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**Original Article**

# Skin infection treatment by using *spilanthes acmella* methanolic extract emulgel

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## Abstract

***Background*** Skin infections can range in severity from moderate to severe. However, skin infections can become more serious if they penetrate deeper into the skin or spread across a large portion of the body. Most skin infections are caused by specific bacteria, fungi, allergens, or other factors.

***Objective*** To examine the efficacy of an emulgel made from *Spilanthes acmella* extract as a herbal treatment for treating cellulitis and bacterial skin eruption.

***Methods*** From May to June 2021, this randomized controlled trial was carried out at a neighborhood clinic in Multan. Three patients took part in the study, and each one received an emulgel based on *Spilanthes acmella* that contained 2% pure extract. For a total of 14 days, each patient applied emulgel three times each day to the suffering area. Each patient had pictures taken on the 0th, 7th, and 14th days.

***Results*** All patients' skin infections had greatly improved after 14 days, as seen in the post-14-days figures. The eczematous conditions got better, the skin softer, and every one of the lesions and skin eruptions had cleared out.

***Conclusion*** It has been determined that the *S* extract base emulgel demonstrated a strong anti-inflammatory, anti-fungal, and anti-bacterial activity to treat many kinds of infectious and eczematous skin disorders. Due to the formulation's emollient effect, which lasted between 7 and 14 days, the skin became normal and smooth.

***Key words***
Eczema; Skin dermatitis; Skin infections; Spilanthes acmella; Plant extract; Herbal remedies.

## Introduction

Various skin disorders are causing several infections among children, adults, and older adults. Some skin diseases are treated using different plant extracts, as the herbal medicines have a lot of benefits for the skin. A lot of researches have been done to study the action of plants as antibacterials and antifungals.[1] It has been reported that cellulitis is a non-necrotizing bacterial hypodermal infection. This acute infection metastasizes the skin and elongates more intensely than erysipelas to effect the

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subcutaneous tissues.[2] It has been reported that the product originated from medicinal plants and served an important role as an antibacterial. The medicinal plants act as a substitute for antibacterial medicines against various infectious diseases of skin.[3]

There is extensive knowledge about the wound healing effects of different medicinal plant extracts. *Centella asiatica* and many other topical formulations have been very effective against topical fungal disorders. Organic extracts such as glycol, ether and chloroform can be used for the formulation of creams, ointments, and gel. Gel formulation has shown the better results on rat models.[4] Bangladesh's rural population has traditionally depended on popular medicinal herbs to cure skin diseases. A total of 10 plants across 9 families were reported to be used against STDs such as syphilis and gonorrhea.[5] Panacea seeds have been used as a stimulant, for tooth ailments, for stomatitis and healing of wounds.[6]

Anti-inflammatory activity of *Spilanthes acmella* was observed by researchers using carrageenan induced hind paw edema. The extract produced a significant dose dependent inhibition of leg edema. This activity has been attributed to the presence of flavonoids that are powerful prostaglandin inhibitors in the late stages of acute inflammation.[7] The impact of different concentrations of *Spilanthes acmella* extracts on four different fungi such as Aspergillus parasiticus, Aspergillus niger, Fusarium moniliform, and Fusarium oxysporum was studied in 2006 by Rani and Murty. All levels of the test solution inhibited the fungal species to a varying degree of susceptibility. The maximum inhibition zone was identified as the most concentrated and increased in proportion to the dose.[8]

Lemon plant exhibited broad spectrum biological activities such as anti-inflammatory, antimicrobial, antibacterial, antifungal.[9,10]

The carbopol 940 gel containing lemongrass and thyme oils possess good antibacterial activity against MRSA when applied to human skin, and exhibit no skin irritation.[11] Spilanthes acmella extract-based emulgel contains lemon oil and carbapol 934 in its formulation.

## Methods

Three Patients having microbial skin infections were enrolled in the study. The patients fulfilled the inclusion criteria for the study. The patients belonged to the south Punjab area of Pakistan (Multan). Informed consent was obtained from patient or from family (In case of child patients). Study was approved by the Ethical Review Board of the Faculty of Pharmacy, BZU Multan vide reference No. 2o/PHP/19. Patient-1 was a 25 years old male having complaints of skin eczema on his left leg cracked skin. Patient-2 was a 3 years old male having severe superficial mycosis on his left-hand wrist and fingers. Patient-3 was a 4 years old male having a severe bacterial infection on his left leg, near the toe on his fingers. All three patients had tried homeopathic and allopathic treatments but none of the therapies was successful. Before starting the treatment, the patients went through serological, allergenic, and hematological tests. The patients were advised to apply the methanolic extract of *Spilanthes acmella* based emulgel containing carbapol 935 and lemon oil in its composition. The extract was 2% w/w emulgel. The emulgel had been applied over the affected areas twice a day (morning and evening). It was advised not to take any other medication, rice, dry fruits, and beef during treatment for 14 days. All patients applied topically extract emulgel. Patients were observed and photos were taken at zero-day then after 7 days from the start then after 14 days of the therapy.

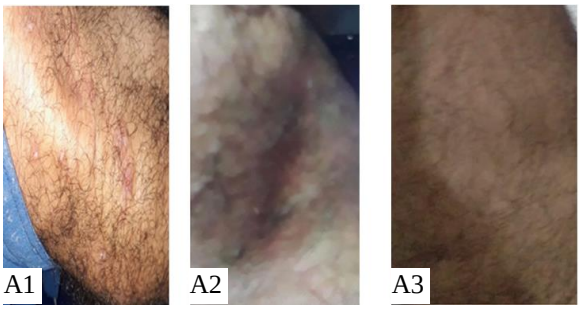


**Figure 1** Patient 1: Photographic images of 25 years old patient having skin infection (A1) before the treatment (A2) after 7 days of treatment (A3) after 14 days of treatment.

## Results

In **Figure 1** peripheral blood eosinophilia, positive results for atopic eczema and elevated level of serum IgE were recorded. Patient-2 with a left-handed infection has shown positive results for primary screening for fungus. Patient-3 with left leg staphylococcus aureus infection was recorded. The patients were not diagnosed with any other diseases. After 14 days skin infection of all patients had shown significant improvement as shown in **Figure 1**, **Figure 2** and **Figure 3**. The skin became soft, there was recovery from eczematous conditions and all the lesions as well as skin eruptions became smooth.

## Discussion

Elevated serum levels of IgE in patient-1, positive fungal test from skin scrapings of patient-2 and staphylococcus aureus had been found in skin lesions of patient-3. All patients were treated with *spilanthes acmella* extract emulgel 2% W/W. Spilanthol is the principal constituent of plant spilanthes acmella extract. It has been well reported for its use as a fungal, antibacterial, and antimalarial activity.[12,13] The methanolic extracts of *Spilanthes acmella* showed larger zones of inhibitions than the other extracts and its ethanolic and hexane extracts showed the medium and lower inhibition zones against the bacterial colonies.[14] Lemon oil was also included in formulating emulgel which


**Figure 2** Patient 2: Photographic images of 3 years old patient having skin infection. (B1) before the treatment (B2) after 7 days of treatment (B3) after 14 days of treatment.


**Figure 3** Patient: 3 Photographic images of 4 years old patient having skin infection (C1) before the treatment (C2) after 7 days of treatment (C3) after 14 days of treatment.

itself contains various bioactive constituents like monoterpenes, esters, sesquiterpenes, aldehydes, alcohol, and ketones.[15] Lemon possesses numerous properties like antimicrobial, antifungal, anti-inflammatory.[16] Propylene glycol was also a component of emulgel which is used as a humectant. Propylene glycol emulgel was found to be non-irritant to the skin and it helped the extract to deeply penetrate the skin.[17]

## Conclusion

Current *spilanthes acmella* extract base emulgel was found to possess strong anti-inflammatory, anti-fungal, and anti-bacterial potentials to treat various eczematous and infectious conditions of

skin by deeply penetrating the skin. The formulation helped the skin to become normal and smooth due to its emollient effect within 7 to 14 days.

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