

# Review on the Protective Mechanism of Pueraria Lobata and Hovenia Dulcis Extracts against Alcoholic Liver Injury

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## ABSTRACT

Alcoholic liver injury is a disease that causes significant harm to the human body and is difficult to cure. Long - term heavy drinking and alcoholism can lead to alcoholic liver injury, triggering physical and mental related diseases, such as liver diseases, pancreatitis, dementia, and various types of cancer. Pueraria lobata and Hovenia dulcis have remarkable effects in combating alcoholic liver injury, and their action mechanisms are diverse. Their extracts can reduce ethanol - induced in vitro liver injury and play a key role in antioxidation, anti - inflammation, regulating cell apoptosis, and enhancing liver function, providing strong support for the prevention and treatment of alcoholic liver diseases. This study investigated the effect of the water extract of the Pueraria Lobata - Hovenia Dulcis herb pair on alcoholic liver injury in mice, aiming to provide new treatment options for the clinical treatment of alcoholic liver injury.

## KEYWORDS

Alcoholic liver injury; Pueraria lobata; Hovenia dulcis

## 1. INTRODUCTION

### 1.1. Anti - Alcoholic Liver Injury (Alcoholic Liver Disease, ALD)

ALD is caused by long - term heavy drinking. After alcohol enters the human body, the vast majority of it is metabolized in the liver, and its metabolites can lead to liver metabolic disorders. Puerarin can regulate liver metabolism, thus alleviating alcoholic liver injury. [1] The pathogenesis of alcoholic liver disease is relatively complex and has not been fully elucidated yet. It is generally believed to be related to various factors such as liver metabolic disorders, lipid accumulation, oxidative stress, cytokine immunity, and inflammatory responses during the ethanol metabolism process.

### 1.2. Pueraria Lobata (Willd.) Ohwi Root (Ge Gen)

Pueraria lobata is an edible herb, mainly distributed in Asia, North America, and South America. Its main chemical components include isoflavones, [2 - 3] such as puerarin, daidzin, daidzein, and their derivatives. It has been confirmed to have antioxidant, anti - inflammatory, lipid - lowering, and anti - diabetic properties. Pueraria lobata has long been used in traditional Chinese medicine to treat alcoholism. It has been proven that it can stimulate the self - repair and regeneration of liver cells, thereby significantly enhancing liver function and reducing alcohol - induced liver injury [4].

### **1.3. Hovenia Dulcis Thunb. (Zhi Ju Zi)**

Hovenia dulcis has also been used in traditional Chinese medicine due to its effect on alcoholic liver injury and is used in the formulations of food supplements and nutraceuticals. Hovenia dulcis has antioxidant and anti-inflammatory effects and is a promising candidate drug for the treatment of alcohol-related liver diseases. [5] In China, formulas based on the combination of Pueraria lobata and Hovenia dulcis have been used since ancient times to maintain the redox balance of the liver and prevent liver diseases caused by alcoholism. Hovenia dulcis is recognized as a rich source of polyphenolic compounds, including anthocyanins and flavonoids, with strong antioxidant, anti-inflammatory, and antibacterial properties. It has been proven to effectively reduce alcohol-induced liver injury, promote the repair and regeneration of liver cells, and thus enhance liver function [6].

### **1.4. Analysis of the Formulation Characteristics of Health Foods Approved in China for Auxiliary Protection Against Chemical Liver Injury**

Through retrieval, the ingredients ranked from high to low are: Pueraria lobata, Ganoderma lucidum, Schisandra chinensis, Hovenia dulcis, Salvia miltiorrhiza, Lycium barbarum, Poria cocos, Gynostemma pentaphyllum, Astragalus membranaceus, Glycyrrhiza uralensis, Crataegus pinnatifida, Curcuma longa, Citrus reticulata, Rhodiola rosea, Panax ginseng, Gardenia jasminoides, Panax quinquefolius, Paeonia lactiflora, Alisma orientale, Panax notoginseng, Ginkgo biloba leaf. The top 5 commonly used drug combinations are: (1) Pueraria lobata and Schisandra chinensis, (2) Pueraria lobata and Hovenia dulcis, (3) Pueraria lobata and Salvia miltiorrhiza, (4) Pueraria lobata and Ganoderma lucidum, (5) Salvia miltiorrhiza and Schisandra chinensis. [7] Therefore, the combined treatment of Pueraria lobata and Hovenia dulcis is well-founded, and the two together may have a good therapeutic effect.

## **2. DOMESTIC RESEARCH PROGRESS**

Through a large number of literature reviews, it can be seen that domestic research has advanced rapidly. There are many drugs that have very good curative effects on alcoholic liver injury. Whether they are traditional Chinese medicines or Western medicines, new ideas and understandings have emerged in the treatment of alcoholic liver injury. Domestic research on Pueraria lobata and Hovenia dulcis has been continuously deepened, and rich achievements have been made in terms of medicinal value and product development, providing strong support for their application.

### **2.1. Puerarin**

Puerarin is an effective antioxidant that can reduce the levels of MDA and glutathione S-transferase (GST) in liver tissue, thus alleviating alcoholic liver injury [8].

### **2.2. Hovenia Dulcis Fruit Peduncle Polysaccharides (HDPs)**

As one of the main active components of Hovenia dulcis, HDPs have been shown to improve acute alcoholic liver injury by regulating the activities of alcohol dehydrogenase and glutathione peroxidase and promoting alcohol metabolism. [9] It also has the potential to regulate chronic alcoholic liver injury through anti-inflammation, anti-lipid peroxidation, and regulation of intestinal permeability. A recent study extracted HDPs from the fruit peduncles of Hovenia dulcis and confirmed that it can effectively scavenge oxygen-free radicals and inhibit the oxidation of biological macromolecules (proteins, lipids, and DNA) in vitro. The flavonoid components in Hovenia dulcis have anti-lipid peroxidation effects. They can also significantly reduce the levels of ALT and AST in the serum of rats with acute alcoholism, reduce the infiltration of inflammatory cells in liver tissue, and at the same

time significantly shorten the sober - up time of mice with acute alcoholism and reduce the ethanol concentration in the blood.

### 3. RESULTS AND PROSPECTS

This study is the first to explore the combined treatment of acute alcoholic liver injury with the water extract of *Pueraria lobata* and *Hovenia dulcis*. It is helpful to provide an experimental and theoretical basis for the application of the water extract of *Pueraria lobata* and *Hovenia dulcis* in liver protection. It is also helpful to provide ideas for the development of anti - alcohol and liver - protecting products with good effects and low toxic side effects. *Pueraria lobata* and *Hovenia dulcis* not only have the function of relieving alcohol intoxication but also have high nutritional value and physiological health - care functions. Therefore, they have broad market prospects in both clinical applications and the development of health - care foods. With the development of high - tech and its continuous penetration into various fields, the extraction of active ingredients from *Pueraria lobata* and *Hovenia dulcis* using high - tech will lead to the development of more health - care functional foods and drugs suitable for people of all ages, with *Pueraria lobata* and *Hovenia dulcis* as raw materials.

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