Modern Research and Application of Ginseng Flower

Rui ZHANG\textsuperscript{a}, Ming BAI\textsuperscript{b}, Yan-Yan MIAO\textsuperscript{c}, Ming-San Miao\textsuperscript{d,\ast}

Henan University of Chinese Medicine, Zhengzhou, Henan, China

\textsuperscript{a}zhangruiyol@126.com, \textsuperscript{b}baiming666@126.com, \textsuperscript{c}13823276201@139.com, \textsuperscript{d}miaomingsan@126.com

\astCorresponding author

Keywords: Ginseng flower, Pharmacological activity, Medicinal value, Application prospect.

Abstract. Ginseng is one of the most valuable medicinal materials in China, and has high application value. Ginseng roots, stems, leaves, buds and fruits have strong pharmacological activity and potential medicinal value. In modern research, the active and nutrient content of ginseng flower is not less than that contained in ginseng, and its application value is still to be developed. But at present, the research and application of ginseng flower is less. Through consulting the domestic literature in recent years, the main chemical components, pharmacological activities and related applications of Panax ginseng flower were summarized.

Introduction

Ginseng flowers are dried unopened inflorescence of Panax ginseng. It is also known as gnome flower, wild ginseng flower, blood ginseng flower and yellow ginseng flower. Ginseng flowers are mainly distributed in China's Jilin, Liaoning, Heilongjiang, Shanxi, Hubei and other places. Ginseng flower has the effects of wisdom, tranquilizing the mind, invigorating qi and strengthening body, relieving heat and relieving pain, and skin care cosmetology. Ginseng flower is sweet, taste is bitter and cool, belongs to the spleen, lung meridian. It is used for dizziness, shortness of breath, neurastheniachest, ahypnosis, lumbar acid, backache, hyperlipidemia and hypertension \cite{1}. It is reported that ginseng flowers contain twenty kinds of saponin active substances, seventeen amino acids, eleven trace elements, three kinds of anticancer active selenium and crude protein. Although ginseng has less medicinal value than ginseng, the nutritive value of ginseng flowers is 3 times higher than that of ginseng. The content of Trace Element Germanium in ginseng flower is very rich, which can be used as a good product for replenishing the vital energy of human body \cite{2}. At present, we should focus on the research of ginseng bud.

Chemical Composition

Ginseng flowers contain saponins, volatile oils, fatty acids, polysaccharides, flavonoids and other ingredients. At present, the research of ginseng flower is mostly concentrated on Ginsenoside. The research shows that the ginsenoside components extracted from ginseng flowers Rb1, Rd, Re, Rg are consistent with ginseng roots. In 1978, Yahara isolated and purified a new saponins from ginseng buds. Up to now, more than 200 kinds of ginsenoside monomer have been isolated and identified \cite{3}. In recent years, with the development of chemical constituents of ginseng buds, a large number of ginsenosides have been isolated.
from ginseng buds. Xu Fei separated out of 11 compounds from ginseng flowers in 70% ethanol solution, and first separated 4 compounds, 20(S)-ginsenoside Rh1, 20(S)-ginseng three alcohol, DMA-20(21), 24-diene-3β, 6α, 12β-three alcohol and DMA-(E)-20(22), 24-diene-3β, 6α, 12β-three alcohol [4]. For the first time, Pan Xiaoling isolated soybean sterol3-O-glucoside, alpha spinosol and 7-sterene-3β alcohol from ginseng flowers [5]. Wang Enpeng analyzed fatty acids in ginseng flowers by acid catalysis and GC-MS. The results showed that the content of unsaturated fatty acids in Panax ginseng flower was rich, reaching 58.62% of the total effluent peak area, and the content of linoleic acid methyl ester was the highest, up to 41.92% [6].

**Pharmacological Action**

The polysaccharides and soaping substances of ginseng flowers are all of effective components with pharmacological effects, and the pharmacological effects of ginseng flowers are still in the basic stage.

**Influence on the heart.** The experimental study showed that ginsenoside Rb1 could reduce the release of CPK and the aggregation of Ca²⁺ induced by ischemia-reperfusion in isolated perfusion rat heart, and play a protective role in myocardial ischemia. A certain dose of ginsenoside could increase the cCMP content of myocardium and increase the cAMP of myocardium in mice. Zheng Weiling proved that the total saponins of ginseng flower can increase the cardiac contractility of the isolated rat heart and reduce the injury ability of the ischemic myocardium [7]. In addition, ginsenosides also have certain platelet inhibition and antithrombotic effects.

**Influence on blood.** Yu Xiuhua observed the effects of ginseng flower extract on Hemorheological Indexes in rats with Qi deficiency and blood stasis syndrome [8]. The results showed that compared with the model group, the content of TXB2 and the ratio of TXB2/6-Keto-PGF1α in the high and medium dose of ginseng flower extract decreased significantly, and the content of 6-Keto-PGF1 increased significantly. In the small dose group, the content of TXB2 and the ratio of TXB2/6-Keto-PGF1α decreased, and the content of 6-Keto-PGF1α increased.

**Anti fatigue.** Song Li chose ginseng root and ophiopogon japonicus, ginseng root and astragalus membranaceus, ginseng flower and ophiopogon japonicus, ginseng flower and astragalus membranaceus. She compared the above components in different proportions and studied their pharmacological activities. The results showed that ginsenoside Re was 15.4 times higher than ginseng root, and ginsenoside Rd was 76.3 times of ginseng root. It was found that the compatibility of ginseng flower with astragalus membranaceus or ophiopogon japonicus could prolong the swimming time of mice [9]. Lin Nan studied the anti-fatigue effect of ginseng flower extract on mice. She measured loaded-swimming time, blood lactic acid, muscle glycogen and glycogen content in mice. It was found that a certain dose of ginseng flower can significantly prolong the time of weight swimming in mice, increase the reserve of glycogen and liver glycogen, and obviously reduce the level of blood lactic acid after exercise. It enhanced the adaptability of mice to exercise load and anti-fatigue effect [11].

**Anti-oxidation and anti-aging.** Wan Qianlin used ginseng flower polysaccharide to study in vitro antioxidant experiments. The results showed that ginseng flower polysaccharides could scavenging two benzyl acyl free radicals and hydroxyl radicals. This ability increases with increasing concentration of polysaccharides [11]. Ma Lin uses self-made ginseng oligosaccharides to study the effects of D-Gal intraperitoneal injection on aging mice.
Compared with the model group, the activity of SOD, GSH-Px and CAT in the serum of ginseng flower oligosaccharide group decreased significantly, and the content of MDA increased significantly, the activity of SOD, CAT and GSH-Px in the liver of mice was significantly increased [12].

**Alleviating alcoholic liver injury.** Liu Guancheng used ginseng flower extract to treat alcoholic liver injury in rats. The results showed that ginseng flower extract could also reduce the serum levels of TC and TG in rats with alcoholic fatty liver. The extracts of ginseng flower can promote the oxidative decomposition of TC and TG in the serum and liver of rats, reduce the content of free fatty acids in the serum, reduce the free fatty acid flow to the liver and alleviate the fatty degeneration of liver cells. At the same time, the results of this experiment showed that the extract of ginseng flower significantly reduced the content of MDA in the liver tissue of alcoholic fatty liver model rats, significantly increased the content of GSH, and promoted the recovery of oxidation and antioxidant mechanism [13].

**Toxic effects.** Yang Ming used rat acute toxicity test and genotoxicity test to study the toxicity of ginseng flower solution. The results showed that ginseng flower was a real no poison and no genetic toxicity. It could be taken for a long time [14].

**Application Value**

In recent years, many studies have shown that the most valuable part of ginseng is not the root but the flower buds of ginseng. Most of the medicinal value of ginseng comes from ginsenosides. The total ginsenoside content in ginseng bud is 5.06 times than ginseng root. The content of ginsenoside Rd is as high as 2.77%, which is 13.85 times that of ginseng root. The unique germanium element in the flower buds of ginseng has the function of improving the body's resistance to fatigue and aging. In addition, ginseng buds contain unique ginseng bud 9 peptide and 11 peptide, all belong to small molecular peptide, can be completely absorbed by the human body, known as the correction peptide, can quickly and accurately identify the human cell cAMP-cGMP balance. At present, ginseng flowers are mostly used in tea drinks, compound drinks, and are often used to assist in the treatment of some common diseases, such as qi deficiency, neurasthenia, indigestion, gastric cancer, lung cancer and so on. The researchers also found the unique saponins of ginseng flower buds, which can effectively promote the replication of DNA, the transcription and translation of RNA. It also can regulate the secretion of balance in the body and improve the sexual function effectively [15]. Ginseng, as a unique Chinese medicine, has become one of the most popular and expensive plant drugs in the world, and at least 6 million Americans take it. In recent years, Germany has imported more than 30 tons of ginseng buds from China every year [16].

**Conclusion**

Flower medicine is relatively small in toxicity and light in texture. It has many functions of ascending and outward spreading. Most of them have the function of clearing away the exterior and dispersing evil and eliminating the detoxification. *Compendium of Materia Medica* records, the nutritive value of ginseng flower is 3.2 times higher than that of ginseng. It contains rich germanium, which is 3 times of Ganoderma lucidum, 6 times of garlic and 55 times of aloe. Germanium is known as the "magic element" in the medical field, and has excellent activity. It can help eliminate free radicals in the body, improve the environment of the body, maintain the normal metabolism of the human body, avoid the aging of the cells, make the body energetic, and can enhance the immunity of the body and prevent the tumor.
At present, the application of ginseng has shifted from the previous use of roots to more comprehensive flowers, fruits, stems and leaves. Ginsenosides are the main active ingredients in ginseng. They are widely distributed in the flowers, stems, leaves, fruits and roots of Panax ginseng. The pharmacological effects of the known ginsenosides include enhancing the immune function, anti-tumor, anti-aging, antivirus and antiviral, protecting the heart and liver, anti-lipid peroxidation and hyperlipidemia, promoting cell proliferation and regulating the central nervous system, etc. Experimental studies showed that ginseng flowers had no acute toxic reaction and could be used for a long time. With the improvement of people's living standard in China, the demand for health products is stronger. Ginseng flower can be used as a raw material for health products. Although there are some health foods and drinks containing ginseng flowers in the market. But the lack of complete food safety evaluation has hindered the development of ginseng flowers. The medicinal value of ginseng bud is far above that of ginseng. In order to make the best use of ginseng buds, we should optimize the extraction process of ginseng bud, deepen the study of its pharmacological activity, establish a quality and safety evaluation standard for compound health products and foods with ginseng buds as main components. In order to improve the utilization rate of active ingredients, we must make deep processing on the active ingredients and by-products of flower medicine. Besides, on the basis of medicinal value, we should develop its non-medicinal uses and medicinal uses of economic plants.

Acknowledgement

Foundation project: national international cooperation base (2016-15), Henan province production and research project (172107000012) Zhengzhou industry university research project (2016-4-16)

References


[16] European scientists found that the medicinal value of ginseng buds is much more than that of ginseng [J]. China Agricultural Information, 2005 (03): 17.