

Effect of Herbal Medicine on Atopic Dermatitis: A review

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ABSTRACT

Atopic Dermatitis (AD) is characterized by chronic, relapsing, pruritic inflammatory skin disease, intense itching and recurrent eczematous lesion. Currently, AD cases has rapidly increase 10%-20% in a developing country and had affected one in five individual in a population. Administration of 2, 4-Dinitrochlorobenzene (DNCB) can be used to induce atopic dermatitis-like symptoms on mice. Therefore, natural herbal medicine has been used as an alternative approached to treat symptoms of dermatitis compared to corticosteroid cream. This review is an effort to update the herbal medicine used worldwide to atopic dermatitis.

Keywords

2, 4-Dinitrochlorobenzene (DNCB), herbal medicine, atopic dermatitis

Introduction

Atopic Dermatitis (AD) or eczema is characterized by chronic, relapsing, pruritic inflammatory skin disease, intense itching and recurrent eczematous lesion (Sinclair et al., 2014; Thomsen, 2014). It commonly occur in infant hood and may progress until adulthood that caused by exposure to pollutant, dust, mites and food allergen (Lifschitz, 2015). The main causes of AD is unknown but, existed hypothesis suggested that it can either be caused by genetic mutation involved Fillagrin (FLG) gene (Thyssen et al., 2014) or it is due to immune system dysfunction (Egawa et al., 2016). Currently, AD cases has rapidly increase 10%-20% in a developing country (Weidinger, et al., 2018) and had affected one in five individual in a population (Thomsen, 2014). According to Ministry of Health (MOH), AD cases have increase 0.94% every year (MOH, 2018).

The location of red rashes of AD patient depends on their age. In infant, the most affected area is on the forehead, cheeks and knee pit, while in adult it affects mostly at the hand, feet or around the neck (Lyons et al., 2015). As it has various symptoms depending on ages, it makes the diagnosis become tougher and might lead to misdiagnose. Thus, the physician recommended AD to always use moisturizer for avoiding it to become worse. However, moisturizer has no direct impact on AD, it somehow urge the patient to use topical corticosteroid cream. The usage of topical corticosteroid cannot be use for a long term as it will result in skin thinning, stretch marks, purpura, focal hypertrichosis, acneiform and skin atrophy (Tay et al., 2016). Topical corticosteroid also suppress the production of glucocorticoid as adrenal gland is believed to become atrophic and signal the hypothalamus to stop producing glucocorticoid (Mooney et al., 2015).

Natural herbal medicine is widely used for medical purpose (Tapsell et al., 2006). Onion, in scientific name *Allium cepa* extract is used to treat redness and skin texture, while garlic (*A. sativum*) is revealed to have the best chemo preventive action (Tabassum et al., 2014). Most popular herbal medicine such as honey is therapeutically used to treat wound healing (Mustafa, 2018) as it consist of anti-inflammatory effect and high vitamin C content. Turmeric is also popular as it contain active compound that has been topically used for skin wound and blister (Grzanna et al., 2005).

According to Lee (2010), DNCB application on the skin of the mice is able to inhibit symptoms of epidermal hyperplasia and inflammatory cell infiltration in the dermis as well increase IgE

level, IL-4 and IFN- γ . Another significant symptoms shown skin lesions such as redness, edema and encourage the mice to scratch (Kitamura et al., 2018). Moreover, first exposure to irritant resulted in high TNF, INF, IL-1, IL-2, IL-3, IL-4, IL-5, IL-6 and IL-10 (Fujii et al., 2009). After three weeks, epidermal thickness started to develop (Jo et al., 2018; Choi et al., 2014; Im et al., 2019).

2, 4-Dinitrochlorobenzene (DNCB)

A research conducted by Lee (2010) reported that DNCB is use as a sensitizer that being dissolved in a vehicle of acetone to olive oil in a ratio 4:1. The sensitizer is being applied at the dorsal part region with dose dependant manner as the concentration is increase by 1% on the second day. Another study conducted by Fujii (2009) in order to induce atopic dermatitis-like symptoms on mice, concentration of 1.5% DNCB. In a similar study conducted by Hamad (2017), application of DNCB for three consecutive days with the concentration of 0.1% followed by 0.2% on the third day is sufficient for inducing Atopic Dermatitis-like symptoms. However, a research conducted by Kitamura (2018) showed that continuous application of DNCB caused stress towards the mice. Thus, application of DNCB with the interval of 14 days for the next sensitization showed strong IgE peaks, symptoms and cytokines respond.

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i. Honey

Usage of honey for treating the wound had been used since ancient times (Azri, et al., 2017). Honey consists of high vitamin C content and have a significant scavenging activity against reactive oxygen species (ROS) that are very useful in boost wound healing (Khazaai, 2017). According to Mustafa, (2018) honey exhibit anti-microbial, anti-carcinogen and anti-oxidant that helps to prevent chronic disease. Anti-microbial agent of honey has the ability to inhibit microorganism and yeast such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Candida albicans* and *Saccharomyces* (Rao et al., 2016), while, anti-inflammatory agent of honey inhibited cytokines (IL-4 and IL-13) stated by Jo et al. (2018).

ii. Green tea

Green tea (*Camellia sinensis*) is widely consumed beverage around the globe, commonly in Asian countries like Japan, Korea and China for treating headache and depression (Sinija et al., 2008). Green tea in dermatological studies shown to have antimicrobial and anti-inflammatory effects in the skin's cellular interaction (Zink et al., 2015). A research conducted by Hwang et al. (2019), green tea extraction that been given orally toward AD-symptoms like mice recorded increase in free radical scavenging activity, reduce in symptoms and increase in skin moisture with a minimal dosage. Repeated treatment showed positive impact as the mice gaining normal body weight and increase their epidermal thickness. Similar research conducted had shown that green tea extraction has triggered release of regulatory cells that help to regulate balancing Th1 and Th2 cells responses in AD cases (Kuo et al., 2014).

iii. Gastrodiaelatablume (GE)

GastrodiaElata is an herb used by old folk in Asian countries like Korea, China and Japan. The roots part is believed to treat neurological disorder such as epilepsy, dizziness and headache (Oh et al., 2006). Extraction of GE root that had been applied topically onto AD recorded decrease in mice body weight, IgE level, mast cell number and ear thickness in two weeks (Kim et al., 2015).

Another research conducted on murine model shown GEE with dose-dependent performed its anti-inflammatory action by suppressing Nitric Oxide (NO) formation (Park et al., 2006).

iv. *CalophyllInophyllum*

CalophyllInophyllum widely found in Sri Lanka and many researches had been done to determine its benefit (Hathurusingha et al., 2012). In India, the oil from its seed specifically used for treating skin disease such as wound and psoriasis (Dweck et al., 2002). A research conducted shown that extraction of *C. Inophyllum* with methanol resulted in decrease of hyperkeratosis in day 49 (Um, 2016). Similar research shown In another research conducted in finding cure for breast cancer, *C. Inophyllum* with dose-independent has cytotoxic effect via apoptosis pathway (Shanmugapriya et al., 2017).

v. *Catalpa Ovata*

Catalpa ovata (Bignoniace) is a tree that widely found in Korea. The stem bark is used for treating inflammatory disease by the folk like itching, eczema and scabies (Oh et al., 2010). According to the research conducted by G. Yang et al. (2013) topical application with dose dependant of *C. Ovata* shown relieved of AD symptoms like itching, erythema, haemorrhage, edema, superficial erosion, deep excoriation, scaling, and skin dryness, hypertrophy, hyperkeratosis, intercellular edema and infiltration of the inflammatory cell. Another research conducted to study the effect of CO towards bacterial and fungal shown suppression of *Staphylococcus* and *A. paraciticus* with dose-dependent manner (Kuk et al., 2002). In a research to study antioxidant activity resulted in significant of radical scavenging activity, with is useful in treating AD (Hongyu et al., 2010).

Conclusion

Most of the mice were applied DNCB to induce AD-like symptoms is treated using herbal medicine that being applied directly on the AD affected area. Most of the research highlighted dosage-dependant manner in order for herbal medicine shows their effect in treating AD. Thus, most of the herbal medicine is able to treat AD and further research is needed in order to find suitable herbal medicine with least side effect as most of herbal medicine has similar effect that can treat AD.

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