



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPAS)**
'A Bridge Between Laboratory and Reader'

www.jjbpas.com

**COMPARATIVE ANALGESIC AND ANTI-INFLAMMATORY EFFECT OF
ANGELICA SINENSIS PIECES AND ITS PRODUCTS IN MICE**

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ABSTRACT

Radix *Angelica sinensis* has been widely used for the treatment of blood illness, because of its good curative effect in many aspects. In this study, we have established a new platform to evaluate the analgesic and anti-inflammatory effect of *Angelica sinensis* pieces and its products (crude AS pieces, AS formula granule, liquored AS pieces) in mice. In the AS experiment, the hot plate test and the writhing test were performed to assess the analgesic effect, and the ear edema test was to detect the anti-inflammatory effect. The analysis demonstrated that the three AS decoctions own perfect effect in prolonging the latency of pain and narrowing the deviation between the weight of ears. Liquored AS pieces and AS formula granule had better analgesic and anti-inflammatory effect than crude AS pieces and no obvious difference between liquored AS pieces and AS formula granule.

Keywords: Analgesic, Anti-Inflammatory, *Angelica sinensis*

INTRODUCTION

Danggui, the dried root of *Angelica sinensis* that has been formulated clinically to treat (AS), a traditional Chinese herbal medicine blood deficiency syndrome, such as

irregular menstruation, dysmenorrhea, amenorrhea, nourishing blood, regulating menstruation, etc. [1]. Aqueous AS extract has been demonstrated to have the properties of analgesia and anti-inflammatory *in vitro* [2]. Recently, many different medication forms of AS appeared in clinic, like crude AS pieces, AS formula granule, liquored AS pieces, AS tablet and AS capsule etc. However, no documents indicate the different pharmacological activities of above these AS medication forms. In the study, we evaluated analgesic effect of AS using hot plate test and writhing test, and the anti-inflammatory effect by ear edema test.

MATERIALS AND METHODS

Reagent and Animals

Crude AS pieces, AS formula granule, liquored AS pieces were provided by Tianjiang pharmaceutical Co., Ltd. (China, Jiangyin). Aspirin and normal saline were bought from the Lunan Pharmaceutical Group Corporation (China). Other reagent are of analytically pure.

Kunming mice were from Experimental animals center, Shandong University of TCM. Hot plate was bought from Beijing gene and life science Corporation (China).

Decoction Preparation

Crude AS pieces and its liquored AS pieces were made into decoction according to the Instructions of the Chinese Pharmacopoeia [1]. Powered AS pieces were extracted twice via reflux with water for 3 h. The combined filtrate was concentrated to 0.2 g·mL⁻¹ crude drug. AS formula granule and its liquored formula granule were heated to solution and concentrated to 0.2 g·mL⁻¹ crude drug.

Hot Plate Test

The hot plate test is a test of the pain response in animals. It is used in basic pain research and in testing the effectiveness of analgesics by observing the reaction to pain caused by heat [3]. The mice always showed a series of specified behavior like hind paw-licking or jumping when they were placed on a heated surface. In the test, Animals were randomly divided into five groups of ten mice, i.e. negative control group (normal saline), positive control group (aspirin), AS pieces group, AS formula granule group and liquored AS pieces group. The mice whose reaction time between 5 to 30 s were chosen to be used in the test. The hot plate was maintained an temperature of 55 ± 0.1 °C. From the start

of the intragastric administration, the medicine ($0.2 \text{ g}\cdot\text{mL}^{-1}$) or normal saline ($0.2 \text{ g}\cdot\text{mL}^{-1}$), the reaction time for mice was recorded in an regular intervals of 60 m from beginning to 120 m respectively.

Writhing Test

The writhing test was performed as described^[4]. It is an effective way to evaluate the analgesic drugs. In the experiment, mice were injected intrathecal administration of the AS ($0.2 \text{ g}\cdot\text{mL}^{-1}$) or normal saline ($0.2 \text{ g}\cdot\text{mL}^{-1}$), after half an hour, 0.2 mL acetic acid solution (0.7%, v/v) was injected intraperitoneally into each mouse. Five minutes later, the numbers of writhing within 30 s were recorded, and the results can reflect the effect of the AS analgesic.

Ear Edema Test

Ear edema test was carried out to measure the effect of anti-inflammatory activity as described by Gad [5]. At first, mice were injected the drugs (0.2 mL) or normal saline (0.2 mL) by intraperitoneal administration. Half an hour later, left ear was spread with 0.2 mL of xylene, the right was used as control, after 3 h, all mice were sacrificed and both ears were taken along their ears baseline, edema inhibition was determined

by the deviation between the weight of left ear and right ear.

RESULTS

Effect of AS Decoction on the Hot Plate Response

The result indicated that the AS decoction extended the reaction time for pain from the beginning to 90 m apparently. In these different AS decoctions, AS formula granule decoction have a better effect than the crude AS pieces decoction, but no significance occurred in the experiment (**Figure 1**).

Effect of AS decoction on the writhing response

According to **Figure 2**, the AS formula granule decoction prolonged the latency and decreased the rate of writhes, compared with the other five groups. The aspirin showed the best effect in analgesic. The experiment data also indicated that the AS formula granule decoction performed a better analgesic effect than crude SM decoction.

Effect of AS Decoction on Ear Edema Response

Compared with the negative control, the AS decoction groups significantly reduced the edema extent. Furthermore, the AS formula granule decoction possessed better effect in the aspect of anti-inflammatory than the

crude AS decoction (Figure 3).

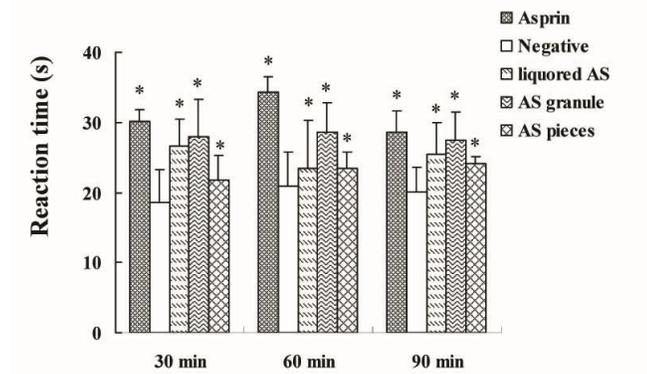


Figure 1: Effect of AS Decoction on the Hot Plate Response

NOTE: Ordinate and Abscissa Represent Reaction Time. Results Were Expressed as Means±SD for the Groups of 10 mice. Each Experiment was Performed Three Times Independently. *P<0.05 Compared to the Negative Control as Determined by the Student's *t*-Test

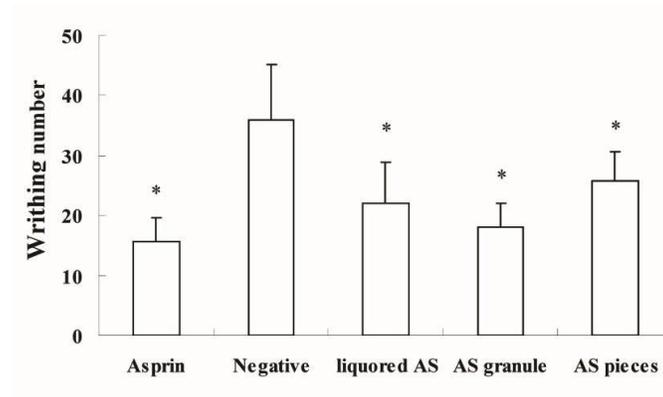


Figure 2 Effect of AS Decoction on the Writhing Response

NOTE: Ordinate Represents Number of Writhing and Abscissa Represents Medication. Results Were Expressed as means±SD for the Groups of 10 mice. Each Experiment was Performed Three Times Independently; *P<0.05 Compared to the Negative Control as Determined by the Student's *t*-Test

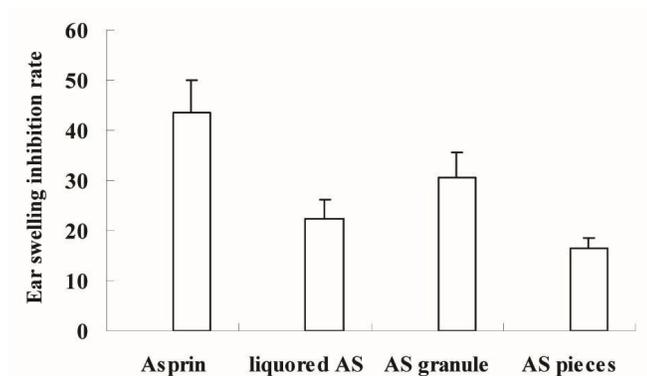


Figure 3: Effect of AS Decoction on Ear Edema Response

NOTE: Ordinate and Abscissa Represent Ear Swelling Inhibition Rates and Medication, Respectively; Results Were Expressed as Means±SD for the Groups of 10 mice. Each Experiment was Performed Three Times Independently; *P<0.05 Compared to the

Negative Control as Determined by the Student's *t*-Test**DISCUSSION**

Radix *Angelica sinensis*, which is a highly valued Chinese traditional medicinal herb, has been used in promoting blood flow, enriching the blood and regulating menstruation. Research shows that angelica has antithrombotic effects [6, 7], other aspects of the activity is not reported in detail. Among the people, it is used for pain anti-inflammatory drugs.

Recently, *Angelica* has a lot of research in the pharmacy, pharmacology and chemical composition. In this experiment, the results suggested that all the three AS decoctions reduce the pain and inflammation of mice. Perhaps their pharmacological mechanism is attributed to the detected volatile oil [8] and ferulic acid [9-10]. It contains many other components [11]. In every mice models, Danggui formula granule and liquored AS pieces showed better analgesic and anti-inflammatory effect than crude SM pieces, which partly showed that the different preparation could be considered as different remedies in clinic. Yellow wine has the role of promoting blood circulation [12] and expelling wind and cold-dispelling the effect [13], formula granule own better solubility particles. It also documented that

in the different preparation, the volatile oil and polysaccharide have been changed, which may explained the different functions of the different AS decoctions [14].

In conclusion, the findings signify the potential of AS as a promising source of natural analgesic and anti-inflammatory medicine. Nevertheless, the other possible mechanisms of action of AS need further investigation.

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