

SHORT COMMUNICATION

MANAGEMENT OF MILD-CHRONIC PSORIASIS WITH THE DEVELOPED
CURCUMIN WHEAT OIL-BASED NANOEMULGEL – A CASE STUDY

Javeria Noor-ul-Ain Azdee¹, Asma Aslam², Kifayat Ullah Khan^{3*}, Naveed Nisar¹, Asma Mamtaz¹, Aqsa Afzal¹, Syed Nisar Hussain Shah¹

¹Faculty of Pharmacy, Department of Pharmaceutics, Bahauddin Zakaria University, Multan, Pakistan. ²Faculty of Pharmacy, the Islamia University of Bahawalpur (IUB), Bahawalpur, Pakistan. ³College of Pharmaceutical Sciences, Soochow University, Suzhou 215123, P.R. China.

*Corresponding author's email: kifayat.rph@yahoo.com

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ABSTRACT

Background: Curcumin and wheat oil are used to reduce psoriasis symptoms by inhibiting inflammation. **Objectives:** The Case-1 study involved a 41-year-old male who had been grappling with severe psoriatic lesions for several years, while Case-2 centred on a 45-year-old female experiencing mild plaque psoriasis. The objective was to evaluate the therapeutic impact of our curcumin wheat oil-based nanoemulgel (CWOE) in both cases. **Methodology:** Patients with psoriasis were given a topical curcumin wheat oil-based nanoemulgel twice daily on the affected area. **Results:** Following the two-month treatment period, notable improvements were observed in the patient's psoriatic lesions, accompanied by a substantial decrease in inflammation. **Conclusions:** Psoriasis can be effectively treated by applying a wheat oil-based nanoemulgel based on curcumin, which has been shown to be therapeutic in both mild and severe instances. These results imply that CWOE might be an effective treatment for psoriasis symptoms. Additional research could confirm its long-term efficacy and safety.

Keywords: Curcumin, Wheat, Psoriasis, Case study.

INTRODUCTION

The primary focus of this article has been the utilization of curcumin and wheat oil to mitigate symptoms of psoriasis, explicitly targeting the inflammation associated with psoriatic lesions. The analysis predominantly aimed to determine the most effective approach for achieving optimal results.

Curcumin, an aromatic Phyto extract derived from turmeric (*Curcuma longa*) rhizomes, exhibits significant therapeutic potential. However, its effectiveness as a pharmacological agent is hindered in vivo due to challenges such as poor aqueous solubility, rapid metabolism, and quick excretion, leading to compromised systemic bioavailability (1,2). To address these limitations, nanosystems have been proposed as a solution, aiming to improve the bioavailability and activity of curcumin. Strategies involve reducing particle size, surface modification, and enhancing encapsulation efficiency by utilizing various Nano carriers like nanoemulgel (3).

Psoriasis, regrettably one of the most prevalent yet historically neglected skin conditions, impacts nearly 2% of the population and stems from an overproduction of keratin. Despite its prevalence, the primary cause remains elusive. However, it's believed to be associated with the overgrowth of immune cells and their accumulation at affected areas, exacerbating the condition. While not wholly curable, its symptoms can be effectively managed, yet it tends to recur persistently throughout an individual's life.

The primary goal of management is to reduce rapid epidermal growth and promote healing in psoriatic lesions. The focus is on control rather than cure. The treatment should be easily understood and followed by the patient, being both acceptable and cosmetically nonirritating. Patience and consistent adherence are essential, as with any skin treatment. Topical applications are generally most effective for skin conditions. Patients should apply the treatment externally and specifically to the affected area, while avoiding sun exposure and

gently applying the regimen for complete absorption.

The case study delved deeper into assessing the specific mechanisms of curcumin and wheat oil when administered to patients with psoriasis. Analyzing the results for these patients, regular monitoring of their blood cells may further elucidate the influence on inflammation, potentially paving the way for enhanced improvements in the future with additional insights.

METHODOLOGY

Formulation of curcumin wheat oil-based nanoemulgel

A nanoemulgel formulation based on wheat oil and curcumin extract was developed through various extraction methods, notably simple distillation that resulted in curcumin oleoresin (Figure 1). This oleoresin was used in formulating the stable nanoemulgel (2) by blending it with a mix of tween/span-80 surfactants, possessing an HLB Value of 12, to incorporate and stabilize the curcumin within the formulation (Table 1).

Characterization. The prepared nanoemulgel underwent characterization to assess its formulation, demonstrating satisfactory physicochemical traits. The curcumin Wheat oil-based nanoemulgel, exhibiting a mustard yellow hue, displayed excellent spreadability, extrudability, and favorable organoleptic qualities. Various tests, including assessments for skin irritation, antimicrobial activity, and anti-inflammatory properties, were conducted to evaluate its physicochemical attributes. These tests confirmed its enhanced stability even after storage for a month, validating its suitability for use. Packaged in a 50g aluminium collapsible tube, the curcumin wheat oil-based nanoemulgel was provided to the patient for application twice daily over 60 days.

Table 1. Composition curcumin wheat oil-based nanoemulgel (% w/w) 50 gm.

Excipients	Quantity (gm)
Tween 80	11
Curcumin extract	1
Wheat oil	7
Span 80	5
Distilled water	26

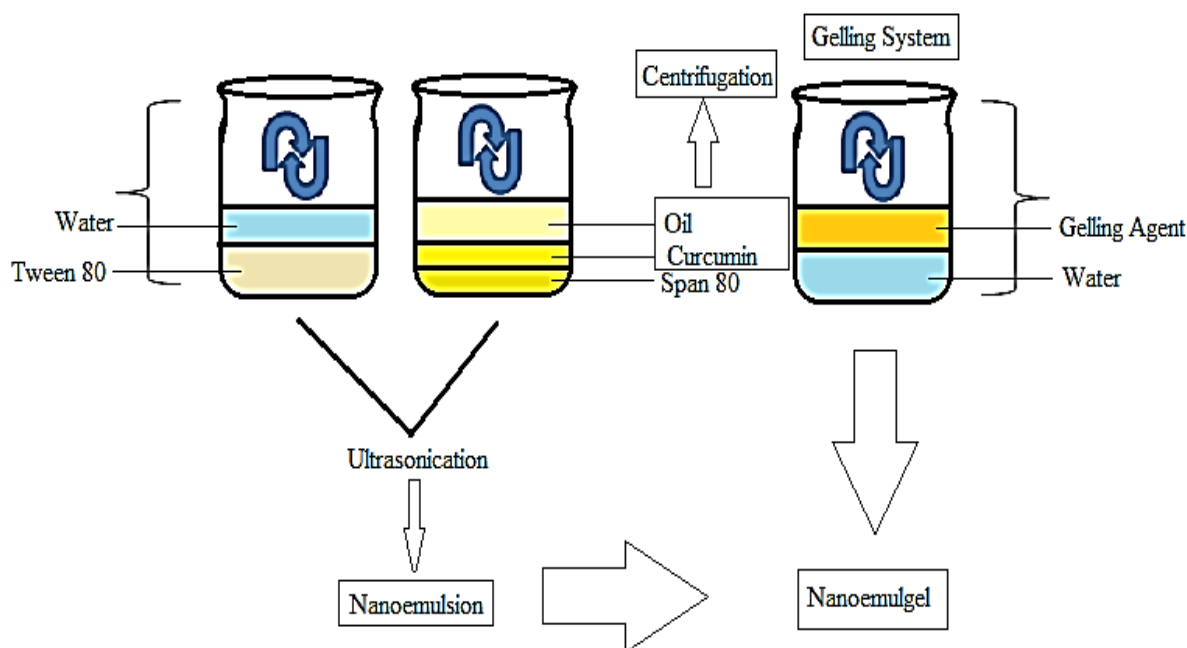


Figure 1. Schematic representation of curcumin wheat oil-based nanoemulgel preparation

Characterization

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RESULTS

Case study1

A forty-one-year-old male patient with psoriatic lesions characterized by thick, red, scaly plaques covering a significant portion of his legs and thighs, approximately twenty-five percent of his body. Despite using emollients,

he occasionally experiences irritation (Figure 2).

Physical examination

The patient presented with distinct, well-defined, erythematous plaques, notably affecting the legs and thighs. Symptoms and physical examination strongly suggested the presence of plaque psoriasis, characterized by these erythematous plaques. The treatment process for erythematous plaque psoriasis is presented in Figure 2.

Treatment plan

The patient applied the curcumin wheat oil-based nanoemulgel to the affected areas twice daily, in the morning and before bedtime. A follow-up appointment was scheduled for eight to nine weeks, with a review after 10 days. This medication, comprising curcumin and oil, was reported to have no known side effects, similar to other medicines used.

Treatment progress

The itching on the legs was so awful that the patient was completely unable to sleep and continuously scratched his skin, worsening the lesions. Following the treatment, the patient was asked to take photographs throughout the treatment course to evaluate the anti-inflammatory efficacy

of curcumin wheat oil-based nanoemulgel (4). In the initial 10 days of treatment, the patient experienced a slight and sporadic reduction in itching right after applying the nanoemulgel, followed by a significant improvement in itching. However, throughout the day, the psoriatic lesions and itching worsened.

Over the subsequent 20 days, there was notable progress in the legs while the itching persisted severely in the thighs, likely due to the patient's typical sitting posture or work activities hindering the healing process. After two months, there was a remarkable overall improvement, including reduced itching, inflammation, and substantial enhancement in skin colour. Consequently, the patient was advised to apply the curcumin wheat oil-based nanoemulgel only once a day, at night.

Despite this positive progress, the symptoms resurfaced without a specific cause. Therefore, the patient was instructed to continue the treatment for another 10 days, resulting once again in noticeable improvements and better skin condition.

Case study 2

A 45-year-old woman was directed to CMH due to plaque psoriasis, with no known family or previous medical history related to the condition (Figure 3). Upon exploring her medical background, she reported the onset of a rash on her arms. A physical examination confirmed a diagnosis of moderately mild psoriasis, localized to her elbows and arms exclusively. She expressed experiencing mild itching along with considerable feelings of embarrassment due to the condition.

Treatment progress

The patient, specifically dealing with mild psoriasis and experiencing mild itching in the arms and elbows, found relief with topical curcumin wheat oil-based nanoemulgel. The itching was disruptive to sleep, prompting the initiation of treatment with the nanoemulgel once nightly. Over 40 days, significant improvements were noted in itching and overall symptoms.

By the end of the month, there was ongoing improvement in symptoms, although some had

lessened while others had exacerbated. Rapid improvement was observed, notably reduced itching after the 40-day treatment period.

DISCUSSION

The nanoemulgel, a novel drug delivery system, aims to improve the effectiveness of lipophilic drugs (5). In this case, a curcumin nanoemulgel was developed using curcumin extract, wheat oil, and a combination of tween/span-80 as surfactants. Evaluation of this formulation revealed notable anti-inflammatory and antimicrobial properties in conducted studies, demonstrating more significant therapeutic effects compared to previous research (5, 6). These findings suggest promising advancements in utilizing curcumin wheat oil-based nanoemulgel for potential therapeutic applications.

The combined effects of wheat oil and curcumin in treating psoriasis are quite intriguing. Wheat oil's anti-inflammatory properties aid in skin regeneration, scar elimination, and alleviating redness and swelling induced by inflammation. Its components, such as omega fatty acids, octacosanol, and linoleic acid, contribute to the longer healing of wounds and warts. On the other hand, curcumin's anti-inflammatory attributes involve modulating pro-inflammatory mediators, inducing apoptosis, and initiating anti-inflammatory cascades, which effectively heal psoriatic lesions (6).

The curcumin wheat oil-based nanoemulgel showcases enhanced percutaneous penetration of drug molecules, optimizing therapeutic activity at the targeted site (7, 8). This innovative delivery system has emerged as a superior option among various novel drug delivery systems for topical applications. Its effectiveness lies in improving drug bioavailability and pharmacokinetic properties, particularly benefiting drugs with poor aqueous solubility that might have been disregarded during development due to limited clinical efficacy (8). Ultimately, the nanoemulgel system can potentially enhance patient compliance and overall therapeutic outcomes.

The antipsoriatic effects of curcumin are multifaceted and promising. Studies reveal that curcumin regulates psoriatic cells by impeding their proliferation and inhibiting pro-inflammatory

processes. It targets potassium channels on T-cells, which play a crucial role in inducing psoriasis, leading to a significant decrease in interleukin cells by approximately 50%. This reduction alleviates the histopathological features associated with psoriasis (6, 8). Curcumin's diverse properties, including its anti-inflammatory, antioxidant, and immunomodulatory effects, contribute to its efficacy against psoriasis. By inhibiting MAPKs, AP-1, and NF- κ B pathways, it suppresses T-cell activation, proliferation, and the production of pro-inflammatory factors. Additionally, curcumin plays a role in maintaining dendritic cells in an immature state, influencing antigen presentation, cytokine production, and the activation of adaptive T-cell responses. These combined effects showcase the potential of curcumin as a multifunctional agent in managing psoriasis (Figure 4).

The diverse mechanisms of curcumin in addressing psoriasis are quite compelling. Studies have indicated that curcumin reduces IL-17 production by CD4 (+) T cells, showcasing its ability to modulate immune responses (9). Its impact extends to dendritic cells, promoting an immature state and fostering anti-inflammatory macrophage polarization. Additionally, curcumin inhibits pro-inflammatory factors, T-cell activity, and vascular endothelial growth factor and even affects genes associated with psoriasis susceptibility, demonstrating its multifaceted potential in managing the condition (10, 11). Meanwhile, vitamin E in wheat oil offers an array of benefits. It potentially enhances skin blood flow, facilitating better nutrient supply to the skin, and holds anti-ageing properties attributed to compounds like ceramides. These compounds could also moisturize and soothe the skin while potentially boosting the body's immunity.

Considering these findings, psoriasis, characterized by an inflammatory cascade and recurring episodes, appears to be an immunoregulatory disease with unresolved

treatment aspects. However, the main histological features of psoriasis, inflammation, and lesions seem promisingly controllable with curcumin's remarkable anti-inflammatory activity. The multifaceted actions of curcumin and the supportive properties of wheat oil present a compelling avenue for managing the complexities of psoriasis.

The nanoemulgel system provides a tailored delivery platform, enhancing curcumin's bioavailability and therapeutic efficacy. Its safety profile and efficacy make it a compelling option for addressing the complexities of psoriasis and other related skin conditions. This approach not only offers targeted delivery but also harnesses the synergistic benefits of curcumin and wheat oil, potentially revolutionizing the management of skin disorders.

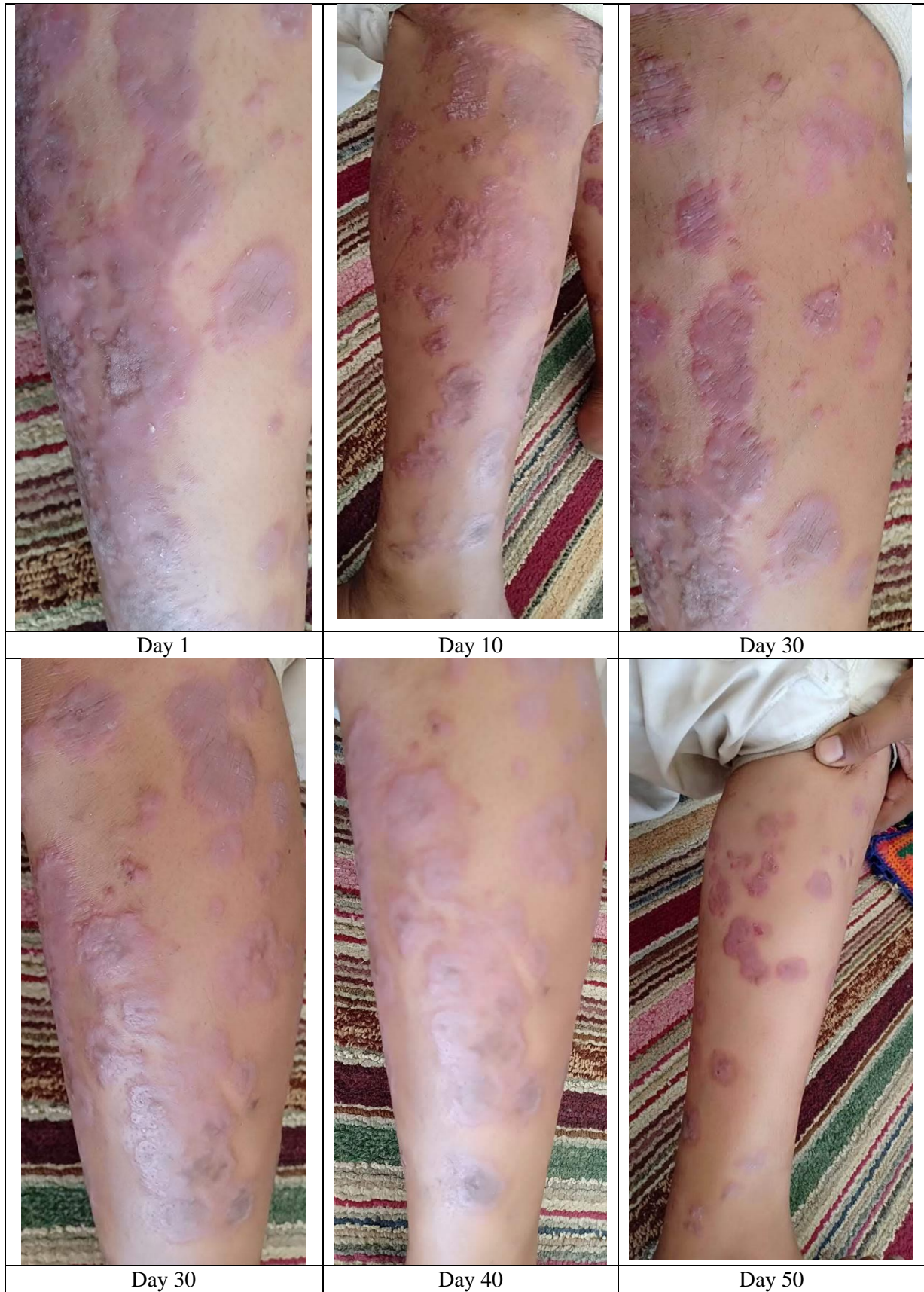


Figure 2. Treatment process for erythematous plaque psoriasis



Figure 3. The treatment process for plaque psoriasis

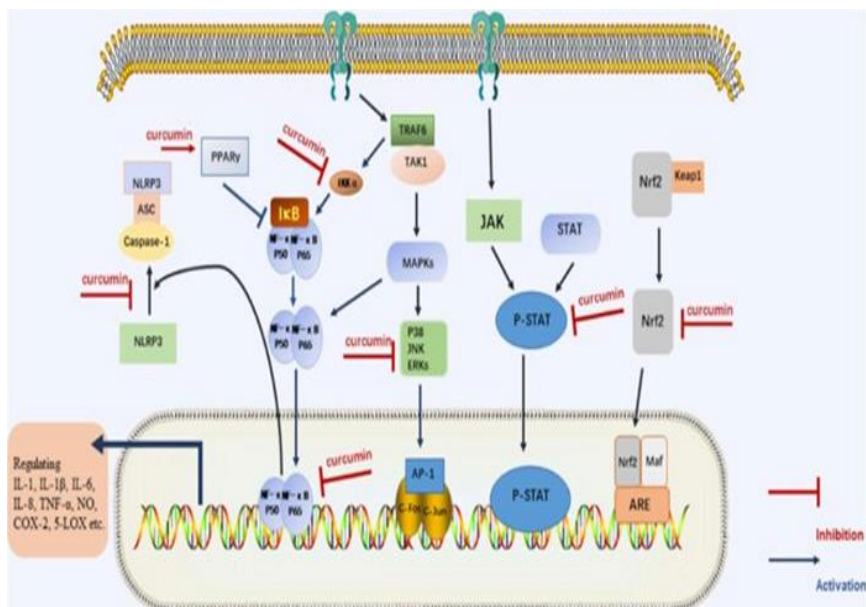


Figure. 4 The regulatory effect of curcumin on inflammatory signalling pathway (12).

CONCLUSION

The use of a wheat oil-based nanoemulgel based on curcumin has demonstrated promise as a treatment for psoriasis, with positive outcomes in both moderate and severe instances. These results suggest that CWOE may be a good choice for treating psoriasis symptoms. Its long-term efficacy and safety could be confirmed by more research.

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None

DECLARATIONS

Authors' contributions

JNA and SNH Shah designed the study. AM and KA collected the data, analyzed the data and drafted the manuscript. NN and AA critically revised the manuscript. All the authors contributed equally and approved the final manuscript.

Ethical approval

The Ethical Committee of the Faculty of Pharmacy, B.Z. University Multan, provided approval for ex-vivo investigations involving humans and animals under reference number 204/PEC/2021.

Conflict of interest

The authors declared no conflict of interest among them.

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