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PREPARTION AND EVALUATION OF HERBAL GEL USED IN THE TREATMENT OF ATOPIC DERMATITIS (ECZEMA)

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ABSTRACT

This study aimed to create a gel using Turmeric and Tagetes erecta leaves extracts for treating Atopic dermatitis (eczema). Extraction involved maceration using acetone for Turmeric and methanol for Tagetes erecta leaves. Physicochemical assessments, including total ash values, revealed 4.92% and 5.61% for Turmeric and Tagetes erecta extracts, respectively. Phytochemical analysis detected secondary metabolites in both extracts. Chromatographic separation (TLC and HPTLC) identified curcumin in turmeric and quercetin in Tagetes erecta leaves. Using Carbapol 940 polymer, formulations (F1-F6) combining the extracts were developed and evaluated, with HPLC confirming the presence of Quercetin and Curcumin in the gel. Stability tests yielded satisfactory results after evaluation. Antimicrobial tests demonstrated higher efficacy against S. aureus compared to E.coli and Candida albicans.

KEYWORDS: Turmeric, TLC, PHTLC, Curcumin, Antimicrobial activity.

INTRODUCTION

The utilization of herbal medicine has witnessed a significant surge due to concerns over the toxicity and complications associated with allopathic medicines. Currently, about 80% of the global population relies on plant-derived remedies for primary healthcare, owing to their perceived lack of side effects. In various historical treatises from India, notable figures such as Dhanwantari, Nagarjun, and Charak have documented the efficacy of herbal cures.

Herbal medicine encompasses a wide array of components derived from plants, including leaves, seeds, roots, and extracts, combining various chemical constituents to produce therapeutic effects. While synthetic drugs dominate modern medicine, herbal remedies maintain high demand due to their perceived safety, accessibility, and cost-effectiveness. Approximately 25-30% of modern drugs trace their origins to plant-derived chemical intermediates. The natural origins of herbs and their historical use since ancient civilizations contribute to their perceived safety and effectiveness.

Despite advancements in synthetic pharmaceuticals, herbal medicine continues to thrive, especially in developing countries. Herbal remedies, appreciated for their minimal adverse effects, remain a popular and accessible form of medicine globally, serving as the basis for many modern pharmaceuticals.

History of Herbal Medicine

According to the available historical information, the study of herbs was started by Sumerians over 5,000 years back, in which it describes the medical applications of plants such as bay leaves, cumin and thyme. Egyptians were known to have used many herbs for medicine, including garlic, opium, castor oil, coriander, peppermint etc., way back in 1000 B.C. The ancient texts of Ayurveda (1000 BC) also mentions about the medicinal values of many herbs including turmeric and Curcumin. Ancient Indian Physician Sushruta (600 BC) has identified 700 medicinal plants and he also mentioned about 64 Ayurvedic preparations from various mineral sources and 57 preparations from animal sources in his famous book Sushruta Samhita.

Types of Herbal Medicine Systems

Herbal medicines are developed throughout the different cultures which can be summarized in three main categories.

I. Western herbal medicine.
II. Chinese herbal medicine.
III. Traditional Indian medicine (Ayurveda, Siddha, Unani).

Atopic Dermatitis (Eczema)

Atopic dermatitis (AD) is a multifaceted chronic skin inflammatory disorder. The word ‘atopy’ is derived from the Greek word ‘atopia’ which means ‘different’ or ‘out of place’, as was first introduced by Coca and Cooke, and was earlier proposed to include Asthma and

Rhinitis. Later on, AD was also included to the group of atopic disorders as it was found to be associated with asthma and rhinitis. In fact, AD is the first manifestation of the Atopic triad. AD is a common condition that usually begins in childhood, mostly in the first six months of life. The incidence of the disease has increased 2-3 folds since 1970s, especially in the industrialized nations worldwide, affecting approximately 15-20 % of children and 1-3 % of adults, particularly in western countries. In 60 % of the patients, AD disappears before adulthood, though some individuals (about 15 %) have atopic flares during adulthood. On the other side, children who persist with moderate to severe AD are at risk of developing other allergic atopic conditions i.e. allergic rhinitis and asthma. The diagnosis of AD is done by characteristic features like erythematous plaques, eruption, flexural lichenification, intense pruritus and cutaneous hypersensitivity reactions. Cytokines and chemokines are released in the skin as a result of scratching and mechanical injury due to intense pruritus. It promotes the skin permeability and entry of allergens in the skin.

AIM AND OBJECTIVES

On the basis of literature study the aim of present manuscript is, To formulate and evaluate the Herbal Gel containing Curcumin and Tagetes erecta extract For the Treatment of Atopic Dermatitis (Eczema)

OBJECTIVES

1) To conduct the detail literature survey related to the research topic.

2) To select the suitable excipients for the research work.

3) To formulate Herbal Gel formulation containing Curcumin and Tagetes erecta extract with suitable excipients for the treatment on atopic dermatitis.

4) To evaluate the developed Herbal Gel containing Curcumin and Tagetes erecta extract for its performance.

5) To conduct the stability study of developed Herbal Gel containing Curcumin and Tagetes erecta extract.

MATERIAL AND METHOD

- Extraction of Curcumin from Turmeric and Tagetes erecta extract through maceration using acetone and methanol, respectively.
- Physicochemical analysis including total ash values, moisture content, and pH determination of the extracts.

- Chromatographic separation techniques (TLC and HPTLC) for identification and quantification of Curcumin and Quercetin.
- Formulation development using Carbopol 940 as a gelling agent for creating various gel batches (F1-F6).
- Evaluation of gel properties including viscosity, spreadability, drug content, and stability studies.
- Assessment of antimicrobial activity against relevant microbial strains.

RESULTS AND DISCUSSION

Maceration is the basic process of extraction, maceration of Turmeric in acetone whereas, Tagetes erecta leaves in Methanol was carried out. After the maceration process, all extract where subjected for the evaporation of solvent.

Figure: Maceration process.

Table: Physicochemical analysis of Tagetes erecta Leaves extract.

Sr No	Parameters	Value
1.	Ash Values Total ash Acid insoluble ash Water soluble ash	 5.61% w/w 1.69% w/w 0.10% w/w
2.	Extractive values with organic solvent Hexane Chloroform Acetone Ethyl acetate Ethanol Water	7.5% w/w 10.1% w/w 9.2% w/w 13.5% w/w 23.5% w/w 21.8% w/w
3.	Loss on Drying	5.5±0.6 mg/g
4.	Foreign matter	5.45% w/w

Phytochemical Analysis of Extract Preliminary Screening of phytochemicals

The presence and absence of the phytochemicals were confirmed by the chemical tests which were considered as preliminary screening. The tests were done to identify the presence of alkaloids, saponin glycosides, tannins, flavonoids etc . The results were mentioned in the table7.

Table 7: Preliminary phytochemical screening of Turmeric & Tagetes erecta leaves extracts.

S. No.	Secondary metabolites	Results	
		Turmeric	Tagetes erecta
1	Steroids	++	++
2	Terpenoids	+	+
3	Tannin	-	-
4	Flavonoids	++	++
5	Alkaloids	++	-
6	Saponin	++	++
7	Glycoside	-	++

7.0 Herbal Gel

Physical Evaluation of Herbal Gel

Physical Parameter of Turmeric and Tagetes erecta extracts were evaluated from the results it was found that Formulation batch F1 was better in the all physical parameters from other batches. The formulated herbal gel shown in figure 12. The results are illustrated in table.

Table 9: Evaluation parameters of Turmeric and Tagetes erecta extracts gel.

Formulation No.	Clarity	pH	Homogeneity	Viscosity	Spreadability	Colour	Irritability
F1	Very Clear	6.4	Very Good	1962	25.67	Yellowish	No
F2	Clear	6.3	Very Good	2064	26.47	Yellowish	No
F3	Clear	6.6	Very Good	2167	24.10	Yellowish	No
F4	Very Clear	6.5	Very Good	2487	20.57	Yellowish	No
F5	Clear	6.8	Very Good	2429	21.96	Yellowish	No
F6	Clear	.6.6	Very Good	2517	22.47	Yellowish	No

Stability Studies

Table: Details of Stability study of Herbal gel Formulations.

Test	Appearance	Observation
pH	6.41	The appearance of the formulation was good and variation in the pH occurs. The initial viscosity and stability batch viscosity was remained same. No Color change occurs in the stability period
Viscosity	2123	
Color	Yellowish	
Spreadability	24.86	

Antimicrobial activity of Herbal gel of Turmeric and Tagetes erecta extracts

Methanolic extracts of Turmeric and Tagetes erecta extracts were screened against *Escherichia coli* and *Staphylococcus aureus* species of bacteria and *Candida albicans* species of fungi and evaluated using the standard agar disc diffusion method. The disc diffusion method is used to detect the antimicrobial activity of plant extract.

Antimicrobial activity of Turmeric extract.

Micro-organisms	Mean Inhibition Zone (mm)				
	50 µl	100 µl	150 µl	Standard (30 µl)	Control (30 µl)
E. coli	3.61 ± 0.32	6.64 ± 0.39	8.25 ± 0.48	10.59 ± 0.68	0
St. aureus	3.13 ± 0.20	5.56 ± 0.31	7.16 ± 0.53	10.92 ± 0.72	0
C. albicans	2.82 ± 0.16	4.69 ± 0.30	6.63 ± 0.41	10.63 ± 0.71	0

The solidified nutrient agar plates were swappedwith the test organism and the samples were impregnated. After the incubation the zone was measured. The antimicrobial activity of plant extracts was detected by the inhibition of zone around the disc. The *in vitro* antimicrobial activity of extracts of Turmeric and Tagetes erecta extracts against bacteria and fungi were qualitatively assessed by the presence of inhibition zones represented in the photographic Figures 15 & 16.The inhibitory activities in culture media of the two plants reported in table 12 & 13 are comparable with standard antimicrobiotics, namely chloromphenical and fluconazole. Table 13: Antimicrobial activity of Turmeric extract.

Antimicrobial activity of Tagetes erecta extract.

Micro-organisms	Mean Inhibition Zone (mm)				
	50 µl	100 µl	150 µl	Standard (30 µl)	Control (30 µl)
E. coli	2.360 ± 0.21	4.91 ± 0.33	7.74 ± 0.45	11.37 ± 0.71	0
St. aureus	1.66 ± 0.10	3.74 ± 0.13	6.84 ± 0.39	10.64 ± 0.73	0
C. albicans	2.23 ± 0.14	4.65 ± 0.32	7.51 ± 0.48	10.76 ± 0.68	0

From the Antimicrobial study it was cleared that, antimicrobial activity is directly proportional to the concentration of extract of Turmeric and Tagetes erecta. These extract shows higher antimicrobial activities against *S. aureus*, when compared to the *E.coli* and *Candida albicans*. The high dose (150 µl) of extract possesses similar activity to standard drug Chloramphenicol forbacteria and fluconazole for fungi.

CONCLUSION

This research successfully extracted a herbal gel formulation containing a combination of Turmeric and Tagetes erecta leaves extract for treating Atopic dermatitis. The extraction process involved maceration, followed by comprehensive physicochemical and phytochemical analyses of the formulated gel.

The identification of compounds revealed the presence of curcumin in turmeric and a higher concentration of quercetin in Tagetes erecta leaves extract. Additionally, the gel formulation was evaluated for various properties and exhibited promising antibacterial activity against different microbial strains. The developed herbal gel, comprising extracts from turmeric and Tagetes erecta leaves, holds significant promise for the nutraceutical industry. Further in-depth studies on this formulation could lead to groundbreaking advancements in skincare and pharmaceutical applications.

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