Formulation & Assessment of Acacia Catechu & Curcumin Loaded Gel for Psoriasis Treatment

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***Abstract*—The skin multiplies ten times more quickly than normal when a person has psoriasis. Some of the most prevalent symptoms are red, itchy, scale-covered skin plaques. People with psoriasis may develop psoriatic arthritis, a form of arthritis. Usually, guttate psoriasis starts in childhood or early adulthood. People with psoriatic arthritis typically develop nail psoriasis. The pathophysiology of psoriasis includes inflammation, aberrant epidermal keratinocyte multiplication, hyperproliferation, and changes to the skin's immune system. An immune system issue is the root cause of inflammation. Although it can skip generations, psoriasis typically runs in families. Because psoriasis affects the immune system, stress, cold, and dry conditions exacerbate the condition's symptoms. Psoriasis cannot be cured, although even in severe cases, treatment can greatly lessen symptoms. Creams, ointments, gels, and other forms of steroids and retinoids are prescribed. Patients with mild to severe psoriasis can also get a variety of treatments. [1]**

***Index Terms*—Psoriasis, Inflammatory skin disorder, Antioxidant property, Acacia catechu and Curcumin Gel**

I. INTRODUCTION:

Traditional medicine has a long history of using Natural and herbal products to treat various human Diseases, and it has now become a multi-billion-dollar Industry with a recorded cost of USD 10 billion/year. [2] Acacia catechu, a polyphenol derived from the khair plant (black catechu) of the fabaceae family, is one of the numerous herbal compounds available for medical Purposes, with a range of therapeutic properties. Acacia catechu has been used for various purposes for Centuries.

Acacia catechu is a highly valued deciduous tree belonging to the Fabaceae family, renowned in traditional Asian medicine for over 2,500 years. Its heartwood extract (known as Katha or cutch) is biologically prized for its rich phytochemical profile, exhibiting potent antioxidant, antimicrobial, and anti-inflammatory properties. A robust introduction for a research paper on Acacia catechu should clearly progress from its general botanical profile to its specific pharmacological importance.

Fig.1.1 Acacia catechu

Traditional medicine has a long history of using Natural and herbal products to treat various human Diseases, and it has now become a multi-billion-dollar Industry with a recorded cost of USD 10 billion/year [3]. Curcumin, a polyphenol derived from the turmeric plant (Curcuma longa) of the Zingiberaceae family, is one of The numerous herbal compounds available for medical Purposes, with a range of therapeutic properties.including as a culinary spice, food additive (e.g., ice cream, yogurt, orange juice, biscuits, popcorn, Cakes, cereals, sauces, gelatins), cosmetic ingredient, and Natural product for treating different diseases, particularly Chronic inflammatory condition. Although the therapeutic benefits of curcumin Have been recognized for centuries, its pharmacological Properties have only been scientifically studied in the Past century.

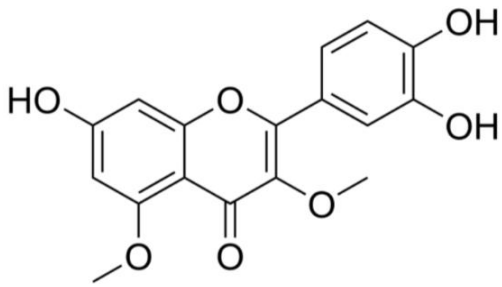
Today, the wide range of Curcumin's Medical applications is attributed to its various Properties, including antioxidant, anti-inflammatory, antiproliferative, anti-carcinogenic, and anti-microbial

effect. In medicine, curcumin is used to treat various Diseases, such as rheumatoid arthritis, eye diseases (e.g., Chronic anterior uveitis, conjunctivitis), urinary tract Infections, menstrual disorders, liver and gastrointestinal Disorders (e.g., abdominal pain, inflammatory bowel Disease). Additionally, curcumin is used as an Adjuvant therapy for treating skin cancers, chickenpox, and wound healing Although curcumin can be obtained from the diet, it is now formulated into tablets with Different dosages, often combined with specific adjuvant (e.g., piperine, phospholipids) that improve its absorption and bioavailability.[3]

Fig.1.2 Curcumin powder

Acacia catechu:

1] Chemical structure of acacia catechu:



2] Molecular formula: C15H14O6

3] Molecular weight: 290.27 g/mol

4] IUPAC Name: [2R,3R]-2-[3,4-dihydroxyphenyl]-3,4-dihydro-2H-chromene-3,5,7-triol

Properties of Acacia catechu:

a] Antimicrobial and Antifungal

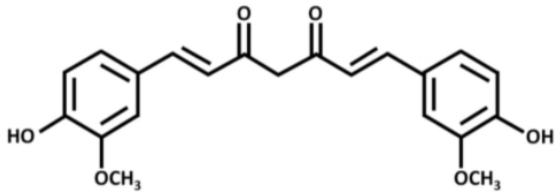
b] Anti-inflammatory

c] Antidiabetic

d] Antioxident

Curcumin:

1)Chemical structure of curcumin:



2)Molecular formula: C21H20O6

3)Molecular weight: 368.35 g/mol

4)IUPAC Name:

[1E,6E]-1,7-bis[4-hydroxy-3-methoxyphenyl]-1,6 heptadiene-3,5-dione

Properties of Curcumin:

a] Anti-Inflammatory activity

b] Antioxidant activity

c] Antibiotic

d] Analgesic

e] Improves skin condition [psoriasis, eczema etc]

f] Speeds up wound healing

II. REVIEW LITERATURE:

1)Veronica Di Nardo, et al. Use of Curcumin in Psoriasis:

Curcumin is a polyphenol derived from the golden spice turmeric, which is widely used for different purposes, such as culinary spice and alimentary addictive, make up and, finally, as a natural product for the treatment of Different diseases, especially for the chronic inflammatory ones. Recently, curcumin has been proposed as a valid and safe therapeutic option for psoriasis.

2)Ying Peng et al. Anti-Inflammatory Effects of Acacia catechu in the Inflammatory Diseases: Status, Limitations and Countermeasure:

Acacia catechu is a natural compound with great potential for disease treatment. A large number of studies have proved that acacia catechu has a variety of biological activities, among which anti-inflammatory effect is a significant feature of it. Inflammation is A complex and pervasive physiological and pathological process. The physiological and Pathological mechanisms of inflammatory bowel disease, psoriasis, atherosclerosis, research focus diseases are not clear

yet, and they are considered to Be related to inflammation. The anti-inflammatory effect of curcumin can effectively improve the symptoms of these diseases and is expected to be a candidate drug for the treatment of Related diseases.

3) Tahmina Haque, et al. Treatment and Management of Psoriasis:

Psoriasis is a common, chronic inflammatory skin disease affecting many people of the world now a days. Psoriasis is Principally an immunological T lymphocyte-driven disease, relating both the distinctive and T-cell-mediated immune Systems. The mostly affected sites comprise the scalp, extensor surfaces of the knees and elbows, umbilicus, genitalia, Anterior lower legs and nails. This disease can significantly impact on a patient's quality of life and is connected comorbidities comprise psoriatic arthritis, obesity and the metabolic syndrome, diseases of cardiovascular system and Liver with fats. Provided treatment is depends on disease severity, quality of life, patient preference, relevant comorbidities and efficacy of the treatment

4) Samia Ibrahim, et al. Turmeric Extract-Based Treatment for Psoriasis:

Psoriasis is a chronic inflammatory skin disease affects 3% Of world population on average. Psoriasis can have disfiguring and disabling Impacts on patients with increased global burden of the disease. According To WHO, there is continuous need for establishing new modalities for Treatment of psoriasis with emphasis on treatment safety concerns of the Patients. The aim of this study is to assess the efficacy and safety of turmeric Extract based ointment in the treatment of mild to moderate psoriasis.

5) Omali Y. Elkhawaga, et al. Review of natural compounds for potential psoriasis treatment:

Psoriasis represents an immune-mediated disease with an unclear cause that's marked by inflammation triggered by dysfunction in the immune system, which results in inflammation in various parts of the skin. There could be obvious symptoms, such as elevated plaques, these plaques may appear differently depending on the type of skin. This disease can cause inflammation in the elbows, lower back, scalp, knees, or other regions of the body. It can begin at any age, although it most commonly affects individuals between the ages of 50 and 60.

6) Neha Khushwaha, Monika Rai, et al, A systemic review of pathophysiology, clinical presentation, types and treatment of Psoriasis:

Psoriasis is a chronic, multisystem inflammatory disease with predominantly skin and joint involvement. It has a bimodal age of onset (16 to 22 and 57 to 60 years) 2 and affects both sexes equally. Beyond the physical dimensions of disease, psoriasis has an extensive emotional and psychosocial effect on patients, affecting social functioning and interpersonal relationships. As a disease of systemic inflammation, psoriasis is associated with multiple comorbidities, including cardiovascular disease and malignancy. The diagnosis is primarily clinical and a skin biopsy is seldom required. Depending on the severity of disease, appropriate treatment can be initiated. For mild to moderate disease, first-line treatment involves topical therapies including corticosteroids, vitamin D3 analogues, and combination products. In this review we have discussed about, etiology, pathophysiology, types, diagnostic methods and available treatment strategies for Psoriasis.

III. AIM AND OBJECTIVE:

Aim:

Formulation and Assessment of Acacia catechu and Curcumin-Loaded Gel for Psoriasis Therapy.

Objective of the study:

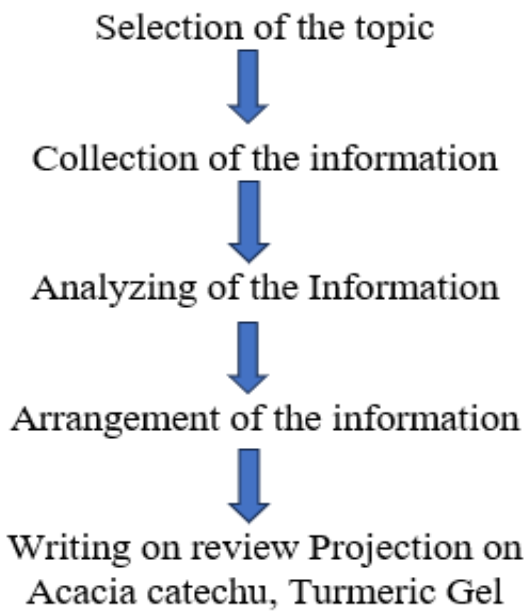
1. Anti-Inflammatory Effects: Reduce inflammation associated with psoriasis.
2. Symptom Relief: Alleviate itching and scaling.
3. Enhanced Delivery: Improve skin penetration of acacia catechu, curcumin.
4. Moisturization: Hydrate and soothe the affected skin.
5. Antimicrobial Action: Prevent secondary infections.

Ideal properties of Catechu,Turmeric Gel:

1. Biocompatibility: Safe for use on skin and does not cause irritation.
2. High Curcumin Stability: Protects curcumin from degradation.
3. Controlled Release: Provides sustained release of active ingredients.

4. Optimal Viscosity: Easy to apply and adheres well to the skin.
5. Moisturizing Capability: Maintains skin hydration.
6. Antimicrobial Properties: Inhibits microbial growth.
7. Good Mechanical Strength: Resilient and durable during use.
8. Non-Greasy Texture: Comfortable for users.

IV. PLAN OF WORK



V. OVERVIEW OF PSORIASIS:

5.1. Epidemiology:

Psoriasis affects both males and females, with earlier onset in Females and those with a family history. Its age of onset shows a Bimodal distribution with peaks at 30-39 years and 60-69 years in men and 10 years earlier in women.

5.2. Actiology:

The pathogenesis of psoriasis is multifactorial, with genetics being A primary contributor especially in those with early-onset (<40 Years) plaque psoriasis. This was demonstrated by twin, family based and large-scale population-level studies, with heritability Estimated to be 60-90%.5 More than 60 susceptibility loci have Now been identified using genome-wide association studies. 5Many of the candidate causal genes are involved in antigen Presentation (HLA-C and ERAPI), NF-kappa B signalling (TNIP1), Type 1 interferon pathway (RNF113 and IFIHI), interleukin (IL)-23/Th17 axis (IL23R, IL12B and TYK2) and skin barrier function (LCE3). This suggests a complex interplay between T cells, dendritic cells and keratinocytes as the likely underlying the Pathophysiology of psoriasis, with the IL-23/Th17 axis being the Central driver of immune activation, chronic inflammation and Keratinocyte proliferation. 6 Environmental triggers have been Known to exacerbate psoriasis such as obesity, stress, beta blockers, smoking and lithium. Although there is a relative paucity of data, pustular psoriasis Appears to be genetically distinct, with different susceptibility Genes implicated (IL36RN, AP1S3 in those of European descent And CARD14.[3]

5.3. Pathophysiology of Psoriasis:

The pathophysiology of psoriasis Involves infiltration of the skin by activated T-cells which stimulate. The proliferation of keratinocytes. This dysregulation in Keratinocyte turnover results in the formation of thick Plaques. Other associated features include epidermal Hyperplasia and parakeratosis. In addition, the epidermal Cells fail to secrete lipids which results in flaky and scaly Skin, which is typical of psoriasis. The pathophysiology of psoriasis is multi factorial land Involve Epidermal Hyper proliferation, abnormal Differentiation of epidermal keratinocytes, and Inflammation with immunologic alterations in the skin. The hyper proliferation is characterized by increased DNA synthesis and a markedly decreased turnover rate for the epidermis. Abnormal keratinocyte differentiation Involves increased
expression of certain keratins (6,16) and a delay in expression of other keratins (1 and 10) That are expressed in normally differentiating skin, Inflammation results from an infiltrate of neutrophils in the epidermis and super facial dermis and an infiltrate of T tymphocytes in the dermis with a predominance of CD8+ cells.[4]

5.4. Symptoms and triggers of Psoriasis:

Common signs and symptoms of psoriasis include:

a. A patchy rash that varies widely in how it looks from person to person, ranging from spots of Dandruff-like scaling to major eruptions over much of the body.

b. Rashes that vary in color, tending to be shades of Purple with Gray scale on brown or Black skin and Pink or red with silver scale on white skin.
c. Smalls calings pots (commonly seen in children).
d. Dry, cracked skin that may bleed.
e. Itching, burning or soreness.

5.5 Psoriasis triggers:

- Infections, such as strep throat or skin infections
- Weather, especially cold, dry conditions
- Injury to the skin.
- Smoking and exposure to second hand smoke
- Heavy alcohol consumption
- Certain medications-including lithium, High blood pressure drugs and antimalarial drugs
- Rapid withdrawal of oral or injected corticosteroids.

5.6. Complications:

- Secondary infections
- Poor cosmesis
- Psoriatic arthritis
- Risk of lymphoma
- Increased risk of adverse cardiac events.
- Psoriatic arthritis, which causes pain, stiffness, and Swealling in and around the joints.
- Temporary Skin Colour Changes (post inflammatory hypopigmentation Or Hyperpigmentation) where plaques have healed.
- Eye conditions, such as conjunctivitis, blepharitis and Uveitis.
- Obesity.
- Type2 diabetes.
- Cardiovascular disease,
- Other auto immune diseases, such as celiac disease, Sclerosis and the inflammatory bowel disease called Crohn's disease.
- Mental health conditions, such as low self-estemand Depression [5].

Clinically classified [In 2 groups] [7]

1] Non-pustular Psoriasis vulgaris (early and late onset)

- Guttate psoriasis
- Erythrodermic psoriasis
- Palmoplantar psoriasis
- Psoriatic arthritis (PsA)
- Inverse psoriasis

2) Pustular psoriasis

- Generalized pustular psoriasis (von Zumbusch type)
- Impetigo herpetiformis
- Localized pustular psoriasis
- Palmoplantar pustular psoriasis (Barber type)

Fig.5.1. Fig.5.2. Fig.5.3.

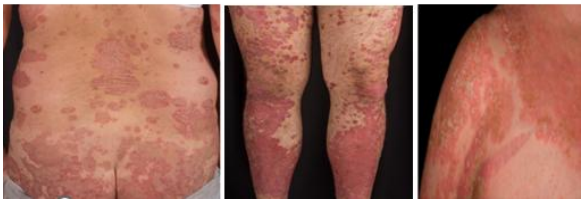
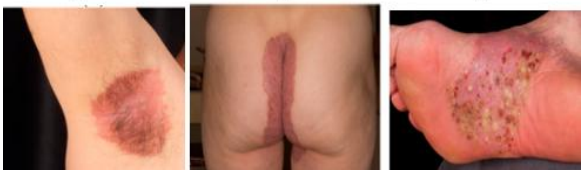


Fig.5.4. Fig.5.5. Fig.5.6



1)Clinical manifestations of psoriasis (A, B)
Psoriasis vulgaris presents with erythematous scaly plaques on the trunk and extensor surfaces of the limbs. (C) Generalized pustular psoriasis. (D) Pustular psoriasis localized to the soles of the feet. This variant typically affects the palms of the hands as well; hence, psoriasis pustulosa palmoplantaris. (E, F) Inverse psoriasis affects the folds of the skin (i.e., axillary, intergluteal, inframammary, and genital involvement). hands as well; hence, psoriasis pustulosa palmoplantaris [7].

A] Psoriasis vulgaris

Psoriasis vulgaris, the most typical clinical form of psoriasis, constitutes around 90% of cases. Clinically, it manifests as shiny translucent erythematous plaques with separate boundaries. The knees, elbows, scalp, and sacral area are the most common locations for lesions, which have symmetric distribution. Traumatic events may cause an immunity to these tumors [8,9]. Squamae break off as layers of white lamellae that, like candle wax, show coherence after removal when the surface of psoriatic plaque is scraped with a blunt blade. The term "wax spot phenomenon" can be utilized to describe this desquamation. It indicates parakeratotic hyperkeratosis. Further removal of the psoriatic plaque may reveal a moist coating that has adhered to the lesion. The "last membrane phenomenon," which is the top layer of the dermal papillae of the epidermis, is a pathognomonic indicator

of psoriasis. When the plaque is further rubbed, an erythematous background and bleeding foci occur along with tiny red pinpoints known as the "Aus pitz sign," which indicate papillomatosis on the ends of the dermal papillae. A hypopigmented macular ring known as the "Woronoff ring" can be seen surrounding cured psoriatic plaques [8,9,10]. Since the exact cause of this ring is unknown, it is believed to be connected to prostaglandin levels reducing in healing lesions [11].

B] Generalized pustular psoriasis

This is an uncommon type of psoriasis that develops into pustules. It is most commonly observed in young people. It may appear on its own or as a consequence of psoriasis vulgaris, such as when systemic steroid treatment abruptly stops, when triggering factors change, when hypocalcemia occurs, or when irritant therapy is administered. It begins quickly on an erythematous backdrop and is followed by nonspecific symptoms including polyarthralgia, lassitude, and a high fever. Leukocytosis, lymphopenia, an increase in sedimentation rate, and a negative nitrogen balance are all evident. New pustules form once the pustules dry out in a few days. Due to its propensity to spread, peripustular erythema can cause erythrodermia. It needs to be handled right away. The acute phase may result in a deadly course if the disseminated form is not treated [12,13,14].

C] Psoriasis in reverse

Flexural or inverse psoriasis is the term used to describe psoriasis that is localized in skinfolds. Friction and moisture in skin wrinkles do not cause squamous lesions. Bright crimson, symmetrical, infiltrative, fissured plaques with unique outlines are how lesions seem. This type of psoriasis is diagnosed by fissured plaques with crisp outlines. It is more common in obese people, and seborrheic lesions are more likely to occur. In general, this type is more resistant to traditional therapies [12].

D] Psoriasis erythrodermic

In this widespread kind of psoriasis, psoriatic lesions cover around 80% of the face. Typical papules and plaques lose their distinctive characteristics, and erythematous lesions predominate. Desquamation is not as clear. Patients with erythrodermic psoriasis may experience hypothermia as a result of widespread vasodilatation. Protein loss and associated systemic issues, such as lower extremity edema and heart, liver, and kidney failure, can also result from desquamation. Additionally, the skin's protective barrier is compromised, which could result in systemic reactions.

It usually arises as a consequence of psoriasis vulgaris, but it can also start on its own as erythrodermic psoriasis. Disorders of the nails can be rather significant. There may be significant pruritus and dermatopathic lymphadenopathy. Small patches of undamaged skin should be checked for psoriatic erythroderma or pityriasis rubra pilaris (PRP) erythroderma in cases of erythroderma. There isn't a particular lab result. These results should be constantly monitored because there is a significant risk of septic shock or cardiovascular shock. The clinical picture is severe, sometimes lethal, and resistant to treatment. Psoriasis palmoplantar. The palms of the hands and the soles of the feet are typically symmetrically affected by this type of psoriasis, with thenar regions being more commonly affected than hypo thenar regions. Although it is not always present, erythema manifests as a pinkish-yellow lesion. The most common lesions are squamae. Keratoderma may form as a result of thick squamae. Negative phenomena occur [12].

E] Psoriasis guttate

Children and young adults are often affected by this kind of psoriasis. Lesions typically arise following streptococcal infections and appear rapidly as tiny droplets or, less frequently, as squamous psoriatic papules. The HLA Cw6 gene is most commonly linked to this type of psoriasis. Antistreptolysin titers are frequently high. Lesions usually go away on their own when the infection regresses. The face, head, proximal extremities, and trunk are typically affected. Usually, they regress in three to four months. Lesions may develop larger and resemble psoriatic plaque. [15]

Current treatment of Psoriasis:

1)Topical treatments:

These go on your skin and are Usually the first thing doctors try. Some have steroids; Others don't. Prescription products slow skin cell Grow and ease inflammation.

2)Phototherapy:
This treatment uses ultraviolet light. You'll get it at your doctor's office or at home with a Phototherapy unit.

3)Systemic Medications:
These prescription drugs work Throughout your body. You'll get them if you have Moderate to severe psoriasis is that doesn't respond to Other Treatments. You Could Take the M by mouth or get them as a shot or IV. This category includes drugs Called biologics, which target specific parts of your immune system that Play a role in the inflammatory process. Learn more About systemic treatments for psoriasis.

4)Corticosteroids:
These drugs are the most Frequently prescribed medications for treating mild to moderate psoriasis. They are available as oils, Ointments, creams, lotions, gels, foams, sprays and Shampoos. Mild corticosteroid ointments (hydrocortisone) are usually recommended for Sensitive areas, such as the face or skin folds, and for Treating widespread patches.

5)Vitamin D analogues:
Synthetic forms of vitamin D- such as calcipotriene (Dovonex, Sorilux) and Calcitriol (Vectical) slow skin cell growth. This type of drug may be used alone or with topical corticosteroids. Calcitriol may cause less Irritation in sensitive areas.

6)Retinoids:
Tazarotene (Tazorac, Avage, others) is Available as a gel or cream. It's applied once or twice Daily. The most common side effects are skin Irritation and increased sensitivity to Light. Tazarotene isn't recommended when you're Pregnant or breastfeeding or if you intend to become Pregnant.

7)Light therapy:
Light therapy is a first line treatment for moderate to severe psoriasis, either alone or in Combination with medications. It involves exposing the skin to controlled amounts of natural or artificial Light. Repeated treatments are necessary.

8)Sunlight:
Brief, daily exposures to sunlight (heliotherapy) might improve psoriasis. Before Beginning a sunlight regimen, ask your health care Provider about the safest way to use natural light for Psoriasis treatment.

9)Antibiotics:
Tetracycline and Penicillin Use of Systemic antibiotics and induction of gh reduction of Intracellular cAMP and by the interaction with Arachidonic acid and its metabolites.

10)Lithium:
Lithium is used for the treatment of manic-Depressive disorder. In 1972, the first lithium Induced psoriasis was reported. There are several Therapies purported to explain the pathogenesis of Lithium provoked psoriasis [19].

VII. GEL:

Gel is a three-dimensional network of Polymer chains that can absorb and retain large amounts of water or biological fluids. It has a wide range of Applications in various fields, including biomedical Engineering, drug delivery, tissue engineering, and Agriculture. Gels are formed by crosslinking polymer Chains to create a network structure that can absorb Water or biological fluids, such as blood or urine. The Crosslinking can be achieved through physical, chemical, or biological methods, depending on the type of polymer and the intended application of the Gel. Gels are highly versatile materials with a Wide range of applications.

They can be used as Scaffolds for tissue engineering, as drug delivery Vehicles, and as wound dressings, among other uses. Gels can also be engineered to have specific Properties, such as mechanical strength. Some common polymers used to prepare Gels include polyethylene glycol (PEG), polyvinyl Alcohol (PVA), polyacrylamide (PAA), and hyaluronic Acid (HA), among others. The properties of the Gel, such as its swelling behavior, mechanical strength and biocompatibility, can be tuned by Modifying the polymer composition, crosslinking Density, and other parameters.

7.1. Types of Gels:
Gel can be classified on different bases as detailed below:

1. Classification based on source:

1.1. Natural Gels:

Natural Gels are biodegradable, biocompatible and good cell Adhesion Properties. There are two major types of natural Polymers which are used to Produce natural Gels are proteins such as Collagen, gelatin and, lysozyme, Polysaccharides such as Hyaluronic acid, Alginate and Chitosan.

1.2. Synthetic Gels:

They are more useful as compare to natural Gels Because they can be Engineered to have a much wider range of mechanical and chemical properties than their Natural counter parts. Polyethylene Glycol based Gels are one class of the widely Used Material in Biomedical application due to their non-toxicity their compatibility and Low Immunogenicity.

1.3. Hybrid Gels:

They are the combination of natural and synthetic Polymer Gels. To combine the advantages of both synthetic and natural Gels many naturally Occurring Biopolymers such as dextran, collagen, Chitosan, have been combined with Synthetic Polymers such as poly (N-isopropyl acrylamide) and polyvinyl alcohol.

2. Classification according to polymeric composition:

2.1. Homo-polymeric Gels:

Homo-polymeric Gels are referred to Polymer network Derived from a single Species of a monomer, which is a Basic structural unit comprising of Any polymer network. Homopolymers May have cross-linked skeletal structure depending on the nature of the Monomer and polymerization technique.

2.2. Co-polymeric Gels:

Co-polymeric Gels are comprised of two or More different Monomer species with at least one hydrophilic component, arranged in a random, block or Alternating Configuration along the chain of the polymer network.

2.3. Multi-polymer interpenetrating polymeric Gel (IPN):

An important class of Gels, having network system which is made of two Independent cross-linked synthetic or natural polymer components. In semi-IPN Gel, one Component is a cross-linked polymer and other component is a non-cross-linked polymer.

3. According to the biodegradability:

3.1. Biodegradable Gels:

Gels are biodegradable many polymers Created by nature Are biodegradable, Such as Chitosan, fibrin and agar. Poly (aldehyde guluronate), Polyanhydrides and poly (Nisopropyl acrylamide) Are examples of synthetic biodegradable Polymers

3.2. Non-biodegradable Gels:

Various vinylated monomers or macromers Such as 2-Hydroxyl ethyl methacrylate, methoxyl Poly (ethylene glycol), 2-Hydroxyl propyl Methacrylate and acryl amide are widely applied In the Preparation of non-biodegradable Gels.

4. Classification based on configuration:

The classification of Gels depends on their physical structure and chemical composition Can Be classified as follows:

4.1. Amorphous (non-crystalline)

4.2. Semi crystalline: A complex mixture of amorphous and crystalline phases.

4.3. Crystalline

5. Classification based on type of cross-linking:

Gels can be divided into two categories based on the chemical or physical nature Of the Cross-link junctions.

1.4. Chemically cross-linked networks have permanent junctions.

1.5. Physical networks have transient junctions that arise from either polymer chain Entanglements or physical interactions as hydrogen bonds, or hydrophobic interactions [16].

VIII. EXTRACTION AND PREPARATION OF ACACIA CATECHU-TURMERIC GEL

Extraction Procedure

1. Preparation: Measure 5 grams of Turmeric powder and 5 grams of Acacia catechu powder.
2. Initial Solvent Mix: Take 200 ml of n-hexane in a flask and add the Acacia catechu powder to it. In a second flask, take another 200 ml of n-hexane and add the Turmeric powder.
3. Stirring: Place the flasks on a magnetic stirrer and let them stir for 24 hours.

4. Filtration and Evaporation: After 24 hours, filter the solutions. Transfer the filtrate into a beaker and leave it to evaporate.
5. Purification with Multiple Solvents: Repeat the same procedure using different solvents for purification:
   a. Ethyl acetate
   b. Chloroform
   c. Methanol
6. Final Result: The highest amount of extraction was observed in methanol. Therefore, the methanol extract was selected for further use.

Fig.8.1

Fig.8.2

Fig.8.3

Fig.8.4

Fig.8.5

List of chemicals and reagents:

Table: 1. List of chemicals used in preparation of Gel

Sr.no	Chemicals	Quantity taken	Uses
1	Acacia catechu	10gm	The ability to inhibit TNF-a (pro-inflammatory cytokine)
2	Curcumin	10gm	Inhibit the inflammatory activity
3	Carbopol	2gm	To act as a thickening stabilizing agent
4	Distilled water	Sufficient quality	
5	Coconut oil	2ml	Moisturizing and antibacterial
6	Triethanolamine	2drop	PH balancer and neutralizer

Preparation of acacia cathechu-turmaric gel

- Weighing the 2gm of Carbopol on the weighing balance accurately.
- The take 20 ml of Distilled water in 100 ml beaker.
- Then constant stirring for 30 min, then it was done to mix the Carbopol.
- After that 0.1% n-hexane residue dissolved in 10 ml methanol.
- Keep it for 1hr 30 min.
- Then add 1 or 2 drop of triethanolamine & 1ml of coconut oil.
- Stir continuously for homo mixture and fill with suitable container.

Mechanism of Action:

1. Acacia catechu, Curcumin Gel is applied topically to the Affected area in psoriasis.
2. The Gel is absorbed into the skin and begins to Release curcumin
3. Acacia catechu, Curcumin inhibits the activity of inflammatory Cytokines, such as IL-6 and TNF-alpha
4. Curcumin also inhibits the activity of enzymes Involved in inflammation, such as COX-2 and LOX.
5. By reducing inflammation, curcumin may alleviate Symptoms of psoriasis, such as redness, scaling, and Itching.
6. Catechu may also promote wound healing by activating growth factors involved in tissue regeneration.
7. The sustained release of curcumin from the gel provides prolonged exposure to the affected Area.

Advantages of acacia catechu and curcumin Gel:

1. Anti-inflammatory and antioxidant properties:

Curcumin is a natural compound with potent anti-inflammatory and antioxidant properties, which can Make curcumin gel useful in wound healing and Tissue repair.

2. Biocompatibility:

Acacia catechu, Curcumin gel is a biocompatible material that can be used in various biomedical applications without causing adverse effects on living tissues.

3. Drug delivery:

Acacia catechu, Curcumin Gel can be used as a drug delivery system for curcumin and other drugs, Providing sustained release and controlled delivery.

4. Biodegradability:

Acacia catechu, Curcumin gel is biodegradable, meaning it can be broken down by biological processes in the body over time, reducing the Risk of long-term accumulation or toxicity.

5. Antioxidant properties:

Acacia catechu, Curcumin is also a potent Antioxidant, which may help to protect skin cells from Damage caused by free radicals.

6. Low toxicity:

Acacia catechu, Curcumin is generally considered Safe and has low toxicity, making it a potentially Attractive alternative to traditional psoriasis treatments that may have more significant side effects

7. Natural origin:

Curcumin is derived from turmeric, A commonly used spice in many cultures, and is Therefore considered a natural compound.

8. Cost-effective:

Curcumin is relatively inexpensive Compared to many traditional psoriasis treatments, which May make it a more accessible option for patients [17]

9. Equipment:

1) pH Meter:

Fig.9.1. pH meter

Objective: To describe the procedure for operation and calibration of pH meter (pH Tutor).

Scope: This SOP is applicable to the operation and calibration of pH meter (pH Tutor).

Responsibility: Officer/ Executive-Quality Control

Accountability: Manager-Quality Control

Procedure:

Operation of pH meter (pH Tutor)

1) Ensure that the instrument is on a clean and dry platform.
2) Ensure that the instrument is clean.
3) Switch on the main power supply to the instrument.
4) Press ON/OFF switch, it will display "MEAS pH and temp. mode on the scree
5) Ensure that the instrument is calibrated
6) Remove the pH electrode from the storage solution and rinse it with purified water 2-Times. Soak the excess water with tissue paper and insert the pH electrode Stir the sample solution keeping the pH electrode.
7) Allow stabilizing the pH and then record the pH. The display shows the pH of your Sample, the temperature.
8) Rinse the electrode with purified water and soak the excess water with tissue paper Between measurement
9) After completion of pH measurement rinse the electrode and temperature sensor with the purified water, soak the excess water with tissue paper and insert the pH with Temp sensor electrode in the storage solution (saturated potassium chloride solution)
10) After measurement enter details in usage log book.

Use: Identification of pH various formulation, solution.
Calibration of pH meter: Preparation of buffer solutions for standardization.
Buffer solution pH 4.01-Dissolve 1.021 g of potassium hydrogen phthalate (previously dried at 110°C for 2 Hours) in sufficient distilled water to produce 100 ml. Mir thoroughly to get uniform Concentration.
Buffer solution pH 0.7- Mix 13 ml of 2.1% w/v solution of citric acid with 87 ml of 7 15% w/v solution of Disodium hydrogen phosphate.[18]

2) Hot plate:

Fig.9.2. Hot plate

Objective:
To lay down a procedure for Operation & Calibration of hot plate.
Scope: This procedure is applicable for procedure for Operation & Calibration of hot plate.
Responsibility: QC Officer/ QC Executive.
Accountability: QC Manager.

Procedure:
Operation Procedure:
Ensure that the instrument is clean and suitable for use if not, then clean the all parts of the instrument with clean & dry cloth or by tissue paper.
Switch 'ON' the main power supply of the instrument.
Set the required temp. Speed low, medium & high with the help of knob.
Put the sample container on hot surface.
After completion of the work switch 'OFF' the main power supply.

Calibration:
Operate the instrument according to the operating instructions.
Take the 100 ml of purified water in 500ml of glass beaker, set the temperature at 50, 60, 70, 80, 90, 100°C and record the results in Calibration Record.
Limit of temperature variation is ± 2°C from the desired temperature.
Frequency of oven calibration is once in three months

3)Magnetic stirrer:

Fig.9.3. Magnetic stirrer

Purpose: To describe the procedure for the operation of magnetic stirrer.
Scope: This procedure is applicable to the magnetic stirrer in Quality Control department.

Responsibility: Executive-Quality Control
Accountability: Incharge-Quality Control

Procedure:
1.Ensure that the working bench is clean.
2. Ensure that the stirrer 'Speed control knob' is in off position.
3. Switch on the power supply.
4. Place the solution to be stirred on the magnetic stirrer.
5. Increase the stirring speed by rotating the 'Speed control knob' clockwise.
6. After the stirring is completed, decrease the stirring speed slowly by rotating the 'Speed Control knob anti clock wise and keep the knob in 'off position.
7.Then switch off the power supply.

Precautions:
1. Keep the top plate clean.
2.Avoid spillage of sample

10. Evaluation of Catechu-Turmeric Gel:
1) pH Test:
1. The pH test of the turmeric Gel showed a value of 6.21 which is near neutral, indicating suitability for its intended application.

Fig.10.1.

2) Solubility Test: The solubility test of the turmeric Gel revealed that it is soluble in water but insoluble in ethanol. This characteristic suggests its potential suitability for aqueous-based formulations, such as creams or gels intended for water-based applications.

Fig.10.2

3) TLC (Thin Layer Chromatography)
TLC analysis of Turmeric Gel
Stationary phase: Silica gel plate
Mobile phase: Ethyl acetate: methanol: water (7:2:1)
Two distinct spots were observed on the TLC plate.
Spot A appeared at a Rf value of 0.4
Spot B appeared at a Rf value of 0.8
Spot A showed a more intense & concentrated color compared to Spot B which was lighter & more diffuse.

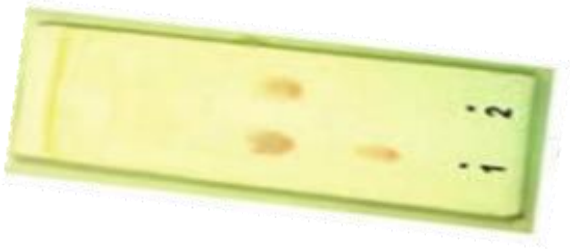


Fig.10.3.

Label:

CATECHU TURMARIC GEL-20 gm	
Ingredient:	Mfg. Lic. No: 195139
Acacia catechu powder 10g	Batch No: C
Curcumin powder 10g	Mfg. By: RCP Hatnoor, kannad
Carbopol 2g	Mfg. Date: 15/05/2026
Distilled water	Exp Date: 01/07/2027
Coconut oil 2ml	Total Net Wt.: 20g
Triethanolamine 2drop	Price: 300Rs
	Storage condition: Store in cool and dry place
	Category: Anti-inflammatory agent
RASHRIYA COLLEGE OF PHARMACY, HATNOOR	

IX. CONCLUSION:

Acacia catechu, Curcumin Gel shows promise as a potential treatment for psoriasis, but further research is needed to establish its efficacy and safety. Future studies should focus on optimizing the delivery system, determining the optimal dose and treatment duration, and evaluating the long-term safety and efficacy of Acacia catechu, Curcumin Gel. Additionally, more research is needed to understand the mechanism of action of Acacia catechu in psoriasis treatment. In conclusion, curcumin gel has emerged as a promising candidate for the treatment of psoriasis, a chronic inflammatory skin disease. The potent anti-inflammatory and antioxidant properties of curcumin make it a suitable agent for managing the symptoms of psoriasis, including scaling. Erythema, and inflammation. The use of curcumin gel can provide sustained release of curcumin at the site of application, ensuring effective treatment with minimal systemic side effects. Furthermore, the biocompatibility and biodegradability of the gel make it a safe and effective topical therapy for psoriasis. However, further research is needed to fully evaluate the efficacy and safety of Acacia catechu, curcumin gel in treating psoriasis in human subjects. Nevertheless, the available Preclinical evidence suggests that curcumin gel holds great promise as a novel therapy for psoriasis.

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