Pruritus: A New Look at an Old Problem

Joanne Cooke, MS, RD, CSR, CNSC
Kansas City VA Medical Center,
Renal Dietitian
Kansas City, Kansas
Email: Joanne.Cooke@VA.gov

Key Words: pruritis, itching in dialysis patients, skin inflammation

Introduction

Pruritus, or itching, is a clinical symptom which is associated with chronic kidney disease (CKD) and causes discomfort to more than 50% of patients on hemodialysis. The prevalence of this complex sensation is underestimated due to the variability of itching among dialysis patients (1). Some patients report continuous itching, while others may have only momentary itching or just night time discomfort (2). Itching also occurs at different levels of intensity since it is affected by skin function, the central nervous system, inflammation, medications, immune function, hyperphosphatemia, and environmental factors (3).

A nutrition-focused physical examination (NFPE) may include evaluation of skin, the largest organ of the body, and may address itching. Proper education and evaluation of itching is a key component of planning relief since there is no universal remedy. NFPE includes evaluation of the type of skin and its appearance. Is it typically normal, dry or oily? Check for signs of dehydration – is there diminished skin turgor? Does the skin feel cool or clammy, or appear pale? Can you identify anything that causes disruption to the skin’s barrier function?

Current Research and Recommendations: Skin Care

The role of the skin’s barrier functions include controlling permeability, which is maintained by key cutaneous lipids, such as cholesterol and ceramide. When the skin’s pH is below 5.5, the antimicrobial defense barrier is maintained, suppressing microbial pathogens such as Staphylococcus aureus (4). The defense barrier is assisted by the action of antimicrobial peptides (AMP), found in epidermal keratinocytes; AMP kill invading pathogens and prevent infection. Vitamin D induces AMP gene expression and the vitamin D receptor also serves as a receptor for nutritional ligands including curcumin, a component of the ancient spice turmeric. Curcumin is a highly pleiotropic molecule shown to possess anti-inflammatory, antioxidant and wound-healing activity. Preliminary studies suggest that curcumin may be useful in topical or oral formulations to reduce skin itching and improve the quality of life in people with chronic itching. However no research has been completed with CKD patients to validate this concept (5). Curcumin is classified as “Generally Recognized As Safe” by the Food and Drug Administration, but due to the risk of anti-platelet activity, caution should be used when taking it with anticoagulants, and patients should be monitored for an allergic reaction.

Antioxidants, such as vitamin C, improve skin integrity by protecting protein lipids from oxidation. Other nutrients, such as alpha tocopherol, beta carotene, lycopene and lutein participate in enzymatic and non-enzymatic pathways to form a UV barrier in the skin. Micronutrient deficiencies in fat soluble vitamins, zinc, copper, selenium, as well as vitamin C may result in a weakened skin matrix, contributing to inflammation, epidermal proliferation, and itching (6).

Dermatologist Dr. Yuval Bibi provided recommendations for renal patients’ skin care for relief of pruritus on the November 2015 Renal Support Network podcast. His suggestions focused on individualized care to protect the skin’s barrier (4). Stating “first do no harm,” Dr. Bibi explained that application of soap dries the skin by stripping it of oils that are necessary to maintain the skin’s barrier, retain moisture and preserve healthy bacteria on the skin’s surface. A helpful strategy includes avoiding assaults to the skin with hot water, harsh soaps, scrubbing or exfoliation. Dr. Bibi recommended cleansing the body’s skin folds, which are the source of odor, but minimizing the use of cleanser on remaining skin surfaces to avoid unnecessary dryness. He further cautioned that bubble bath products should not be used because the soap is too drying and fragrances may be irritating. After bathing with a mild cleanser, pat skin dry, and quickly apply a fragrance free, dye free moisturizer to “seal in” moisture on the skin. He emphasized the value of selecting a moisturizer that is creamy and oil based, for example petroleum jelly, but most importantly a product the patient will use liberally and frequently. Dr. Bibi added that drinking extra water does not add hydration to the skin, but using a humidifier in the bedroom may provide relief. Patients may find Dr. Bibi’s podcast to be a helpful educational resource (4).

Chronic itching is also a distressing malady due to psycho-emotional triggers. Recent insights into the neuroimmunology of itching have improved our understanding of why stress triggers pruritis. Stress responses involve the cortical center of the brain, activating an axis involving three endocrine glands – the hypothalamus, pituitary, and adrenal glands (7,8). The once-popular theory that itch and pain shared a common pathway has fallen out of favor (9). The endocrine axis improved our understanding of why stress triggers. Recent insights into the neuroimmunology of itching have improved our understanding of why stress triggers pruritis. Stress responses involve the cortical center of the brain, activating an axis involving three endocrine glands – the hypothalamus, pituitary, and adrenal glands (7,8). The once-popular theory that itch and pain shared a common pathway has fallen out of favor (9). The endocrine axis improved our understanding of why stress triggers pruritis. Stress responses involve the cortical center of the brain, activating an axis involving three endocrine glands – the hypothalamus, pituitary, and adrenal glands (7,8). The once-popular theory that itch and pain shared a common pathway has fallen out of favor (9). The endocrine axis improved our understanding of why stress triggers pruritis. Stress responses involve the cortical center of the brain, activating an axis involving three endocrine glands – the hypothalamus, pituitary, and adrenal glands (7,8). The once-popular theory that itch and pain shared a common pathway has fallen out of favor (9).
Advances in Practice

Itch treatment for dialysis patients is medically complex due to the multitude of potential triggers. In addition to patients’ large medication lists, stress, anxiety, potential allergies, or increased temperature may cause the release of histamine from mast cells in the skin to trigger an itch. A common example of itch sensation at the neural level occurs when opiates are prescribed to block pain, as they may provoke an itching response. Runners sometimes experience a similar reaction when running releases endorphins, an endogenous source of opiate that triggers itch. Advanced strategies on the “frontier” of itch therapy include combining topical skin care with peripherally active anti-inflammatory agents and drugs to counteract the chronic central itch sensation at the neural level. Neuronal receptors such as transient receptor potential vanilloid type 1 (TRPV1) may be activated by Capsaicin, which is the pungent ingredient in hot chili peppers. Capsaicin first excites, and then desensitizes the sensation of histamine induced itch (12,13). Another unique treatment in the arsenal for itch includes gamma linolenic acid ointment. Gamma linolenic acid ointment is derived from evening primrose oil or hemp oil and provides protective antioxidants and helps maintain the moisture level of the skin.

The gut-brain-skin theory proposes that use of probiotics can reduce stress induced neurogenic skin inflammation by positively impacting the large number of shared neural signals (15). Emotional states alter normal intestinal microflora, increase intestinal permeability and contribute to systemic inflammation, including altered epidermal barrier function. Many bacteria protect the body and at the same time the body protects and nourishes intestinal microflora. Selection of the right type of oral or topical probiotics may be beneficial in tailoring the body’s microflora for reduced release of inflammatory mediators and improved production of ceramide, a component which restores the skin barrier (16,17).

CKD patients may have abnormal fatty acid profiles and may exhibit symptoms of essential fatty acid deficiency (EFAD), including itching, sweating, skin infections or slow wound healing (18). Essential fatty acids are precursors to a variety of substances found in healthy skin, with studies suggesting that dietary and supplemental omega-3 polyunsaturated fatty acids reduce skin itch related to inflammation from renal disease (19).

Nutrition related care for itching in CKD patients is incomplete without acknowledging the importance of phosphorus control through diet, dialysis, and medication. Proper control of serum calcium and phosphorus is always a priority. When hyperphosphatemia leads to hyperparathyroidism, the resulting calcification causes mast cells to release histamine, provoking itching (20). Memose and colleagues pointed out that this disruption of the calcium ion gradient causes itching to occur when large amounts of calcium accumulate in the lower epidermis (21).

However, CKD is also known to disrupt the conversion of vitamin D, keratinocytes in the skin retain their ability to make their own active form of vitamin D3 (1,25(OH)2 D3) when exposed to sun (22). The serum vitamin D binding protein has a preference for vitamin D3, and selectively moves it from the skin into the circulation. Thus active vitamin D in the skin plays a role in maintaining homeostasis within the skin, and when ultraviolet B light therapy is provided, helps to suppress histamine release from mast cells, relieving pruritus (23, 24).

Conclusion
Itching is a common problem among dialysis patients, affecting both mental and physical health, and thus, reducing quality of life. Further studies are needed to clarify the role of micronutrients in maintaining healthy skin structure and function for the comfort and well-being of dialysis patients.

Tips to Reduce Itching

- Avoid washing in water that is too hot or too cold – both irritate the skin – use warm water.
- Limit time in the shower or bath. Shower water “pelts” the skin and excess soaking in the tub “prunes” the skin – both can cause barrier damage.
- Wash gently – avoid scrubs and ex-folliants which cause micro-tears in the skin.
- Cleanse skin folds regularly with a gentle cleanser, removing odor, but minimize washing of other areas to avoid stripping oils from the skin.
- After showering or bathing blot skin dry with a soft towel, don’t rub. Slather on a creamy oil based moisturizer. Select one you are happy to use often!
- Avoid soap and drying cleansers which strip essential moisture from the skin.
- Choose unscented skin care products. Fragrances (lavender, lemon/citrus, or mint), coloring, and alcohol can cause irritation.
- Choose hypoallergenic laundry detergent for sensitive skin and wear soft undergarments.
- Limit unprotected sun exposure.
- Try an ointment or cream rather than a lotion, since they are thicker and may contain soothing ingredients such as jojoba or olive oil, shea butter, dimethicone, glycerin, mineral oil, coconut oil, gamma linolenic acid from evening primrose oil or hemp oil, or petrolatum.
- Read moisturizer label for skin repairing ingredients such as squalene, cholesterol, ceramides, hyaluronic acid, glycerin, petrolatum jelly or caprylic triglycerides.
- Stay warm but avoid sitting directly in front of a fire place or other open flame, which is too drying.
- Use a humidifier in your home.
References


