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Research on the Anti-Alcohol Effect of Mulberry Juice

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Abstract: Alcohol culture has a long history in China, often appearing in scenarios such as business banquets, social gatherings, and family parties. With the expansion of the drinking population, the health problems caused by alcohol consumption have attracted widespread social attention. Excessive drinking can lead to alcohol poisoning in mild cases, damage to the stomach and liver in severe cases, and even induce alcoholic hepatitis and pancreatitis. Against this background, finding raw materials containing anti-alcohol substances and developing products to replace traditional anti-alcohol drugs have become important directions in the development of food science and nutrition. Based on existing theoretical and empirical research results, this paper systematically explores the anti-alcohol value of mulberry juice from aspects such as its biological components, anti-alcohol mechanism, relevant experimental verification, and application prospects. It aims to promote the development of natural anti-alcohol products, provide references for accelerating human alcohol metabolism, alleviating post-drinking discomfort, and meeting people's pursuit of a healthy life.

Keywords: Mulberry juice; Biological components; Anti-alcohol effect; Liver protection; Mechanism of action

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1. Introduction

With social progress and the proposal of the "Healthy China" strategy, the concept of general health has increasingly gained popularity. People have elevated the connection between drinking and health to a new level, paying more attention to drinking health. While pursuing the spiritual enjoyment brought by drinking, they do not want adverse reactions that affect physical health and normal life. According to the Dietary Guidelines for Chinese Residents, the daily alcohol intake should not exceed 25 grams for men and 15 grams for women. When drinking in moderation, alcohol (ethanol) is converted into acetaldehyde by alcohol dehydrogenase (ADH), and acetaldehyde is then catalyzed by acetaldehyde dehydrogenase (ALDH) to form acetic acid, which is finally decomposed into carbon dioxide and water and excreted from the body. However, in cases of excessive drinking, a large amount of acetaldehyde accumulates in the human body and cannot be excreted in a timely manner, imposing a burden on the liver metabolic system. These further triggers drunken symptoms such as vasodilation,

facial flushing, nausea and vomiting, headache and fatigue, and may even damage liver cells, inducing diseases such as alcoholic hepatitis, fatty liver, and even cirrhosis. Currently, there are various types of anti-alcohol drugs on the market, but they often contain chemical components that have certain side effects on the human body. Therefore, selecting natural ingredients containing anti-alcohol components to develop safe, reliable, and effective anti-alcohol drinks is of great significance. Mulberry, the fruit of Morus alba L. in the Moraceae family, is a kind of food ingredient that is both medicinal and edible, rich in anthocyanins, resveratrol, polysaccharides, and other components, with certain antioxidant capacity and anti-alcohol effects. In traditional Chinese medicine, Compendium of Materia Medica records that mulberry "can relieve alcohol poisoning when squeezed into juice for drinking". At the same time, mulberry contains a variety of bioactive components, showing application potential in alleviating drunken symptoms and protecting liver function.

2. Biological components of mulberry juice

The anti-alcohol effect of mulberry juice is mainly influenced by its biological components.

Firstly, anthocyanins. Mulberry fruits are deep purple in color. Anthocyanins in mulberries mainly exist in the forms of cyanidin and pelargonidin, which are important material bases for mulberries to exert physiological activities [1]. Studies have confirmed that mulberry anthocyanins can exert liver protection effects through specific pathways. As water-soluble flavonoids, they have strong antioxidant activity, which can scavenge excess reactive oxygen species (ROS) in the body and reduce oxidative stress damage caused by alcohol metabolism [2]. At the same time, anthocyanins also have anti-inflammatory effects, which can inhibit the release of alcohol-induced inflammatory factors and alleviate inflammatory reactions in the gastrointestinal tract and liver [3].

Secondly, resveratrol. Resveratrol is a natural polyphenol that often appears in plants such as grapes, peanuts, and mulberries. The content of resveratrol varies among different mulberry varieties and qualities; the higher the content of such components, the stronger the antioxidant activity [4]. Studies have found that resveratrol can regulate the activity of liver metabolic enzymes, possibly increasing the activity of alcohol dehydrogenase and acetaldehyde dehydrogenase, promoting the metabolism of ethanol and acetaldehyde, and avoiding their long-term accumulation in the body [5]. In addition, resveratrol has liver-protective effects, can inhibit hepatocyte apoptosis, and reduce alcohol-induced damage to hepatocytes [6].

Thirdly, mulberry polysaccharides. Mulberry polysaccharides are one of the core active components in mulberries, with various functions such as enhancing immunity, antioxidation, and liver protection. Mulberry polysaccharide fractions obtained by different extraction and purification processes (such as MFPs-1, MFPA1, MFPB1, etc.) all show significant liver-protective activity [7]. In terms of anti-alcohol effects, mulberry polysaccharides can enhance the body's antioxidant capacity, scavenge free radicals produced by alcohol metabolism, and reduce oxidative stress damage to the liver; at the same time, polysaccharides can form a protective film in the gastrointestinal tract, slow down the absorption rate of alcohol, reduce the peak concentration of alcohol in the blood, and thereby alleviate the occurrence of drunken symptoms. Mulberry polysaccharides obtained by different purification methods such as weak polar fractional alcohol precipitation have been verified for their activity against acute alcoholic liver injury, further confirming the core role of polysaccharides in anti-alcohol and liver protection [8].

In addition, mulberries are rich in vitamins, amino acids, and minerals such as potassium and calcium. These nutrients can assist in alcohol metabolism: vitamins, as antioxidants, can synergistically scavenge free radicals;

amino acids can provide raw materials for the repair of hepatocytes and help restore liver function, synergizing with active components to exert anti-alcohol and liver-protective effects [9].

3. Anti-alcohol mechanism of mulberry juice

With its rich and diverse bioactive components, mulberry juice exerts anti-alcohol effects mainly through the following aspects, forming a multi-pathway and multi-target anti-alcohol mechanism.

First, accelerating alcohol metabolism and reducing toxic substances in the body. The activity of alcohol dehydrogenase and acetaldehyde dehydrogenase is an important factor affecting the rate of alcohol metabolism. The resveratrol and polysaccharide active components contained in mulberry juice promote the rapid conversion of ethanol to acetaldehyde and accelerate the decomposition of acetaldehyde to acetic acid by regulating the pathway of liver metabolic enzyme activity. This greatly shortens the retention time of alcohol-related toxic products in the body, reduces the concentration of acetaldehyde in the blood, and thereby alleviates drunken symptoms [10]. Studies have found that mulberry extracts can reduce the toxicity of acetaldehyde in the body, accelerate its excretion, and thus reduce alcohol-induced liver damage [11].

Second, scavenging reactive oxygen species and reducing oxidative stress damage. Alcohol metabolism produces a large number of free radicals, such as superoxide anion radicals and hydroxyl radicals. These free radicals can induce oxidative stress reactions by attacking hepatocytes, leading to hepatocyte damage. Mulberry juice is rich in antioxidant components such as anthocyanins, resveratrol, and polysaccharides, which neutralize excess reactive oxygen species in the body by generating a large number of electrons or hydrogen atoms, reducing the attack of free radicals on hepatocytes. Among them, mulberry anthocyanins can activate the Nrf2-ARE pathway, increase the activity of antioxidant enzymes such as superoxide dismutase (SOD) and glutathione peroxidase (GSH-Px), further enhance the body's antioxidant capacity, reduce alcohol-induced oxidative stress damage, and protect the structural and functional integrity of hepatocytes [12]. Alleviating oxidative stress damage is one of the core mechanisms by which mulberries improve liver diseases, and this mechanism is also applicable to the protection against alcoholic liver injury.

Third, alleviating inflammatory reactions and reducing the degree of body damage. Alcohol and its metabolite acetaldehyde can stimulate the body to produce inflammatory reactions, inducing the release of inflammatory factors such as tumor necrosis factor-α (TNF-α) and interleukin-6 (IL-6), causing damage to the gastrointestinal tract and liver. The anthocyanins and resveratrol in mulberry juice have strong anti-inflammatory effects, can inhibit inflammatory signaling pathways, limit the synthesis and release of inflammatory factors, reduce the level of stimulation and damage caused by alcohol to the gastrointestinal tract and liver, and thereby alleviate gastrointestinal discomfort and liver damage caused by drunkenness [13]. Mulberry polysaccharides can also reduce liver inflammatory reactions by inhibiting the expression of inflammatory factors, synergizing with other components to exert anti-inflammatory and protective effects.

Fourth, protecting hepatocytes and promoting liver repair. The liver is the main organ for alcohol metabolism; excessive drinking can directly lead to hepatocyte damage and necrosis. Multiple components in mulberry juice work together to protect and repair hepatocytes. Among them, resveratrol can reduce hepatocyte apoptosis by inhibiting the expression of hepatocyte apoptosis-related genes; mulberry polysaccharides can provide nutritional support for the repair of hepatocytes and promote the regeneration of damaged hepatocytes. Different polysaccharide fractions (such as MFPs-1, MFP-1, etc.) can alleviate alcoholic liver injury by inhibiting hepatocyte apoptosis [14].

Studies based on multi-omics analysis have shown that mulberry polysaccharides can protect against acute alcoholic liver injury by regulating multiple signaling pathways, creating a stable repair environment for hepatocytes. In addition, mulberry anthocyanin extracts can significantly reduce the degree of ethanol-induced liver injury and mortality in mice, further confirming the protective effect of mulberry components on hepatocytes [15].

Fifth, regulating lipid metabolism and assisting liver protection. Alcoholic liver injury caused by excessive drinking leads to disorders of lipid metabolism in the body, increasing the burden on the liver. Mulberry components can regulate the level of liver lipid metabolism, promote the decomposition of lipids in hepatocytes, reduce liver steatosis, and thus play a role in protecting the liver. This mechanism is consistent with the regulatory effect of mulberries on non-alcoholic fatty liver disease, both by regulating liver lipid metabolism function to improve the liver's ability to cope with alcohol damage.

4. Experimental verification of the anti-alcohol effect of mulberry juice

In recent years, scholars at home and abroad have designed verification experiments on the anti-alcohol effect of mulberry extracts using animals and *in vitro* cells, providing experimental evidence.

Animal experiments, with mice and rats as research objects, examine the mechanism of mulberry components on alcoholic liver injury. Li Wenli et al. extracted anthocyanins from mulberries and used them in mouse liver injury intervention experiments. They found that this component significantly inhibits ethanol-induced liver injury in mice, alleviates discomfort symptoms, and reduces mouse mortality. Experiments using mice as models have shown that mulberry extract intervention can prolong the loss of righting reflex time, and the dosage level is correlated with sobering time and blood alcohol concentration. In rat experiments, the antioxidant properties of mulberry components reduce stress damage caused by alcohol, improve the pathological morphology of liver tissue, and reduce the level of liver inflammation and steatosis. This effect is also applicable to the intervention of alcoholic liver injury. In addition, pharmacodynamic verification of different mulberry polysaccharide fractions has shown that polysaccharide fractions such as MFPA1 and MFPB1 can significantly alleviate acute alcoholic liver injury, mainly by reducing the levels of liver injury markers such as alanine aminotransferase (ALT) and aspartate aminotransferase (AST) in serum and slowing down the rate of hepatocyte necrosis. Pharmacokinetic studies of mulberry polysaccharide MFPs-1 have also provided pharmacokinetic evidence for its anti-alcohol and liver-protective effects *in vivo*, confirming that it can be effectively distributed and function in the body.

In vitro cell experiments mainly use human hepatocellular carcinoma cells (HepG2 cells) as models to verify the significant protective effect of mulberry components through alcohol-induced hepatocyte injury experiments. The results show that the number of viable HepG2 cells decreases after alcohol intervention, and the release of lactate dehydrogenase (LDH, a marker of cell damage) increases significantly; after mulberry extract intervention, the number of viable cells increases, and the release of LDH decreases significantly. At the same time, the level of reactive oxygen species (ROS) in the intervention group shows a decreasing trend, the activity of antioxidant enzymes increases, and the proportion of apoptotic cells decreases significantly. This proves that mulberry components improve the ability of hepatocytes to resist alcohol damage by alleviating oxidative stress and cell apoptosis.

Regarding the efficacy of mulberry products, research on the nutritional functions of mulberry products such as mulberry vinegar has shown that the rich active components of mulberries can exert anti-alcohol effects, alleviate post-drinking discomfort symptoms, and supplement nutrients for the body, verifying the application

value of processed mulberry products in anti-alcohol [8]. Mulberry polysaccharide products obtained by different purification and modification methods have been verified for their activity against acute alcoholic liver injury, providing technical support for the development of mulberry juice products.

5. Application prospects of mulberry juice

With the improvement of residents' living standards and health awareness, people's requirements for the efficacy and quality of anti-alcohol products are constantly increasing, which requires the development of safer, natural, and effective anti-alcohol products. Mulberry juice is mainly composed of natural nutrients, has no side effects on the human body after consumption, and has anti-alcohol effects, so it has broad development and application prospects.

In terms of product development, establish a research and development team for mulberry anti-alcohol juice, and develop a variety of anti-alcohol drinks combined with the taste needs of consumers. Focus on product portability, design small bottles of concentrated mulberry drinks according to consumers' need for timely drinking after drinking, improve portability, and facilitate consumers to drink quickly before and after drinking. Develop formulas for mulberry drinks with good anti-alcohol effects, learn from mulberry vinegar formulas, focus on mulberry components, and enhance the anti-alcohol effect by integrating other auxiliary traditional Chinese medicine ingredients to create compound mulberry anti-alcohol products. Modern food technology can also be used to extract high-concentration mulberry juice powder to create instant products, meeting the diverse needs of consumers.

In terms of product quality control, invite experts in pharmacy, clinical medicine, traditional Chinese medicine, and nutrition to strictly establish a formula design review system to ensure the scientificity of the launch and update of new formulas. Construct an integrated quality standard system based on planting, picking, processing, and sales, strictly control the content of main mulberry components, improve product effectiveness, safety, and stability, and ensure the actual anti-alcohol effect.

In terms of market promotion, focus on consumer groups who need to drink frequently, investigate the needs of consumers such as party groups and business people, take traditional Chinese medicine and modern research results as the core, create product selling points of being green, natural, safe, and effective, and achieve precise promotion from point to area.

6. Discussion

Although the anti-alcohol efficacy of mulberry juice has been verified by certain theories and experiments, there are still some deficiencies. Firstly, the identification and screening of active components with anti-alcohol efficacy in mulberries are not precise enough, and the synergistic mechanism between various components is unclear. In this regard, it is necessary to strengthen interdisciplinary research, establish an interdisciplinary research team of medicine and nutrition, and comprehensively use multi-omics and molecular biology methods with modern medical, nutritional, and food technologies to conduct in-depth research on the core anti-alcohol active components of mulberries and clarify their targets and synergistic mechanisms. Secondly, there are few clinical studies and applications, and the research on the stability of effects is not in-depth. Current research mainly focuses on cell experiments and animal experiments, with a narrow scope of clinical application, making

it difficult to objectively evaluate the stability of the anti-alcohol effect of mulberry juice in the human body. In this regard, it is necessary to expand the scope of clinical application and experimental scale, conduct multi-center, large-sample clinical observation trials, and evaluate the long-term effectiveness and safety of the anti-alcohol effect of mulberry juice in the human body through long-term observation and follow-up evaluation. Thirdly, the product processing principles and processes need to be optimized. In the processing process, retaining the activity of mulberry components while adjusting the taste of the juice to meet public needs is an important issue in product development. Advanced purification, extraction, and concentration technologies should be comprehensively used to reduce the loss of active components, and nutrients and seasonings with rich nutrition and diverse tastes should be added according to the needs of consumers to meet their demand for protecting physical health.

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References

[1] Han F, Li T, Aliya M, et al., 2024, Research Progress on Chemical Constituents and Pharmacological Effects of Mulberry (Morus alba L.). Chinese Traditional and Herbal Drugs, 55(15): 5274–5285.

[2] Kim J, Kim Y, Lee S, et al., 2024, Mulberry Anthocyanins Protect Against Ethanol-Induced Liver Injury via Nrf2-ARE Pathway Activation. Journal of Agricultural and Food Chemistry, 72(15): 16234–16243.

[3] Wang D, Jiang S, Hu A, et al., 2023, Mulberry Improves Oxidative Stress Damage in Rats with Non-Alcoholic Fatty Liver Disease. Chinese Journal of Clinical Pharmacology and Therapeutics, 28(06): 609–616.

[4] Jing B, 2025, Mechanism of Mulberry Polysaccharide MFP-1 Against Alcoholic Liver Injury Based on Multi-Omics Integrated Analysis, thesis, Guizhou Normal University.

[5] Bian L, 2021, Pharmacodynamic Re-evaluation and Mechanism Study of Mulberry Polysaccharide Fractions MFPA1 and MFPB1 Against Acute Alcoholic Liver Injury, thesis, Guizhou Normal University.

[6] Jiang Y, Jiang S, Hu A, et al., 2021, Effect of Mulberry on Lipid Metabolism in Rats with Non-Alcoholic Fatty Liver Disease. Zhejiang Journal of Integrated Traditional Chinese and Western Medicine, 31(05): 407–412.

[7] Li B, Chen H, Zhao C, et al., 2022, Protective Effect of Mulberry Polysaccharides on Cadmium-Induced Liver Injury in Mice. Food Science, 43(01): 135–141.

[8] Ma Y, Xu M, Chen B, et al., 2021, Interpretation of Nutritional and Functional Efficacy of Mulberry Vinegar. Journal of Food Safety and Quality, 12(06): 2117–2124.

[9] Xiao R, 2019, Structural Characterization of Mulberry Polysaccharides by Weak Polar Fractional Alcohol Precipitation and Their Anti-Acute Alcoholic Liver Injury Activity, thesis, Guizhou Normal University.

[10] Tan X, 2019, Fractional Purification with Low Concentration Ethanol, Molecular Modification and Anti-Acute Alcoholic Liver Injury Activity of Mulberry Polysaccharides, thesis, Guizhou Normal University.

[11] Liang H, Yang T, Teng C, et al., 2021, Mulberry Leaves Extract Ameliorates Alcohol-Induced Liver Damages Through Reduction of Acetaldehyde Toxicity and Inhibition of Apoptosis. International Journal of Medical Sciences, 18(1): 53–

64.

[12] Li Y, Zhang L, Chen W, et al., 2021, Protective Effects of Mulberry Fruit Juice on Ethanol-Induced Oxidative Stress and Apoptosis in HepG2 Cells. Food & Function, 12(8): 3567–3575.

[13] Wang H, Zhang Y, Fang J, et al., 2023, Resveratrol Content and Antioxidant Activity of Mulberry (Morus alba L.) Fruits from Different Cultivars. Food Chemistry, 412: 135678.

[14] An S, 2024, Pharmacokinetic Study of Mulberry Polysaccharide MFPs-1 Against Alcoholic Liver Injury, thesis, Guizhou Normal University.

[15] Li W, Zhou Y, Yang L, 2022, Effect of Mulberry Anthocyanin Extract on Ethanol-Induced Liver Injury and Mortality in Mice. Food and Nutrition in China, 28(07): 34–40.