



THE STUDY OF THE ACTION OF SUBSTANCES CONTAINED IN THE ROOT OF *PAEONIA ANOMALA* L. IN RELATION TO THEIR USE IN TRADITIONAL MEDICINE

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ABSTRACT

The basic development of the pharmacology and pharmacy of Traditional Mongolian medicine in the twenty-first century is to study and explore the main content of ancient medical books and scriptures written by doctors of previous generations. It is important to determine and study in detail the action of the main chemical and secondary components contained in *Paeonia anomala* L. against the disease. Therefore, it has become a challenging issue to determine the action of the main chemical and secondary ingredients contained in the *Paeonia anomala* L. on the disease and to study it in detail.

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INTRODUCTION

In recent years, comprehensive phytochemical investigations and pharmacological activity analyses have been conducted due to the growing prominence of *Paeonia* plants for their medicinal and edible values. Among the different parts of *Paeonia*, the root is of particular interest to phytochemists due to its medicinal uses. In addition, the leaves, flowers, and stems have also been studied for their chemical composition. *Paeonia* plants are well known to produce monoterpene glycosides with a “cage-like” pinane skeleton, and other classes of metabolites such as flavonoids, tannins, stilbenes, triterpene noids and steroids, and phenols, have also been reported. Modern pharmacological research has shown that compounds

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and extracts obtained from the plants in this genus exhibit an extensive range of biological activities, including antioxidant, anti-inflammatory, antitumour, hepatoprotective, cardiovascular protective, and neuroprotective effects¹.

Purpose and objective of the research

“This study aims to summarize the traditional medicinal uses and clinical applications of *Paeonia anomala* L. while critically evaluating its phytochemical and pharmacological research from 2011 to 2024.

“Significance of the research

It is of practical significance to produce a new medicine from the root of *Paeonia anomala* L. clarify its taste, quality, power, action, and use, or to rewrite the study in terms of traditional and modern medicine.

The novelty of the research

The main compounds extracted from the root of *Paeonia anomala* L. will be isolated and identified, and mechanism of action the action will be established, and the results will be used in teaching and research.

Material and method of the research

Popular and widely used databases such as PubMed, Scopus and Google Scholar were searched using the various search strings; from these searches, a number of citations related to the traditional uses and phytochemistry of the genus *Paeonia anomala* L. were retrieved.

Sumbe khamba Ishbaljir. gso dpyad bdud rtsi ‘i chu rgyun gyi cha lag gi nang tshan gyi sman so so’i mngon brjod dang ngos ‘dzin shel dkar me long. Wooden printing block with Tibetan script².

Toin Jambaldorj. gso byed bdud rtsi’i ‘khrul med ngos ‘dzin bzo rig me long du rnam par shar ba mdzes mtshar mig rgyan zhes bya ba bzhugs so. Wooden printing block with Tibetan script³.

Research methods: Methods of textual analysis for ancient books and checklist methods were used in the study.

RESULT

Our study *Paeonia anomala* L. alone has 10 more widely used drugs that are consistent with its strength and indications, 2 prescriptions for gynecological diseases, 5 prescriptions for rheumatism diseases, 6 prescriptions in current practice, and 4 empirical or evidence-based drugs.

Paeonia anomala L is used for uterine redness, paralysis, epilepsy, tremors in hands and feet, insomnia, stroke, urinary incontinence, prostate, pneumonia, stomach ulcers, blood clotting, memory, thyroid, white discharge, hemorrhoids, kidney, uterus, ovary, hydro edema, constipation, and back pain.

In phytochemical investigations, 25 compounds have been isolated from *Paeonia anomala* L. roots plants to date, which contains monoterpenoid, flavonoids, triterpenoids and steroids, and phenols. Studies of their pharmacological activities have revealed the antioxidant, anti-inflammatory, antitumour, antibacterial, antiviral, cardiovascular protective, and neuroprotective properties of the genus *Paeonia*^{4,5,6}.

Table 1. Summarize information on the phytochemical composition of *Paeonia anomala* L.⁷⁻¹⁰

The monoterpene compounds and their glycosides from the <i>Paeonia anomala</i> L.	The terpenoids and steroids from the <i>Paeonia anomala</i> L.	The phenols from the <i>Paeonia anomala</i> L.
Paeoniflorin	β -Sitosterol	Paeonolide
4''-Hydroxy-3''-methoxyalbiflorin	β -Amyrin	Methyl salicylate
6 ϵ -O-p-Hydroxybenzoyl-4''-hydroxyalbiflorin		Phenethyl alcohol
Albiflorin		Salicylic
Albiflorin- R ₂		Gallic acid
		Ethyl gallate
		Benzoic acid
		Paeonovicoside
		Benzaldehyde
		Me benzoate
		p-Oxybenzaldehyde
		Thymol
		3,4- Dimethoxybenzaldehyde
		2-Hydroxy-benzyl-3- hydroxy-benzoate
		1,2,3,4,6-penta-O-galloyl-beta-D-glucose
		4'-Methylpropiophenone
		Oxypaeoniflorin
		Paeonidin

From the roots of *Paeonia anomala* L. a total of 25 substances were isolated, comprising 3 monoterpenes, 2 terpenoids, and 17 phenolic compounds. The structures of these compounds were successfully determined through detailed analysis. Phenolic compounds as well as flavonoids are well-known as antioxidant and many other important bioactive agents that have long been interested due to their benefits for human health, curing and preventing many diseases¹⁴.

Table 2. Recipes used in Mongolian traditional medicine practice

Type	Quantity
A prescription for joint yellow water disease	2
Prescription for gynecological diseases	5
6 prescriptions in current practice	6
Empirical or evidence-based drugs	4

Phytochemicals from several medicinal plants are also illustrated, and their potential applications in pharmaceutical and medical aspects, antioxidant effects, antibacterial effect, anti-cancer effect, cardioprotective effects, immune system promoting and anti-inflammatory effects, skin protective effect from UV radiation and so forth are highlighted¹³.

Traditional Mongolian medicine: Arthritis is a disease characterized by joint swelling, pain, and movement retardation caused by the presence of arthralgia in the joints and bones.

This disease is mainly caused by the accumulation of yellow water and blood, and then it enters the joints and interferes with its gas and blood flow. The main conditions that trigger this disease are long-term sitting in a wet and humid place, working and working, getting cold in the cold, getting frostbite due to sweating, getting injured, and chronic heatstroke. If the action of substances contained in the root of

Paeonia anomala L. is interpreted in connection with the use in traditional medicine, the biological activity of the phenolic compounds mainly contained in the plant is similar to the action of the traditional recipe containing the root of *Paeonia anomala* L.

CONCLUSION

Phytochemical and pharmacological reports have indicated that *Paeonia* is an important medicinal herb resource, and some of its traditional uses including the treatment of inflammation and cardiovascular diseases and its use as a neuroprotective agent, have been partially confirmed through modern pharmacological studies. If the study of the action of substances contained in *Paeonia anomala* L. root is explained in connection with its use in traditional medicine, the biological activity of the phenolic compounds mainly contained in the plant is similar to the action of the traditional recipe containing the root of *Paeonia anomala* L.

REFERENCES

1. Bold Sharav. "History of Mongolian Traditional Medicine", Volumes I-IV. Ulaanbaatar, 2006.
2. Sumbe khamba Ishbaljir. gso dpyad bdud rtsi 'i chu rgyun gyi cha lag gi nang tshan gyi sman so so'i mngon brjod dang ngos 'dzin shel dkar me long. Wooden printing block with Tibetan script.
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4. Li P, Shen J, Wang Z, et al. Genus *Paeonia*: A comprehensive review on traditional uses, phytochemistry, pharmacological activities, clinical application, and toxicology. *J Ethnopharmacol.* 2021; 269:113708.
5. Odontuya G. LD, Purevdorj E., Proksch P. Pancreatic lipase inhibitory and antioxidative constituents from the aerial parts of *Paeonia Lactiflora* Pall. (Ranunculaceae). *Phytochemistry Letters.* 2017; 21:240-6.
6. Selenge E, Murata T, Tanaka S, Sasaki K, Batkhoo J, Yoshizaki F. Monoterpene glycosides, phenylpropanoids, and acetin glycosides from *Dracocephalum foetidum*. *Phytochemistry.* 2014;101:91-100.
7. Du GH, Yuan TY, Du LD, Zhang YX. The Potential of Traditional Chinese Medicine in the Treatment and Modulation of Pain. *Adv Pharmacol.* 2016; 75:325-61.
8. Enkhtuya E, Shimamura T, Kashiwaga T, Ukeda H. Antioxidative Constituents in the Leaves of *Paeonia anomala* Grown in Mongolia. *Food Science and Technology Research* 2017.
9. Oidovsambu S, Kim CY, Kang K, Dulamjav B, Jigjidsuren T, Nho CW. Protective effect of *Paeonia anomala* extracts and constituents against tert-butylhydroperoxide-induced oxidative stress in HepG2 cells. *Planta Med.* 2013; 79(2):116-22.
10. Marina Kritsanidaa, Prokopios Magiatisa, Alexios-Leandros Skaltsounisa,*and James P. Stablesb. Phytochemical Investigation and Anticonvulsant Activity of *Paeonia parnassica* Radix. *Natural Product Communications.* 2006; 2(4). https://www.researchgate.net/publication/287997193_Phytochemical_Investigation_and_Anticonvulsant_Activity_of_Paeonia_parnassica_Radix
11. Tsahar gevsh Luvsanchultem ལུབ་སྐྱེ་བའི་ལྷོ་ལྷོ་ལྷོ་ལྷོ་ Wooden printing block with Tibetan script.
12. 金光注释集 达日茂玛仁巴·罗布桑朝日嘎著. Altan khadmal, Khukh-Khot Inner Mongolian national publishing, China; 1984.
13. Khurelbaatar L, Tserendulam L, Akhtolhyn T, Sansarkhuyag E. "Emt urgamal sudlal" Ulaanbaatar, 2018.
14. Ibuprofen. [Internet]. [place unknown]; 2005 Jan 5; cited 2025 Jan 8]. Available from: <https://go.drugbank.com/drugs/DB01050>