetan King to the mainland, such as Wutai mountain, to study TCM [3].

Based on the above historical literature, many scholars believe that Tibetan medicine has been largely influenced by traditional Chinese medicine during its development. An earlier article [4] revealed that there were many connections in the historical background, theoretical system, and application of prescriptions between TM and TCM, and TM possesses its own unique features in addition to what it shares in common with TCM regarding medicinal properties, pharmacology, clinical medical practices, prescriptions, and patent medicines. However, we still do not know much about the similarity or dissimilarity of the two traditional medicinal systems, and a thorough study on shared-use medicines in TM and TCM is still absent. In view of this, the main goals of the present paper are to systematically list shared-use medicines in TM and TCM, evaluate the differences of the medicinal parts and medical efficacies, analyze the mutual influence of history and the exchanging process of the two medical systems, and discuss the historical and cultural background leading to those shared-use medicines.

Methods

TCM use a total of 12,807 [5] different types of medicine, and TM use 3105 [6] species according to documentation. However, comprehensive statistics on these total varieties cannot reflect the clinical status of TM and TCM. Luckily, earlier, Zhong Guoyue compiled 502 medicinal materials that are used in the Tibetan medicine prescriptions. The present paper listed commonly used Tibetan medicines based on his study, including publications such as the Ministry of Health of the People's Republic of China • Tibetan Medicine, Book 1 [7] and the Tibetan Medicine Standards for Six Provinces [8]. According to The Collection of Chinese Herbal Medicines [9], shared-use medicines, including animal, plant, mineral, and fungi resources, were documented alphabetically. Information on the scientific name, medicinal parts, and medical efficacy was extracted from publications, such as Chinese Pharmacopoeia, Book 1 (2015 edition) [10], The Collection of Chinese Herbal Medicines [9], Chinese Medicine Dictionary [11], Ministry of Health of the People’s Republic of China • Tibetan Medicine, Book 1 [7], Tibetan Medicine Standards for Six Provinces [8], The Four-Part Medical Classics [11], Crystal Beads [12], Tibetan Medicine Chronicles [13], Chinese Materia Medica (Tibetan Medicine) [14], Tibetan medicine in China [15], and Tibetan Herbals in China [16], and was pooled together. Information on the family and genus was analyzed based on Flora Reipublicae Popularis Sinica [17], and Higher Plants of China [18]. The shared-use medicines recorded by Chinese Pharmacopoeia, Book 1 (2015 edition) [10] and the Medical Standards of the Ministry of Health of the People's Republic of China • Tibetan Medicine, Book 1 [7] were marked in this paper.

According to the medicinal property, the shared-use medicines in TM and TCM were divided into five categories: classes I, II, III, IV, and V. The shared-use medicines with the same purpose fell into class I; the shared-use medicines with medicinal usage by TM basically covering that by TCM fell into class II; the shared-use medicines with medicinal usage by TCM basically covering that by TM fell into class III; the shared-use medicines that were used for different purposes fell into class IV; and the shared-use medicines with partial overlapping medical effects in the two medicinal system fell into class V.

According to the medicinal part differences, the shared-use medicines were divided into five types: classes A, B, C, D, and E. The shared-use medicines with same medicinal parts in TM and TCM fell into class A; the shared-use medicines with medicinal parts in TM covering that in TCM fell into class B; the shared-use medicines with medicinal parts in TCM covering that in TM fell into class C; the shared-use medicines with totally different medicinal parts in the two medical systems fell into class D; and the shared-use medicines with partial overlapping medicinal parts in the two medicinal system fell into class E. The above information were given in Tables 1, 2, 3, 4 and 5.

Based on the plant distribution recorded in the Flora Reipublicae Popularis Sinica and other research on medicinal materials, the origins of the shared-use medicines could be roughly divided into the following five types: the first category included varieties that were distributed in both the Tibetan region and in the areas that were mainly covered by the Central Plains throughout history;
| No. | Family     | Scientific name | Chinese name | Parts in TCM | Parts in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Parts used treated in TCM | Disease groups treated in TCM |
|-----|------------|-----------------|--------------|---------------|-------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------|--------------------------------|
| 1   | Apidae     | Apis cerana Fabr* | 蜂蜜* | Bee wax, honey bee | | Indications: epigastric pain alleviated after meals or by pressing, dry cough, constipation, external use for sores, scalds, and burns [10] | Indications: dry cough without phlegm, intestinal dry constipation, counteract toxicity of aconitum, external use for ulcers in the mouth, sores, burns, and scalds [8] | B | Digestive, respiratory disorders | Digestive and respiratory disorders |
| 2   | Asteraceae | Aucklandiae radix | 木香* | Root | Root | Indication: abdominal distension and epigastric pain, diarrhea, dysentery, indigestion, loss of appetite [10] | Indication: abdominal distension and epigastric pain, vomiting, diarrhea, and pneumonia [8] | A | Digestive disorders | Digestive disorders |
| 3   | Convolvulaceae | Cuscuta chinensis Lam.* | 菝丝子* | Seed | Seed | Indications: impotence, seminal emission, dripping of urine after urination, enuresis, frequent urination, aching and weakness of the loins and knees, blurred vision and tinnitus; threatened abortion due to deficiency of the kidney; diarrhea due to hypofunction of the spleen and the kidney; an external use for vitiligo [10] | Indications: pain in the loins and knees, impotence, seminal emission, stranguria with turbid discharge, abnormal vaginal discharge, diarrhea, and tinnitus [14] | A | Reproductive system disorders | Reproductive system disorders |
| 4   | Elapidae   | Bungarus multicinctus Blyth | 银环蛇 | Meat | Meat | Rheumatic, stroke, hemiplegia, convulsion, spasm, tetanus, leprosy, and scab [10] | Rheumatic, hemiplegia [19]; convulsion, spasm, tetanus, syphilis, and scab [13] | A | Nervous system ailments | Nervous system ailments |
| 5   | Fabaceae   | Dalbergia odorifera T. Chen | 降香 | Heartwood | Heartwood | Hematemesis, traumatic hemorhonia, hypochondriac pain due to stagnation of liver qi, vomiting, and stomach pain [10] | Liver diseases, limb edema [13] | A | Circulatory system disorders | Circulatory system disorders |
| 6   | Piperaceae | Piper longum L.* | 华枝 | Fruit | Fruit | Indications: epigastric pain, vomiting and diarrhea caused by cold, migraine; and external use for toothache [10] | Indications: rLung diseases in cold syndrome, precordial and abdominal pain with cold sensation, nausea and vomiting, borborygmus, and diarrhea [8] | A | Digestive disorders | Digestive disorders |
| 7   | Polygonaceae | Rheum officinale Baill.* | 药用大黄 | Roots and rhizome | Roots and rhizome | Indications: fever with constipation, retention of feces and abdominal pain; dyentery; jaundice caused by damp-heat; hematemesis, epistaxis, inflammation of eyes and sore throat due to heat in blood; appendicitis with abdominal pain; boils, sores and abscesses; amennorhage due to blood stasis; traumatic injuries; hemorrhage from the upper gastrointestinal tract; and external use for scalds and burns [10] | Indications: constipation due to excessive heat, indigestion distension syndrome, tenesmus, jaundice in damp-heat syndrome, blood stasis, amennorhage, sores, and boils [8] | A | Digestive disorders | Digestive disorders |
| 8   | Polygonaceae | Rheum palmatum L.* | 掌叶大黄 | Roots and rhizome | Roots and rhizome | The same as above [10] | The same as above | A | Digestive disorders | Digestive disorders |
| 9   | Polygonaceae | Rheum tanguticum Maxim. ex Regel* | 唐古特大黄 | Roots and rhizome | Roots and rhizome | The same as above [10] | The same as above | A | Digestive disorders | Digestive disorders |
| 10  | Rutaceae   | Zanthoxylum bungeanum Maxim.* | 花椒 (藏椒) | Exocarp and seed | Exocarp and fruit | Indications: epigastric pain cold sensation, vomiting and diarrhea; abdominal pain due to intestinal parasitosis; ascariasis; and | Indications: gastropathy, fungi and tachemonad external use for dermatosis [15] | E | Digestive, immune system | Digestive and immune system ailments |
| No. | Family          | Scientific name          | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM | Uses in TM | Parts used | Disease groups treated in TCM | Disease groups treated in tm |
|-----|-----------------|--------------------------|--------------|------------------|-----------------|-------------|------------|------------|--------------------------------|-------------------------------|
| 11  | Selaginellaceae | Selaginella pulvinata     | 垫状卷柏     | Whole plant      | Whole plant     | external use for itching in eczema [10] | Indications: amenorrhea, hematochezia, and archoptoma [10] | A Reproductive and digestive disorders | Reproductive and digestive disorders |
| 12  | Apiaceae        | Ferula sinkiangensis K. M. Shen * | 新疆阿魏     | Resin            | Resin           | Indications: indigestion, congestion, and stomach pain due to parasitic diseases [10] | Indications: indigestion, congestion, and stomach pain due to parasitic diseases [10] | A Digestive disorders | Digestive disorders |
| 13  | Apiaceae        | Ferula lukanensis K. M. Shen * | 阜康阿魏     | Resin            | Resin           | Indications: indigestion, congestion, and stomach pain due to parasitic diseases [10] | Indications: indigestion, congestion, and stomach pain due to parasitic diseases [10] | A Digestive disorders | Digestive disorders |
| 14  | Zingiberaceae   | Alpinia katsumadai Hayata* | 草豆蔻     | Seed pellets expelled | Seed pellets expelled | Indications: accumulation of damp-cold in the spleen and the stomach manifested by epigastric distention, and pain and cold feeling accompanied with belching, nausea, vomiting, and anorexia [10] | Indications: spleen diseases and gastropathy [15] | A Digestive disorders | Digestive disorders |
| 15  | Zingiberaceae   | Alpinia officinarum Hance* | 高良姜     | Rhizome          | Rhizome         | Indications: epigastric pain with cold sensation, vomiting, belching, and acid regurgitation due to cold in the stomach [10] | Indications: epigastric pain with cold sensation, vomiting and diarrhea due to cold in the spleen and stomach; loss of appetite [8] | A Digestive disorders | Digestive disorders |
| 16  | Zingiberaceae   | Kaempferia galanga L.*    | 山奈*        | Rhizome          | Rhizome         | Indications: dyspepsia accompanied with epigastric distention, pain, and cold feeling [10] | Indications: complication of badkan diseases and flung diseases [15] | A Digestive disorders | Digestive disorders |
| 17  | Zingiberaceae   | Amomum tsako Crevost et Lemair | 草果*        | Fruit           | Fruit           | Indications: abdominal distention and epigastric pain, vomiting, malaria, and fever [10] | To remove cold in the spleen and stomach; promote digestion [13] | A Digestive disorders | Digestive disorders |
| 18  | Zingiberaceae   | Zingiber officinalis Rox.* | 姜*          | Rhizome          | Rhizome         | Indications: common cold caused by exterior wind-cold; Vomiting due to cold in the stomach [10] | Indications: badkan diseases, flung diseases, abdomen pain due to cold in the spleen and stomach, vomiting and diarrhea, cough and dyspnea due to cold in the lung, and rheumatoid arthritis [8] | A Respiratory, digestive disorders | Respiratory, digestive, and immune system ailments |
| 19  | ———              | Cordyceps               | 菌草        | Fungi           | Fungi           | Pulmonary tuberculosis, cough, hemoptysis, dyspnea of deficiency type, night sweating, emission, impotence, and soreness-tired of waist and knee [10] | Lung diseases, emission, and impotence [14] | A Respiratory and reproductive system disorders | Respiratory and reproductive system disorders |

*Shared-use medicines recorded by the 2015 edition of China Pharmacopoeia
Class A included the shared-use medicines with the same medicinal parts in TM and TCM; class B included the shared-use medicines with medicinal parts in TM covering that in TCM; class C included the shared-use medicines with medicinal parts in TCM covering that in TM; class D included the shared-use medicines with totally different medicinal parts in the two medical systems; and class E included the shared-use medicines with partial overlapping medicinal parts in the two medical systems.*
| No. | Family        | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Parts used | Disease groups treated in TCM | Disease groups treated in TM |
|-----|---------------|-----------------|--------------|-------------------|-----------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|------------|-------------------------------|------------------------------|
| 1   | Aristolochiaceae | Aristolochia debilis Sieb. et Zucc.* | 马兜铃* | Root | Aerial parts | Indications: dyspnea asthma, cough and bloody sputum due to heat in the lung; bleeding, and swollen and painful hemorrhoids due to heat in the large intestine [10] | Indications: blood disease, clung disease, liver disease, foorgan disease, badikan diseases, plague disease [15] | Root | Respiratory disorders | Respiratory and digestive disorders |
| 2   | Cervidae      | Cervus elaphus Linnaeus | 马鹿 | Antler and testis | Indications: impotence, emission, carbuncle, sores, and swelling [10] | Indications: vertigo, impotence, flacid limbs, deafness, and metrorrhagia [15] | Antler | Reproductive and locomotor system ailments | Reproductive and urinary system disorders |
| 3   | Cervidae      | Cervus nippon Temminck | 梅花鹿 | Antler and testis | Indications: impotence, emission, carbuncle, sores, and swelling [10] | Indications: vertigo, impotence, flacid limbs, and deafness, metrorrhagia [15] | Antler | Reproductive and locomotor system ailments | Reproductive and urinary system disorders |
| 4   | Asteraceae    | Inula racemosa J. D. Hooker * | 土木香* | Roots | Roots | Indications: distending pain in the chest, hypochondria and epigastrium, vomiting and diarrhea, bruise or sudden sprain of the chest with pain during breathing; abortion threat [10] | To remove heat from blood [12] | Roots | Digestive disorders | Immune system ailments and digestive disorders |
| 5   | Asteraceae    | Dolomiaea souliei (Franchet) C. Shih | 川木香 | Roots | Roots | Indications: abdominal distension, gurgling sound, and diarrhea [10] | Indications: loss of appetite, gastric ulcer, abdominal distension, and rheumatism [15] | Roots | Digestive disorders | Digestive disorders |
| 6   | Crassulaceae  | Rhodiola crenulata(Hook f. et Thoms. )H. Ohba * | 大花红景天* | Roots and rhizome | Roots and rhizome | Indications: constriction in the chest with heart pain, apoplexy, lassitude, and asthma [10] | Indications: nausea, vomiting, cyanosis on the lips and palm due to climatic sickness; loss of strength, chest distress, insomnia and dream-disturbed sleep, and also used for tuberculosis [14] | Roots and rhizome | Digestive and nervous system ailments | Digestive, and nervous system ailments |
| 7   | Brassicaceae  | Raphanus sativus L. | 萝卜 | Aerial parts | Roots | To promote digestion and stop thirst, remove heat, and counteract toxicity. | Indications masses in the abdomen, obstruct phlegm, dyspepsia due to stomach cold, eye disease, consumptive thirst, constipation, and influenza [16] | Aerial parts | Digestive disorders | Digestive disorders |
| 8   | Fabaceae      | Medicago ruthenica (L.) Trautv. | 花苜蓿 | Seed | Whole plant | To remove toxic-heat, relieve cough, and arrest bleeding [9] | Indications: boils and measles, cough due to heat in the lung [7]. External use to eliminate inflammation and arrest bleeding [8] | Seed | Respiratory disorders | Respiratory disorders |
| 9   | Liliaceae     | Allium sativum L. | 大蒜 | Bulb | Bulb | Indications: carbuncle, furuncles, skin disease, phthisis, cough, diarrhea, and dysentery [10] | Indications: carbuncle toxin, skin diseases, cold, hemorrhoids, urinary retention, and leprosy [14] | Bulb | Respiratory disorders | Urinary, respiratory and digestive disorders |
| 10  | Malvaceae     | Malva crispa L. | 冬葵* | Roots, Flower and | Indications: enuresis, edema, thirst, | Indications: anuresis, gonorrhea, edema, | Roots, Flower and | Urinary | Urinary, | Urinary, |
| No. | Family | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM | Uses in TM | Disease groups treated in TCM | Disease groups treated in TM |
|-----|--------|----------------|--------------|-------------------|-----------------|-------------|----------|----------------------------|----------------------------|
| 11  | Myristicaceae | *Mystica fragrans* Houtt. | 肉豆蔻* | Kernel | Kernel | Indications: deficiency-cold of the spleen and stomach with persistent diarrhea, epigastric and abdominal distension and pain, anorexia, and vomiting [10] | Indications: rheumatic heart disease, abdominal pain due to cold in the stomach, dyspepsia, feeling of anxiety in the qi deficiency syndrome, and epidemic febrile disease [16] | A Digestive disorders | Circulatory system disorders |
| 12  | Myrtaceae | *Eugewia caryophyllata* Thunb. | 丁香* | Flower bud | Flower bud | Indications: hiccups, vomiting, diarrhea, and abdominal pain with cold sensation [10] | Indications: hiccups, vomiting, diarrhea, abdominal pain with cold sensation, and impotence [8] | A Digestive disorders | Digestive disorders |
| 13  | Pedaliaceae | *Sesamum indicum* L. | 胡麻 | Seed | Seed | To replenish the liver and kidney, tonify blood, moisten intestines, and promote lactation [10] | Indications: wind syndrome of head and dizziness due to yin deficiency of the liver and kidney, constipation in deficiency syndrome [8] | A Reproductive system ailments and digestive disorders | Reproductive and nervous system ailments and digestive disorders |
| 14  | Sciuridae | *Trogopterus xanthipes* | 复齿鼯鼠 | Dry excrement | Excrement, meat | To activate blood circulation and eliminate blood stasis, and arrest bleeding [10] | Excrement: promote the flow of blood and dredge the meridians, eliminate blood stasis and pain, use for stomach pain, dysmenorrhea, and amenorrhea; meat: gynecological diseases, and oxytocin, contraception [16] | B Digestive, reproductive and locomotor system ailments | Digestive, reproductive and locomotor system ailments |
| 15  | Piperaceae | *Piper nigrum* L. | 胡椒* | Fruit | Fruit | Indications: vomiting, abdominal pain, diarrhea and loss of appetite due to cold in the stomach; inappetence, and epilepsy with profuse phlegm [10] | Indications: badkan diseases, cold phlegm, indigestion, vomiting and dysentery due to cold, and abdominal pain with cold sensation [8] | A Digestive disorders | Digestive disorders |
| 16  | Ranunculaceae | *Aconitum pendulum* Busch | 铁棒锤 | Tuber, seedling, roots | Tuber | To disperse wind and relieve pain, remove blood stasis, arrest bleeding, reduce swelling and remove toxin [9] | Indications: lung diseases, cold diseases, yellow fluid diseases, leprosy, and epilepsy [7] | B Locomotor system ailments | Nervous system ailments |
| 17  | Rubiaceae | *Rubia cordifolia* L.* | 苦草* | Roots | Roots, rhizome, and whole plant | Indications: spitting of blood, epistaxis, abnormal uterine bleeding, traumatic bleeding; amenorrhea, arthralgia, and traumatic swelling and pain [10] | Indications: whole grass; pneumonia, nephritis and trichomonal vaginitis; root; spitting of blood, epistaxis, hematochezia, abnormal uterine bleeding, menstrual disorders, menoxenia abdominal pain, ecchymoma pain, trauma injury, and bloody dysentery [12] | B Digestive, locomotor system ailments | Digestive, reproductive and locomotor system ailments |
| 18  | Euphorbiaceae | *Euphorbia tirucalli* Steudel * | 狼毒* | Roots | Roots | To cause urination, remove indigestion, and kill parasites [10] | Indications: boils and sores, scrofula, external use for dermatitis, and ulceration [7] | A Immune system ailments | Respiratory and immune system ailments |
| No. | Family     | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Disease groups treated in TCM | Disease groups treated in TM |
|-----|------------|-----------------|--------------|-------------------|------------------|-----------------------------------------------------------------------------|----------------------------------------------------------------------------|-----------------------------|----------------------------|
| 19  | Apiaceae   | Coriandrum sativum L. | 芫荽 | Fruits | Fruits | Indications: measles, cold, indigestion, and loss of appetite [9] | Indications: indigestion, loss of appetite, thirst, gastric ulcer, measles, cold, stomach diseases, and dysentery [7] | A                           | Digestive disorders         |
| 20  | Zingiberaceae | Amomum kravanh Pierre ex Gagnep | 白豆蔻 | Seed | Fruits | To promote the flow of qi and arrest vomiting, warm the stomach, and promote digestion [10] | Indications: heart disorder, gastropathy, and nephropathy characterized by cold [16] | A                           | Digestive disorders         |
| 21  | Zingiberaceae | Alpinia galanga (L.) Willd | 大高良姜 | Fruits, rhizome | Fruits | To stimulate the functional activity of the stomach by expelling cold, promote the flow of qi, and relieve pain [10] | Indications: fruit; nephropathy, gastropathy [13] Rhizome; precordial and abdominal pain with cold sensation; indigestion due to stomach-cold, loin pain in kidney deficiency syndrome, and lung abscess [16] | B                           | Digestive disorders         |
| No. | Family          | Scientific name              | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Parts used | Disease groups treated in TCM | Disease groups treated in TM |
|-----|----------------|-----------------------------|--------------|-------------------|-----------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|------------|-----------------------------|-----------------------------|
| 1   | Thymelaeaceae   | Stellera chamaejasme Linn.* | 瑞香狼毒*     | Roots             | Roots           | To cause urination, remove indigestion, and kill parasites [10]          | Indications: boils and sores, scrofula, external use for dermatitis, and ulceration [7] | A          | Digestive disorders          | Immune system ailments       |
| 2   | Juglandaceae    | Juglans regia L.            | 胡桃          | Kernel, exocarp and leaf | Exocarp and leaf | Kernel: to reinforce kidney, relieve asthma, use for tinnitus, cough, and asthma in kidney deficiency syndrome, seminal emission, lumbago, tympanitis, and astiction; Exocarp: relieve swelling and itching, tracheitis, lepra alphos, tinea capitis, sores, and boils; Leaf: leucorrhoea [10] | Indications: lung diseases, spasm of tendons and collaterals, aching and weakness of the loins and knees, constipation, seminal emission, and impotence [8] | C          | Respiratory and reproductive system disorders | Reproductive and digestive disorders |
| 3   | Fabaceae        | Glycyrrhiza inflata Bat.     | 胀果甘草*      | Rhizome and root  | Rhizome and root | Indications: hypofunctioning of spleen and stomach, cough, palpitation, swollen sore throat, and sores [10] | Indications: lung diseases [15] | A          | Digestive and respiratory disorders | Respiratory disorders       |
| 4   | Fabaceae        | Glycyrrhiza uralensis Fisch. | 甘草*         | Rhizome and root  | Rhizome and root | Indications: hypofunctioning of spleen and stomach, cough, palpitation, swollen sore throat, and sores [10] | Indications: lung diseases [15] | A          | Digestive and respiratory disorders | Respiratory disorders       |
| 5   | Leguminosae     | Trigonella foenum-graecum L. | 荨芦巴        | Seed              | Seed            | Indications: cold syndrome of the kidney due to yang deficiency marked by pain and coldness in the lower abdomen; hemia; and weakness and edema of the legs caused by cold-damp [10] | Indications: mass formation in the abdomen, discomfort and distension in the chest and hypochondriac regions, and kakke due to cold-dampness [8] | A          | Reproductive system disorders and digestive disorders | Digestive disorders       |
| 6   | Liliaceae       | Polygonatum sibiricum Redouté* | 黄精*         | Rhizome           | Rhizome         | Indications: weakness of the spleen and the stomach marked by latitude, dryness in the mouth and anorexia; dry cough due to deficiency of yin of lung; deficiency of vital essence and blood; and wasting-thirst caused by internal heat [10] | Indications: various deficiency, dry cough hydrodipsia, and thirst [8] | A          | Digestive and respiratory disorders | Respiratory disorders       |
| 7   | Arecaceae       | Areca catechu L.*           | 槟榔*         | Exocarp          | Seed            | Indications: tenesiasis, ascariosis, and fascioliasis; abdominal pain due to intestinal parasitosis; diarrhea and tenesmus due to accumulation of undigested food; edema and weakness of the legs; and malaria [10] | Indications: kidney disease, toothache, and parasitic diseases [14] | D          | Digestive and urinary system disorders | Reproductive and digestive disorders |
| 8   | Polygonaceae    | Rumex nepalensis Spreng.    | 尼泊尔酸模     | Roots and leaf   | Roots           | To remove toxic-heat, arrest bleeding, relax bowels, and kill fungi and trichomonad [10] | Indications: boils and eczema [7] | C          | Digestive disorders and immune system ailments | Immune system ailments       |
| 9   | Ranidae         | Rana chensinensis           | 中国林蛙      | Meat             | Meat            | Indications: palpitation, insomnia, night sweating, and hemoptysis [10] | Indications: neurasthenia [12] | B          | Respiratory disorders         | Urinary and nervous system ailments |
| 10  | Ranunculaceae   | Coptis                      | 黄连*         | Rhizome          | Rhizome         | Indications: vomiting, diarrhoea, jaundice, | Indications: infectious disease, | A          | Digestive                    | Immune                      |
Table 3 Information on class III (Continued)

| No. | Family     | Scientific name         | Chinese name* | Parts used in TCM | Parts used in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Parts used Disease groups treated in TCM | Disease groups treated in TM |
|-----|------------|-------------------------|----------------|-------------------|------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------|-------------------------------------------|--------------------------------|
| 11  | Rutaceae   | Zanthoxylum simulans    | 野花椒         | Root and fruit    | Exocarp          | To dispel cold from the spleen and stomach, relieve pain, kill fungi and trichomonad, and prevent impregnation [10] | Indications: gastropathy, fungi and trichomonad, and external use for dermatosis [15] | D                          | Digestive and immune system ailments    |
| 12  | Solanaceae | Lycium chinense Mill.*  | 梅杞*          | Root and bark     | Fruits           | Indications general debility with deficiency of vital essence with manifestations of aching of the loin and knees, dizziness, and tinnitus; diabetes by internal heat; anemia; and impaired vision [10] | Indications: heart febrile disease and gynecopathy [15] | D                          | Reproductive system disorders          |
| 13  | Urticaceae | Urtica laetevirens      | 宽叶荨麻       | Whole plant, roots, and seed | Aerial parts     | Indications: rheumatism arthralgia, postpartum and infantile convulsion, infantile paralytic sequel, hypertension, dyspepsia, stool atresia. External use for urticaria initially and snake bite [10] | Indications: chronic heart diseases and dyspepsia due to rlung diseases [7] | C                          | Locomotor, nervous system ailments and digestive disorders |
| 14  | ———       | Sulfur*                 | 硫黄*          | Natural element sulfur minerals | Natural element sulfur minerals | Indications: external use for scabies and fawus, abscesses due to cold and phlegm retention and malignant ulcers, oral administration for impotence with cold lower extremities, and asthma or constipation of deficiency-cold type [10] | Indications: carbuncles, sores and boils, tetter, and leprosy and external use for mange, malignant sore, pruritus [15] | A                          | Reproductive and digestive disorders     |

*Shared-use medicines recorded by the 2015 edition of China Pharmacopoeia
Class A included the shared-use medicines with the same medicinal parts in TM and TCM; class B included the shared-use medicines with medicinal parts in TM covering that in TCM; class C included the shared-use medicines with medicinal parts in TCM covering that in TM; class D included the shared-use medicines with totally different medicinal parts in the two medical systems; and class E included the shared-use medicines with partial overlapping medicinal parts in the two medical systems.
| No. | Family       | Scientific name                          | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Disease groups treated in TCM                                                                 |
|-----|--------------|------------------------------------------|--------------|-------------------|-----------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| 1   | Acanthaceae  | Adhatoda vasica Nees                     | 鸭嘴花        | Whole plant       | Twig            | To dispel wind and activate blood circulation; eliminate blood stasis and relieve pain; and re-join the bone [10] | Indications: blood and liver heat-related diseases, mkhris pa diseases, traumatic injury, boils, swelling, and pain [15] | A Locomotor system ailments, Digestive, locomotor system ailments |
| 2   | Araceae      | Acorus calamus L                         | 芷            | Rhizome           | Rhizome         | To dispel wind to resolve the exterior, clear heat and remove dampness, relieve cough resolve phlegm, eliminate blood stasis, and reduce swelling [10] | Indications: dyspepsia, diphtheria, boils, and sores [7] | A Respiratory and locomotor system ailments, Digestive disorders |
| 3   | Berberidaceae| Sinopodophyllum hexandrum (Royle) Ying.  | 桃儿七         | Roots and rhizome | Fruits          | Indications: rheumatic arthritis, traumatic injury, cough due to wind-cold, and menoxenia [10] | Indications: stasis syndrome of women, fatal death, mazischesis, and amenorrhea [8] | D Immune system ailments, locomotor, respiratory, and reproductive system disorders |
| 4   | Bombacaceae  | Gossampinus malabarica (DC.)Mern         | 木棉花*        | Flower            | Flower          | Indications: diarrhea, dysentery, and hemorrhoids [10] | Indications: lung and liver diseases [15] | A Digestive disorders, Digestive disorders |
| 5   | Bovidae      | Bos taurus domesticus Gmelin *           | 牛黄*          | Dry gallstones    | Dry gallstones  | Indications: impairment of consciousness in febrile diseases and stroke; infantile convulsion, epilepsy, mania; sore throat, ulcers in the mouth, carbuncles, and boils [10] | Indications: plague epidemic disease and liver-heat syndrome [11] | A Nervous system ailments and respiratory disorders, Digestive disorders |
| 6   | Burseraceae  | Boszvellia carterii Birdw *              | 乳香*          | Resin            | Resin           | Indications: stomach pain, dysmenorrhea, amenorrhea, rheumatism, traumatic injury, carbuncle, and sore [10] | Indications: skin diseases [14] | A Circulatory system disorders and locomotor system ailments, Immune system ailments |
| 7   | Caryophyllaceae| Arenaria kansuensis Maxim                 | 甘肅蚤缀     | Whole plant      | Whole plant     | To nourish yin and tonify blood, replenish the kidney, and reinforce the bone [10] | Indications: pneumonia and various lung diseases [7] | A Digestive disorders, Respiratory disorders |
| 8   | Cervidae     | Moschus berezovskii Flerov              | 林麝           | Secretions in sweet bursa of male body | Secretions in sweet bursa of male body, meat, testis, feces | To restore consciousness and activate blood circulation, stimulate menstruation, reduce swelling, and relieve pain [10] | Indications: stroke, syncope due to phlegm, sudden attack of precordial and abdominal pain, kidney disease, masses in the abdomen, external use for traumatic injury, carbuncle-abscess, and furuncles [15] | B Nervous, circulatory and locomotor system ailments, Nervous system ailments, locomotor, reproductive, and digestive disorders |
| 9   | Cervidae     | Moschus moschiferus Linnaeus             | 原麝           | Secretions in sweet bursa of | Secretions in sweet bursa of | Indications: stroke, syncope due to phlegm, sudden attack of precordial and abdominal pain, kidney disease, | B Nervous, circulatory and locomotor system ailments, Nervous system ailments, locomotor, reproductive, and digestive disorders |
| No. | Family     | Scientific name | Chinese name | Parts used in TCM | Uses in TCM | Parts used in TM | Uses in TM | Disease groups treated in TCM | Disease groups treated in TM |
|-----|------------|-----------------|--------------|-------------------|-------------|-----------------|------------|-------------------------------|-------------------------------|
| 10  | Cervidae   | Mochus sifanicus | 马麝 | Secretions in sweet bursa of male body | To restore consciousness and activate blood circulation, stimulate menstruation, reduce swelling, and relieve pain [10] | Secretions in sweet bursa of male body, meat, testis, and feces | Indications: stroke, syncope due to phlegm, sudden attack of precordial and abdominal pain, kidney disease, masses in the abdomen; external use for traumatic injury, carbuncle-abcess, and furuncles [15] | B Nervous, circulatory and locomotor system ailments | Nervous system ailments, locomotor, reproductive, and digestive disorders |
| 11  | Combretaceae | Terminalia chebula Retz. * | 诃子* | Fruit | Indications: protracted diarrhea with hematochezia or prolapse of the rectum and chronic cough with sore throat and hoarseness [10] | Fruit | Indications: lung diseases, blood diseases, mkhris pa diseases, and badkan diseases [15] | A Digestive, urinary, and respiratory disorders | Digestive and circulatory system disorders |
| 12  | Combretaceae | Terminalia chebula Retz. var. tomentella (Kurz) C. B. Clarke | 絒毛诃子 | Fruit | To check diarrhea and chronic cough and subdue the upward qi [10] | Fruit | Indications: lung diseases, blood diseases, mkhris pa diseases, and badkan diseases [15] | A Digestive and reproductive system disorders | Digestive disorders |
| 13  | Asteraceae  | Carthamus tinctorius L. * | 红花* | Flower | Indications: amenorrhea, dysmenorrhea; retention of lochia; abdominal masses; traumatic injuries, sores, and ulcers with swelling and pain [10] | Flower | Indications: pneumonia, hepatitis, blood heat, carbuncles, traumatic injury, and gynecopathia [14] | A Reproductive and locomotor system ailments | Respiratory, locomotor and reproductive system disorders |
| 14  | Asteraceae  | Saussurea lanceps Hand.-Mazz. | 绵头雪莲花 | Whole plant | To tonify kidney and reinforce yang; regulate menstruation by arresting bleeding [9] | Whole plant | Indications: head trauma, anthrax, pricking pain, gynecopathy, rheumatic arthritis, and stroke. External use for swelling [7] | A Reproductive system disorders | Reproductive and immune system ailments |
| 15  | Cucurbitaceae | Lagenaria siceraria (Molina) Standl. | 葫芦 | Exocarp, seed | To cause urination, reduce swelling. Used in edema, ascites, and tuberculous cervical lymphadenitis [9] | Seed | Indications: dysentery due to heat, pulmonary disease, and rash [7] | C Urinary and respiratory disorders | Respiratory and immune system ailments |
| 16  | Dipterocarpaceae | Dipterocarpus turbinatus Gaertn.f. * | 龙脑香* | Resin | Indications: loss of consciousness in stroke and attack of noxious factors, syncope due to violent excitement or postpartum anemia; inflammation of eyes, aphet, and swollen sore throat [10] | Resin | Indications: high fever and chronic hotness fever [14] | A Nervous system ailments and respiratory disorders | Nervous system ailments |
| 17  | Equidae     | Equus asinus L. | 驴 | Skin | Blood, meat | Blood, meat | Indications: hemostasis [10] | Indications: rheumatism [14] | D Circulatory system disorders | Nervous system ailments |
| 18  | Gentianaceae | Gentiana crassicaulis Duthie ex Burk * | 粗茎秦艽 | Roots | Flower, roots | Flower, roots | Indications: rheumatic or rheumatoid arthritis with muscular contracture and severe joint pain; fever recurring | Indications: tonsillitis, urticaria, carbuncle, and rheumatoid arthritis [13] | B Nervous, locomotor system | Respiratory and immune system ailments |
| No. | Family   | Scientific name                           | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Parts used treated in TCM | Disease groups treated in TCM |
|-----|----------|-------------------------------------------|--------------|-------------------|-----------------|----------------------------------------------------------------------------|----------------------------------------------------------------------------|---------------------------|-------------------------------|
| 19  | Gentianaceae | Gentiana straminea Maxim | 麻花艽 | Roots             | Flower, whole plant | To dispel wind and dampness and subdue deficient heat | Indications: gastroenteritis, hepatitis, and cholecystitis [7, 8] | B | Respiratory ailments, Digestive disorders |
| 20  | Gramineae | Bambusa Congecon T. Silicea* | 天竺黄 | Secretion         | Secretion       | Indications: coma, stroke, and epilepsy and convulsion in children | Indications: lung diseases [8] | A | Nervous system ailments, Respiratory disorders |
| 21  | Gramineae | Saccharum sinense Roxb. | 甘蔗 | Stem               | Stem            | Indications: blood stasis symptom                                      | Indications: diarrhea, impotence [14] | A | Digestive system disorders, Reproductive system disorders |
| 22  | Iridaceae | Gocus sativus L. | 藏红花* | Stigma            | Secretion       | Indications: amenorrhea, abdominal mass, and palpitation due to fright | Indications: pneumonia and liver diseases [13] | A | Circulatory system disorders, Digestive disorders |
| 23  | Lamiaceae | Logognis supine(Steph. ex Willd) | 夏至草 | Whole plant       | Flower, aerial parts and seed | To regulate menstruation by nourishing blood | Indications: blood diseases due to heat, bloodshot eyes of nebula due to blood heat, parasitosis [15] | C | Nervous, reproductive system disorders, Immune system ailments |
| 24  | Lamiaceae | Leonurus japonicus Thunb. (Leonurus japonicas Houtt.)* | 益母草* | Whole plant, fruits and aerial parts | Fruits, seed and aerial parts | Indications: menstrual disorders, dysmenorrhea, amenorrhea, incessant dripping of lochia; edema and oliguria such as edema in acute nephritis [10] | Indications: Fruits: enoxenia, amenorrhea, dysmenorrhea, masses formation in the stomach, conjunctival congestion edema pain, eye inflammation, corneal opacity, and hypertension [8]; aerial parts: Seed: blood diseases due to heat, bloodshot eyes of nebula due to blood heat, and parasitosis [15] | C | Reproductive and urinary system disorders, Reproductive and circulatory system disorders |
| 25  | Lamiaceae | Leonurus sibiricus L. | 细叶益母草 | Whole plant       | Aerial parts and seed | Indications: menoxenia, amenorrhea, postpartum congestion abdominal pain, nephritis edema, dysuria, and hematuria [10] | Indications: blood diseases due to heat, bloodshot eyes of nebula due to blood heat, and parasitosis [15] | C | Reproductive and urinary system disorders, Immune system ailments |
| 26  | Fabaceae | Acacia catechu (L.f)Wild* | 儿茶* | Twig              | Wood            | Indications: festering wound difficult to heal up, skin diseases with watery discharge, ulcers in the mouth, and traumatic injury with pain and bleeding [10] | Indications: cough and thirst, external use for skin diseases with watery discharge, ulcerative gingivitis, and ulcers in the mouth and hemorrhoid [8] | A | Immune, locomotor system ailments, Respiratory and immune system ailments |
| 27  | Leguminosae | Cassia tora Linn. | 决明* | Seed              | Seed            | Indications: headache and vertigo, eye diseases, and constipation [10] | Indications: skin diseases and epilepsy [15] | A | Five sense organs related ailments, Immune system ailments |
| 28  | Fabaceae | Pterocarpus indicus Willd. | 紫檀 | Heartwood         | Heartwood       | Indications: furuncle and swollen [20] | Indications: hypertension, pneumonia, and heart diseases [7] | A | Immune system ailments, Immune system ailments and... |
| No. | Family | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM | Uses in TM | Parts used treated in TCM | Disease groups treated in TCM |
|-----|--------|----------------|--------------|-------------------|-----------------|-------------|-----------|---------------------------|-------------------------------|
| 29  | Fabaceae | Abrus precatorius L. | 相思子 | Roots, rattan, cane, leaf, and seed | Seed | Roots, rattan: sore throat, and hepatitis. Leaf: bronchitis, seed external use for boils, and eczema [9] | Indications: gynecopathy and gallbladder masses [15] | C | Respiratory and immune system ailments |
| 30  | Liliaceae | Fritillaria cirrhosa D.Don * | 川贝母 | Bulb | Bulb | Indications: dry cough due to heat in the lung and cough with bloody sputum in consumptive diseases [10] | Indications: yellow fluid diseases, menometrorrhagia, and trachitis [13] | A | Respiratory disorders |
| 31  | Loganiaceae | Strychnos nux-vomica Linn. * | 马钱 | Seed | Seed | Indications: protracted arthritis, rheumatoid arthralgia; numbness and paralysis; sequela of poliomyelitis; traumatic injury; boils and sores [10] | Indications: lung diseases, blood heat diseases, stomach cramps toxicosis [15] | A | Nervous system ailments, locomotor, immune system ailments |
| 32  | Malvaceae | Abelmoschus moschatus Medic | 黄葵 | Roots, leaf, and flower | Leaf, flower, and seed | Indications: Root: high fever, cough due to lung heat, postpartum milk atresia, stool constipate, dysentery, and urinary calculi. Leaf: topical fester swelling, felon, bone fracture. Flower: burns and scalds [9] | Indications: yellow fluid diseases, dermatosis, parasitosis, and itching [16] | E | Respiratory and digestive, urinary system ailments |
| 33  | Menispermae | Tinospora sinensis (Lour.) Merr. | 中华青牛胆 | Rattan | Stem | To soothe the tendons and activate collaterals; dispel wind and relieve pain [10] | Indications: lung disease, rheumatoid arthritis [7] | D | Respiratory, digestive disorders |
| 34  | Oleaceae | Fraxinus stylosa Lindelsh. | 宿柱白蜡树 | Bark | Bark | Indications: diarrhea, leukorrhea, and conjunctive congestion with swelling and pain [10] | Indications: fracture, hyperosteogeny, and osteomyelitis [14] | A | Urinary system disorders |
| 35  | Orchidaceae | Dendrobium hookerianum Lindl. | 金耳石斛 | Stem | Aerial part | Indications: thirst, hiccup, and lassitude in the loin and legs [10] | Indications: indigestion, gastric ulcer, sore throat, and hemorrhoids [12] | B | Digestive disorders |
| 36  | Phytolaccaceae | Phytolacca acinosa Roxb.* | 商陆 | Root | Root | Indications: anasarca with oliguria and constipation; external use for carbuncles and sores [10] | Indications: febrile disease, edema, distension, dysuria; external use for carbuncles, boils, swelling, and toxicity [15] | A | Digestive, urinary system disorders |
| 37  | Polypodiaceae | Pyrosia lingua (Thunb) Fanw.* | 石韦 | Whole plant | Whole plant | Indications: urinary infection and urination; spitting of blood, episaxis, hematuria, and abnormal uterine bleeding; and cough and asthma due to heat in the lung [10] | Indications: pus and sores in the chest, cough due to heat in the lung. Laryngopharyngitis, spinal cord cavity disease, traumatic injury, trauma hemorrhage, seminal emission in | A | Urinary and respiratory disorders |

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| No. | Family | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM | Uses in TM | Parts used | Disease groups treated in TCM | Disease groups treated in TM |
|-----|--------|-----------------|--------------|-------------------|-----------------|-------------|------------|-------------|--------------------------------|----------------------------|
| 38  | Pteridae | *Pinctada martensis* (Dunker) | 马氏珍珠贝 | Pearl and dry shell | Pearl and dry shell | Indications: Pearl: palpitation and insomnia; convulsion, epilepsy; nebula; skin ulcerations difficult to heal. Nacre: headache, dizziness, fidgetiness, and insomnia; inflammation of the eyes due to heat in the liver; and blurred vision in deficiency of the liver [10] | Indications: commotio cerebri, head injury, white veins disease, numbness and pain in arthritis, and nosotoxicosis [14] | A | Nervous system ailments | Nervous system ailments |
| 39  | Lythraceae | *Punica granatum* L. | 石榴 | Root, stem, bark, flower, leaf | Seed | Indications: protracted diarrhea, chronic dysentery; hematocritia, prolapse of the rectum; abnormal uterine bleeding; leukorrhagia; and intestinal parasitosis with abdominal pain [10] | Indications: anorexia, dyspepsia, and aching of kidney and loins due to cold in the stomach [14] | D | Digestive and reproductive system disorders | Digestive disorders |
| 40  | Ranunculaceae | *Paeonia veitchii* Lynch | 川赤芍 | Roots | Roots | Indications: maculation in epidemic diseases; spitting of blood; epistaxis; inflammation of the eye; pain in the chest; amenorrhea, dysmenorrhea; mass formation in the abdomen; traumatic injuries; and boils and sores [10] | Indications: carbuncles, fever. Flower: dermatosis, dermatitis [16] | B | Immune system ailments and reproductive and locomotor system ailments | Immune system ailments |
| 41  | Santalaceae | *Santalum album* L. | 檀香 | Heartwood | Heartwood | Indications: pectoral and abdominal pain due to stagnation of qi with cold; epigastric pain, loss of appetite; and angina pectoris in heart disease [10] | Indications: pneumonia and lung abscess [16] | A | Digestive and circulatory system disorders | Circulatory and respiratory system disorders |
| 42  | Sapindaceae | *Sapindus mukorossi* Gaertn. | 无患子 | Root, fruit | Seed | To remove heat and phlegm, check diarrhea and blood stasis [9] | Indications: diphtheria, vesicula seminalis disease, stranguria with turbid discharge, and frequent urination [7] | D | Respiratory disorders | Respiratory and urinary system disorders |
| 43  | Saxifragaceae | *Bergenia purpurascens* (Hook. f. et Thoms.) Engl | 岩白菜 | Rhizome, whole plant | Rhizome | To remove toxic heat, arrest bleeding, and regulate menstruation [9] | Epidemic febrile diseases, liver and lung heat diseases, and dysentery [15] | A | Circulatory system disorders | Respiratory and digestive disorders |
| 44  | Styracaceae | *Styrax benzoin* Dryand. | 安息香 | Resin | Resin | Indications: loss of consciousness in stroke and attack of noxious factors, syncope due to violent excitement or postpartum anemia; pain in the chest and epigastrium; infantile convulsion [10] | Indications: rlung diseases, subcutaneous ulcer, and boils [15] | A | Nervous system ailments and circulatory system disorders | Digestive, immune system ailments |
| No. | Family          | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM | Uses in TM | Parts used | Disease groups treated in TCM | Disease groups treated in TM |
|-----|----------------|-----------------|--------------|-------------------|-----------------|-------------|------------|-------------|--------------------------------|-------------------------------|
| 45  | Apiaceae       | Angelica sinensis (Oliv.) Diels.* | 当归* | Roots | Roots | Indications: anemia with dizziness and palpitation; menstrual disorders, amenorrhea, dysmenorrhea; constipation; rheumatic arthritis; traumatic injuries; carbuncles, boils, and sores. Radix Angelicae Sinensis (stri-baked with wine) amenorrhea, dysmenorrhea, rheumatic, arthralgia, and traumatic injuries [10] | Indications chronic febrile diseases, cardiopulmonary disease, toxicosis, and complication of badIan diseases and lung diseases [15] | A | Reproductive, digestive, immune, and locomotor system ailments | Digestive and respiratory disorders |
| 46  | Apiaceae       | Heracleum candicans Wall. ex DC. | 白亮独活 | Roots | Roots | Indications: rheumatism and pain in the waist and knee [10] | Indications: boils, sores, and leprosy [15] | A | Immune system ailments | Immune system ailments |
| 47  | Apiaceae       | Notopterygium forbesii de Boiss. | 宽叶羌活 | Roots and rhizome | Roots and rhizome | Indications: common cold caused by exterior wind-cold, rheumatism numbness, urticaria, and itching [10] | Indications: plague, greenfly and pinworm, hemorrhage disease, constipation, and leprosy [14] | A | Respiratory and immune system ailments | Immune system ailments and circulatory system disorders |
| 48  | Apiaceae       | Notopterygium incisum Ting ex H. T. Chang* | 羌活* | Roots and rhizome | Roots and rhizome | Indications: headache in common cold, rheumatic arthralgia, and aching of the back and shoulders [10] | Indications: leprosy, headache, laryngopathy, rheumatic arthralgia, and epidemic disease or cholera [15] | A | Respiratory and immune system ailments | Immune system ailments and circulatory system disorders |
| 49  | Unionidae      | Cristaria plicata (Leach).* | 褶纹冠蚌* | Pearl and dry shell | Pearl and dry shell | Indications: epigastric and abdominal distension with anorexia and vomiting; and external use for toothache and swollen feet [10] | Indications: commotio cerebri, head injury, white veins disease, numbness and pain in arthritis, nosotoxicosis [14] | A | Nervous system ailments | Nervous system ailments |
| 50  | Unionidae      | Hyriopsis cumingii(Lea).* | 三角帆蚌* | Pearl and dry shell | Pearl and dry shell | Indications: epigastric and abdominal distension with anorexia and vomiting; and external use for toothache and swollen feet [10] | Indications: commotio cerebri, head injury, white veins disease, numbness and pain in arthritis, nosotoxicosis [14] | A | Nervous system ailments | Nervous system ailments |
| 51  | Valerianaceae  | Nardostachys chinensis Batal.* | 甘松* | Roots and rhizome | Roots and rhizome | Indications: epigastric and abdominal distension with anorexia and vomiting; and external use for toothache and swollen feet [10] | Indications: accumulation of damp-cold in the spleen and the stomach manifested by epigastric distention and pain, external use for ulcerative gingivitis, and dental caries and | A | Digestive disorders | Digestive disorders |
| No. | Family          | Scientific name                  | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM                                                                 | Uses in TM                                                                 | Parts used treated in TCM | Disease groups treated in TCM |
|-----|-----------------|----------------------------------|--------------|-------------------|------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------|--------------------------------|
| 52  | Valerianaceae   | *Nardostachys jatamansi* (D. Don) DC. | 北หี*        | Roots and rhizome | Roots and rhizome | To regulate the flow of qi and relieve pain and to invigorate the spleen function [10] | To remove toxic heat, dispel cold and eliminate swelling [14] | A                        | Digestive disorders           |
| 53  | Vitaceae        | *Vitis vinifera* L.              | 葡滕*         | Fruits and roots  | Fruits           | Indications: measles, dysuria, rheumatism, and fracture [9]               | Indications: lung diseases [15]                                        | C                        | Respiratory, urinary, and locomotor system ailments |
| 54  | Zingiberaceae   | *Curcuma longa* L*              | 姜黄*         | Rhizome           | Rhizome          | Indications: pricking pain in the chest and hypochondriac regions, menorrhagia, mass formation in the abdomen, rheumatic pain of the shoulders and arms, and traumatic swelling and pain [10] | Indications: ulceration and hemorrhoids, sores, and epidemic diseases [14] | A                        | Reproductive, immune, and locomotor system ailments |
| 55  | Zygophyllaceae  | *Tribulus terrestris* L*         | 疙黎*         | Fruits, whole plant | Fruits           | Indications: headache and dizziness, distending pain in the hypochondrium; cessation of lactation, mastitis, and bloodshot eyes of nebula; and urticaria with itching [10] | Indications: headache, itching, distending pain in the hypochondrium; reverse of qi, inflammation of eyes, corneal opacity, masses formation in the abdomen, and cessation of lactation [8] | A                        | Digestive, reproductive and immune system ailments |
| 56  | –               | Calamina*                       | 炉甘石*       | Natural mineral   | Natural mineral  | Indications: eye diseases and pruritus [10]                                | Indications: skin diseases [12]                                          | A                        | Immune system ailments         |
| 57  | –               | Realgar*                        | 娃黄*         | Natural mineral   | Natural mineral  | Indications: carbuncle, furunculosis, snake bite, epilepsy, and malaria [10] | Indications: gall and diphtheria [13]                                    | A                        | Immune system ailments         |
| 58  | –               | Actinolite asbestos.*           | (阳起石)石棉 | Natural mineral   | Natural mineral  | Indications: pain in waist and knee and impotence [20]                    | Indications: tendon injury, cough, swollen sore throat, and dysuria [14]   | A                        | Reproductive system disorders  |
| 59  | –               | Calcitum*                       | 寒水石*       | Sulfate minerals  | Sulfate minerals | Indications: fever and polydipsia, swollen sore throat, ulcers in the mouth on the tongue, toothache, and external use for burns and scalds [9] | Indications: various gastropathy and gastric ulcer due to dyspepsia, masses in the abdomen, edema, diarrhea, and trauma [14] | A                        | Respiratory disorders          |
| 60  | –               | Cinnabar*                       | 朱砂*         | The sulfide minerals of cinnabar | The sulfide minerals of cinnabar | Indications: palpitation, insomnia and dream-disturbed sleep; epilepsy, mania, and infantile convulsion; blurred vision; ulcers in the mouth; | Indications: pus of wounds, yellow fluid diseases, inflammation, and bone fracture [21] | A                        | Nervous system ailments and respiratory disorders |

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| No. | Family | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM | Uses in TM | Disease groups treated in TCM | Disease groups treated in TM |
|-----|--------|----------------|--------------|-------------------|-----------------|-------------|-----------|-----------------------------|----------------------------|
| 61  | –      | Gypsum Fibrosum | 石膏 | Natural mineral | Natural mineral | Indications: heal sore and promote granulation [10] | Indications: thirst, coma, delirium, heat stroke, dyspnea, headache, and toothache [22] | A Immune system ailments | Respiratory disorders |
| 62  | –      | Hematitum       | 刚玉族赤铁矿 | Natural mineral | Natural mineral | Indications: vertigo and tinnitus, vomiting, hiccup, hematemesis, and metrorrhagia [10] | Indications: fracture, traumatic injury [14] | A Digestive disorders | Locomotor system ailments |
| 63  | –      | Magnetitum *    | 磁石* | The oxide minerals spinel clan | The oxide minerals spinel clan | Indications: dizziness, blurring of vision, tinnitus, impairment of hearing, palpitation, insomnia, and dyspnea due to diminished function of the kidney [10] | Indications: traumatic injury of head [12] | A Nervous system ailments | Locomotor system ailments |
| 64  | –      | Natrii sulfas   | 芒硝 | Natural mineral | Natural mineral | Indications: constipation, pruritus, alopecia [10] | Indications: indigestion, constipation, edema, heart diseases, tumor, and jaundice [14] | A Digestive disorders | Digestive disorders |
| 65  | –      | Pyritum*        | 自然铜* | Pyrite sulphide minerals | Pyrite sulphide minerals | Indications: traumatic swelling and pain, and bone fracture [10] | To benefit brain and the liver [12] | A Locomotor system ailments | Nervous system ailments |
| 66  | –      | Succinite (Amber) | 琥珀 | Resin | Resin | Indications: infantile convulsion, epilepsy, diseases, palpitation, insomnia, dysuria, urodeny, hematuria, and amenorrhoea [9] | Indications: blurred vision, corneal ulcer, leukemia, and poisoning [14] | A Nervous and urinary system disorders | Five sense organ-related ailments |
| 67  | –      | 膏驯 | Mineral | Mineral | Indications: hemostasis [10] | Indications: stomach and liver diseases [12] | A Circulatory system disorders | Digestive disorders |

*Shared-use medicines recorded by the 2015 edition of *China Pharmacopoeia*
Class A included the shared-use medicines with the same medicinal parts in TM and TCM; class B included the shared-use medicines with medicinal parts in TM covering that in TCM; class C included the shared-use medicines with medicinal parts in TCM covering that in TM; class D included the shared-use medicines with totally different medicinal parts in the two medical systems; and class E included the shared-use medicines with partial overlapping medicinal parts in the two medical systems.
| No. | Family     | Scientific name | Chinese name | Parts used in TCM | Parts used in TM | Indications in TCM | Uses in TM |
|-----|------------|-----------------|--------------|-------------------|------------------|--------------------|-------------|
| 1   | Boraginaceae | Onosma paniculatum | 滇紫草 | Root | Root and bark | Indications: macule, jaundice, hematuria, stranguria with turbid urine, constipation, and burns [20] | Indications: pneumonia, hemoptysis, measles, and constipation [19] |
| 2   | Asteraceae  | Taraxacum mongolicum | 蒲公英 | Whole plant | Whole plant | Indications: boils and sores, mastitis, lymphadenitis, inflammation of eyes, sore throat, lung abscess, appendicitis, jaundice caused by damp-heat, and urinary infection with difficult painful urination [10] | Indications: badkan diseases, seasonal febrile and epidemic diseases, blood disease, and mkhris pa diseases [15] |
| 3   | Brassicaceae | Thlaspi arvense | 荞 | Seed | Seed | Indications: abdominal distension, acute appendicitis, and edema [10] | Indications: stranguria with turbid urine, liver diseases, cough, indigestion, and vomiting [14] |
| 4   | Liliaceae   | Asparagus cochinchinensis | 天冬 | Root tuber | Tuber | Indications: cough, thirst, sore and pain in the waist and knee, and constipation [10] | Indications: nourishing the kidney and stomach [14] |
| 5   | Meloidae   | Mylabris phalerata | 斑蝥 | Whole worm | Whole worm | Indications: masses in the abdomen, cancer, chronic tinea, scrofula, vegetation, abscesses without diabrosis, malignant sore, and slough [10] | Indications: external use for carbuncles and boils, scrofula, tinea, and leukoderma; indigestion, ulcers, and abscess in the alimentary canal when taken orally [15] |
| 6   | Plantaginaceae | Plantago asiatica | 车前 | Seed and whole plant | Seed | Indications: edema; dysuria with difficult painful urination, diarrhea caused by summer-damp, and inflammation of the eyes; cough caused by phlegm-heat [10] | Indications: pneumonia, nephropathy, and trauma [23] |
| 7   | Plantaginaceae | Plantago depressa | 平车前 | Seed and whole plant | Seed | Indications: edema, dysuria with difficult painful urination, diarrhea caused by summer-damp, inflammation of the eyes, and cough caused by phlegm-heat [10] | Indications: diarrhea due to cold, and dysentery [13] |
| 8   | Polypodiaceae | Drynaria roosii | 槲蕨 | Rhizome | Rhizome | Indications: rheumatic arthritis [10] | Indications: traumatic injury, tinnitus, diarrhea, and alopecia [14] |
| 9   | Rosaceae   | Chaenomeles speciosa | 贴梗海棠 | Fruits | Fruits | Indications: arthralgia spasm, and sore and pain in waist and knee [10] | Indications: stomach diseases, indigestion, and ulcer [14] |
| 10  | Solanaceae | Hyoscyamus niger | 天仙子 | Seed | Seed | Indications: gastric spasm and pain, asthma and cough, and mania [10] | Indications: mania, rheumatic arthritis, stomachache, chronic asthma and cough [14] |
| No. | Family         | Scientific name               | Chinese name | Parts used in TCM | Parts used in TM | Uses in TCM                                                                                                                                  | Uses in TM                                                                                                                                  | Parts used | Disease groups treated in TCM | Disease groups treated in TM |
|-----|----------------|------------------------------|--------------|-------------------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|------------|-------------------------------|-------------------------------|
| 11  | Thymelaeaceae  | *Aquilaria sinensis* (Lour.) Spreng. | 白木香* | Heartwood with resin | Wood with resin | To subdue the upward qi, regulate the function of the spleen and stomach, warm the kidney, and relieve pain [10] | Indications: heart disease, adverse of qi, dyspnea, vomiting and diarrhea, hiccupping, precordial and abdominal pain with cold sensation, feeling of cold in the loins and knees in deficiency syndrome, and constipation [8] | Wood with resin | A | Digestive disorders           | Immune system ailments         |
| 12  | Thymelaeaceae  | *Aquilariae lignum resinatum* | 沉香* | Heartwood with resin | Wood with resin | Indications: distension and pain in the chest and abdomen, vomiting or hiccupping due to cold in the stomach, and dyspnea and adverse of qi in kidney deficiency syndrome [10] | Indications: heart febrile diseases and lung diseases [13] | Wood with resin | A | Digestive disorders           | Circulatory system disorders  |
| 13  | Ursidae        | *Selenarctos thibetanus* G. Cuvier | 黑熊 | Bile | Gall bladder, meat, and bone | Indications: infantile convulsion, epilepsy, jaundice, and external use for carbuncles, hemorrhoids, conjunctival congestion, and nebula [10] | Gall bladder chronic ulcerated hotness, and jaundice [8] | Gall bladder, meat, and bone | D | Nervous system ailments       | Nervous system ailments        |
| 14  | ——              | Os Draconis                 | 龙骨 | Natural mineral | Natural mineral | Indications: sweating, emission, and furuncles [9] | Indications: gall, headache, and trauma [14] | Natural mineral | A | Nervous and immune system ailments | Nervous and immune system ailments |
| 15  | ——              | Borax                      | 硼砂 | Natural mineral | Natural mineral | Indications: acute tonsillitis, laryngopharyngitis, stomatitis, gingivitis, and otitis media [9] | Indications: swollen sore throat and furuncles [15] | Natural mineral | A | Respiratory ailments           | Circulatory system disorders and respiratory ailments |

*Shared-use medicines recorded by the 2015 edition of China Pharmacopoeia
Class A included the shared-use medicines with the same medicinal parts in TM and TCM; class B included the shared-use medicines with medicinal parts in TM covering that in TCM; class C included the shared-use medicines with medicinal parts in TCM covering that in TM; class D included the shared-use medicines with totally different medicinal parts in the two medical systems; and class E included the shared-use medicines with partial overlapping medicinal parts in the two medical systems
the second category included varieties that were mainly produced in the Tibetan Plateau and its surrounding areas; the third category included varieties that were imported from South Asia, Southeast Asia, and Western Regions; the fourth category included the varieties that were generated inland and were traded in the Tibetan region; and the last category included the varieties that were mainly imported from the Han district. Detailed information was given in the Table 12.

Results
The similarity of medicinal parts and the efficacy of shared-use varieties used in TM and TCM
A total of 136 species of shared-use medicines that are used in prescriptions of TM and TCM were listed, and detailed information was given in Table 6 and Fig. 1.

As shown in the above chart, nearly 50% of the shared-use medicines are used for different purposes in TM and TCM (class IV), whereas shared-use medicines with the same utilization accounted for 14% (class I), which indicated that extremely different knowledge on medicine usage existed between TM and TCM.

The proportion of shared-use medicines with similar utilizations (classes I, II, III, and V) reached 50%, which suggested a medicinal knowledge exchange between the two medical systems. For example, a number of 49 species from the inland area and 7 species from Sichuan province were recorded by the classical Tibetan medical book Crystal Beads [12]. However, both TM and TCM have immense diversity in their medicinal parts, and as the medical effects of one of them cover that of the other, the medicinal parts tend to be more diverse.

The origins of shared-use varieties used in TM and TCM
According to Tables 1, 2, 3, 4 and 5, the origins of shared-use medicines used by TM and TCM were documented in Table 7.

As shown in Table 7, the shared-use medicines that are distributed in both the Han inland and the Tibetan region accounted for the majority of the total (49%, which is the first category). Thirty-five percent of the total were imported by TM from the non-Han area through trade routes (the third category and the fourth category). Fifteen percent of the total depended on import from both the Tibetan and Han regions. Interestingly, varieties that were produced in the Tibetan region exclusively (the second category) were far more common than those that were imported from Han inland (the last category), which supported the fact that the Qinghai-Tibet Plateau also serves as the supplier for medicinal resources of TCM. The proportion of imported varieties in class I was significantly higher than that in the other groups, indicating that the shared-use medicines with the same efficacy were obviously affected by the extraterritorial medical systems. The proportion of shared-use medicines that were produced exclusively in Tibet (the second category) and the shared-use medicines that were mainly traded in the Tibetan region (the fourth category) were higher than those of other origins in class IV, which suggested a connection and an obvious evidence of independent development of the TM and TCM systems.

The clinical application status of shared-use varieties used by TM and TCM
Since the prescription preparations are used to treat diseases in TM, the frequency of the utilization of shared-use medicines in prescription reflects its clinical application status. According to the statistical results of Tibetan medicines that are used, frequency was compiled
by Zhong Guoyue [1], and the clinical application status of shared-use medicines was shown in the following Table 8.

TCM emphasizes that the use of medicine should be compatible according to clinical needs, so the importance of shared-use medicine can be reflected by its application frequency in clinical prescriptions. Earlier, Ping [24] et al. listed 10,000 prescriptions from the First Affiliated Hospital of Guangzhou and the University of Traditional Chinese Medicine and sorted out the top 50 commonly used medicinal items, among which there are only four that were shared-use in TM and YCM, as shown in Tables 8 and 9.

In Tables 8 and 9, the shared-use medicines occupied a far more important place in clinical prescriptions of TM than TCM. Among the medicinal materials that were used in more than 51 Tibetan clinical preparations, shared-use medicines in TM and TCM accounted for 73%, and 90% of those were imported from South Asia, Southeast Asia, and Western regions. Of the top 10 medicinal materials in usage frequency, most were imported, except for musk and Zha-xun.

Comparison of the therapeutic systems of shared-use medicines used in TM and TCM

The present study has attempted to group the shared-use medicines according to the similar types of diseases that affect the same part of the body; data was extracted from Tables 1, 2, 3, 4 and 5, as shown in Table 10.

It can be easily observed from Table 10 that there was a high similarity between TM and TCM in treating digestive diseases, respiratory ailments, circulatory system diseases, and urogenital disorders. A large proportion of herbal aromatics viz., Dalbergia odorifera T. Chen, Resina ferulae, Kaempferia galanga L., Piper longum L., Amomum kravanh Pierre ex Gagnep, Ewgewia caryophyllata Thunb., Piper nigrum L., Myristica fragrans Houtt., Alpinia katsumadai Hayata, Alpinia

Table 8

| Number of preparations involved | Scientific name of the shared-use medicines | The number of shared-use medicines/ The total number of medicinal materials[1] (percentage composition) |
|---------------------------------|------------------------------------------|---------------------------------------------------------|
| > 300                           | Terminalia chebula Retz. (Terminalia chebula Retz., Terminalia chebula Retz. var. torrentella (Kurz) C. B. Clarke), Carthamus tinctorius L., Aucklandia lappa Decne. | 3/3 (100%) |
| 201~300                         | PHYLLANTHI FRUCTUS, Amomum kravanh Pierre ex Gagnep, Punica granatum L., Zha-xun, Piper longum L, Ewgewia caryophyllata Thunb., MOSCHUS (Moschus beranzovskii Flerov, Moschus moschiferus Linnaeus, Moschus silanicus Buchner), Inula racemosa Hook.f., Myristica fragrans Houtt. | 9/9 (100%) |
| 99~200                          | Calcium, BOVIS CALCULUS, Adhatoda vasica Nees, CINNAMOMI CORTEX, Aquilaria agallocha Roxb (Aquilaria sinensis (Lour.) Gilg, Aquilaria agallocha Roxb), Zingiber officinale Rosc., Glycyrrhiza uralensis Fisch. (Glycyrrhiza uralensis Fisch., Glycyrrhiza inflata Batt.), Amomum tsao-ko Crevost et Lemair, Styrax benzoin Dryand., Tinospora sinensis (Lour.) Merr. | 10/19 (53%) |
| 51~100                          | BAMBUSAE CONCRETIO SILICEA (Bambusa textilis McClure and Schizostachyum chinense Rendle root exudates), Dalbergia odorifera T. Chen, OLIBANUM, Rubia cordifolia L., Selenarcots: Tibetanus G. Cuvier, Rhodiola crenulata-(Hook. f. et Thoms.) H. Ohba, Acer calamus L, Aconitum pendulum Bisch, Piper nigrum L., Crocus sativus L., Malva verticillata, Abelmoschus moschatus Medic, Cassia obtusifolia L., Tribulus terrestris L. | 14/19 (73%) |
| 11~50                           | FERULAE RESINA (Ferula fukanensis K. M. Shen, Ferula sinkangensis K. M. Shen), Kaempferia galanga L., Gossampinus malabarica (DC) Merr, Cinnabaris, MARGARITA (Cristata plicata (Leach), Hyriopsis cumingii (Lea), Pinctada martensii (Dunker)), Borax, Coralium | 7/103 (7%) |

Note: Considering that pomegranate seed rather than pomegranate is used in TM, pomegranate seeds and pomegranate were merged in this table.

Table 7

| Category | The first category | The second category | The third category | The fourth category | The fifth category |
|----------|-------------------|--------------------|-------------------|--------------------|-------------------|
| Number of different origins | 6 | 12 | 8 | 28 | 13 | 67 |
| Percentage of different origins | 49% | | | | |

The first category included varieties that distributed in both Tibetan region and the areas mainly controlled by the Central Plains regime in history; the second category included varieties that were mainly produced in the Tibetan Plateau and its surrounding areas; the third category included varieties that were imported from South Asia, Southeast Asia, and Western Regions; the fourth category included the varieties that were generated in the inland and that were traded in the Tibetan region; the last category included the varieties that were mainly imported from the Han district.
officinarum Hance, and Alpinia galanga (L.) Willd were used by both medicinal systems to treat digestive diseases, which indicated a high consensus of using volatile compounds to warm the stomach and promote digestion in TM and TCM.

The family and genus characteristics of shared-use medicines used in TM and TCM

In the present article, we have listed a total of 136 shared-use medicines in TM and TCM, of which angiosperm, belonging to 53 families and 101 species, was used the most, accounting for 71% of the total 136 types of shared-use medicines. Leguminosae was the most widely used family, followed by Zingiberaceae, Umbeliferae, Compositae, Liliaceae, Polygonaceae, Labiatae, Thymelaeaceae, and Ranunculaceae. Three pteridophytes (having two families and three species) were used in both TM and TCM. Sixteen animal resources and 12 mineral resource medicines were used, accounting for 12% and 9%, respectively, of the total. The high proportion is due to the wide use of animal and mineral resource medicines in TM. Detailed information was given in Table 11.

Discussion

It is interesting and complicated to discuss the relationships between the two neighboring traditional systems of medicine and their long histories. Naive materialism is the foundation of both; meanwhile, TM is largely influenced by Tibetan Buddhist culture while TCM is largely influenced by Confucian culture. In terms of medical theory and knowledge on medicinal materials, the two-, three-, five-, and six-group methods are widely used in both TM and TCM, such as the “five essences” (water, fire, soil, qi, air) of the former and the “five elements” (gold, wood, water, soil, fire) of the latter. There is a high similarity in knowledge of the two medicinal systems on properties and flavors of medicine; for example, both styles of medicine are grouped according to the properties of “cold and warm,” and “sour, bitter, sweet, pungent, and salty” are used both in the “six flavors theory” of TM and the “five flavors theory” of TCM. However, the present paper discussed the relationship of TM and TCM in terms of the similarity and dissimilarity of efficacy and the origins of shared-use medicines, instead of the philosophical theory.

The possible reasons for the similarity of different medical systems in the usage of medicine could be the following:

1. Significant pharmacological effects of medicine;
2. Mutual communication between the two medical systems about clinical practices;
3. Same influence of other traditional systems of medicine;
4. Coincidence.

While the reason for different medicinal properties of the same medicine varies, it could be due to the following:

1. Different medicinal parts or preparation used;
2. Different medicinal prescriptions;
3. Distinctive local culture and heritage of knowledge on medicinal application;
4. Diverse regional common ailments as well as natural and socioeconomic conditions;

Table 9: Shared-use medicines involved in TCM prescriptions

| Medicinal materials name | Scientific name | Usage frequency | Use frequency ranking in the original text |
|-------------------------|----------------|----------------|------------------------------------------|
| Glycyrrhizae Radix et Rhizoma | Glycyrrhiza uralensis Fisch., Glycyrrhiza inflata Bat. | 65.35% | 1 |
| Fritillaria | Fritillaria cirrhosa D.Don | 14.20% | 11 |
| Paeonieae radix rubra | Paeonia veitchii Lynch | 9.76% | 27 |
| Aquilariae Lignum Resinatum | Aucklandia lappa Decne. | 6.82% | 48 |

Table 10: Diseases groups according to medicinal property using shared-use medicines in TCM and TM

| Disease group                  | Number of TCM involved | Number of TM involved |
|-------------------------------|------------------------|-----------------------|
| Circulatory system diseases   | 12                     | 13                    |
| Urinary system diseases       | 18                     | 13                    |
| Immune system diseases        | 21                     | 31                    |
| Nervous system diseases       | 23                     | 16                    |
| Reproductive system diseases  | 24                     | 21                    |
| Motion system diseases        | 24                     | 14                    |
| Respiratory system diseases   | 36                     | 34                    |
| Digestive system diseases     | 61                     | 62                    |
Based on the research results, this article has drawn the following inferences.

**Medicinal knowledge exchange occurred during the parallel development of TM and TCM**

**Shared-use medicines are mostly determined by flora similarity and medicinal trade**

It can be observed in Table 12 that a total of 67 shared-use medicines were distributed in both the Tibetan and Han regions, accounting for 49% of the total. The Huaxia people originated in northwestern China, rising north of the Yangtze River and belonging to the China-Japan forest subregion. While the Tibetans rose in the Qinghai-Tibetan Plateau, where the eastern part belongs to the China-Himalayan ecological subregion, and the west is the Qinghai-Tibetan Plateau plant subregion. There is a large crossover in plant varieties between the two ethnic regions [25]. In comparing the shared-use medicines listed in Table 9 with common plants in Northern China [26] and the Tibetan regions [27], Compositae, Leguminosae, Gramineae, Ranunculaceae, Labiatae, Umbelliferae, Liliaceae, and Rosaceae are common families within both regions. Therefore, the large number of cross-plant species formed by flora is the main reason for the large number of shared-use medicines in the two traditional systems of medicine.

As shown in Table 12, 56 taxa of shared-use medicines were imported from the non-Han region to the Tibetan region, accounting for 35% of the total. On the other hand, 20 taxa were imported from the non-Tibetan region to Han inland, accounting for 15% of the total. This suggests that imported medicinal materials from the southern regions have some influence on the two medicinal systems, especially on TM (from Table 7), and that both TM and TCM have closely communicated with other extraterritorial medical systems and acquired practical experience regarding the usage of medicine.

1. **The shared-use medicines marked significant differences in their medicinal properties**

In the Tang dynasty, the central plains and Tubo exchanged information closely, according to the edited books and research articles. It is generally believed that TM has been largely influenced by TCM, which is reflected in the pulse diagnosis and visceral knowledge of TM [28]. However, this paper showed that shared-use medicines used in TM and TCM marked significant differences in their medicinal properties, and most of the widely used Tibetan medicines were imported from the non-Han area. The unique medicinal use of TM is reflected in earlier books, such as Yutu Materia Medica, Tara Materia Medica, and Miaoyin Materia Medica. Based on the analysis, this article believed that medicinal materials and medicinal use experiences of TM were mainly summarized by its clinical practitioners during and before the Tubo dynasty in the extreme natural conditions in the Tibetan plateau. TM developed in parallel with TCM and was greatly influenced, especially in medicinal resources by traditional medicinal systems in southern Asia in the later stage.

As for the shared-use medicines distributed in the Tibetan plateau listed in the Table 12, although they are local products, varieties such as Notopterygium incisum Ting ex H. T. Chang, Gentianae Macrophyllae Radix, Moschus, and Gansong, were recorded in the ancient traditional Chinese medicine and were traded to the Han region through the western Sichuan Plateau, which was controlled for a long time by the Central Plains dynasticism since the Qin and Han dynasties [29], as well as the southern Gansu province. For example, the use of Snow Lotus Herb [30] can be traced back to Qing dynasty in Supplements to Compendium of Materia Medica, which appears to be a teaching from Uygur Medicine, while the use of Arenaria kansuensis Maxim has been recorded in The Collection of Chinese Herbal Medicines 1975 version, which appears to be a teaching from folk practices. Therefore, the Tibetan plateau serves as a medicinal resource for TCM.

In summary, shared-use medicines by TM and TCM marked a significant difference in medicinal properties.

2. **Shared-use medicines with similar medicinal properties presented an obvious commercial**

### Table 11 Number of species used in shared-use medicines

| Classification | Family        | No. of species used |
|----------------|---------------|---------------------|
| Angiosperm     | Leguminosae   | 9                   |
|                | Zingiberaceae | 8                   |
|                | Apiaceae      | 7                   |
|                | Asteraceae    | 6                   |
|                | Liliaceae     | 4                   |
|                | Polygonaceae  | 4                   |
|                | Labiatae      | 3                   |
|                | Thymelaeaceae | 3                   |
|                | Ranunculaceae | 3                   |
|                | others        | 54                  |
| Gymnosperm     | Polypodiaceae | 2                   |
|                | Selaginellaceae| 1                  |
| Resinae        | –             | 5                   |
| Animalia       | –             | 16                  |
| Mineral group  | –             | 12                  |
| Others         | –             | 4                   |
### Table 12: Historical origins of shared-use medicines (classes I–V)

| Origins | I (A total of 19) | II (A total of 21) | III (A total of 14) | IV (A total of 68) | V (A total of 15) |
|---------|------------------|-------------------|-------------------|------------------|----------------|
| The first category | | | | | |
| Bungarus multicinctus Blyth, *Gos chambrensis Lam.*, *Rheum palmatum L.*, Selaginella pulvinita (Hook. et Greve.) Maxim., *Zingiber officinale Rosc.*, *Honeybee* | Allium sativum L., Coriandrum sativum L., Polygonatum sibiricum Delar., ex Redouté, *Stellera chamaejasme* Linn., Glycyrrhiza uralensis Fisch., *Aconitum* L. | Polygonatum sibiricum Delar., ex Redouté, *Stellera chamaejasme* Linn., Glycyrrhiza uralensis Fisch., | Areca catechu L. | Asparagus cochinchnensis (Lour.) Merr., *Chamaomeles speciosa* (Sweet) Nakai, Drynaria fortunei (Kunze) J.Sm. |
| | | | | | |
| Ophiocordyceps sinensis, *Rheum tanguticum* Maxim. ex Regel. | RHODIOLAE CRENULATAE RADOXET RHIZOMA, Mademima soulie (Franch.) Ling. | | Aresta kunsuensis Maxim, Utricularia ciliata D.Don, *Nardostachys jatamansi* (D. Don) DC., *Notopterygium forbesii* DC., *Chang*, *Sinoalpia straminea Maxim.*, Moschus *sibericus* L., Equus asinus Linnaeus, *Dendrobium hookerianum* Lindl. | |
| The second category | | | | | |
| Aucklandia lappi Decne., *Dalia coriaceae* Lebl., *Fritillaria sikangensis* K. M. Shen, *Fritillaria sikangensis* K. M. Shen, *Kämpferia galanga* L., *Piper longum* L. | Amomum kravarii Pierre ex Gagnep., Euphediao carophyllata Thunb., *Piper* nigrum L., Myristica fragrans Houtt. | Areca catechu L. | Boswellia carteri Birdw., *Coccus sativus* L., Dryobalanops aromatica Gaertn.*, | Aquilaria agallocha Roxb. |
| The third category | | | | | |
| Alpinia katsumadai Hayata, *Dalia coriaceae* Lebl., *Amomum tsao ko Grev. et Lem*. | Alpinia galanga (L.) Willd., Sesamum indicum L., *Aristolochia debilis* Sieb. et Zucc. | Gycynhiza uralensis Fisch, *Glycyrrhiza inflata* Bat, *Trigonella foenum-graecum* L. | Acorus catechu (L.f.)Willd, Adhatoda vasica Nees, BAMBUSA *CONCRETIO SILICEA*, | Aquilaria sinensis (Lour.) Gilg |
| The fourth category | | | | | |
| | | | | | |

The first category included varieties that were distributed in both the Tibetan region and the areas that were mainly controlled by the Central Plains regime in history; the second category included varieties that were mainly produced in the Tibetan Plateau and its surrounding areas; the third category included varieties that were imported from South Asia, Southeast Asia and Western Regions; the fourth category included the varieties that were generated in the inland and which were traded in the Tibetan region; the last category included the varieties that were mainly imported from the Han district.
characteristic of materia medica as well as the same chemical profile

It can be observed in Table 7 that, out of 19 shared-use medicines with similar medicinal effects (class I), a number of 13 were traded medicines, up to 68% of the total, which was much higher than other proportions. These varieties have marked an obvious commodity attribute. For example, RHEI RADIX ET RHIZOMA was commonly traded through the silk road. Ophiocordyceps sinensis was the representative example of traded medicine from the Tibetan region to Han inland, which was originally recorded in the ancient Tibetan medicinal book Ten Million Buddhist Relics by Suka·Nii6anmu-duoji (1439–1475). It was not traded in the Han region until the Kangxi period and was recorded in A General Description of Sichuan in the Yongzheng period. Rhodiola crenulata (Hook. f. et Thoms.) H. Ohba was recorded in Chinese Pharmacopoeia in the year of 1977 as commonly used Tibetan medicine, while currently it is widely used by traditional Chinese medicine.

As shown in the Table 12, among the shared-use medicines that are used in TM and TCM, there was a large number of aromatic medicines that are rich in volatile compounds. Those aromatic medicines are used to warm the stomach and promote digestion in both TM and TCM, which is closely related to the pharmacological activity of volatile components.

**Tibetan plateau not only provides medicinal usage knowledge of TCM, but it also serves as a supply of medicinal resources attributing to “high altitude” locations**

Tibetan culture exchanged medicinal information closely with Han culture officially during the Tang dynasty. After the perdition of the Tubo regime, the culture exchange moved towards the flock through the tea-horse ancient road. Medicines as Ophiocordyceps sinensis, Rhei Radix Et Rhizoma, Nardostachys chinensis Batal., Gentianae Macrophyllae Radix, Fritillaria cirrhosa D. Don, Notopterygium incisum Ting ex H. T. Chang, and Moschus were imported from the Tibetan plateau and were widely used in TCM. It can be observed in the Table 12 that a number of 16 traditional Chinese medicines were imported from the Tibetan plateau, which was much higher than the Tibetan medicines that were imported from the Han region (five species). The traditional Chinese medicines that were imported from the Tibetan plateau could be divided into the following three categories: the first category, such as Notopterygium incisum Ting ex H. T. Chang, Fritillaria, Moschus, and Gentianae Macrophyllae Radix, after a long history of medicinal use in TCM, were used quite differently in TM; the second category, such as Ophiocordyceps sinensis and Rhodiola Crenulatae Radixet Rhizoma, were used similarly in TM and TCM, because they were imported during the near ancient time or even in modern times; the last category, such as the Snow Lotus Herb, presented a different medicinal effect from TM, because of the influence of other traditional medicinal systems. In summary, the Tibetan plateau not only provides medicinal usage knowledge of TCM, but it also serves as a supply of medicinal resources. According to the literature, the western Sichuan and western Yunnan regions were the main trade routes. In contrast, few Tibetan medicines were imported from the Han region, and no available ancient literature could provide a clue that TM has learned knowledge from TCM. Therefore, this paper believed that TM started to acquire medicinal knowledge from TCM only in modern times. For example, Fritillaria cirrhosa D. Don has been used in TM to stop coughs, as it is used in TCM, only since modern times.

Attributed to its unique geographical location and cultural diversity, the Tibetan region plays a role as a development cradle for various traditional medical theories and knowledge.

Tibetan culture has been extensively and deeply influenced by many ancient civilizations of the world. It has been exchanging knowledge with ancient Indian, Central Plains and Persian cultures for a long time. During the Hellenistic period after Alexander’s expedition, it was inevitably influenced by the Mediterranean through ancient India. There are not many existing cultures like Tibetan culture that are influenced by multi-mainstream cultures from the ancient world. It also shows a stark contrast to the demised history of various cultures in the neighboring Western Regions.

Due to the religious influences and relatively closed environment, the social development of areas in the Tibetan region has been slow since the “Peihong period” of Tibetan Buddhism, thus providing conditions for the preservation and inheritance of medicinal knowledge. Taking the Terminalia chebula Retz., which is used most commonly in TM, as an example, its prescription “Da San Guo Tang” came from India and is still commonly used in a Tibetan compound recipe. In contrast, after the Ming dynasty, Terminalia chebula Retz. var. tomentella (Kurz) C. B. Clarke and Phyllanthi Fructus were almost discarded from use in TCM prescriptions. Tibetan medicine Zota and some other varieties are similar examples of this case. Therefore, we believe the medicinal distinctness of the Tibetan plateau has been preserved since the “Xiang Xiong” period, and foreign medicines, including Terminalia chebula Retz., Aucklandia lappa Decne, and Carthamus tinctorius L., have also been promoted in TM. This can be demonstrated by the special status of exotic species in Tibetan medicinal prescriptions.
Research results of the present study are scientific and representative

To verify the scientific research results, this study also compared 3107 TM varieties and more than 2200 kinds of TCM varieties according to the Dictionary of Chinese National Medicine and The Collection of Chinese Herbal Medicines. A total of 313 shared-use medicines were documented, and the proportions of each variety are 12% for class I, 12% for class II, 12% for class III, 60% for class IV, and 50% for class V, which was consistent with the results of this paper, thus indicating the representativeness of the statistical results of this study (Table 13).

Conclusions

The present study was based on the statistical analysis of the authoritative publications and papers of national medicine and traditional Chinese medicine. To reflect the exact clinical use status of TM and TCM and to make sure the results are representative, clinical formulas of TM were used for statistics.

Studies showed that medicinal knowledge exchange occurred during the parallel development of TM and TCM, the shared-use medicines are mostly determined by the flora similarity and medicinal trade and marked significant differences in their medicinal properties, and shared-use medicine with similar medicinal properties presented an obvious commercial characteristic of materia medica, as well as the same chemical profile. From the breed point of view, Tibetan plateau not only provides medicinal usage knowledge of TCM, but it also serves as a supply of medicinal resources, attributing to the "high altitude" influence. Attributed to its unique geographical location and cultural diversity, the Tibetan region plays a role as a development cradle for various traditional medical theories and knowledge.

Table 13 Shared-use medicines that are involved in more than 51 TM preparations

| Efficacy classification | Shared-use medicines |
|-------------------------|----------------------|
| Class I                 | Aucklandia lappa Deenh., PHYLANTHUS FRUCTUS, Alpinia katsumadai Hayata, Piper longum L., Anomum tsaoiko Crevest et Lemair, Dalbergia odorifera T. Chen, Rhodiola crenulata (Hook. f. et Thoms.) H. Ohba, Piper nigrum L. |
| Class II                | Myristica fragrans Houtt., ZINGIBERIS RHIZOMA, Ewgewia Caryophyllata Thunb., Rubia cordifolia L., Mahua verticillata. |
| Class III               | Glycyrrhiza uralensis Fisch., Glycyrrhiza inflata Bat. |
| Class IV                | Terminalia chebula Retz., Carthamus tinctorius L., MOSCHUS (Moschus berezovskii Florov, Moschus moschiferus Linnaeus, Moschus sibiricus Buchner), Calcium, BOVIS CALCULUS, Adhatoda vasica Nees, CINNAMOMI CORTEX, Punica granatum L., Styrax benzoin Dryand., Tinospora sinensis (Lour.) Merr., BAMBUSAE CONCRETIO SILICEA (Bambusa textillis McClure and Schizostachyum chinense Rendle root exudates), OLIBANUM, Selernactos thibetanus G. Cuvier, Aconitum pendule Busch, Crocus sativus L., Abelmachus moschatus Medic, Cassia obtusifolia L., Tribulus terrestris L. |
| Class V                 | Aquilaria agallocha Roxb |

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Authors’ contributions

MZ is involved in the study design, literature and vouchers review, systematicalization and analysis of the data, and wrote the first draft. KW is involved in the study and revised and finalized the manuscript. RG conceived and designed the study and supervised the whole work. SZ confirmed the drug efficacy in the table. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interest.

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