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# Patch Test Analysis of Channa Striata Extract Biopolymer

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**ABSTRACT**

**Introduction**: Wound healing involves complex interactions between cells and mediators that occur immediately after the wound occurs and depends on nutritional factors and wound closure. Snakehead murrel fish (Channa striata) extract has been extensively researched to speed up the wound healing process because of its high amino acid content. Patch tests were carried out to assess the allergen potential of the Channa striata extract biopolymer in the form of wound dressings.
**Methods:** Experimental study of 40 subjects who had admit patch test with various consentration of Channa striata extract biopolymer. The patch test materials divided of 5 grups. They were aquadest solution, Eucheuma cottonii biopolymer, Channa striata extract biopolymer concentrations of 5.4 g/mL, 10.8 g/mL, and 21.6 g/mL. All subjects had been assessed for skin reactions that occured after 48 hours, 72 hours, and 96 hours.
**Results**: A total of 40 subjects met the inclusion criteria and completed informed consent. There was minimum allergen reaction (+) in slight subject in all grups except aquadest grup after 48 hours. The allergic reaction dissolve in 72 and 96 hours. An irritant reaction (IR) occurred in among all grups but indicated to the hypafix plaster.
**Conclusion**: Patch test containing biopolymer Channa striata extract showed a minimal allergic reaction

**Keywords**

Patch test, Channa striata extract, Allergic reaction, Wound healing

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## INTRODUCTION

Wounds are described as the result of a process that disrupts the normal anatomical structure of the tissue. Wounds can be classified as open or closed, characterized by skin damage.1-3 Wound healing involves complex interactions between cells and mediators that occur immediately after the wound occurs and lasts for weeks, depending on several factors, including nutrition and wound closure. Several studies had tried to understand how to accelerate wound healing, including using snakehead murrel fish (Channa striata) extract.[1,4,5]

Channa striata is a freshwater fish that can live in dirty water with low oxygen levels and has the potential to accelerate wound healing. Channa striata extract contains important components, such as albumin, Zn, Cu, and Fe, which accelerate the wound healing process and are important for the synthesis of wound collagen fibers, especially glycine. In addition, this species has high levels of arachidonic acid and polyunsaturated fatty acids, which can increase prostaglandin synthesis. Prostaglandins induce platelet aggregation and aid in platelet adhesion to endothelial tissue and initiate blood clotting, an important role in wound healing.[6-9]

Biopolymers are naturally occurring polymers derived from biological sources such as plants and microorganisms. They are biodegradable and biocompatible, serving as sustainable alternatives to synthetic plastic. Biopolymers are advantageous due to their biocompatibility and ability to create a moist environment conducive to healing.Various studies have assessed the benefits of giving Channa striata extract orally, in the form of creams, oil-phase ointments, sprays, and biopolymers for wound dressings and giving satisfactory results in wound healing.[1,4,9,10]

Skin patch tests are a diagnostic procedure used to determine the presence of skin hypersensitivity to an antigen. This examination technique has been developed for the standardization of allergens, testing tools, and testing protocols.11,12 The patch test aims to cause an eczematous reaction by attaching the allergen using the occlusion technique to the subjects' intact skin, which is suspected to be allergic to certain substances. The immunological basis of the patch test is a type IV hypersensitivity reaction, an allergic reaction involving sensitization and elicitation phases. Patch test is contraindicated in this condition, such as pregnancy, when the allergic reaction in acute phase and consuming of drugs that reduce hypersensitivity reactions like antiinflammation and immunomodulator.[1,13,14]

The innovation in this study emerges from exploring biopolymers in wound care, offering a fresh, eco-friendly approach by combining them with natural extracts such as Channa striata. Although biopolymers have been used in other capacities, their potential in wound dressings could significantly improve healing. However, verifying their safety is a necessary step before considering clinical applications.

## METHOD

This was an experimental research study involving 40 subjects at the Dermatology and Venerology Polyclinic, Universitas Sumatera Utara Hospital. This study was conducted in April 2022 and received ethical clearance from the Health Ethics Committee of the Universitas Sumatera Utarh (number 440/KEPK/USU/2022). All subjects had to meet the inclusion criteria, including healthy male and female sex, aged 18-60 years, and willingness to follow the procedure for carrying out the patch test by providing informed consent. Patients with skin diseases on patch testing, pregnant patients, and those with a history of atopic dermatitis were excluded from this study.

Each volunteer will be given five types of allergens: aquadest, biopolymer as a control, and biopolymer with three different concentrations of Channa striata extract biopolymer (21.6 gr/mL, 10.8 gr/mL, and 5.4 gr/mL). Biopolymer wound dressing with Chana sriata extract was produced by PT. Mega Medica Pharmaceuticals. The procedure for the patch test is as follows: the allergen is placed in each chamber and assigned a number. The treatment groups were as follows: 1, NaCl 0.9% (control); 2, biopolymer (Eucheuma cottonii); 3, biopolymer with 21.6 g/ml Chana sriata extract; 4, biopolymer with 10.8 g/ml Chana sriata extract; and 5, biopolymer with 5.4 g/ml Chana sriata extract. The subject's back was cleaned with a 70% alcohol swab and allowed to dry. The chamber containing the allergen was attached to the back. The chamber was sealed with a Hypafix tape. The subject was instructed to (a) keep the pasted area dry, (b) reduce physical activity, and (c) reduce exposure to direct sunlight. The observation was done at 48 hours, 72 hours dan 96 hours to examined the iiritan or allergic raction occur

## RESULTS

A total of 40 subjects participated in this study, of which 31 were female and 9 were male. The average age of male research subjects was 23.3 years and 30.06 years for females, with an age range between 20 - 36 years. The participants' educational background was dominated by high school graduates. The reactions to exposure to allergens for each patch group are shown in Table 1. All irritant reactions were dissolved after 96 h. Almost all allergic reactions tended to resolve after 72 h, but there was one (2,5%) subject that showed a persistent allergic reaction after 96 h (crescendo sign). Only seven subjects (17.5%) experienced mild itching. that did not require any antihistamines.

Table 1. Characteristics of allergic reactions at various durations of allergen exposure

| Duration (Hours) | Skin reaction | Control (NaCl 0,9%) | Biopolymer *Eucheuma cottonii* | Biopolymer5,4 g/mL | Biopolymer 10,8 g/mL | Biopolymer 21,6 g/mL |
|---|---|---|---|---|---|---|
| 48 | IR | 7 | 12 | 10 | 9 | 9 |
| | + | - | 1 | 1 | 1 | 1 |
| | - | 33 | 27 | 29 | 30 | 30 |
| 72 | IR | - | 2 | 3 | 2 | 2 |
| | + | - | 1 | 1 | 1 | 1 |
| | - | 40 | 37 | 36 | 37 | 37 |
| 96 | IR | - | - | - | - | - |
| | + | - | 1 | 1 | 1 | 1 |
| | - | 40 | 39 | 39 | 39 | 39 |

Note: IR: Irritation reaction; (+), minimal allergic reaction; (-), no reaction.

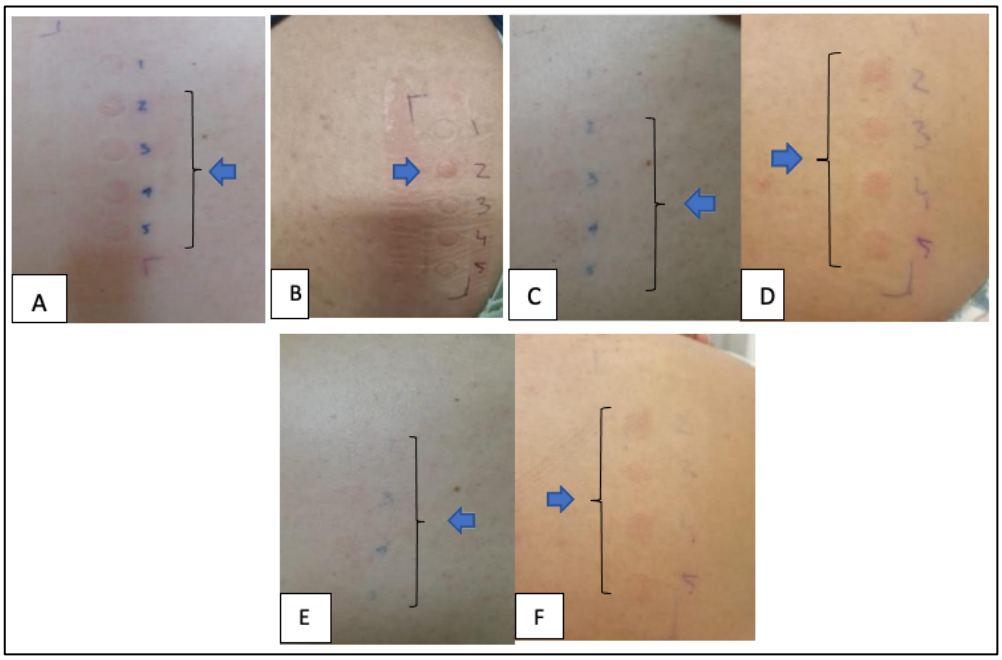


Figure 1. (A) IR reaction due to adhesive after 48 h. (B) Reaction + on biopolymer containing Eucheuma cottonii after 48 h. (C) IR reaction due to adhesive after 72 h. (D) Reaction + on the biopolymer containing Eucheuma cottonii, Channa striata 5.4 g/ml, 10.8 g/ml, and 21.6 g/ml after 72 h. (E) IR reaction due to adhesive at 96 h. (F) Reaction + on the biopolymer containing Eucheuma cottonii, Channa striata 5.4 g/ml, 10.8 g/ml, and 21.6 g/ml at 96 h.

## DISCUSSION

Our study had certain limitations due to the small number of samples used for the evaluation. Despite these limitations, our study has several strengths. This study marks the first time that wound dressings containing Channa extract have been evaluated, providing novel insights into their potential applications. We found positive reactions to wound adhesive biopolymer extracts of various concentrations after 48 h: concentrations of 5.4 g/mL in 4 subjects, concentrations of 10.8 g/mL in 5 subjects, and concentration of 21.6 g/mL in 3 subjects. However, we observed that as the duration of patch use increased, the positive reactions disappeared.

Our study revealed an irritant reaction due to the use of adhesive plasters. The adhesive plaster used is hypapix with polyacrylate content. Acrylate is reported as one of the main causes of irritant contact dermatitis and skin allergies.[15]

Minimal allergic reactions were observed at baseline and at a concentration of 5.4 g/mL, biopolymer after the concentration of 10.8 g/mL and biopolymer at concentration of 21.6 g/mL which were observed at 48, 72 and 96 hours. Skin symptoms are associated with the large molecular weight of fish enzymes such as pepsin and trypsin that effectively degrade human epidermal keratin.[16]

The baseline biopolymer consists of algae. There is evidence of the presence of allergens in edible algae. Allergenicity to edible algae species has been reported and induces several clinical outcomes ranging from urticaria and gastrointestinal symptoms to oedema and anaphylaxis.[17]

## CONCLUSION

In this study, allergic reactions were only observed within the first 48 h at the tested concentrations. Specifically, minimal allergic reactions were noted at baseline with biopolymer concentrations of 5.4, 10.8, and 21.6 g/mL. However, the exact number of patients who experienced allergic reactions versus those who did not is not explicitly described in the provided text. Further clarification is needed to determine how many participants were allergic and how many were not affected by the biopolymer preparations.

## DECLARATIONS

Ethics approval and consent to participate were obtained. Permission for this study was obtained from the Ethics Committee of the Universitas Sumatera Utara and Haji Adam Malik General Hospital.

## CONSENT FOR PUBLICATION

The Authors agree to publication in the Journal of Society Medicine.

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None

## COMPETING INTERESTS

The authors declare no conflicts of interest in this study.

## AUTHORS' CONTRIBUTIONS

All authors significantly contributed to the work in terms of execution, data acquisition, analysis, interpretation, or all these areas. Contributed to drafting, revising, and critically reviewing the manuscript. Approved the final version for publication, agreed to the journal submission, and agreed to be accountable for all aspects of the work.

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