

Coconut Oil as a Therapeutic agent in Medication Induced Contact Dermatitis

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ABSTRACT

Penile Candidiasis is said to be an infection of the penis caused by the yeasts from the genus *Candida*. Contact dermatitis is an intense or incessant skin inflammation brought about by cutaneous association with a substance, biologic, or physical agent. The location and shape of the rash provide important clues to the cause of the allergen. The power of the response relies upon the level of affectability and centralization of the antigen. The most probable diagnosis is neomycin induced contact dermatitis. The treatment of candidiasis is often challenging, with inadequate response to agents to treat the condition, reported in the literature. We report a case of a 24-year-old Indian male who presented with recurrent itching of glans and prepuce, dryness, peeling skin. After failing conventional treatment regimens, the patient received a trial of coconut oil with beclomethasone + clotrimazole cream. Complete resolution of cutaneous lesions reported after 2-3 days.

Key words: Candidiasis, ICD, Neomycin, Mount test, Coconut oil.

INTRODUCTION

Irritant contact dermatitis (ICD) is a damage of the skin happens due to any of the etiological agent which makes to release a set of inflammatory mediators from epidermal cells which is non-specific and non-allergic. It is classified into acute and chronic.

Irritants are classified as cumulatively toxic (eg, hand soap causing irritant dermatitis in an exceedingly hospital employee), subtoxic, degenerative, or toxic (eg, acid exposure at a chemical plant). Although it's rather more common, irritant dermatitis remains understudied compared with allergic dermatitis. Most articles on dermatitis concern allergic dermatitis.

This largely reflects the fact that with history and patch testing, a specific hypersensitivity and a probable cause of dermatitis can be identified in most cases of allergic contact dermatitis.¹

Most dermatitis is diagnosed by the distribution of the rash. Sometimes the cause cannot be identified by history or physical examination and your dermatologist may want to perform KOH mount test for suspected penile candidiasis.² Potassium hydroxide KOH mount tests are a safe and easy way to diagnose fungal infections. Scrape skin tests are different from injection or patch skin tests because they test for different fungal species in skin scrapings. In skin scrape tests, affected skin (skin scrapings) is collected. Then, skin scrapings placed into a liquid containing potassium hydroxide, or KOH, which will destroy all cells that are not fungal cells. Next sample is looked under microscope and fungus is identified.³ There are many of the etiological agents quoted in the literature out of them a few include prescription and non-prescription topical agents, rubbers, herbs, cosmetic agents etc.⁴ KOH mount tests are usually negative in contact dermatitis and punch biopsy must be performed to make a definitive diagnosis.^{5,6}

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CASE REPORT

A 24 year old male presented to Ashwini Derma Care, Hanmakonda with itching of glans and prepuce, dryness, peeling skin. Patient consent was taken for this therapeutic planning after approval of the Institutional Review Board (JCP/2019/Derma/02). The patient had applied neomycin cream to glans of the penis for three consecutive days for the suspected diagnosis for penile candidiasis (with a history of similar complaints) and the symptoms exacerbated on the fourth day. The patient might had dermatitis, but suspected to be candidiasis before but otherwise healthy. Dermatological examination findings were normal except for erythematous, edematous and scaly plaque lesions exceeding the borders of the area on which the neomycin cream was applied. KOH mount test was performed to identify the fungal infection. KOH mount test result was negative with this case. Then, punch biopsy performed for the affected area which revealed perfect inflammatory pathology excluding other causes.

The patient was diagnosed with neomycin induced allergic contact dermatitis of glans penis based on the clinical findings, KOH mount test and punch biopsy of glans penis. Later on, a trial of coconut oil along with an ointment containing Beclomethasone (0.025% w/w) + Clotrimazole (1% w/w) applied in a tapering dose (quarterth inch of cream and coconut oil as daily once an application for one week followed by alternate-day application for the next week followed by twice in a week application in the third week) was advised to apply for 30 days. The lesions were completely resolved with the prescribed medication after 30 days.

DISCUSSION

Number of agents commonly found in therapeutic products for the skin may produce skin inflammation and present symptoms like Macular erythema, hyperkeratosis, or fissuring predominating over vesiculation.⁷ An aminoglycoside antibiotic like neomycin selectively inhibits 30s ribosomal subunits⁸ thereby prevents protein synthesis. It has been claimed to stop the protein synthesis in some gram +ve aerobic bacteria and multiple gram -ve aerobic bacteria.⁹ During the times of allergen test through the patch test procedure, the standard concentration of neomycin used to be 20% in petrolatum.¹⁰

The most commonly used topical antibiotic by developed countries like united and states and European countries is neomycin as a therapeutic option for various microbes.¹¹ It is available in both prescription and over-the-counter preparations.¹² It actively fights against infections of skin, ears and eyes. It is available in various formulations

like creams, ointments, lotions, powders and liquid preparations. Interestingly, theories suggesting that neomycin-containing ointments sensitize the skin more than creams, lotions, or powders.¹³ For therapeutic purposes, based on the severity of various skin diseases, neomycin would be used as a single medication or can be given in combination with other topical agents like bacitracin, polymyxin, antifungals and corticosteroids.^{14,15}

Natural plant oils, due to their easy availability, accessibility and low cost they are most commonly used globally for treating various skin ailments.^{16,17} As coconut oil contains most vulnerable compounds in it with specific properties including antimicrobial, antioxidant, anti-inflammatory and anti pruritic actions made coconut oil to be important, cost-effective, alternate and complementary medicine to target various xerotic and inflammatory skin diseases in which the skin barrier is disrupted.^{18,19}

Based on the previous study explanations, histopathological findings²⁰ strongly suggesting the patient is suffering from irritant contact dermatitis. The underlying impaired skin barrier with a frequent and irrelevant application of topical antibiotics predisposes to risk of getting irritant contact dermatitis.²¹ Similar to that of other topical medications that cause sensitivity of the skin, neomycin seems to show a parallel pattern of manifestations include eczema-like localized reaction, urticarial and hypersensitivity.²² The reaction in the patient was irritant contact dermatitis for neomycin as per the findings of biopsy and the substance responsible for the reaction in the patient is observed to be neomycin.

Contact dermatitis develops in two stages: the afferent phase and the efferent phase. The afferent phase where contact with the substance and sensitization happens. In the efferent phase, T cell-mediated delayed hypersensitivity reaction occurs upon the second contact with the substance.^{23,24} The afferent phase lasts for 10 to 15 days in most cases and is asymptomatic. This phase may be short and allergic contact dermatitis can be induced even after single skin contact with a strong happen in unsensitized individuals. In such cases, the two phases occur in a single step. The reaction in this patient seems to happen in a single step.²⁵ Other mechanisms involve resident epidermal cells, dermal fibroblasts, endothelial cells and various leukocytes encounter each other under the control of predominating inflammatory cytokines and lipid mediators. In response to released cytokines, Keratinocytes play a key role in the initiating skin inflammatory reactions. Resting keratinocytes produce some cytokines constitutively. Several studies have also concluded that most commonly used topical antimicrobial agents like neomycin

and bacitracin possess higher levels of resistance to microorganisms than with other agents like fluidic acid and mupirocin.²⁶⁻²⁹

Also while comparing with our study, we found similar case reports with neomycin and bleomycin induced flagellate erythema and linear hyperpigmentation in various areas skin. These eruptions induced by drugs like bleomycin was seen in patient with lymphoma, which were self-limiting.

Previous studies have demonstrated that topical preparations which contain neomycin will cause contact dermatitis. Those studies have concluded the use of local antibiotics must be prescribed only when they are necessary. It also concluded that neomycin must be avoided in patients whoever has sensitivity towards it. These conclusions were driven from cross sensitivity results of patch test on group of patients who were exposed with local antibiotics containing neomycin and ribostamycin. This cross sensitivity was explained from their chemical structure as neomycin contains four rings important components are naming and neobiosamin similar to that of ribostamycin which were responsible for the sensitivity.³⁰

Topical corticosteroids might not help in efficiently treating irritant contact dermatitis. But they may be helpful for superimposed eczematous features.³¹ Topical tacrolimus is an alternative agent to topical corticosteroid, but as per the previous study report it may produce stinging and irritation in persons with irritant contact dermatitis.^{32,33} Corticosteroids are immune suppressive with anti-inflammatory properties that modify the body's immune response to diverse stimuli. Other actions include vasoconstriction and anti proliferation. These agents have limited use in the treatment of irritant contact dermatitis.³⁴

Trial of coconut oil was advised to the patient as it possesses benefits for skin health.³⁵ Coconut oil contains medium-chain fatty acids, as they are having the antimicrobial properties, coconut oil seems to efficiently combat against the dreadful and dangerous microbes. Therefore it is considered to be a good option in treating skin infections most likely fungal and bacterial origin. Hence coconut oil is proven to be important for skin health.³⁶ Apart from antimicrobial properties Coconut oil may also relieve skin inflammation due to its antioxidant property. As it acts as an antioxidant it going to stabilize free radicals and neutralize reactive atoms which are the key factors of inflammation.³⁷ Coconut oil not only acts as antimicrobial and antioxidant but also act as hydrating agent as well.³⁸ A study that was conducted on essential

oils proved that coconut oil significantly improved skin hydration.³⁹ Another comparison study conducted to measure the efficacy of coconut oil and mineral oil found results showing that coconut oil decreased 68% of eczema severity made it an effective one against the mineral oil in treating eczematous lesions.⁴⁰

In conclusion, our study illustrated the potential risks associated with neomycin and the benefits of coconut oil in treating contact dermatitis. Coconut oil as a therapeutic agent to counter the contact dermatitis for treating infection caused by Organism. The unusual neomycin here a causative agent for contact dermatitis, which was not identified initially and treated effectively with coconut oil. It is pertinent here to identify the curative property of coconut oil was explored for the treatment of contact dermatitis. Though our observation is limited to one patient, few more studies will establish the role of the coconut oil in contact dermatitis.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

ABBREVIATIONS

ICD: irritant contact dermatitis; **eg:** example; **KOH:** potassium hydroxide; **W/W:** weight by weight; **+ve:** Positive; **-ve:** negative.

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