Analysis on the Application and Characteristics of Chinese Patent Medicines Containing Dried Rehmanniae Radix

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Abstract. Dried Rehmanniae Radix has sweet taste, and its drug property is cold. It acts on heart, liver and kidney. It has the effect of clearing heat and cooling blood, nourishing yin and promoting fluid production. The active constituents of dried Rehmanniae Radix are mainly iridoid glycosides, polysaccharides, oligosaccharides and so on. This article sorted and analyzed the application forms, efficacy, applicable symptoms and the frequency of the use of single traditional Chinese medicine in the Chinese patent medicines containing dried Rehmanniae Radix in the Chinese Pharmacopoeia of 2015. This method provides a train of thought for the further study of the pharmacological constituents of dried Rehmanniae Radix, and supplements the pharmacodynamics of Chinese herbal medicine of dried Rehmanniae Radix. It also provides ideas for the improvement of dried Rehmanniae Radix prescription and the new usage of its old prescription.

1. Introduction

Rehmannia is fresh or dry root of Scrophulariaceae plant. It’s mainly produced in Henan, and its quality is better in Henan Province of Wenzhang County, Qinyang, Wuzhi, and Boai County. In the fall to dig rehmannia and to remove the reed head, fibrous roots mud for fresh use; or to slowly bake to about 80% dry rehmannia root. The former was said the “fresh rehmannia”, and the latter was called dried Rehmanniae Radix. Dried Rehmanniae Radix was first recorded in “The Shen Nong Ben Cao Jing”. It has sweet taste and its drug property is cold. It acts on heart, liver and kidney. It has the effect of qingreliangxue and yangyinshengjin [1]. The current research on pharmacological action on dried Rehmanniae Radix showed that it has neuroprotective effect, reinforcement learning and memory ability, immune enhancement, inhibiting pulmonary fibrosis, anti-inflammatory and antipyretic and haemostatic, removing blood stasis and promoting blood circulation, blood glucose, anti-tumor, anti-oxidation, anti-aging, protecting the gastric mucosa, bacteriostasis, estrogen-like effect [2-5]. In the application of dried Rehmanniae Radix, it is often mixed with other Chinese herbs to form a prescription for the treatment of some diseases. The traditional Chinese medicine is under the guidance of TCM theory to Chinese herbal medicine as raw materials, production in accordance with the provisions of the prescription, production technology and quality standard, the utility model has the advantages of convenient carrying, convenient use, and good safety. Different from the single target therapy of Western medicine, Chinese patent medicine has the characteristics of multiple components, multiple levels and multiple targets. Combined with the above advantages, Chinese patent medicines are more and more popular among the majority of people. This article sorted and analyzed the application forms, efficacy, applicable symptoms and the frequency of the use of single traditional Chinese medicine in the Chinese patent medicines containing dried Rehmanniae Radix in the Chinese Pharmacopoeia of 2015. In this way, we hope to promote the innovative research and
clinical application of Chinese patent medicine containing dried Rehmanniae Radix in the field of traditional Chinese medicine.

2. The records of Chinese patent medicines containing dried Rehmanniae Radix in Chinese Pharmacopoeia
There are 152 Chinese patent medicines containing dried Rehmanniae Radix in Chinese Pharmacopoeia. According to the dosage form, these Chinese patent medicines are classified into pills, granules, tablets, mixture, capsules, ointments, liniment and aerosol, a total of 8 kinds, of which pills were the most, a total of 47 species. Details of the 8 formulations are shown in Table 2-1. Only 7 of the Chinese patent medicines containing dried Rehmanniae Radix can be used for external use, and the rest are all taken orally, indicating that dried Rehmanniae Radix is mostly used as part of a prescription for oral administration.

Table 2-1. The classification of the dosage forms of Chinese patent medicines containing dried Rehmanniae Radix

| the dosage forms | pills | granules | tablets | capsules | ointments | mixture | liniment | aerosol |
|------------------|-------|----------|---------|----------|-----------|---------|----------|---------|
| quantity         | 47    | 29       | 28      | 18       | 8         | 19      | 2        | 1       |
| Rate (%)         | 30.9  | 19.1     | 18.4    | 11.8     | 5.3       | 12.5    | 1.3      | 0.7     |

3. Characteristic analysis of forms of dried Rehmanniae Radix producing Chinese patent medicines
In 152 Chinese patent medicines containing dried Rehmanniae Radix which is recorded in the Chinese Pharmacopoeia of 2015, xinyuan capsule and jingwanhong ointment belong to the secret prescription. In addition to them, dried is made of the other Chinese patent medicines by four forms of decoction, fine powder of crude medicine, alcohol extract and oil-fried thing. The statistical results are shown in Table 3-1. It is found that dried Rehmanniae Radix mainly participates in making Chinese patent medicine by the form of decoction. The present study shows that the main bioactive substances in dried Rehmanniae Radix are a water-soluble component, which is consistent with above rules. However there are three other forms of dried Rehmanniae Radix used as intermediate. Taking alcohol extract as an example, we can speculate that there may be some heat unstable components in dried Rehmanniae Radix which can exert some pharmacological activity. That would be the basis and direction for further study of pharmacological active ingredients in dried Rehmanniae Radix.

Table 3-1. The four forms by which dried Rehmanniae Radix is made of the other Chinese patent medicines

|  | decoction | fine powder of crude medicine | alcohol extract | oil-fried thing |
|---|-----------|-------------------------------|----------------|----------------|
| quantity | 92        | 10                            | 45             | 3              |
| Rate (%)  | 61.3      | 6.7                           | 30             | 2              |

4. Characteristic analysis of functional classification of the Chinese patent medicines containing dried Rehmanniae Radix
According to the records of efficacy of qingreliangxue and yangyinshengjin about dried Rehmanniae Radix in the Chinese Pharmacopoeia of 2015, the 152 Chinese patent medicines containing dried Rehmanniae Radix are broadly classified. There are 43 Chinese patent medicines with the effect of qingre, accounting for 28.3%, and 14 Chinese patent medicines with the effect of liangxue, accounting for 9.2%, and 29 Chinese patent medicines with the effect of yangyin, accounting for 19.1%, and 9 Chinese patent medicines with the effect of shengjin, accounting for 5.9%. The Chinese patent medicine is characterized by multiple level and multiple target, and its clinical use of drugs not only
play a single effect, but at the same time play two or more effects. Therefore, there are 12 Chinese patent medicines exerting qingreliangxue, 11 Chinese patent medicines exerting qingreyangyin, 4 Chinese patent medicines exerting qingreshengjin, 3 Chinese patent medicines exerting liangxueyangyin, and 8 Chinese patent medicines exerting yangyinshengjin in the 152 Chinese patent medicines containing dried Rehmanniae Radix. In addition, related reports reported that dried Rehmanniae Radix has the modern pharmacological action of hematopoietic, suggesting that it also has the effect of yangxue, and there are 18 Chinese patent medicines with this effect, accounting for 11.8%. According to some books of traditional Chinese medicine recorded the effect of runchang of dried Rehmanniae Radix, there are 2 Chinese patent medicines with this effect, accounting for 1.3%. Be similar to prepared rehmannia root which can nourish the liver and kidney, dried may have the effect of nourishing the liver, kidney and heart for acting on the heart, liver and kidney. This provides the basis for further study on the modern pharmacological action of dried Rehmanniae Radix. Dried Rehmanniae Radix has the modern pharmacological action of homeostasis, which corresponds Chinese patent medicines containing dried Rehmanniae Radix, including zhihongchangpi pills, eye pills, zanglian pills and gongning granules. Some modern pharmacological actions of dried Rehmanniae Radix have not been applied in a prescription, which provides certain scientific basis for the new development of some old prescriptions. The above mentioned effects of Chinese patent medicines containing dried Rehmanniae Radix were summarized. The statistical results are shown in Table.4-1.

According to Table.4-1, the Chinese patent medicines containing dried Rehmanniae Radix mainly have the function of qingre, yangyin and yangxue, which reveals the application rule of dried Rehmanniae Radix in prescription. In addition, dried Rehmanniae Radix may have the effect of nourishing heart, liver or kidney, which provides a direction for further research on the modern pharmacological action of it.

**Table.4-1. Pharmacodynamic classification of Chinese patent medicines containing dried Rehmanniae Radix**

| Efficacy       | qingre | liangxue | yangyin | shengjin | yangxue | runchang | zhixue | nourishing the liver, kidney or heart |
|----------------|--------|----------|---------|----------|---------|----------|--------|--------------------------------------|
| quantity       | 43     | 14       | 29      | 9        | 18      | 2        | 4      | 32                                   |
| Rate (%)       | 28.3   | 9.2      | 19.1    | 5.9      | 11.8    | 1.3      | 2.6    | 21.1                                 |

5. **Characteristic analysis of using frequency of single herb in the Chinese patent medicines containing dried Rehmanniae Radix**

The using frequency of single herb in the Chinese patent medicines is counted. The single herbs are used more than 30 times as the standard, the results are as follows. There are 64 Chinese patent medicines containing Chinese angelica, 64 Chinese patent medicines containing Radix liquiritiae, 54 Chinese patent medicines containing Radix Ophiopogonis, 47 Chinese patent medicines containing Scutellaria baicalensis, 38 Chinese patent medicines containing Ligusticum wallichii, 48 Chinese patent medicines containing Radix Scrophulariae, 34 Chinese patent medicines containing Radix paeoniae Alba, 34 Chinese patent medicines containing Paeoniae Radix and 32 Chinese patent medicines containing Radix platycodonis. The statistical results are shown in Table.5-1.

It can be seen from the Table.5-1 that these 8 kinds of Chinese herbs are used in 152 kinds of Chinese patent medicines containing dried Rehmanniae Radix. The use of frequency from high to low is Chinese angelica, Radix liquiritiae, Radix Ophiopogonis, Radix Scrophulariae, Ligusticum wallichii, Radix Paeoniae Alba, Paeoniae Radix, Radix platycodonis. It is suggested that dried Rehmanniae Radix is often combined with traditional Chinese medicine of buyi, qingre or huoxue. And it provides the basis for the improvement of the prescription of dried Rehmanniae Radix with buyi, qingre and huoxue effect. The compatibility rule of dried Rehmanniae Radix has also been reported in other literatures [6].
Table 5-1. The using frequency of single herb in the Chinese patent medicines containing dried Rehmanniae Radix

| single herb |  |  |  |  |  |  |  |
|-------------|----------------------------|----------------------------|----------------------------|-----------------------------|-----------------------------|----------------------------|----------------------------|
| Radix liquiritiae | Chinese angelica | Radix Ophiopogonis | Ligusticum wallichii | Radix Scrophulariae | Radix paeoniae Alba | Paeoniae Radix | Radix platycodonis |
| The using frequency | 64 | 64 | 54 | 38 | 48 | 34 | 34 | 32 |

6. Conclusion

Dried Rehmanniae Radix is widely distributed in China, and it is one of the four Huai medicines in Henan. It is a commonly used Chinese herbal medicine. Some achievements have been made in the study of pharmacological action and active constituents of dried Rehmanniae Radix. At present, research shows that dried Rehmanniae Radix has neuroprotective effect, reinforcement learning and memory ability, immune enhancement, pharmacological action of inhibiting pulmonary fibrosis, anti-inflammatory and antipyretic and hemostatic, removing blood stasis and promoting blood circulation, blood glucose, anti-tumor, anti-oxidation, anti-aging, protect the gastric mucosa, antibacterial, estrogenic effects. The bioactive constituents of dried Rehmanniae Radix are iridoid glycosides, polysaccharides, oligosaccharides, etc. It has been preliminarily found that the active components of dried Rehmanniae Radix can be used as hemostatic agents, which are related to carbohydrates and iridoid glycosides. In lowering blood sugar, the active site P-BP-F has been found to have significant hypoglycemic effect. Catalpol, one of the effective components of dried Rehmanniae Radix, has the functions of lowering blood sugar, protecting nerve, protecting heart and resisting tumor. Study on polysaccharides of dried Rehmanniae Radix oligosaccharides and the discovery of dried Rehmanniae Radix polysaccharides can strengthen immunity, anti fatigue, anti anxiety, treatment of obesity; diabetes induced bone marrow mesenchymal stem cells to differentiate into neuron like cells. Dried Rehmanniae Radix oligosaccharides can improve glucose metabolism disorder, protect liver, and improve the survival ability of adipose derived mesenchymal stem cells.

In this paper, statistics on the Chinese patent medicines containing dried Rehmanniae Radix in the 2015 edition of Chinese Pharmacopoeia are carried out. It is found that the administration mode of Chinese medicine containing dried Rehmanniae Radix is less than that of topical use, and summarized the characteristics of the 152 kinds of Chinese patent medicines containing dried Rehmanniae Radix in the application form and efficacy, and analyzed the characteristics of these two aspects. The results show that the main application form of dried Rehmanniae Radix in the preparation of Chinese patent medicine is water decoction, and the traditional Chinese medicine containing dried Rehmanniae Radix mainly played the role of qingre, yangyin and yangxue. Compared with the single function of traditional Chinese medicine rehmannia root function and the active ingredients and modern pharmacological effects. It is found that dried Rehmanniae Radix may have the effect of nourishing the liver and kidney deficiency. However, it does not reflect the modern pharmacological effects of dried Rehmanniae Radix. The former provides the direction for the further study of the modern pharmacological action of dried Rehmanniae Radix, and the latter provides the direction and thought for the new use of dried Rehmanniae Radix. This paper also sums up the 152 kinds of Chinese medicine containing Rehmannia single herb in the frequency of use, and analyzes the characteristics. The results show that dried Rehmanniae Radix is combined with Chinese medicines of buyi, qingre and huoxue, which provide the basis for giving full play to its efficacy and improving the related prescription.

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