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Biotransformation products from *Clarias batrachus* oil



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ABSTRACT

Biotransformation can be defined as an application that utilized natural and recombinant organisms' enzymes secreted by yeast, fungi and bacteria or whole cells as catalyst in synthesis of organic compound. Therefore, *Pseudomonas aeruginosa* bacterium has been chosen to be the biocatalyst for biotransformation of ω fatty acids extracted from Malaysian catfish, *Clarias batrachus* emphasizing on bioconversion of arachidonic acid. In addition, arachidonic acid was one of prostaglandin precursor which exerts a variety of pharmacological effects on human and animals. In this study, the fatty acids were extracted from the catfish using modified Folch method where the fish flesh was freeze dried prior to homogenization with the chloroform and methanol system. Then, the crude lipid extract was added to the bacterial culture and incubated for 4 days. After incubation, the biotransformation product was extracted and analyzed by using gas chromatography and mass spectrometer (GC-MS) to identify the fatty acids and other compounds. It was found that several fatty acids, especially ω -fatty acids were converted to cholesterol. This indicates that ω -fatty acids can be used as starting materials for other bioactive metabolites for pharmaceutical purposes.

MATERIALS AND METHOD

Extraction of fish oil.

The catfish was obtained from Koperasi Shamelin catfish farm, Janda baTasek Kenyir, Terengganu Malaysia. The oil was extracted from the fish flesh using a modified Folch method [3].

Development of Topical Cream

The topical cream was developed in the form of water-in-oil emulsion. The fish oil was mixed with the vegetable oil, water, surfactants, emulsifiers and stabilizers. The dispersion was homogenized using a homogenizer (IKA T10, Basic Ultra Turrax, Stauffen, Germany).

Animals

Male rats (Sprague-Dawley, 150–200 g) were purchased from the Experimental Animal Center near IIUM University. The rats were treated according to the previous reported procedure [4]. The animals were fed and housed in a room with a controlled ambient temperature (25 ± 2 °C), humidity ($70\pm 10\%$), and a 12-h light/dark cycle. Animals were acclimatized to the housing conditions and handled for 3–4 days before experiments. All experimental procedures were conducted according to the IIUM Guidelines for the Care and Use of Laboratory Animals. The experimental protocols were approved by the Committee on Animal Care and Use at IIUM University.

Induction of Arthritis

Induction of arthritis was carried out according to the method previously reported [4]. Male rats were used for inducing arthritis by the injection of the CFA adjuvant into the joint of the right paw of the hind leg. The increase of circumference of the joint of the paw of the hind leg was measured. The topical cream was applied at the joint of the induced rat while the saline solution (NaCl), as a control, was injected on the knee joint.

RESULTS AND DISCUSSION

Effects of topical cream on swelling (edema) in the hind paw of the induced arthritic rats

Figure 1 shows the circumference of the joint of the right paw after the injection of CFA. The induced paw remained swollen for more than 20 days. The circumference of edema increased and reached a peak 4 days after CFA injection then slowly subsided until the 12th day, when the paw began to swell again. Treatment with *C. micropeltes* topical cream significantly reduced CFA-induced paw edema on the 4th, 14th and 16th day compared with the group treated with CFA with saline (NaCl). The result also indicates that treatment of saline solution only resulted in enhancement of the course of adjuvant arthritis while giant snakehead fish topical cream reduced the development of adjuvant arthritis in the right joint of the paw. The result obtained was consistent with the previous data [4,5]. However, the mode of action of the topical cream on anti-inflammatory mechanism will be studied later.

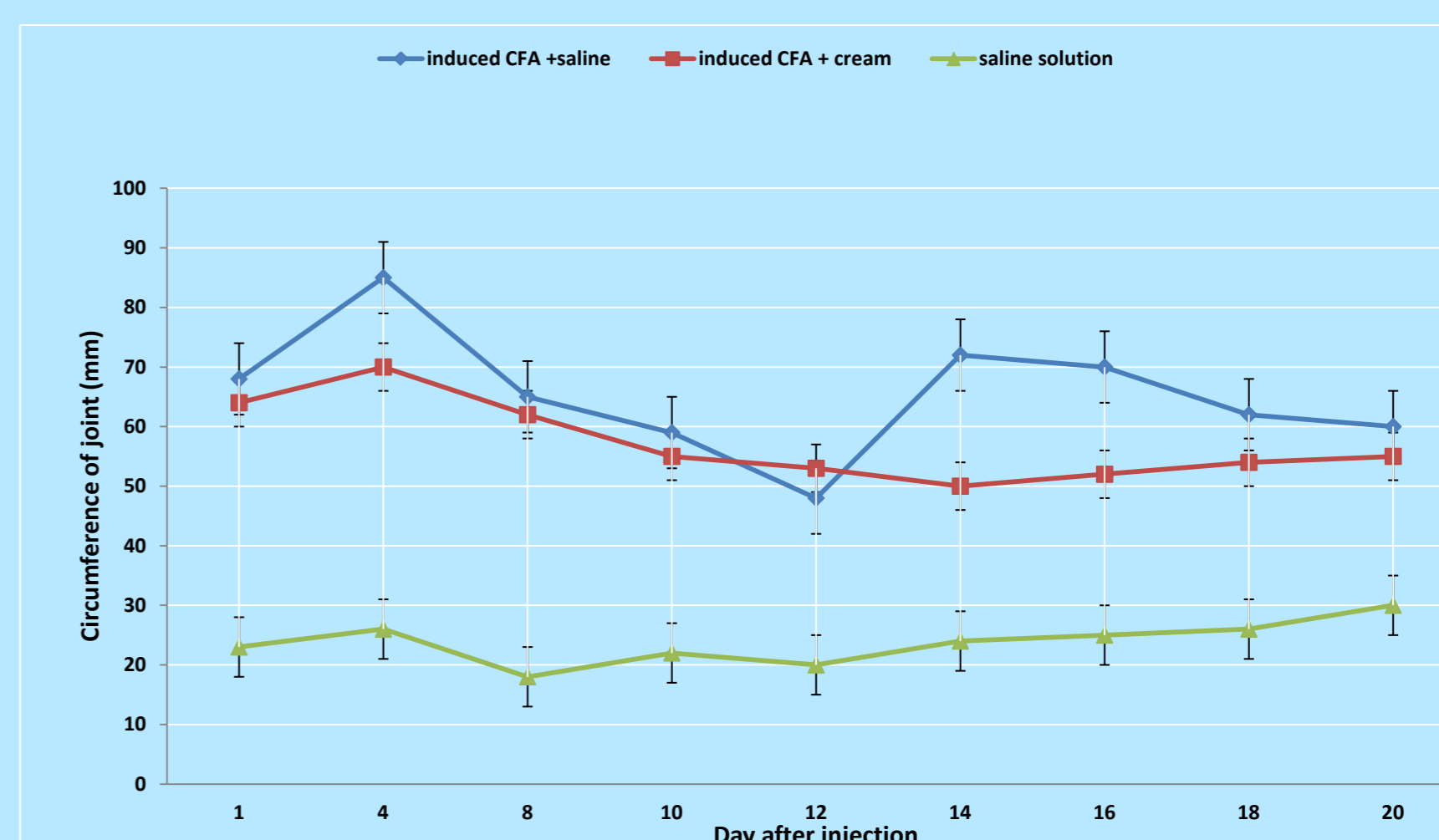


Figure 1. Effects of topical cream on swelling (edema) in the hind paw of the induced arthritic rats

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