International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 32, Issue 6, June 2026 ijppr.humanjournals.com ISSN: 2349-7203

Formulation and Evaluation of Anti – Inflammatory Cream Containing Diclofenac and Turmeric Extract

Sakshi Bhanudas Jawale, Prof Chopade B.L, Dr. Megha T. Salve, Pallavi S. Kale

Shivajirao Pawar College of Pharmacy Pachegaon. Tal. Newasa Dist. Ahilyanagar, Maharashtra, India.

Received: 21 April 2026 Revised: 12 May 2026 Accepted: 22 May 2026

ABSTRACT :

Inflammation is a common condition associated with pain, redness, swelling, and Irritation of tissues. The present research work focuses on the formulation and evaluation of A herbo-synthetic anti-inflammatory cream containing diclofenac sodium and turmeric extract. Diclofenac sodium is a synthetic non-steroidal anti-inflammatory drug (NSAID) Widely used for pain and inflammation relief, while turmeric extract possesses natural anti-inflammatory and antioxidant properties due to the presence of curcumin. Research abstracts for combination creams containing Diclofenac and Turmeric (Curcuma longa/curcumin) typically evaluate their combined efficacy using standardized in vitro and in vivo models. These evaluations are designed to test the formula's ability to reduce pain, inhibit swelling, and ensure skin safety. The cream formulation was prepared using suitable excipients such as stearic acid, cetyl alcohol, glycerin, beeswax, liquid Paraffin, and preservatives to obtain a stable topical preparation. The prepared cream was evaluated for various parameters including appearance, pH, homogeneity, spreadability, viscosity, stability, and skin irritation. The prepared formulation was evaluated for various physicochemical and performance parameters such as appearance, color, odor, texture, homogeneity, pH, viscosity, spreadability, washability, stability, and skin irritation. The pH of the cream was found to be within the acceptable skin-compatible range. The cream showed good homogeneity, smooth consistency, easy spreadability , and satisfactory stability under different storage conditions without phase separation or significant change in appearance. Skin irritation studies indicated that the formulation was safe for topical application and did not produce redness or irritation under normal conditions A topical formulation combining diclofenac and turmeric (curcumin) extract is an emerging synergistic treatment for localized joint and muscle pain. This combination merges the pharmaceutical anti – Inflammatory strength of an NSAID with the natural, antioxidant properties of turmeric to enhance overall relief and reduce swelling. The anti-inflammatory effectiveness of the formulation is attributed to the synergistic action of diclofenac sodium and turmeric extract. Diclofenac provides rapid reduction of pain and inflammation, while turmeric extract contributes additional anti-Inflammatory and antioxidant benefits. The presence of natural ingredients such as beeswax, vitamin E oil, and lavender oil may also improve skin moisturization and product.

Keywords: Diclofenac sodium, Turmeric Extract, Anti – Inflammation , Cream

INTRODUCTION :

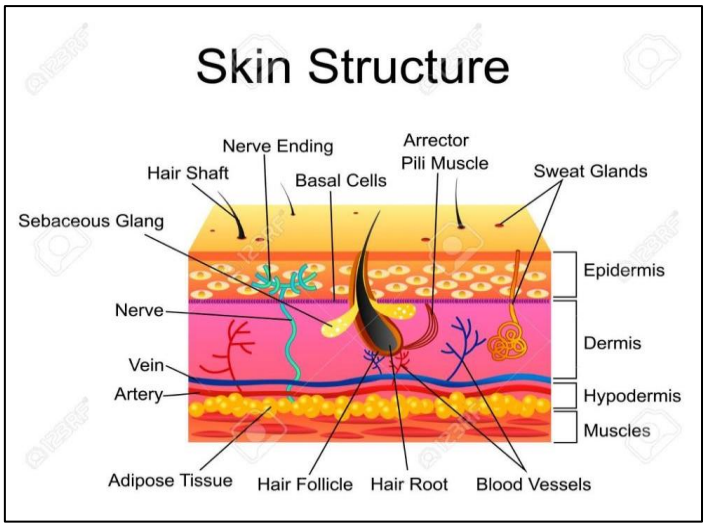
Inflammation is a complex biological response of the body tissues toward harmful stimuli such as pathogens, damaged cells, irritants, allergens, and physical injury. It acts as a protective mechanism intended to eliminate the initial cause of cell injury, remove damaged tissues, and initiate the healing process. The classical signs of inflammation include redness, swelling, heat, pain, and loss of function. Although inflammation is essential for protection and repair, prolonged or excessive inflammation may lead to various chronic diseases and tissue damage. It is getting popularized in developing and developed Countries owing to its natural origin and lesser side effects. The scientific evidence has brought about the possibility of utilization of herbal plant in the treatment of inflammatory diseases and the development of anti-inflammatory products. Inflammatory disorders are among the most common health problems affecting people worldwide.

Anti-inflammatory drugs are commonly used reduce pain, swelling, and inflammation. These drugs may be administered orally or topically. Oral administration of Anti-inflammatory drugs may produce systemic side effects such as gastric irritation, ulcer formation, nausea, and kidney-related complications during prolonged use. Topical formulations provide localized drug action directly at the site of inflammation, improve patient compliance, and reduce systemic adverse effects. Creams are semisolid dosage forms intended for external application to the skin or mucous membranes. They are cosmetically acceptable, easy to apply, non-greasy, and capable of delivering both hydrophilic and lipophilic drugs. Topical creams are widely used in dermatological and anti-inflammatory therapy because they enhance drug penetration and provide prolonged contact with the affected area.

International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 32, Issue 6, June 2026 ijppr.humanjournals.com ISSN: 2349-7203

Diclofenac Sodium is one of the most widely used non-steroidal anti-inflammatory drugs (NSAIDs) for the treatment of pain and inflammatory conditions. It exhibits potent anti-inflammatory, analgesic, and antipyretic properties. Diclofenac Sodium works by inhibiting cyclooxygenase (COX) enzymes, there reducing the synthesis of prostaglandins which are responsible for inflammation and pain. Due to its effectiveness, Diclofenac sodium is extensively incorporated into topical formulations for the treatment of arthritis, muscle pain, joint inflammation, and sports injuries. Inflammation is a broad and ancient medical term referring to a set of classic signs and symptoms, including pain, edema, hyperemia, warmth, and loss of function. It is characterized by a group of complex changing responses to tissue injury primarily caused by harmful stimuli, such as pathogens, physical agents, chemical compounds, damaged cells. Diclofenac cream is generally well-tolerated, with mild side effects primarily localized To the application site, such as redness, itching, or rash. Diclofenac is used to treat pain and other Symptoms of arthritis of the joints (e.g., Osteoarthritis), such as inflammation, swelling, stiffness, and Joint pain. This cream formulation has been shown to provide significant pain relief.

Structure Of Skin :



Skin Structure:

The skin is the largest organ of the human body, covering about 1.5–2 m² in adults and accounting for nearly 15% of total body weight.

Definition of Skin :

The skin is the largest organ of the human body that forms the outer protective covering of the body. It acts as a barrier between the internal organs and the external environment, protecting the body from injury, microorganisms, harmful substances, and water loss.

Layers of Skin :

1. Epidermis
2. Dermis
3. Hypodermis

1. Epidermis :

It serves as a protective barrier between the body and the external environment.

2. Dermis :

The dermis is the thick middle layer of the skin that supports and nourishes the epidermis and contains blood vessels, nerves, and glands.

3. Hypodermis :

The hypodermis is the innermost layer beneath the dermis that contains fat and connective tissue and helps in insulation, energy storage, and protection.

Cream:

Definition of Skin:

A cream is a semi-solid dosage form used for external application to the skin or mucous membranes. It is a type of emulsion preparation that contains one or more medicinal substances dissolved or dispersed in a suitable base consisting of oil and water phases.

Creams are widely used in pharmaceutical and cosmetic preparations because they are easy to apply, spread smoothly on the skin, and provide effective delivery of active ingredients.

Types of Cream

1. Oil – in- Water Cream
2. Water -in- Oil Cream

Functions of Cream :

1. Moisturizing and softening the skin
2. Delivering drugs through the skin
3. Protecting skin for dryness and irritation
4. Treating skin diseases and inflammation
5. Cosmetic enhancement

Advantages of Cream :

1. Easy to apply and spread
2. Better patient acceptance
3. Provide local therapeutic effect
4. Less greasy compared to ointment
5. Can carry both water soluble and oil soluble drugs

Disadvantages of Cream :

1. May require preservatives to prevent contamination
2. Less stable than ointment
3. Possibility of phase separation during storage

Uses of Pharmaceutical Cream :

1. Fungal infection

2. Skin allergies
3. Pain and inflammation
4. Acne and dermatitis
5. Dry and damaged skin

Objectives :

1. To prepared a stable cream formulation.
2. To study physical and chemical properties of the skin.
3. To evaluate the effectiveness and stability of the formulation.
4. To compare the anti – inflammatory activity.

Materials and Methods :

Materials : Active Ingredient

Diclofenac Sodium , Turmeric Extract

Chemical :

Diclofenac sodium, Turmeric Extract, Stearic Acid, Cetyl alcohol, Beeswax, Liquid paraffin, Glycerin, Triethanolamine, Methyl paraben, Propyl paraben, Purified water.

Methods of Cream :

A cream is a semisolid dosage form used for application on the skin. Creams are prepared by mixing oil phase and water phase with suitable emulsifying agents to form a stable emulsion.

General Method of Cream Preparation :

1. Preparation of oil phase :

Oil-soluble ingredients are taken in one beaker.

Ingredients may include : Stearic acid, Cetyl alcohol, Liquid paraffin, Beeswax, Emulsifying agents.

The oil phase is heated to about 70–75°C until all ingredients melt completely.

2. Preparation of Aqueous Phase :

Water-soluble ingredients are dissolved in purified water in another beaker.

Ingredients may include: Distilled water, Glycerin, Preservatives, Drug substances soluble in water.

The aqueous phase is also heated to the same temperature (70–75°C).

3. Mixing of Phases :

Stirring helps in formation of a uniform emulsion.

Mixing is continued until the cream becomes smooth and homogeneous.

4. Incorporation of Active Ingredients :

Heat-sensitive ingredients such as: Turmeric extract, Diclofenac sodium, Fragrance, Coloring agents are added after cooling to around 40°C.

5. Homogenization :

Texture and Uniformity.

6. Cooling and Packaging :

The prepared cream is allowed to cool completely.

It is transferred into clean, airtight containers or tubes and labeled properly.

Ingredients used in Preparation of Cream:

Ingredients	Category	Functions
Diclofenac sodium	Active Pharmaceutical ingredients	Reduces pain, inflammation and swelling
Turmeric Extract	Herbal Active Ingredient	Provide anti – inflammatory, antioxidant, and wound healing properties
Stearic Acid	Emulsifying agent	Helps in formation and stabilization of Cream
Cetyl alcohol	Thickening agent	Improves texture and consistency
Liquid paraffin	Emollient	Softens and moisturizers the skin
Glycerin	Humectant	Retains moisture and prevent dryness
Triethanolamine	PH adjuster/ emulsifier	Helps stabilize the emulsion
Methyl paraben	Preservatives	Prevents microbial growth
Propyl paraben	Preservatives	Enhance preservation of cream
Purified water/ Distilled water	Vehicle	Base for aqueous phase
Beeswax	Stiffening agent	Gives body and firmness to cream
Perfume or fragrance (Optional)	Perfuming agent	Improves odor of formulation

Roles of Main Ingredients :

1. Diclofenac Sodium

It is a non steroidal anti – inflammatory drugs.

It is used to relieve : Pain, Redness, Swelling and Inflammation

2. Turmeric Extract :

It contains active compound called curcumin.

It provides : Anti – Inflammatory activity, Antioxidant action, Antimicrobial effect, and Skin healing properties.

Example Formula for 100 g Cream :

Ingredients	Quantity
Diclofenac Sodium	1g
Turmeric Extract	2g
Stearic Acid	10g
Cetyl alcohol	2g
Liquid paraffin	5g
Glycerin	5g
Triethanolamine	1g
Methyl paraben	0.1g
Propyl paraben	0.02g
Distilled water	q.s to 100g

Organoleptic Evaluation Parameters

Parameters	Evaluation
Color	Yellow to light yellow due to turmeric extract
Odor	Characteristics mild odor of turmeric and base
Appearance	Smooth and elegant appearance
Texture	Soft and uniform texture
Consistency	Semisolid and easily spreadable
Homogeneity	No lumps or coarse particles present
Phase Separation	No phase Separation observed
Feel on Application	Smooth and soothing on skin
Washability	Easily washable with water

Physical Evaluation of Cream :

Physical evaluation including the determination of pH, Spread ability, Tube extrudes ability and viscosity was carried out on the cream at the time of preparation (at zero time) and thereafter every month until 3 months period.

Determination of pH :

The pH measurement was carried out by using a calibrated digital type pH meter by dipping the glass electrode and the reference electrode completely into the cream so as to cover the electrodes.

Determination of Spreadability :

Spread ability of cream was determined by the apparatus which consists of a wooden block, which was provided by a pulley at one end . By this method spread ability was measured on the basis of slip and drag characteristics of cream. An excess of cream (about 2g) under study was placed on this ground slide. The cream was then sandwiched between this slide and another glass slide having the dimension of fixed ground slide and provided with the hook. 1 kg weighted was placed on the top of the two slides for 5 minutes to expel air and to provide a uniform film of the cream between the slides.

Determination of Tube Extrude ability :

Tube extrude ability was determined by filling the cream in clean, lacquered aluminum collapsible tube and pressed firmly at the crimped end. Weight in grams required to extrude 0.5 cm ribbon of cream in 10 seconds was determined.

Determination of Viscosity :

Viscosity of cream was determined by Brookfield viscometer. The viscosity measurements were done using Brookfield DV-II + viscometer using LV-4 spindle.

Drugs and Excipient :

- **Diclofenac Sodium :**

Diclofenac falls under the NSAIDS class of drug.

Some benefits in of NSAIDS in the pharma world are as follows:

1.) They are a class of medicines available by prescription and OTC.

2.) They are some of the most commonly used medicines for pain and fever.

Chemical Information :

Property	Information
Chemical Name	Sodium [2,(2,6 dichloloroanilino) phenyl] acetate
Molecular Formula	C14H10Cl2NNaO2
Molecular weight	318.13 g/mol
Drug Category	Non – Steroidal anti – inflammatory drugs (NSAID)
Route of Administration	Oral, Topical, Injectable

Mechanism of Action :

Diclofenac sodium works by inhibiting cyclooxygenase (COX-1 and COX-2) enzymes. This reduces the synthesis of prostaglandins, which are responsible for pain, inflammation, and fever.

Uses :

Arthritis, Osteoarthritis, Rheumatoid arthritis, Muscle pain, Joint pain, Back pain, Sprains and strains, Post-operative pain.

Advantages :

1. Effective pain relief
2. Reduces inflammation quickly
3. Available in different dosage form
4. Suitable for topical and oral use

Side effect :

Skin irritation (topical use), Stomach upset, Nausea, Headache, Dizziness.

- **Turmeric Extract :**

Turmeric extract is a concentrated form obtained from the rhizomes (underground stems) of the turmeric plant. It contains active compounds called curcuminoids, mainly curcumin, which provide anti-inflammatory, antioxidant, and antimicrobial properties. Turmeric extract is an important herbal ingredient widely used in pharmaceutical and cosmetic preparations due to its anti-inflammatory, antioxidant, and healing properties. It is commonly incorporated into creams with diclofenac sodium for therapeutic effectiveness.

Synonym :

Haldi, Curcuma, Indian saffron

Biological Source :

It is Obtained from dried rhizomes of Curcuma longa.

Family : Zingiberaceae

Chemical Constituents :

1. Curcumin
2. Demethoxycurcumin
3. Bisdemethoxycurcumin
4. Volatile oils (turmerone, atlantone, zingiberene)
5. Proteins and carbohydrates

Properties :

1. Yellow to orange colored powder
2. Aromatic odor
3. Bitter taste
4. Insoluble in water
5. Soluble in alcohol and acetone

Uses :

Pharmaceutical Uses :

1. Used in creams, gels, ointments, and capsules
2. Combined with Diclofenac for enhanced anti-inflammatory action

Cosmetic Uses :

1. Skin care products

2. Anti-acne creams

3. Herbal face packs

Traditional Uses :

Used in Ayurveda for wound healing and pain relief

Advantages :

1. Natural herbal ingredients

2. Safe and economical

3. Multiple therapeutic activities

4.Good healing property

Disadvantages :

1.Poor water solubility

2.Low bioavailability

3.Strong yellow staining effect

- **Stearic Acid :**

Stearic acid is a saturated long-chain fatty acid commonly used in pharmaceutical, cosmetic, and topical cream formulations as an emulsifying agent, thickening agent, and stabilizer.

Chemical Information :

Chemical Name: Stearic Acid

IUPAC Name: Octadecanoic Acid

Molecular Formula: $C_{18}H_{36}O_2$

Chemical Class: Saturated Fatty Acid

Properties :

1.White or slightly yellow waxy solid

2.Mild odor

3.Insoluble in water

4.Soluble in alcohol and ether

5.Melting point around 69–70°C

Uses :

Pharmaceutical Uses :

1.Creams

2.Ointments

3.Lotions

4.Tablets

Cosmetic Uses :

1.Face creams

2.Moisturizers

3. Shampoos

4.Soap

Industrial Uses :

1.Candle manufacturing

2.Rubber processing

3.Lubricants

Advantages :

1.Improves cream consistency

2.Enhances stability

3.Non-toxic and safe

4.Provides smooth texture

Disadvantages :

1.Excess quantity may make cream too stiff

2.Can affect spreadability if not properly balanced

- **Cetyl Alcohol :**

Cetyl alcohol is a wax-like white solid used in creams, lotions, and cosmetic preparations. It acts as an emulsifying agent, thickening agent, and stabilizer in formulations.

Chemical Information :

Property	**Information**
Chemical Name	Cetyl Alcohol
Molecular Formula	C16H34O
Category	Fatty Alcohol
Appearance	White waxy flakes or powder
Nature	Non – ionic Substance

Advantages :

1.Produces soft and smooth cream

2.Helps maintain stability

3.Reduces phase separation

4.Improves appearance of formulation

Uses :

1.Creams

2.Lotions

3.Ointments

4.Cosmetic products

5.Pharmaceutical preparations

- **Liquid Paraffin :**

Liquid paraffin is a clear, oily liquid used in pharmaceutical and cosmetic preparations as an emollient and moisturizing agent. It helps soften and protect the skin.

Chemical Information :

Property	**Information**
Chemical Name	Liquid Paraffin
Other Name	Mineral oil
Nature	Hydrocarbon oil
Appearance	Clear, colourless oily liquid
Category	Emollient and Lubricant

Uses :

1.Moisturizing agent – prevents dryness of skin

2.Emollient – softens and smoothens the skin

3.Lubricant – used in creams and ointments for smooth application

4.Protective barrier – reduces water loss from skin

5.Vehicle/Base – used as an ingredient in topical formulations

Advantages :

1.Non-irritating to skin

2.Gives soft feel

3.Stable and inexpensive

4.Good moisturizing property

Disadvantages :

1.Excess use may feel greasy

2.Can block pores in oily skin

3.Not soluble in water

- **Triethanolamine :**

Triethanolamine (TEA) is an organic chemical compound commonly used in pharmaceutical and cosmetic formulations. It helps in forming stable creams by acting as an emulsifying agent and pH adjuster.

Chemical Nature :

1.Organic alkaline compound

2.Contains amine and alcohol groups

3.Colorless to pale yellow liquid

Uses :

1.Emulsifying agent – helps mix oil and water phases

2.pH adjuster – maintains suitable pH of creams and lotions

3.Stabilizer – improves stability of formulations

4.Surfactant – improves texture and spreadability

Advantages :

1.Produces smooth and stable cream

2.Helps maintain skin-friendly pH

3.Improves texture of formulation

4.Easily soluble in water

Disadvantages :

1.Excess amount may irritate skin

2.Sensitive skin may react to high concentrations

3.Must be used in proper quantity

- **Methyl Paraben :**

Methyl paraben is a chemical preservative commonly used in creams, lotions, ointments, cosmetics, food products, and pharmaceutical preparations to prevent the growth of bacteria and fungi.

Chemical Information :

1.Chemical name: Methyl p-hydroxybenzoate

2.Molecular formula: $C_8H_8O_3$

3.Molecular weight: 152.15 g/mol

4.Appearance: White crystalline powder

5.Odor: Odorless or slight odor

6.Solubility: Slightly soluble in water, freely soluble in alcohol

Uses :

1.Used as a preservative in creams and ointments

2.Prevents microbial contamination

3.Increases the shelf life of pharmaceutical and cosmetic products

4.Used in: Skin creams, Lotions, Shampoos, Syrups, Ointments

Advantages :

1.Effective preservative at low concentration

2.Stable over a wide pH range

3.Low cost and easy to use

Disadvantages :

1.May cause mild skin irritation in sensitive individuals

2.Excess use may produce allergic reactions in rare cases

- **Propyl Paraben :**

Propyl paraben is a preservative used in pharmaceutical and cosmetic products to prevent the growth of microorganisms such as bacteria and fungi. It helps maintain the stability and shelf life of formulations.

Chemical Information :

1.Chemical name: Propyl p-hydroxybenzoate

2.Molecular formula: $C_{10}H_{12}O_3$

3.Molecular weight: 180.20 g/mol

4.Appearance: White crystalline powder

5.Odor: Odorless

6.Solubility: Slightly soluble in water, soluble in alcohol and acetone

Uses :

1.Used as an antimicrobial preservative

2.Prevents fungal and bacterial contamination

3.Improves product stability and shelf life

4.Commonly used in: Creams, Ointments, Lotion, Cosmetics, Pharmaceutical preparations

Advantages :

1.Effective against fungi and molds

2.Works well with methyl paraben in combination

3.Stable and economical preservative

4.Effective at low concentrations

Disadvantages :

1.May cause allergic reactions in sensitive skin

2.Excessive concentration may irritate the skin

Result :

The formulated cream containing diclofenac sodium and turmeric extract showed good anti-inflammatory and analgesic activity. The cream was smooth, homogeneous, stable, and easy to apply on the skin. The combination of diclofenac sodium and turmeric extract enhanced the therapeutic effect by reducing pain, swelling, and inflammation effectively.

Conclusion :

The diclofenac sodium and turmeric extract cream formulation was found to be effective, stable, and safe for topical use. The herbal extract improved the anti-inflammatory property of the formulation and may reduce side effects associated with prolonged use of synthetic drugs.

REFERENCES :

1. Goodman & Gilman's The Pharmacological Basis of Therapeutics Brunton L.L., Hilal-Dandan R., Knollmann B.C.13th Edition, McGraw-Hill, 2018Pages: 959–970.
2. Remington: The Science and Practice of Pharmacy Adejare A. 23rd Edition, Pharmaceutical Pages: 745–760.
3. A Textbook of Pharmaceutics Bentley's Textbook of Pharmaceutics 8th Edition, Elsevier, 2017 Pages: 312–325.
4. Guyton and Hall Textbook of Medical Physiology Hall J.E. 14th Edition, Elsevier, 2021.Pages: 423–430.
5. Harper's Illustrated Biochemistry Rodwell V.W. et al. 31st Edition, McGraw-Hill, 2018. Pages: 217–223.
6. Essentials of Medical Pharmacology Tripathi K.D. 8th Edition, Jaypee Brothers Medical Publishers, 2019. Pages: 188–196.
7. Ross & Wilson Anatomy and Physiology in Health and Illness Waugh A., Grant A. 14th Edition, Elsevier, 2022. Pages: 354–362.
8. Martindale: The Complete Drug Reference Sweetman S.C. 39th Edition, Pharmaceutical Press, 2017. Pages: 75–78.
9. Textbook of Pathology by Harsh Mohan Harsh Mohan. 8th Edition, Jaypee Brothers, 2019. Pages: 110–118.
10. A Textbook of Human Anatomy by B.D. Chaurasia Volume 1, 8th Edition Pages: 72–85.
11. Gray's Anatomy 41st Edition Pages: 1160–1175.
12. Ross and Wilson Anatomy and Physiology in Health and Illness 14th Edition Pages: 358–370.
13. Remington: The Science and Practice of Pharmacy 22nd Edition Pages: 850–870.
14. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems 10th Edition Pages: 387–405.
15. Aulton's Pharmaceutics: The Design and Manufacture of Medicines 5th Edition Pages: 472–489.
16. Diclofenac in Goodman and Gilman's The Pharmacological Basis of Therapeutics 13th Edition Pages: 959–965.
17. Martindale: The Complete Drug Reference 39th Edition Pages: 85–90.
18. Turmeric in Pharmacognosy by C.K. Kokate 54th Edition Pages: 210–215.
19. Trease and Evans Pharmacognosy 16th Edition Pages: 263–267.
20. Handbook of Pharmaceutical Excipients 8th Edition Pages: 296–300 (Cetyl Alcohol), Pages: 441–445 (Glycerin), Pages: 697–700 (Methyl Paraben), Pages: 701–704 (Propyl Paraben), Pages: 728–731 (Liquid Paraffin), Pages: 742–746 (Stearic Acid).
21. Lachman Lieberman and Kanig's The Theory and Practice of Industrial Pharmacy 4th Edition Pages: 534–552.
22. Indian Pharmacopoeia 2022 Edition Volume II, Pages: 1450–1455.
23. Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems 10th Edition Pages: 401–403.
24. Lachman Lieberman and Kanig's The Theory and Practice of Industrial Pharmacy 4th Edition Pages: 538–540.
25. Remington: The Science and Practice of Pharmacy 22nd Edition Pages: 864–866.
26. Aulton's Pharmaceutics: The Design and Manufacture of Medicines 5th Edition Pages: 478–481.
27. Indian Pharmacopoeia 2022 Edition Volume II, Pages: 1450–1456.
28. Diclofenac in Goodman and Gilman's The Pharmacological Basis of Therapeutics 13th Edition Pages: 959–965.
29. Martindale: The Complete Drug Reference 39th Edition Pages: 85–90.
30. K.D. Tripathi Essentials of Medical Pharmacology 9th Edition Pages: 198–205.

International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 32, Issue 6, June 2026 **ijppr.humanjournals.com** ISSN: 2349-7203

How to cite this article:
Sakshi Bhanudas Jawale et al. Ijppr.Human, 2026; Vol. 32 (6):206-220.

Conflict of Interest Statement: All authors have nothing else to disclose.

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.