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Using Big Data to Analyze the Processing Technology, Chemical Composition, and Pharmacological Effects of Paeoniae Radix Alba

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Abstract:
Paeoniae Radix Alba, as a commonly used menstrual regulation and hemostatic drug in clinical practice, has a wide range of uses and a large amount of usage. The processing technology and products of the traditional Chinese medicine Paeoniae Radix Alba have been used since ancient times. Currently, the processed products of Paeoniae Radix Alba include wine Paeoniae Radix Alba, fried Paeoniae Radix Alba, earth Paeoniae Radix Alba, vinegar Paeoniae Radix Alba, etc. Different processed products of Paeoniae Radix Alba have different clinical purposes. Compared with their raw products, the processed products of Paeoniae Radix Alba have certain differences in chemical composition and therapeutic effects. Therefore, it is particularly important to choose the appropriate variety of Paeoniae Radix Alba in clinical application; The chemical components contained in Paeoniae Radix Alba determine its different pharmacological effects. This article is based on big data analysis as a means, and through extensive literature research and analysis, using computer-aided functions, it is finally concluded that the main chemical components contained in Paeoniae Radix Alba include terpenes, flavonoids, tannins, and various volatile oils; Paeoniae Radix Alba has various pharmacological effects such as anticonvulsant, antiepileptic, sedative, analgesic, and anti-inflammatory. Summarize and summarize the modern processing methods, chemical components, and pharmacological effects of Paeoniae Radix Alba through literature review, in order to provide reference for in-depth research on Paeoniae Radix Alba.

Keywords: Big data, Paeoniae Radix Alba, Processing methods, Chemical components, Pharmacological effects.

INTRODUCTION

The dried roots of Paeonia lactiflora Pall, a plant in the Ranunculaceae family, are commonly used traditional Chinese medicine with abundant medicinal resources and low prices. The main functions of Paeonia lactiflora Pall are to nourish blood, calm liver and suppress yang, and relieve pain slowly. In clinical practice, it is often used to treat liver (heart) blood deficiency syndrome, liver yang hyperactivity syndrome, and spasmodic pain in internal organs, abdomen, limbs, muscles, etc. It is often used in combination with licorice. Paeoniae Radix Alba has a long history of use as a traditional Chinese medicine, and is scattered as "red peony" in the earliest surviving herbal work "Shennong Materia Medica Classic": "There are two types of red peony: red peony benefits urination, Paeoniae Radix Alba relieves pain and dissipates blood. Later, in the Ming Dynasty's herbal works such as "Medicine Huayi", the red peony andPaeoniae Radix Alba were divided into two medicinal herbs for recording [1]. The efficacy ofPaeoniae Radix Alba was recorded in the "Materia Medica", but there was no record of the processing method until the first simple description of "cut" appeared in the "Annotations on Typhoid Diseases" of the Han Dynasty. From the perspective of ancient Chinese herbal works, the processing techniques of Paeoniae Radix Alba include cutting, steaming, and rice frying [2]. The commonly used modern processing techniques of Paeoniae Radix Alba include stir friedPaeoniae Radix Alba, winePaeoniae Radix Alba, vinegarPaeoniae Radix Alba, and earth friedPaeoniae Radix Alba. As an era of rapid computer development, big data analysis has already demonstrated its cutting-edge nature in many fields. This article adopts a dual approach of traditional paper literature review and computer big data analysis to understand that nearly 150 chemical components have been isolated from the traditional Chinese medicine decoction pieces of Paeoniae Radix Alba, of which volatile oil components account for one-third. They also include some terpenoids (monoterpenoids, triterpenes), organic acids, tannins, steroids, flavonoids, and glycosides [3]. Modern pharmacological studies have shown that the active component of Paeonia lactiflora that plays the main pharmacological role is monoterpenoid glycosides, namely total glycosides of Paeonia lactiflora (TGP), it has various pharmacological effects such as analgesia [4], anti-inflammatory [5], antidepressant [6], liver protection [7], etc.

HISTORICAL EVOLUTION OF PAEONIAE RADIX ALBA PROCESSING

The biggest difference between Paeoniae Radix Alba and red peony lies in their different processing methods. Red peony is usually dried and used raw without any treatment after excavation; Before use, Paeoniae Radix Alba usually needs to be "peeled" and then boiled in water. The term "peeled" first appeared in the "Golden Chamber Yuhan Jing", and the processing processes such as purification and cutting have been used to this day. A brief summary of the processing history of Paeoniae Radix Alba is shown in Table 1 [8].

Table 1. Summary of the processing history of paeoniae radix alba

Dynasty	Record of processing methods	source
Han dynasty	cutting	<Annotate the theory of typhoid fever>
During the Northern and Southern Dynasties period	Steamed with Honey Water	<Lei Gong's Treatise on Artillery Burning>
Tang dynasty	Boiling Yellow	<Prepare Urgent Thousand Gold Prescription>
Song dynasty	Stir fry or stir fry slightly; Baking; Cooking; Stir fried with wine	<A Complete and Effective Prescription for Women><Popularize the parties involved><General Introduction to Pediatric Health><Bianque's worries>
Yuan dynasty	Fried charcoal; Stir fried rice in water	<Danxi Heart Technique><Effective World Medicine>
Ming Dynasty	Stir fried with mint sauce	<Examining Yao Han>
Qing dynasty	Soy fried; Simmering	<Theory of seasonal diseases><A miraculous and effective prescription>

RESEARCH ON THE MODERN PROCESSING TECHNOLOGY OF 2 PAEONIAE RADIX ALBA EXCIPIENTS

The processing method of ancient Paeoniae Radix Alba is still in use today. According to the 2020 edition of the Chinese Pharmacopoeia, the processing process of Paeoniae Radix Alba is "washed, moistened, thinly sliced, and dried". After processing, the cold nature of Paeoniae Radix Alba is alleviated, with the main focus on nourishing blood and nourishment, astringing yin and stopping sweat. The processed products of Paeoniae Radix Alba recorded in the Chinese Pharmacopoeia mainly include wine Paeoniae Radix Alba. After being roasted with wine, the sour and cold nature of the Paeoniae Radix Alba decreases, and it enters the bloodstream. It is good at regulating menstruation and stopping bleeding, softening the liver and relieving pain; In addition, vinegar can introduce drugs into the liver and enhance the effect of soothing the liver and relieving depression; After frying with soil, soil qi can be used to enter the spleen, enhancing the effects of nourishing blood and spleen, and stopping diarrhea; Modern research has shown that there are significant changes in the composition of Paeoniae Radix Alba before and after processing. This article reviews the modern processing methods of Paeoniae Radix Alba.

Stir Fried Paeoniae Radix Alba with Wine Moistening Bran

Wang Jianke et al. [9] used L9 (34) orthogonal experimental design and comprehensive scoring method to better control the quality of Paeoniae Radix Alba decoction pieces. The drying method and time, stir frying temperature, wheat bran dosage, stir frying time, and Huangjiu dosage were used as inspection factors. Paeoniflorin, paeoniflorin, water-soluble extract, and alcohol soluble extract were used as evaluation indicators to optimize the wine making process of Guizhou Paeoniae Radix Alba. The results showed that when the dosage of Paeoniae Radix Alba was 250g, First, use 10% yellow wine to moisten the slices until they are completely soaked, dry them at a temperature of about 50 ℃ for 30 minutes, and then stir fry 5% wheat bran at a temperature of 150 ℃ for 8 minutes. The comprehensive score obtained from this process is 0.7413, which is the best process for stir frying Paeoniae Radix Alba with wine moistening bran.

Soy Fried Paeoniae Radix Alba

Shen Jiantao [10] conducted a detailed study on the soil frying and processing technology of Paeoniae Radix Alba. The response surface center composite experimental design method was used, and the processing temperature, processing time, and soil dosage of Paeoniae Radix Alba were used as the evaluation indicators to optimize the soil frying and processing technology of Paeoniae Radix Alba. The research results showed that when 100g of Paeoniae Radix Alba was processed with 30g of stove core soil, the soil frying temperature was 220 ℃, and the time was 9 minutes, The content of paeoniflorin and paeoniflorin in the Paeoniae Radix Alba decoction pieces has reached its peak. When optimizing the process of frying Paeoniae Radix Alba with soil using response surface methodology, the optimal process was found to be at a temperature of 201.1 ℃, with a processing time of 11.3 minutes and a dosage of 29.9 g of stove core soil. Combined with the actual situation in Xi'an, the optimal process was at a temperature of 200 ℃, with a frying time of 11 minutes and a dosage of 30 g of stove core soil. Through experimental verification, this method was stable and reliable.

Stir Fried Paeoniae Radix Alba with Bran

Stir fried Paeoniae Radix Alba with bran is a typical modern processing technique for Paeoniae Radix Alba. Although it has not been included in the Chinese Pharmacopoeia, the fried Paeoniae Radix Alba has a golden color and beautiful appearance during

the frying process, and the processed products are better at entering the liver and spleen meridians. In Liu Sijing's [11] research on the key technologies for the industrialization of roasted Paeoniae Radix Alba with bran, the indicators of the processing technology of Paeoniae Radix Alba were quantified. By examining single factors such as bran dosage, frying time, and frying temperature, a diversified quality control system was established, with no evaluation indicators for total peony glycosides. At the same time, total peony glycosides, Paeoniae Radix Alba polysaccharides, tannins, and extracts were used as quality indicators. Through single factor experiments, the frying time should be controlled within 8-12 minutes, the amount of wheat bran should be controlled within 10-20%, and the appropriate frying temperature should be 100-150 ℃; The optimal process for stir frying Paeoniae Radix Alba with bran was obtained by using L9 (33) orthogonal experimental method. The amount of bran added was 10%, the temperature was controlled at 130 ℃, and the stir frying was carried out for 10 minutes, which was verified through experiments. Zhang Yonghao [12] used orthogonal experimental method to compare the total content of paeoniflorin and paeoniflorin in Paeoniae Radix Alba wine and stir fried Paeoniae Radix Alba with honey bran. The results showed that the production of Paeoniae Radix Alba with honey bran had the best results, and the optimal processing technology was wheat bran: honey: water at 10:5:1. Meng Ran et al. [13] used the BOX Behnken response surface methodology to optimize the process of stir frying Paeoniae Radix Alba with bran. The results showed that the optimal process for stir frying Paeoniae Radix Alba with bran was to quickly stir fry at 330 ℃ for 4 minutes at a ratio of 5:1 between Paeoniae Radix Alba and wheat bran.

Liquor Made Paeoniae Radix Alba

As the largest proportion of processed products among modern varieties of Paeoniae Radix Alba, JiuPaeoniae Radix Alba has mature processing methods and techniques. Ma Lingzhen et al. [14] used high-performance liquid chromatography to determine the effective component of Paeoniae Radix Alba, paeoniflorin, and analyzed and compared the content of effective components in JiuPaeoniae Radix Alba with different amounts of yellow wine and processing times. The experimental results showed that the optimal selection process is a ratio of Paeoniae Radix Alba to yellow wine with a dosage of 10:1, The optimal processing time for Paeoniae Radix Alba wine is 15 minutes. Zhang Yonghao [8] used orthogonal experimental method to optimize the processing technology of Paeoniae Radix Alba wine. The total content of paeoniflorin and paeoniflorin was used as evaluation indicators, and the best processing technology of Paeoniae Radix Alba wine was obtained by considering factors such as soaking time, dosage of yellow wine, baking time, and baking temperature. The results showed that the best processing technology of Paeoniae Radix Alba wine was: soaking for 60 minutes, dosage of yellow wine at 15%, and baking at 100 ℃ for 60 minutes. Li Jin et al. [15] conducted a single factor experiment to optimize the purification process of Paeoniae Radix Alba, and an orthogonal experiment to optimize the processing process of Paeoniae Radix Alba wine. Using appearance, paeoniflorin content, moisture content, and other evaluation indicators, the optimal dosage, time, and cost of yellow wine were selected. The experimental results showed that the optimal process was 15% yellow wine dosage, 60 minutes of brewing time, and 100 ℃ temperature.

Vinegar Made Paeoniae Radix Alba

Li Zhenyu et al. [16] used HNMR metabolomics technology combined with multivariate statistical analysis to compare and analyze the Paeoniae Radix Alba processed with different types of vinegar. Rice vinegar and aged vinegar were used to process the Paeoniae Radix Alba, and the results showed that the Paeoniae Radix Alba processed with rice vinegar had a high content of sucrose and total glycosides of peony. The Paeoniae Radix Alba processed with aged vinegar had a high content of primary metabolites such as amino acids and peony lactone glycosides. From the perspective of chemical changes, the changes in aged vinegar Paeoniae Radix Alba are greater than those in rice vinegar Paeoniae Radix Alba.

CHEMICAL CONSTITUENTS OF PAEONIAE RADIX ALBA

According to literature review and organization, the chemical components isolated from the traditional Chinese medicine Paeonia lactiflora mainly include terpenoids, phenylethanol glycosides, volatile oils, flavonoids, tannins, steroids, organic acids, etc. Abbreviations and Acronyms

Terpene Compounds

The terpenoids extracted from Paeoniae Radix Alba mainly include monoterpenoids, triterpenes, and glycosides. Monoterpenoids generally refer to terpenoids and their derivatives formed by the polymerization of two molecules of isoprene. Monoterpenoids and their glycosides are the most important chemical components of Paeonia lactiflora, closely related to its physiological activity and pharmacological effects. Triterpenoids are another major component in Paeonia lactiflora, formed by the removal of hydroxyl groups from multiple isoprenoids and their end-to-end connections.

Paeoniflorin is the earliest discovered pinane monoterpene glycoside [3]. Since it was first discovered in Paeoniae Radix Alba by Shibata [17] et al. in 1963, research on the chemical composition of Paeoniae Radix Alba has gradually deepened, and 48 monoterpene compounds have been obtained from Paeoniae Radix Alba [18], such as hydroxybenzoyl paeoniflorin, benzoyl paeoniflorin, paeoniflorin, and paeoniflorin.

The triterpenoid compounds in Paeoniae Radix Alba were isolated by Ikuta et al. [19]in 1995. In 1997, Kamiya et al. [20] first isolated two other triterpenoid compounds from Paeoniae Radix Alba. In 2016, Fu et al. [21] first extracted two triterpenoid compounds, paeonenoide D and paeonenoide E, and isolated 11 α, twelve α- Epoxy-3 β, there are a total of 9 triterpenoid compounds. In 2019, Wang et al. [22] isolated four mixed terpene compounds using methods such as silica gel column and constant concentration elution. More and more monoterpenoid compounds in Paeonia lactiflora have been extracted and separated.

Phenylethanol Glycosides

According to literature review, there are currently three phenylethanol glycosides extracted and separated from Paeonia lactiflora, including 2-phenylacetyl - [α- L-pyranorhamnoglycan - (1 → 6)- β- D-glucoside, 2-phenylacetyl - [β- D-glucan - (1 → 6)- β- D-glucoside, 2-phenylacetyl- β- D-glucoside [23].

Volatile Oil Compounds

Paeoniae Radix Alba contains about 55 volatile oil components such as holly oil, linoleic acid, and palmitic acid, among which palmitic acid has the highest content [24].

Tannin Compounds

Tannins are a type of complex polyphenolic compounds widely present in plants, which can combine with proteins to form insoluble precipitates. The tannins isolated from the traditional Chinese medicine Paeonia lactiflora are mainly tannin compounds based on gallic acid.

Nishizawa et al. [25] isolated galloyl tannin compounds from the roots of Paeonia lactiflora and identified the structures of l, 2, 3, 6-O-tetragalloyl glucose and 1, 2, 3, 4, 6-O-pentagalloyl glucose. Tan Jingjing [26] used silica gel column chromatography, Sephadex LH-20 column chromatography, ODS column chromatography and other separation methods, and analyzed and identified the structure through spectroscopic methods. Fifteen compounds were isolated from Paeonia lactiflora, among which compound 6-O-galloyl group- β- D-glucopyranose was first isolated from a plant of the genus Paeonia, and the compound pyrogallol was first isolated from this plant. At present, there are more than 30 types of tannin compounds isolated from Paeonia lactiflora [27].

Flavonoids

There are various types of flavonoids, which are a class of substances with broad biological activities, such as kaempferol-3-7-di-O- β- D-glucoside and kaempferol-3-O- β- D-glucoside is one of the two earliest flavonoid compounds discovered in Paeoniae Radix Alba [28], in addition to catechins, quercetin 3-O - (6 "- galloyl) - glucoside, and quercetin 3-O- β- D-glucoside (quercetin-3-O)- β- D-glucoside and more than 20 flavonoids [29].

Steroid Compounds

Steroid compounds have a common structural feature, which is the basic skeleton structure of cyclopentane polyhydrophenanthrene. Currently, there are four steroidal compounds extracted and separated from Paeonia lactiflora, including three steroidal ester glycosides and one steroidal alcohol compound.

Organic Acids

Liu Jie et al. [30] explored the chemical composition and content differences between traditional Chinese medicine Paeoniae Radix Alba decoction pieces and Chishao decoction pieces by establishing high-performance liquid chromatography tandem quadrupole time-of-flight mass spectrometry (HPLC-Q-TOF-MS/MS) and HPLC-DAD methods from two aspects of qualitative and quantitative analysis. Q-TOF-MS method and negative ion mode scanning were used to qualitatively identify 38 components of Paeoniae Radix Alba, including organic acid components such as protocatechuic acid. Da Jingwen [31] used silica gel column chromatography to separate them, eight compounds, including organic acid compound benzoic acid, were isolated from the petroleum ether and ethyl acetate extraction sites of the water extract and alcohol precipitate of Paeonia lactiflora.

PHARMACOLOGICAL EFFECTS OF PAEONIAE RADIX ALBA

Research on the pharmacological effects of Paeoniae Radix Alba has shown that the main component of its pharmacological effects is total glycosides of Paeoniae Radix Alba, with the highest content of paeoniflorin. After long-term research and development and extensive practice, it has been proven that the traditional Chinese medicine Paeoniae Radix Alba has multiple pharmacological effects such as pain relief, anti-inflammatory, antioxidant, antidepressant, anti pulmonary fibrosis, and cardiovascular disease.

Analgesic Effects

Multiple pharmacological studies have found that the analgesic mechanism of Paeoniae Radix Alba is related to its extract TGP and PF. These substances can alleviate pain sensitization symptoms of inflammatory pain, dysmenorrhea, neuropathic pain, and visceral pain in model rats or mice by regulating prostaglandins (PG) and receptors in the body, as well as related signal transduction pathways. They play a good anti-inflammatory, spasmolytic, and analgesic role, which is related to the soft liver and analgesic effects of Paeoniae Radix Alba The clinical application of suppressing liver yang is consistent. According to literature review, the combination of peony and licorice decoction has certain advantages in the treatment of lower back and leg pain and lower back pain and cold pain, and it has also been confirmed to have significant effects in treating central pain; In the treatment of visceral pain and chronic diseases such as spleen stomach weakness type epigastric pain, anorectal pain, and uterine spasmodic pain after embryo transfer, its adverse reactions are minimal and the effective rate is greatly improved; In the treatment of neuralgia, the classic Chinese herbal formula containing Paeoniae Radix Alba has better therapeutic effects than simple Western medicine. In the treatment of cancer pain, the application of modified Shaoyao Gancao Tang to treat patients with advanced cancer pain has been confirmed to have a certain therapeutic effect on cancer pain, and can reduce the dosage of the analgesic Western medicine Durantin, greatly reducing the pain level of patients and improving their acceptance.

Anti-inflammatory Effects

Zhai Jiansheng et al. [5] used network pharmacology methods to explore the possible mechanism of Paeoniae Radix Alba in the treatment of systemic lupus erythematosus. The results showed that Paeoniae Radix Alba in the treatment of systemic lupus erythematosus has the characteristics of multi component and multi target action, which controls the occurrence and development of the disease by inhibiting immunity and reducing inflammation.

Xi Saifei et al. [32] observed the effect of different processed products of Radix Paeoniae Alba on idiopathic thrombocytopenic purpura (ITP). After the intervention of raw Radix Paeoniae Alba and the effective components of bran fried Radix Paeoniae Alba, the proportion of regulatory T cells (Treg) and the level of Foxp3 mRNA expression in the spleen were significantly increased ($P<0.05$), and the effect of bran fried Radix Paeoniae Alba on the proportion of Treg and the level of Foxp3 mRNA expression in ITP mice was stronger, The results indicate that different processed products of Paeoniae Radix Alba can exert therapeutic effects on ITP by regulating platelet count, Th1/Th2 balance, and Treg ratio, and bran fried Paeoniae Radix Alba has a better therapeutic effect on ITP.

Shao Kuan Furong et al. [33] explored the clinical efficacy and mechanism of total glucosides of peony (TGP) as an adjuvant therapy for children with purpura nephritis (HSPN). The experimental results showed that TGP has a significant therapeutic effect on HSPN, possibly by inhibiting the proliferation of Tfh cells, downregulating the expression of IL-21 and IL-4, thereby alleviating renal inflammatory response and protecting the kidney.

Antidepressant Effects

In recent years, due to the frequent occurrence of depression, more attention has been paid to the adverse reactions of Western medicine treatment, and attention has shifted to traditional Chinese medicine treatment. Studies have shown that the antidepressant effect of total glycosides of peony may be mediated by monoamine oxidase inhibition, and total glycosides of peony have antidepressant effects on corticosterone induced depression. Yuan Ming et al. [6] studied the network pharmacology mechanism of Paeoniae Radix Alba in treating depression through methods such as constructing a chemical composition database, screening active ingredients, predicting targets, and constructing a network. Finally, 16 active ingredients were screened from Paeoniae Radix Alba, such as kaempferol, catechin, paeoniflorin, sitosterol, eugenol, and 4-o-methylpaeoniflorin; The active ingredients mainly act on 75 antidepressant targets, such as AR, ESR1, NTRK1, VEGFA, SRC, and CYP families. Among them, AR, ESR1, and CYP families mainly treat depression through pathways that regulate hormone levels in the body. Zhang Yongchao et al. [34] pointed out that the effective components of Paeoniae Radix Alba, total glycosides of Paeoniae Radix Alba, and total glycosides of red peony have certain therapeutic effects on depression. The possible mechanisms include increasing

the content of monoamine neurotransmitters, regulating functional abnormalities of the hypothalamic pituitary adrenal axis, repairing damaged neurons, inhibiting the expression of monoamine oxidase, and enhancing neuroprotective effects. And the compatibility methods of Paeoniae Radix Alba Chaihu, red peony Epimedium, and red peony Acorus tatarinowii can promote the antidepressant effect of peony.

Anti Fibrotic Effect

Fibrosis refers to the pathological process of necrosis of organ parenchymal cells caused by inflammation, abnormal increase and excessive deposition of extracellular matrix in tissues. Literature review shows that peony has certain therapeutic effects on myocardial fibrosis, liver fibrosis, and pulmonary fibrosis. Wang Zhenxian et al. [35] studied the effect of total glucosides of paeony (TGP) on myocardial fibrosis in diabetes rats and its mechanism. The results showed that 8 weeks of TGP treatment could significantly reduce fasting blood glucose, TC and TG levels in diabetes rats, significantly improve cardiac function indicators (reduce LVIDd, LVIDs and increase EF, SV), reduce the degree of myocardial fibrosis, and the effect of TGP high-dose group was better than Met group, it is suggested that TG can protect heart function of diabetes rats by inhibiting myocardial fibrosis. Du Lijuan [36] successfully established a pulmonary fibrosis model by nebulizing inhalation of bleomycin. In her study, it was pointed out that TGP can inhibit the proliferation of MRC-5 cells, and the combination of total glycosides of peony and pirfenidone has a certain improvement effect on bleomycin induced pulmonary fibrosis model mice. Wang Yunlian et al. [37] demonstrated through practice that paeoniflorin delays the progression of radiation-induced liver fibrosis in rats by inhibiting NOX4 expression and autophagy, while exploring the effect and mechanism of paeoniflorin on liver fibrosis in rats.

Antioxidant Effects

Qin Yadong et al. [38] pointed out in their study on the in vitro antioxidant effects of the alcohol extract of Paeonia lactiflora (CREt) and different polar parts that experiments showed that CREt and CRE parts had strong scavenging rates for the three free radicals, with maximum scavenging rates exceeding 70%, and had significant antioxidant effects in vitro. In the experiment of screening the antioxidant active components of Paeonia lactiflora polysaccharides (PRPS) in vivo and in vitro, the results showed that PRPS40 and PRPS80 may be the active components of Paeonia lactiflora polysaccharides in vivo and in vitro, respectively, indicating that Paeonia lactiflora has significant antioxidant effects both in vivo and in vitro. Xia Ying et al. [39] investigated the antioxidant activity of the crude extract of Paeonia lactiflora and its active component pentagalloylglucose (PGG). The results showed that the traditional Chinese medicine Paeonia lactiflora contains the antioxidant active component PGG, which has a much greater antioxidant effect than the positive control drug Vc. PGG may become a potential natural and efficient antioxidant.

Liver Protection Effect

Paeoniae Radix Alba is one of the commonly used drugs in the treatment of hepatitis and liver cirrhosis in clinical practice. Shi Baoyin [6] established a rat model of subacute alcoholic liver injury using the gradual addition of alcohol method. The degree of liver cell damage in the high, medium, and low dose groups of Gegen Paeoniae Radix Alba Gancao tablets was effectively reduced ($P<0.05$). This indicates that Gegen Paeoniae Radix Alba Gancao tablets have auxiliary protective effects on subacute alcoholic liver injury. Li Xuemei et al. [40] obtained a network diagram of Shaoyao Gancao Tang for treating liver injury through network pharmacology methods, in order to explore the protective effect of Shaoyao Gancao Tang on liver. In this study, it was pointed out that Paeoniae Radix Alba contains 75 active ingredients, 48 targets related to liver injury diseases, and 41 pathways. The efficacy of Paeoniae Radix Alba licorice medicine is mainly achieved by regulating various inflammatory factors, exerting anti-inflammatory and antioxidant effects, or through various metabolic pathways, reduce the lipid level in the liver, or protect the liver by inhibiting cell proliferation and activation.

Effects on the Nervous System

Parkinson's disease, as a degenerative disease of the nervous system, has a high incidence rate among the middle-aged and elderly, which brings heavy burden to families and society. Zhang Shuxiang et al. [41] pointed out in the article "Research progress of traditional Chinese medicine Paeoniae Radix Alba in the field of Parkinson's disease" that in the clinical application of Parkinson's disease, about 20 classic formulas or clinical combinations have the participation of Paeoniae Radix Alba, which confirms that Paeoniae Radix Alba is also commonly used in the treatment of neurological diseases.

SUMMARY

The evolution in the digital era has led to the confuence of healthcare and technology resulting in the emergence of newer data-related applications. Big data analysis is playing an important role in various fields, and its application in the industry of traditional Chinese medicine ingredient analysis is very feasible and effective. Overall, as a common Chinese medicinal herb,

Paeoniae Radix Alba has a wide range of pharmacological effects and good therapeutic effects. This article summarizes and summarizes the most common processed products ofPaeoniae Radix Alba, such as winePaeoniae Radix Alba, vinegarPaeoniae Radix Alba, soilPaeoniae Radix Alba, friedPaeoniae Radix Alba, and branPaeoniae Radix Alba, through literature review, and obtains the optimal processing technology. It proposes a plan for the correct and reasonable processing ofPaeoniae Radix Alba. Through the above summary, it can promote the correct processing and use ofPaeoniae Radix Alba, better exert its efficacy, and treat various diseases. At the same time, the chemical components contained inPaeoniae Radix Alba are sorted and narrated in detail. Different chemical components have different pharmacological effects. Currently, the main components ofPaeoniae Radix Alba include terpenoids, tannins, organic acids, sugars, etc., which have various pharmacological effects such as analgesic, anti-inflammatory, liver protection, and antidepressant effects. There are also shortcomings in this article, such as the detailed chemical composition of Paeonia lactiflora not being listed one by one. With the continuous development of science and technology, in-depth research onPaeoniae Radix Alba will also help to better understand its efficacy and mechanism of action, making greater contributions to the development of traditional Chinese medicine.

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