

Coptis oil: component analysis, safety and anti-inflammatory efficacy evaluation

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Han, Jinhua¹; Li, Shenghui¹; Yu, Yu²; Ding, Song¹; Yang, Ke¹; Liu, Chenguang^{2*};
 1 Qingdao Youdo Bioengineering Co., Ltd, Qingdao, Shandong, China;
 2 College of Marine Life Science, Ocean University of China, Qingdao, Shandong, China

Introduction:

In recent years, more and more people are suffering from skin problems, such as allergies^[1], eczema^[2], etc. It is very necessary to develop a gentle and effective skin care products for people with problem skin. It is derived from the classic Chinese medicine prescription coptis Ointment, which is widely used clinically to treat Skin Physiological Damage Disease.

Inflammation is the normal physiological response of most skin physiological damage disease, and this can be initiated by microbial infection and tissue injury^[1,2]. It is characterized by abundant production of pro-inflammatory mediators such as nitric oxide (NO), tumor necrosis factor (TNF)- α ^[3], interleukin (IL)-1 α ^[4], IL-6^[5] and IL-8^[6], which are considered important targets for the development of anti-inflammatory agents.

In this study, we used sesame oil as the solvent to extract the effective components of Coptis, Turmeric, Phellodendron, Rehmannia, and Angelica. Then the composition of Coptis oil was analyzed. In addition, we also assessed the irritation and safety of Coptis oil. Finally, we chose "LPS-macrophages" as the inflammation model to evaluate the anti-inflammatory effects of Coptis oil.

Materials & Methods:

2.1 Component analysis
 Composition analysis of Coptis oil by gas chromatography mass spectrometry Pyrolysis gas chromatography mass spectrometer and Headspace gas chromatography mass spectrometer through the computer to complete spectra analysis for total ion flow chart, and through the comparison at the same time NIST11S retrieval qualitative, and the spectrogram is used to calculate peak area so as to further the relative molecular mass of Coptis oil components.

2.2 Safety
2.2.1 Chicken embryo chorioallantoic membrane test
 0.1% NaOH was used as Positive control; Normal saline was used as Negative control. According to the calculated IS value, the eye irritation of the test substance is classified according to Table 1.

2.2.2 Skin repetitive open smear test
 30 volunteers smeared 0.05 mL of coptis oil on the appropriate area on the curved side of the forearm, twice a day; for 7 consecutive days; observed and recorded skin reactions. see the table-2 for the judgment standard.

Table -2 Standard table for judging skin reaction of skin repetitive open smear test

Level of reaction	Rating level	Clinical manifestations of skin reactions
-	0	Negative reaction
±	1	Faint erythema, dry skin, wrinkles
+	2	Erythema, edema, papules, wind masses, scaling, fissures
++	3	Obvious erythema, edema, blisters
+++	4	Severe erythema, edema, bullae, erosion, hyperpigmentation or hypopigmentation, acne-like changes

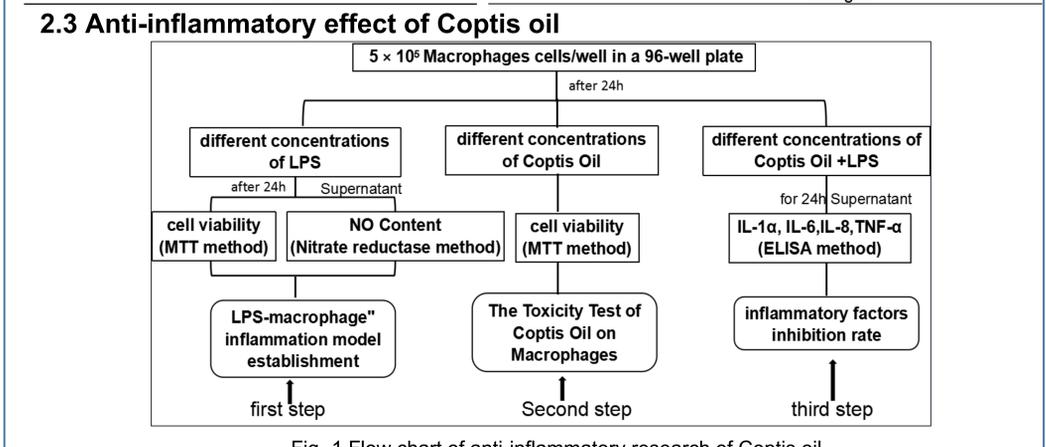


Fig.-1 Flow chart of anti-inflammatory research of Coptis oil

Results & Discussion:

3.1 Component analysis
 Unsaturated fatty acids: Linoleic acid (37.58%), Oleic acid (24.6%), Palmitic acid (5.35%) and etc.; Sesamo (40mg/mL); Curcumin (9.10ug/mL); Ferulic acid (12.20ug/mL); Berberine hydrochloride and other active ingredients.

3.2 Safety
3.2.1 Chicken embryo chorioallantoic membrane test
 The results showed that the 6 chicken embryos in the Coptis oil group had no bleeding, coagulation, or vasolysis five minutes later. The stimulus score is less than 1, indicating that Coptis oil has no eye irritation or little irritation.

3.2.2 Skin repetitive open smear test
 The results showed that there were no erythema, dry skin, wrinkles, erythema, edema, papules, desquamation, etc. which indicates that this formula of Coptis oil is less irritating, moderately safety and suitable for people.

3.3 Anti-inflammatory effect of Coptis oil
3.3.1 "LPS-macrophage" inflammation model establishment
 LPS concentration is $5\mu\text{g}\cdot\text{mL}^{-1}$ to establish the "LPS-macrophage" inflammation model for the following experiments. (Fig.-2)

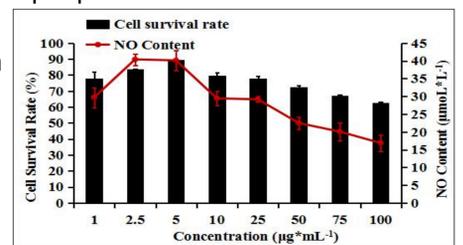


Fig.-2 Effect of modeling concentration on the survival rate and NO content of RAW264.7 Cells

3.3.2 The Toxicity Test of Coptis Oil on Macrophages
 Choose the concentration of $1\mu\text{L}\cdot\text{mL}^{-1}$, $5\mu\text{L}\cdot\text{mL}^{-1}$, $10\mu\text{L}\cdot\text{mL}^{-1}$ Coptis oil for subsequent cytokine determination. (Fig.-3)

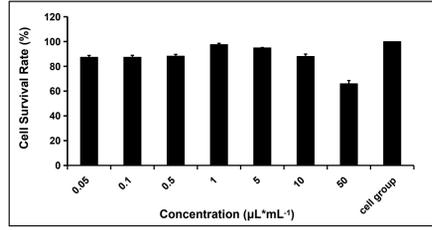


Fig.-3 The effect of coptis oil on inflammatory factors

3.3.2 inflammatory factors inhibition rate
 The results (Fig.-4) showed that Coptis oil had a strong inhibitory effect on the levels of TNF- α , IL1- α , IL-6 and IL-8.

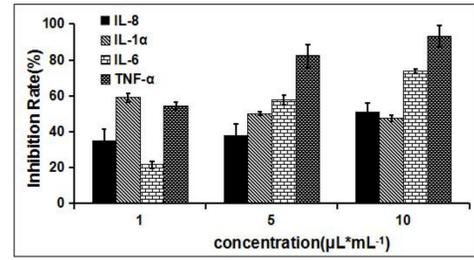


Fig.-4 The effect of coptis oil on inflammatory factors

Conclusions:

In this study, Coptis oil was prepared with sesame seed oil as the solvent to extract Coptis Rhizoma, Turmeric, Phellodendron, Rehmannia, and Angelica. Through the research of chemical composition, safety and anti-inflammatory activity, it is found that it contains a variety of active ingredients; it is highly safe, non-irritating, and has a certain anti-inflammatory function, which is suitable for development and application in the cosmetics field and has good application prospects.

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