An inhibitory effect of yuzu seed oil in the development of house dust mite antigen-induced atopic-like dermatitis in NC/Nga mice

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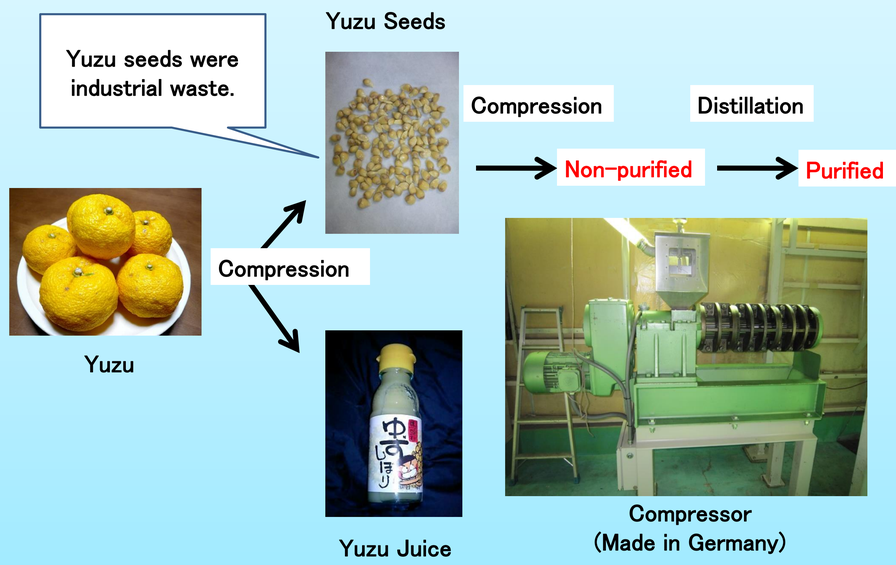
Introduction

Yuzu (*C. junos Sieb.* ex Tanaka) is a typical Japanese citrus fruit with a desirable smell. Yuzu was brought via Korea from China to Japan more than 1,000 years ago. Yuzu peel and juice are used in making vinegar and seasonings in Japan.

It is reported that the components of yuzu peel have anti-allergic, relaxation and antioxidant effects.

However, no studies have been performed on the effects of yuzu seeds because yuzu seed oil is a new material. In this study we show that yuzu seed oil may be suitable as a new curative method for atopic dermatitis.

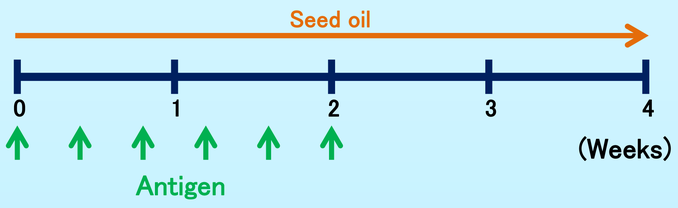
The manufacturing method of yuzu seed oil



The study design


NC/Nga mouse

This type of mouse develops human atopic-like skin lesions with elevated serum IgE level when kept in conventional conditions.



Induction of atopic dermatitis

・Antigen : Mite antigen ointment (Biostir AD®)

・ We applied the antigen under SPF conditions to the back and ear auricles on NC/Nga mice 6 times in 2 weeks.

Application of yuzu seed oil

・ We applied yuzu seed oil to NC/Nga mice every day.

・ We used olive oil as a negative control.

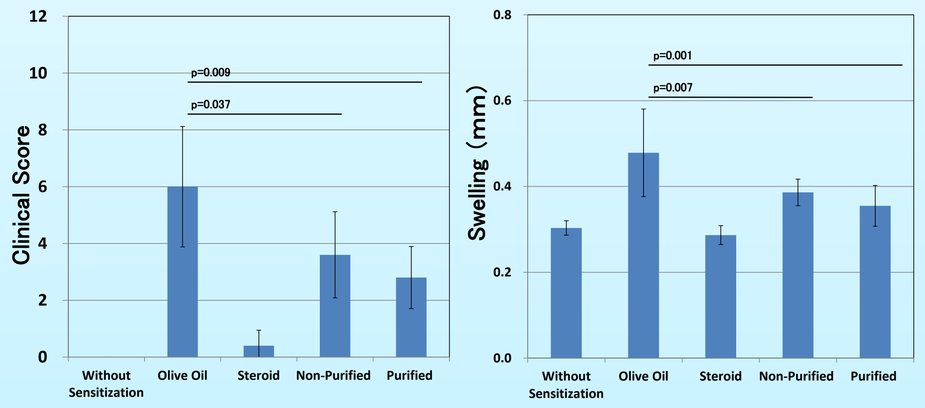
・ We used betamethasone sodium phosphate (topical steroid) as a positive control.

Clinical features


Negative control (olive oil) | Non-Purified | Purified

This photograph was taken 4 weeks after sensitization. Atopic dermatitis induced by topical application of the antigen resulted in immediate clinical signs and symptoms of itching, erythema and hemorrhage on the ear and back. This was followed by edema, superficial erosion, deep excoriation, scarring and dryness of the skin. These clinical signs were markedly alleviated in both the yuzu seed oil groups.

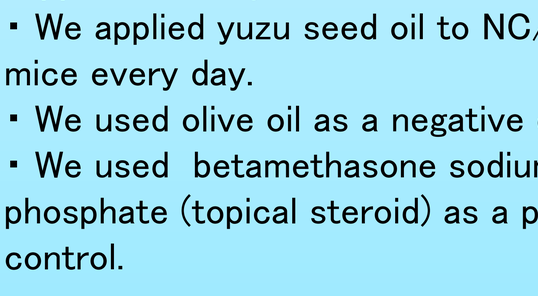
The effect of yuzu seed oil aplication on clinical skin severity scores and ear thickness.



This figure shows changes in the clinical skin severity scores and ear thickness in NC/Nga mice. Briefly, dermatitis severity was evaluated once a week, by assessing four specific criteria : (1) erythema/hemorrhage, (2) scarring/dryness, (3) edema, and (4) excoriation/erosion. Each criterion was then evaluated on a three point evaluated : 0 (none), 1 (mild), 2 (moderate) and 3 (severe), with the sum of the individual scores used to denote overall dermatitis severity, characterized by itch-associated responses of NC/Nga mice with antigen-induced chronic dermatitis.

The clinical skin severity score and ear thickness of the control group, which were sensitized with the antigen under SPF conditions, increased from the beginning of the sensitization. Application of yuzu seed oil significantly inhibited the increase of the clinical skin severity score and the ear thickness in comparison with the negative control group.

The effect of yuzu seed oil in serum IgE level.

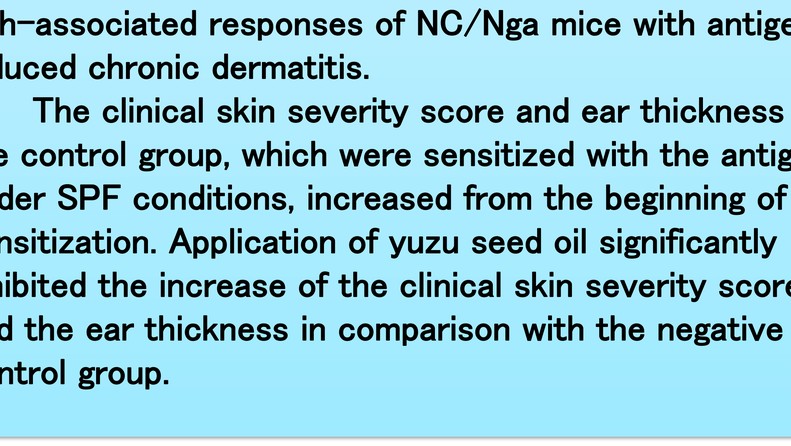


As shown in this figure, IgE level in the serum of the negative control group increased with the periodical topical application of the antigen. The IgE level in the serum had no significant correlation with the progression of dermatitis. Application of yuzu seed oil did not inhibit the increase of IgE in the serum.

The inhibitory effect of yuzu seed oil on histamine levels in serum and skin lesions.

This figure shows changes in the histamine levels in the serum and skin lesions of NC/Nga mice. Samples were taken 4 weeks after sensitization and histamine levels were measured using the ELISA system. The histamine levels in the serum and skin lesions of the negative control group, which were sensitized with the antigen under SPF conditions, increased from the beginning of the sensitization. Application of yuzu seed oil significantly inhibited the increase of the histamine levels in the serum and skin lesions in comparison with the negative control group. Particularly, the effect on the cutis was remarkable.

A hypothesis of the effect of yuzu seed oil on atopic dermatitis.



Conclusion

・Yuzu seed oil inhibited atopic dermatitis symptoms and signs in the antigen-treated NC/Nga mice.

・We showed that yuzu seed oil reduced the pathosis of the atopic dermatitis but did not prevent pathogenesis in NC/Nga mice.

・In conclusion, yuzu seed oil is a good candidate to be used as an alternative medicine against atopic dermatitis .

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