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Sacran, a natural skin barrier enhancer, improves atopic and contact eczema: Case report

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Abstract

Atopic and contact eczema are skin inflammations manifested by erythema, edema and scaling. Data from five atopic eczema and one contact eczema patients with mild to moderate condition are presented is this report. Eczema area severity index (EASI) was calculated by considering the severity of each of symptoms (erythema or redness, thickness/swelling, scratching/excoriation, lichenification/prurigo) on affected body areas. In addition, for each patient, a dermatology life quality index (DLQI) was determined at baseline and once a week, with the use of a questionnaire. Regarding contact eczema patient, a marked improvement of skin lesions with an amelioration of the dermatology life quality index (DLQI: 29 and 38 on day 1 and day 10, respectively) and concomitant reduction of the disease severity (EASI score: 9.6 and 0.3, respectively). On the other hand, topical 0.2% sacran also significantly improved DLQI in atopic patients (DLQI: 27 vs. 36, respectively; $p<0.05$) with a marked reduction of the total disease severity (mean EASI score: 17.4 +/- 2.6 vs. 4.1+/- 0.7; $p<0.01$). This is the first report on the beneficial health effects of sacran on skin eczematous disorders in a sample of human subjects. Implementing a comparative clinical trial with a larger sample size should be envisaged to confirm sacran's efficiency and safety.

Key words: Atopic eczema, contact eczema, dermatology life quality index, sacran, skin symptoms

1. Introduction

Atopic eczema, also called atopic dermatitis, is a common chronic inflammatory skin disorder characterized by pruritus, eczematous lesions (mainly scaling, erythema) and a defect of skin barrier (Vestita *et al*., 2015). Children are the most affected, but the disease may occur in adults, too; patients show an impairment of the skin barrier function and a defective innate immunity (Zeppa *et al*., 2011; Mrabet-Dahbi and Maurer, 2011; Boguniewicz *et al*., 2011). On the other hand, contact dermatitis (CD) is an eczematous eruption caused by external agents, which can be broadly divided into irritant substances that have a direct toxic effect on the skin (irritant contact dermatitis, ICD) and allergic chemicals where immune delayed hypersensitivity reactions occur (allergic contact dermatitis, ACD). Irritant Contact Dermatitis (ICD) is a skin inflammation manifested by erythema, mild edema and scaling (English, 2011; Hogan *et al*., 2011), consecutive to direct contact with some environmental factors (chemical products such as solvents, soap or detergents, *etc*.).

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Nowadays, treatment options atopic and contact eczema are in general limited; most clinicians often rely on topical corticosteroids, emollients or immunosuppressive drugs (for resistant chronic dermatitis) (English, 2011). Sacran is a glucosaminoglycan-like sulfated polysaccharide extracted from the jelly-like extracellular matrix (ECM) of a cyanobacterium, *Aphanothece sacrum* (Okajima *et al*., 2009). It is currently commercialized and used as a skin care product in Japan. We have previously reported that sacran enhances skin barrier function and exerts anti-inflammatory activity and improves atopic dermatitis *in vivo* (Ngatu *et al*., 2012). However, there have been no report on sacran's effect on irritant contact dermatitis.

2. Methods

2.1 Patients and clinical evaluation

Data from five female children with atopic eczema (including 3 patients followed at a local dermatological clinic and 2 others whose parents requested to treated at home, age-range: 7-11 y.) and one adult female patient with acute contact eczema are presented in this report. Eczema area severity index (EASI) was calculated by considering the severity of each of symptoms (erythema or redness, thickness/swelling, scratching/excoriation, lichenification/ prurigo) on affected body areas as reported previously (Ngatu *et al*., 2014). In addition, for each patient, a dermatology life quality index (DLQI) was determined at baseline and once a week, with the use of a

questionnaire (Finlay and Khan, 1994; Takahashi *et al.*, 2006).

2.2 Ethical consideration and data analysis

Participation was voluntary. For children, one of the parents had to sign an informed consent form, whereas adult patients did it by themselves. The main study project was approved by the ethics committee of Kochi University Medical School, Kochi, Japan. Data were analyzed (baseline vs. week 2) and chi-square test was performed using Stata statistical package version 11.0 (StataCorp, TX, USA).

3. Results and Discussion

3.1 Case of irritant contact eczema in a female office worker

A 33-year old female office worker developed a burning rash on both lower limbs some hours after a skin contact with wild plants. The patient is allergic to a number of steroid preparations, has no personal or family history of atopic dermatitis and has been healthy until the day she had spent some minutes in a small forest. She only remembered being in contact with wild plants that firstly caused a mild itch on her lower limbs a few minutes later, and no insect biting occurred that day. While she arrived at home, she developed erythematous lesions on both lower limbs consisting of small isolated red spots that progressively caused a burning pain on the affected areas. A day later, skin symptoms (erythema, feeling of burning) were getting severe and spreading from feet to the knees. On the third and fourth days of disease, the red spots started getting larger and symptoms were worsening, suggesting a possible aggravation of the toxic effect of an irritant agent. The patient then decided and has consulted one of the authors.

She had no fever and vital signs were normal and completed a dermatology life quality index (DLQI) form on day1 (baseline) and day 10 of treatment with topical 0.2% sacran aqueous solution. Informed consent and permission were obtained from the patient to use images (in this report) taken during the course of treatment. Four days later, an improvement of skin lesions, with a marked improvement of her skin condition (Figure 1). On tenth day of treatment, the patient had no complaint; an amelioration of the dermatology life quality index (DLQI: 29 and 38 on day 1 and day 10, respectively) with a concomitant reduction of the disease severity (EASI score: 9.6 and 0.3, respectively).

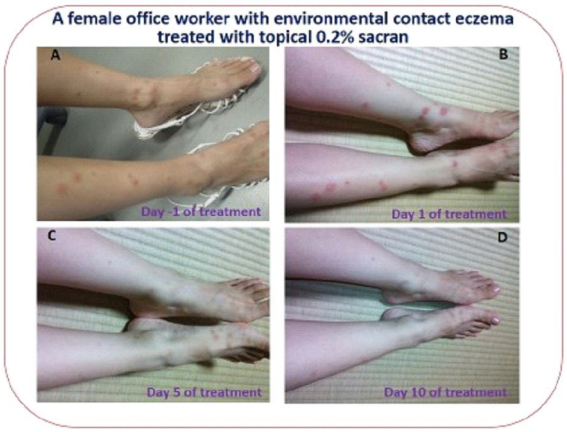

Figure 1: Case of contact eczema in a 33-year old female patient: skin lesions a day before treatment (A) and at days 1 (B), 5 (C) and 10 (D) of topical 0.2% sacran treatment

3.2 Cases of atopic eczema (n=5)

Five patients with moderate atopic eczema (including 4 girls and 1 boy), with a history of atopy and who were not under another medication, were participated in the preliminary study. The treatment consisted of a twice daily topical application of 0.2% sacran. Two weeks after the start of topical sacran treatment, a significant improvement of DLQI was noted in all atopic patients (DLQI: 27 vs. 36, respectively; $p<0.05$) with a marked reduction of the total disease severity (mean EASI score: 17.4 +/- 2.6 vs. 4.1+/- 0.7; $p<0.01$) as shown in Figure 2. In addition, all patients reported a reduction of pruritus (itch) within the first week of treatment. Figure 3 shows changes in the severity of skin lesions (erythema, swelling, lichenification and scratching markings).

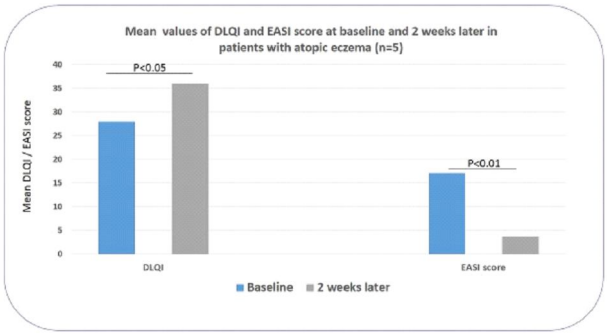

Figure 2: Trend of the dermatological life quality index (DLQI) and eczema area severity index (EASI) in a sample of five atopic eczema patients at baseline and 2 weeks later

Figure 3: Changes in the severity of skin lesions in a 7 year-old and an 11-year old female atopic eczema patients

The present report shows that sacran (which possesses a skin barrier enhancing activity and improves animal model of eczematous disorder, and currently in use as a skin moisturizer and skin care product in Japan) could alleviate eczematous skin lesions in atopic and contact eczema patients. More importantly, none of the patients reported adverse effects that could be caused by sacran. There are reports in the literature suggesting beneficial health effects of other algal sulfated polysaccharides on a number of skin disorders. Marine

algal biomaterials have recently been subject to research in many countries in the field of drug discovery; as natural products, they have the advantage of low toxicity and bioavailability (Ali *et al*., 2000; Stonik and Fedorov, 2011; Thomas *et al*., 2013). Meanwhile, though the present report shows beneficial health effects of sacran, implementing a comparative clinical trial with a larger sample size should be envisaged to confirm its efficiency and safety profile.

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Conflict of interest

We declare that we have no conflict of interest.

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