Tomato seed saponins promise to cure dermatitis

Dr Hiroshi Shimoda from Oryza Oil & Fat Chemical Co Ltd and Professor Toshio Morikawa of Kindai University conducted a study on the chemical composition and bioactive properties of tomato seeds. The researchers found steroidal saponins called lycoperosides, previously associated with skin-health promotion, to be the major seed components, more abundant in seeds than in tomato fruits. The researchers further demonstrated that these saponins cure inflammation and damaged skin in atopic dermatitis.

While much is known about the health benefits of the tomato fruit, similar knowledge of the tomato seed was lacking. Shimoda and his colleague Professor Toshio Morikawa investigated the chemical composition and bioactive activity of tomato seed and found lycoperoside saponins to be the major seed components, more abundant in seeds than in tomato fruits. Based on the reported effects of saponins, Shimoda and associates hypothesised that saponins from tomato seeds may cure inflammation and damaged skin in AD.

Until recently, NC/Nga inbred mice have been used as rodent models in AD research aimed at identifying viable drug candidates, including natural products. However, to induce symptoms of edema or swelling caused by excess fluid trapped in the tissues, a particular chemical would have to be topically applied to the ears of these mice. Nowadays, interleukin (IL-33) transgenic (IL-33Tg) mice that do not require any such treatment are being used as an alternative to NC/Nga mice to assess the efficacy of AD remedies.

Loosely defined, cytokines are strong biostimulatory proteins that are important in cell signalling and IL-33 is a cytokine that plays a pivotal role in allergic disorders. IL-33 is expressed in epithelial or endothelial cells and it serves as an endogenous danger signal that activates innate immunity as it is released rapidly after cellular damage or stress. In IL-33Tg mice, IL-33 is upregulated which leads to AD-like inflammation. The transgenic animals exhibit epidermal hyperplasia, or enlargement of the skin tissue, and an extreme scratching behaviour as the symptoms progress. IL-33 activates the immune system by promoting the
Clinical result of tomato seed extract on skin elasticity.

In light of previous findings that tomato saponins had a suppressive effect on AD, Shimoda and associates investigated the effects of tomato seed extract (TSE) and lycoperoside H (LH) on AD symptoms in IL-33Tg mice. This was the first study to demonstrate the efficacy of natural products in a mouse model. In their study, the scientists gave TSE or LH to mice with AD symptoms. As a result of four-month administration, AD inflammation and TEWL were suppressed by TSE and LH. TSE slightly suppressed scratching behaviour, while TSE and LH both increased locomotive activity. Moreover, LH administration clearly suppressed the accumulation of inflammatory cells in skin lesions and epidermal hypertrophy. Therefore, the researchers found that LH was a candidate for an anti-inflammatory edible seed compound to cure AD symptoms.

Various edible plants contain a glycosylated form of ceramides, sphingolipids that play an important role in skin-barrier function. These glycosylceramide-rich plant extracts are often used as dietary supplements and beverages to aid skin hydration. Another way of improving dry skin symptoms is to use compounds that can increase skin ceramide by inducing internal ceramide synthesis. Oral administration of TSE containing LH has been demonstrated as being able to enhance skin elasticity. This role of TSE and LH was deduced while investigating barrier functions. Shimoda and associates are planning a new clinical trial that will look into the effect of LH on reducing dry skin symptoms and they seek to further expand the knowledge base on the roles of tomato seed saponins and LH.

While much is known about the composition and properties of tomato fruit, similar knowledge on the tomato seed was lacking.

**Research Objectives**

Dr. Hiroshi Shimoda and his team research tomato seeds as a potential cure for atopic dermatitis.

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**Bio**

Hiroshi Shimoda graduated from Kyoto Pharmaceutical University in 1990 and entered a pharmaceutical company. In 2000, he obtained a PhD (pharmacological) at Osaka University, and in 2003 he joined Oryza Oil & Fat Chemical Co. Since 2004 he has been Research and Development Director, and has published more than 95 scientific papers.

Toshio Morikawa received his PhD from Kyoto Pharmaceutical University in 2002. In 2001, he became an assistant professor in the same university. In 2005, he became a lecturer at Kindai University and was promoted to professor in 2015. His research interests involve searching for bio-functional molecules from natural resources.

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**References**

