Effectiveness of Topical Chia Seed Oil on Pruritus of End-stage Renal Disease (ESRD) Patients and Healthy Volunteers

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**Background:** Several studies have been performed to evaluate the efficacy of dietary n-3 fatty acid for patients with renal dysfunction. While about 40% to 80% of patients with end-stage renal disease (ESRD) complain about pruritus and xerosis, there are few reports on the effects of topical n-3 fatty acid on these symptoms. **Objective:** In order to investigate the possible beneficial effects of topical n-3 fatty acid, oils extracted from chia (*Salvia hispanica*) seed were formulated into topical products, the effects of which were measured. **Methods:** Five healthy volunteers having xerotic pruritus symptoms and 5 patients with pruritus caused by either ESRD or diabetes were involved in this study. A topical formulation containing 4% chia seed oils were applied for an 8-week duration. Subjective itching symptoms were assessed on a 6-point scale, as were other skin functions, namely transepidermal water loss and skin capacitance. **Results:** After the 8 weeks of application, significant improvements in skin hydration, lichen simplex chronicus, and prurigo nodularis were observed in all patients. A similar improvement was also observed among healthy volunteers with xerotic pruritus. Improvement of epidermal permeability barrier function and skin hydration, represented by transepidermal water loss and skin capacitance, respectively, were also observed. No adverse effects were observed in all the tested patients and volunteers. **Conclusion:** Chia seed oil can be used as an adjuvant moisturizing agent for pruritic skin, including that of ESRD patients. *(Ann Dermatol 22(2) 143 ∼ 148, 2010)*

**Keywords**
Alpha-linolenic acid, Chia seed oil, End-stage renal failure, Omega-3 fatty acids, Pruritus

**INTRODUCTION**

Xerotic skins and pruritus are frequently associated with diabetes or patients with end-stage renal disease (ESRD). While the exact mechanisms underlying the pruritic phenomena have not yet fully understood, about 30% of diabetic patients show skin disorders, and more severe pruritic symptoms are generally observed when there is a renal complication¹. It was also reported that pruritus affect about 40∼85% of patients under hemodialysis maintenance, and that the severity of the pruritus is closely correlated with the dryness of the skin². Even with the high incidence of pruritus in diabetic and ESRD patients, objective assessment is relatively difficult. Subjective evaluation, instead, is generally used for measuring the efficacy of treatment. Topical products such as moisturizers or emollients are typically used for alleviating the symptoms of pruritus, but the complete resolution by topical products is rarely accomplished. Since one of the most unbearable symptoms of diabetes and ESRD is pruritus, effective therapeutic modalities need to be developed.

N-3 fatty acid exhibits anti-inflammatory properties for many inflammatory diseases³. Oral supplementation of fish oils, rich in n-3 fatty acids, is known to be beneficial for relieving the pruritus⁴. Oils extracted from the seed of chia (*Salvia hispanica L*) have been used for long time as a dietary supplement by American Indians and Mexican natives. Recently, it has been reported that chia seed oil is
the richest botanical source of 18 : 3 n-3 fatty acid currently known. In addition, chia seed oil also contains natural α-linolenic acid and flavonol, which can act as lipid antioxidants. Since the flavonol has anti-oxidant, anti-inflammatory, anti-thrombotic and anti-cancer effects, chia seed oil has been used a lot in the food industry. Recently, topical application of chia seed oil has also received more attention. Unfortunately, to this date there is a lack of published data describing the therapeutic effect of chia seed oil, especially as a topical anti-pruritic agent. In this study, we assessed the effect of topical chia seed oil on pruritus and xerosis in both the end-stage renal failure patients and healthy volunteers. A topical formulation containing 4% chia seed oil was used for 8 weeks and subjective assessment of dermatologic symptoms and functional measurements were performed.

MATERIALS AND METHODS

Subjects

The subjects consist of 11 patients with diabetes, complicated with ESRD, who have been treated in the Department of Dermatology, Endocrinology, or Nephrology in Ansan Hospital, Korea University College of Medicine from Dec, 2007 to Mar, 2008, and 5 healthy volunteers having xerotic pruritus symptoms. Six of the 11 patients withdrew from the study due to personal reasons (and did not experience adverse effects of the tested products). Finally, 5 patients (3 patients with diabetes; 2 patients with ESRD) completed the study for 8 weeks. The 2 patients with ESRD were undergoing hemodialysis. The mean age of the 5 patients (all males) with underlying disease was 49 years. The 5 healthy volunteers with pruritus completed the study for 8 weeks without withdrawing. The mean age (3 males and 2 females) was 31.6 years (Table 1). Patients under dermatological treatment were excluded from the study and no other topical treatments were allowed for the subjects, except the topical chia seed oil containing moisturizers, during the test period.

Study design

We assessed effectiveness of topical chia seed oil containing moisturizers as oil-in-water lotion formula with 4% chia seed oil for 8 weeks. For the comparison, moisturizers without chia seed oil were used as placebo samples. Subjects were allowed to apply the moisturizers to either the left or right side of body whenever needed, and thoroughly rubbed them in for high absorption of chia seed oil, until the colour of the moisturizer had disappeared. Placebo samples were also applied to the other side of body at the same time and in the same manner. Subjects completed a questionnaire and rated their pruritus symptoms every 2 weeks. Along with the subjective measurements, functional measurements of skin conditions such as epidermal permeability barrier function, expressed by trans-epidermal water loss (TEWL), skin hydration (expressed by skin capacitance) and skin surface pH were also performed every 2 weeks.

Subjective assessment

In order to evaluate the efficacy of topical chia seed oil containing moisturizers, subjective evaluation of degree of the satisfaction, the improvement of skin dryness, the improvement of pruritus, the improvement of abrasion, the improvement of lichen simplex chronicus, and the improvement of prurigo nodularis were all scored on a 6-point scale (0~5, 0, aggravation; 1, almost no improvement; 2, some improvement; 3, good improvement; 4, excellent improvement; 5, total improvement) (Table 2). Clinical photos were also taken, using a digital camera (DSC-F828®, Sony, Japan).

Objective assessment

Every measurement performed between Dec, 2007 and Mar, 2008 and was carried out in an environmentally controlled room at a constant temperature 23 ± 1°C, relative humidity 40 ± 2%, and same lighting. TEWL values and skin capacitance were measured by the DermaLab.