

Oral administration of yuzu seed oil inhibits the development of atopic dermatitis-like skin lesions in NC/Nga mice.

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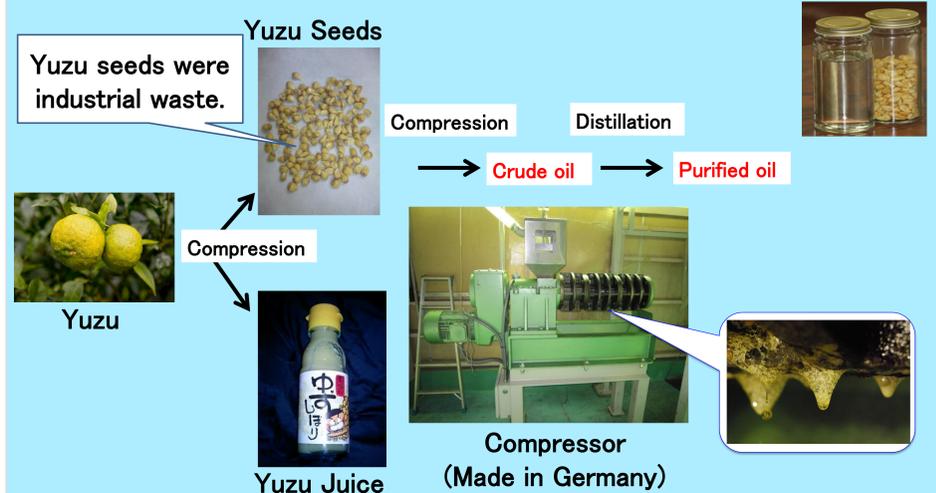
Introduction

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. This sour citrus fruits have been recognized for culinary use as citrus vinegar, due to sour taste and refreshing smell.

Traditionally, the yuzu were used in a hot bath to ward off ills, such as colds, arthritis, rheumatism and general aches and pains. In fact, 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 oral administration of yuzu seed oil has protective effect to atopic dermatitis.

The manufacturing method of yuzu seed oil

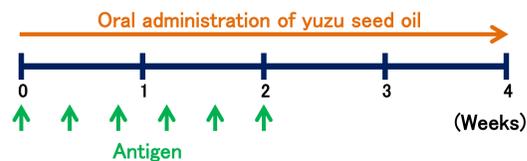


The study design



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.

An oral administration of yuzu seed oil

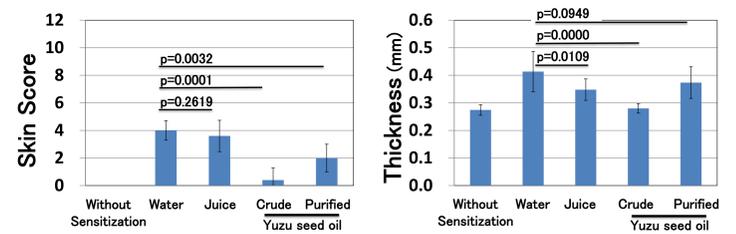
- Five NC/Nga mice were provided with one of the following samples ad libitum : control (water), yuzu juice, crude yuzu seed oil or purified yuzu seed oil (100 μ l /mice by sonde) for the following 4 weeks.

Clinical features



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 the crude yuzu seed oil group.

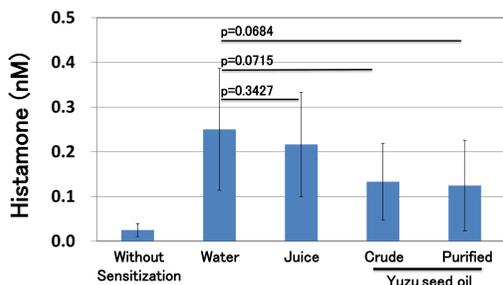
The effect of yuzu seed oil application on clinical skin severity scores and ear thickness.



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.

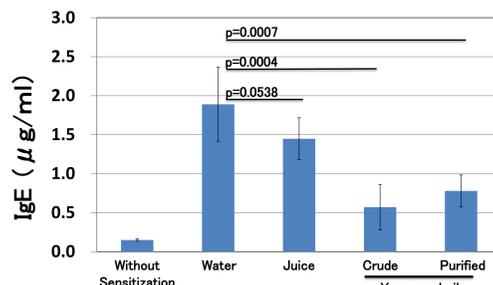
The clinical skin severity score and ear thickness of the control group, which were sensitized with the antigen under SPF conditions, increased from the beginning of the sensitization. An oral administration of crude oil significantly inhibited the increase of the clinical skin severity score and the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

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



This figure shows changes in the histamine levels in the serum 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 of the water group, which were sensitized with the antigen under SPF conditions, increased from the beginning of the sensitization. The histamine levels in the serum were tendency to decrease by oral administration of yuzu seed oil.

The effect of yuzu seed oil in serum IgE level.



As shown in this figure, the effects of yuzu seed oil on serum IgE levels in mite antigen-sensitized NC/Nga mice. The IgE level in the serum of water group increased with the periodical topical application of the antigen. The levels of serum IgE were significantly lower in crude oil group and purified oil group than water group mice.

However, serum IgE levels were not significantly different between the water and juice groups. The IgE level in the serum had significant correlation with the progression of dermatitis.

The character of the yuzu seed oil

TEST ITEM	MEASURED VALUE	DESCRIPTION
Acid value	0.03	Standard methods for the analysis of fat
Iodine value	97.8	Wijs method
Saponification value	195	Standard methods for the analysis of fat
Non-saponification value	0.43%	Standard methods for the analysis of fat
Arsenic (As)	not detected	Atomic absorption spectrophotometry
Heavy metal (Pb)	not detected	Sodium sulfide colorimetric method
Viable bacterial count	>300/g	Standard agar plate culture method
Oliform organisms	>30/g	The most probable number method
Number of molds	negative	Potato dextrose (10%) agar plate culture method
Number of yeast	negative	Potato dextrose (10%) agar plate culture method

Conclusion

- 1) An oral administration of yuzu seed oil to NC/Nga atopic dermatitis model mice led to a striking suppression of the development of dermatitis, scratching behavior, and serum IgE elevation.
- 2) In conclusion, yuzu seed oil is a good candidate to be used as an alternative medicine against atopic dermatitis .