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Therapeutic Pearls

Oxidative stress as a treatment target in atopic dermatitis: The role of furfuryl palmitate in mild-to-moderate atopic dermatitis

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Dear Editor,

Much of what we know about atopic dermatitis (AD) pathogenesis revolves around the fundamental concepts of barrier dysfunction, pruritus/inflammation, and a dysfunctional immune response. Dermatologists often give advice concentrating on moisturizing, bathing, cleansing, and reducing symptoms of itching and dryness for patients with AD. A recent observation in AD research is that oxidative stress plays a central role in the pathogenesis of this chronic relapsing skin disorder. Events that lead to skin barrier defects have also been correlated with the release of reactive oxygen species, which directly damage the skin's cellular components, such as the cell membrane, organelles, and even DNA (Fig. 1; Ji and Li, 2016).

Oxidative stress is recognized as having an impact on hypertension, diabetes, heart disease, and certain cancers, as well as skin disorders. Studies have highlighted oxidative stress and the effects of antioxidant therapy on skin diseases (Fig. 2). For certain skin diseases (e.g., AD), higher levels of oxidative damage markers are seen during exacerbations (Baek and Lee, 2016). Also, at least one of the following defects can be found in patients with AD: Oxidative stress, increased oxidative stress signals during flares, and/or decreased antioxidant levels (Ji and Li, 2016). Patients with AD often have lower systemic antioxidant levels and may have lower dietary intake of nutrients with antioxidant properties, but the relationship between systemic antioxidant status and AD risk warrants further evaluation in large, prospective studies.

Standard moisturizer therapy with emollients has been the therapy of choice for barrier repair. Growing evidence shows that topical antioxidants could provide additional protection against oxidative stress when admixed with moisturizers. Barrier-enhancing moisturizers in combination with antioxidants were observed to have comparable effects as topical corticosteroids on the permeability of the skin barrier (Man et al., 2015).

Recently, a review of the antioxidant furfuryl palmitate and its effect on mild-to-moderate AD and other related skin disorders (i.e., atopic, seborrheic, irritative, allergic contact dermatitis, xerosis, and cutaneous inflammatory pathologies) has been published.

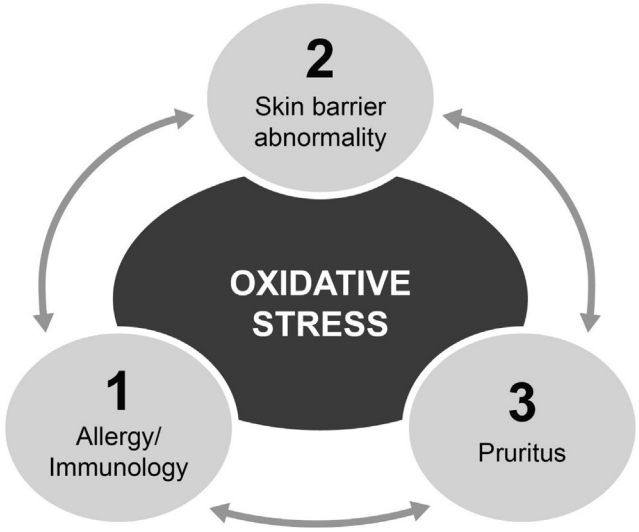

Fig. 1. Interplay among oxidative stress, skin barrier defect, and inflammation in atopic dermatitis.

Furfuryl palmitate and its derivatives were effective and safe in treating AD, may be used as an adjunct to moisturizers, and may even be considered as a replacement for topical corticosteroids and calcineurin inhibitors (Table 1; Pigatto and Diani, 2018).

In conclusion, oxidative stress may be another potential target in AD management. Alternative pharmaceutical antioxidant agents, such as furfuryl palmitate and its derivatives, may provide effective and safe steroid-sparing options for AD in the future. More robust trials are needed to show the definitive effects of these agents on the prevention and treatment of AD exacerbations.

Conflict of Interest

None.

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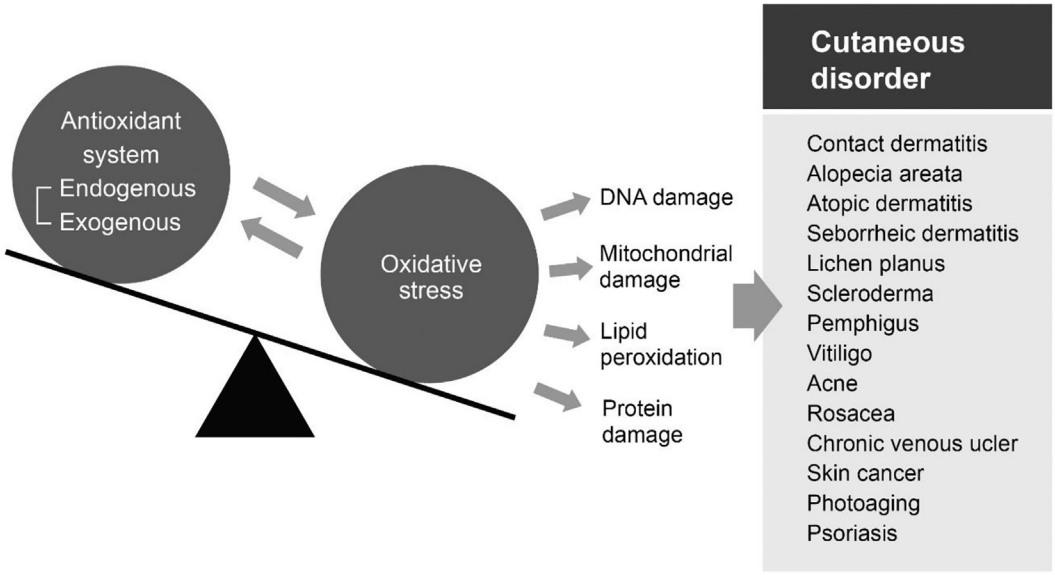

Fig. 2. Oxidative stress has been defined as a state of imbalance wherein reactive oxygen species overwhelm the capacity of the intrinsic antioxidant systems to inhibit cellular damage due to oxidation (Adapted from Baek and Lee, 2016).

Table 1
A summary of reports on furfuryl palmitate and its derivatives (Pigatto and Diani, 2018).

Lead author; year	Agent	Study design; number of patients	Results; adverse events	Formulation; duration of treatment; frequency of applications
Patrizi et al., 2012	Sorbityl furfural palmitate vs. placebo	Single-center, double-blinded, randomized, placebo-controlled study; 60 pediatric patients	Significant reduction of itching and severity; no severe adverse events	Cream; 30 days; twice a day
Nemelka et al., 2002	Superoxide dismutase, 18 beta-glycyrrhetinic acid, vitamin E, alpha bisabolol, and furfuryl palmitate	Unilateral trial; 60 pediatric patients	Improvement of inflammatory skin conditions; no relevant adverse events	Cream; 2 weeks; twice a day
Bocchietto et al., 2002	Superoxide dismutase, 18 beta-glycyrrhetinic acid, vitamin E, alpha bisabolol, and furfuryl palmitate	Unilateral trial; 64 adults and 44 pediatric patients	Reduction of erythema and itching; no relevant adverse events	Cream; 2 weeks; twice a day
Pigatto et al., 2011	Furpalmate vs. vehicle	Double-blinded, randomized, placebo-controlled study; 40 adult patients	Reduction of signs and symptoms of atopic dermatitis; no severe adverse events	Cream; 21 days; twice a day
Lauriola et al., 2011	Furpalmate vs. topical corticosteroid	Investigator-blinded, randomized, placebo-controlled study; 40 adult patients	Both groups significantly improved from baseline with no difference between the groups	Cream; 14 days; twice a day
Tripodi et al., 2009	Emollient cream enriched with furfuryl palmitate vs. emollient cream	Randomized controlled trial; 117 pediatric patients	No statistical difference, but treatment product was less tolerated	Cream; 14 days; twice a day

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Study Approval

The author(s) confirm that any aspect of the work covered in this manuscript that has involved human patients has been conducted with the ethical approval of all relevant bodies.

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