

## Study on preparation process of an anti-aging Chinese herbal compound healthy beverage.

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### Abstract

**Objective:** To study the preparation process of anti-aging healthy beverage.

**Methods:** L9 (34) was used to identify, weigh and pretreat raw materials, optimize and make an orthogonal experiment with as reference, screen out the optimal formula of beverage blending in accordance with sensory score.

**Results:** The best formula of anti-aging healthy beverage with compound hawthorn and *Astragalus membranaceus*: 43% for extraction amount of Chinese herbal medicine such as hawthorn and *Astragalus membranaceus*, dosage of sweetener for 8.4%, dosage of  $\beta$ -cyclodextrins for 0.5%, dosage of essence for 0.07%, xanthan gum for 0.05%, CMC Na for 0.15%, pectin for 0.06% and carrageenan for 0.04%. In this way, beverage flavor and stability are both the best.

**Conclusion:** Beverage with healthy function with hawthorn and *Astragalus membranaceus* as the main materials can be controlled to the optimum in stability and homogeneity effect. Beverage flavor can be ensured the best; at the same time, the production stability of the food industry can be ensured.

**Keywords:** Chinese herbal medicine, Hawthorn, *Astragalus membranaceus*, Healthy beverage.

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### Introduction

The theory of free radicals (oxidative damage) is the most representative theory in the field of aging mechanism [1]. Therefore, antioxidant activity evaluation is the most mature method in the methodology of anti-aging evaluation. According to relevant theories, oxidative damage and antioxidant defense in the body are in dynamic equilibrium status, so to prevent or eliminate oxidative damage caused by free radicals with antioxidants is an effective method for delaying senility, preventing and blocking the development of cancer and cardiovascular diseases [2,3].

Quite a few natural extracts and herbal preparations with phenols, flavonoids and alkaloids as active ingredients have been proved to be anti-aging active substances. The chemical structures with the above-mentioned composition have excellent electron donor, three-dimensional conformation and electrical factors, can make dehydrogenation reaction with free radicals and form stable intermediates to interrupt the follow-up chain reaction [4-6]. The anti-aging effect is good. Many mature healthy products that can prolong life and nourish skin have been developed. The hawthorn is a deciduous tree or shrub of *Crataegus* (Rosaceae) and its fermented beverage has a good anti-aging effect [7,8].

According to many studies, free radical damage is closely related to aging. Many Chinese herbal extracts such as ginseng polysaccharide and letinous edodes polysaccharide could

directly scavenge free radicals, increase the activity of antioxidant enzymes such as SOD and CAT, and reduce the MDA content, and play the role of anti-aging [9]. As a commonly used traditional Chinese medicine, *Astragalus* was often applied to the clinical prevention and treatment of immune dysfunction disorders, cardiovascular [10]. Extract of *Astragalus* (EA) is an effective component extracted from *Astragalus membranaceus*, mainly including astragalosides (AST) and *Astragalus* Polysaccharides (APS) [11]. This paper mainly studies the process of anti-aging healthy beverage prepared with traditional Chinese medicine such as hawthorn and *Astragalus membranaceus* as formula.

### Materials and Methods

#### Test methods

Technology process of anti-aging healthy beverage with compound hawthorn and *Astragalus membranaceus* [12].

Raw material identification → screening → processing → washing → boiling → filtering → adding wine

Fine wine sinking → refined filtration → extracting solution → blending → homogeneity → sterilization → filling → testing → finished product

### **Key points of anti-aging healthy beverage with compound hawthorn and *Astragalus membranaceus***

Identification of raw materials: raw materials must be tested and identified in order to determine their authenticity. The main technical indicators to test raw materials can be used only after passing the test. The dosage of raw materials of 100 kg hawthorn, *Astragalus* and other Chinese herbal extracts: 6 kg hawthorn, 2 kg *Astragalus*, 2 kg *atractylodes* and 2 kg *Codonopsis*. Traditional Chinese medicine is rinsed quickly by gun water. And then materials are fed. Concentration: boil with high heat, stir continuously, concentrate Chinese medicine juice to the specified amount, stop heating, and cool to be room temperature. Wine sink: slowly place the alcohol 3 times the amount of Chinese herbal juice into Chinese herbal medicine concentrated liquor, constantly stir, and place for 48 h quietly to fully precipitate it. Filtration, and immediately stop heating after alcohol evaporation. Blending: include flavor blending and beverage stability blending test [10]. Filter: first filter coarsely by a centrifugal separator, then filter finely by plate and frame filter, and filter to be clear. Homogenization: homogenization at 50~70°C, 20 MPa. Then conducted the sterilization process.

## **Results and Discussion**

### **Blending test of anti-aging healthy beverage with compound hawthorn and *Astragalus membranaceus***

Based on the preliminary experiment, the paper screens out sugar and honey to adjust sweetness and adds  $\beta$ -cyclodextrin ( $\beta$ -CD) to remove the bitterness. At the same time, in the national standard additive range, the paper adds the appropriate amount of food essence to enhance the aroma of beverages. The four factors are set up at 3 levels, makes an orthogonal test based on L9 (34), and screens out and blends beverages in accordance with sensory score.

### **Stability blending test**

According to the results of single factor test, the paper selects the four stabilizers of the xanthan gum, sodium carboxymethyl cellulose, pectin and carrageenan to make an orthogonal optimal design based on L9 (34): the influencing factors of beverage sequence is A>B>D>C, that is, extracts of traditional Chinese herbal medicine have the greatest impact on beverage

**Table 1.** Influence of homogenization on product quality.

| Homogenization pressure (Mpa) | Blank | 15      | 20   | 25   | 30   |
|-------------------------------|-------|---------|------|------|------|
| Taste                         | Rough | General | Fine | Fine | Fine |
| Precipitation rate (%)        | 4.5   | 3.28    | 1.75 | 1.75 | 1.74 |

There is a great difference between homogeneity and non-homogeneity, the precipitation rate of non-homogeneity is 4.5%. And under the 20 MPa pressure, the precipitation rate of homogeneity drops to 1.75%; the pressure is greater than 20

flavor, followed by sweetener, essence, and  $\beta$ -cyclodextrin. The best combination is A2B2C3D1, that is, when the amount of extracts of traditional Chinese herbal is 40%; the dosage of sweetener is 7.5%;  $\beta$ -cyclodextrin content is for 0.4% and the amount of essence is 0.02%, the beverage has the best flavor.

### **Influence of additives on the stability of anti-aging healthy beverage**

**Single factor test:** When four stabilizers of the xanthan gum, sodium carboxymethyl cellulose, sodium alginate and carrageenan are applied separately to anti-aging healthy beverage products with compound hawthorn and *Astragalus membranaceus*, the effect is better.

### **Determination of the best combination of compound stabilizers**

Based on single factor test, the paper makes the blending test of beverage stability according to 1:3:4. According to range analysis in Table 1, the xanthan gum has great influence on the stability of anti-aging healthy beverage with compound hawthorn and *Astragalus maxima*, followed by Carrageenan, sodium carboxymethyl cellulose, and pectin. The best stabilizer combination is A2B3C3D2, that is, 0.07% xanthan gum, 0.15% CMC Na, 0.06% pectin and 0.04% carrageenan. According to verification, the centrifugal sedimentation rate of the A2B1C3D2 optimal group is 0.64% and with good repetition effect. Anti-aging healthy beverage with compound hawthorn and *Astragalus* produced by the formula can be placed in normal temperature for 4 months with good stable state.

### **Influence of homogenization on product quality**

According to Stokes's theorem, the falling rate of a particle in a beverage is proportional to the square of the radius of the protein ion, which shows the importance of homogenization in the process of lactic acid beverage production. The particles dispersed in the beverage are very unstable and easy to agglutinate and precipitate. In order to prevent precipitation, the ions must be refined. This research selects different homogeneous pressures to further reduce the size of the particles in the beverage and thus improve the stability, the influence of homogenization on product quality was shown in Table 1.

MPa, and the precipitation rate is almost unchanged. Therefore, homogeneity under the 20 MPa pressure can bring good results. The paper adopts 20 MPa homogeneity.

Homogeneity temperature is appropriate from 50 to 70°C. After all, high temperature easily causes damage to nutrients.

### Quality standard

**Sensory indicators:** Pale yellow color, uniform organization, no precipitation, no odor. Physicochemical index: soluble solids content is more than 10%, pH value is from 5.5 to 6. Microbial indicators: the total number of bacteria is less than or equal to 100 cfu/ml; coliform bacteria is less than or equal to 3 cfu/ml; pathogenic bacteria should not be detected.

### Conclusion

(1) With hawthorn and *Astragalus membranaceus* as the main raw materials and with sweeteners,  $\beta$ -cyclodextrin and essence as the blending additives, the beverages can be with good taste, rich nutrition, and a certain healthy function. (2) Based on repeated tests, when 0.07% xanthan gum, 0.15% CMC Na, 0.06% pectin and 0.04% carrageenan are added, the product is with the best stability. (3) When the homogeneity pressure is 20 MPa and the homogeneity temperature varies from 50 to 70°C, the homogeneity is with the best effect.

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