

## REVIEW ARTICLE

# A Review on the Formulation and Evaluation of Herbal Cold Creams Incorporating Natural Oils

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**Abstract:** Herbal cold creams, formulated with natural oils, have emerged as a popular choice in the cosmetic industry due to their natural composition, enhanced safety profile, and potential therapeutic benefits. These emulsions provide a cooling sensation upon application and offer advantages such as moisturizing, nourishing, and protecting the skin. The physiology of the skin, the mechanism of action of topical formulations, and the ideal properties of herbal cold creams play a crucial role in their formulation and effectiveness. Natural oils, such as neem, coconut, almond, olive, and sesame oil, enhance the therapeutic potential of cold creams by providing moisturizing, anti-inflammatory, antimicrobial, and anti-aging properties. Herbal cold creams can be formulated as oil-in-water (O/W) or water-in-oil (W/O) emulsions, each with its unique characteristics. The formulation process involves careful consideration of ingredient selection, emulsifier choice, preservation, and manufacturing methods. Evaluation parameters, including pH measurement, irritancy test, spreadability, viscosity, and dilution test, are essential to ensure the quality, stability, and efficacy of the formulated creams. The growing trend towards herbal cosmetics highlights the need for further research and development to create innovative, safe, and effective herbal cold cream formulations that cater to the diverse needs of consumers while adhering to regulatory requirements.

**Keywords:** Herbal cosmetics; Cold cream; Natural oils; Emulsion; Evaluation

## 1. Introduction

Cosmetics have been used for centuries to enhance beauty and improve skin appearance. The term "cosmetics" is derived from the Greek word "kosmestikos," which means "to adorn" [1]. In recent years, there has been a growing interest in herbal cosmetics due to their natural composition, enhanced safety, and potential therapeutic benefits. Herbal ingredients in cosmetic products offer advantages such as antioxidant, anti-inflammatory, antiseptic, and antibacterial properties, and are generally considered to have fewer adverse effects compared to synthetic alternatives [2,3].

Cold creams are a type of herbal cosmetic that provide a cooling sensation upon application due to the slow evaporation of water within the emulsion. These creams are typically formulated by blending oils with water through an emulsification process [4]. Historically, cold creams were produced using animal fats and vegetable oils [5,6]. However, with the increasing demand for natural and safe ingredients, there has been a shift towards incorporating natural oils in the formulation of cold creams.

Herbal cold creams offer various advantages, including natural composition, enhanced safety, cultural trust, formulation versatility, historical efficacy, ready availability, cost-effectiveness, gentle cleansing, function normalization, nutrient richness, energy boost, immune support, and phyto-constituent variety [7]. However, they also have some disadvantages, such as limited absorption, skin irritation risk, poor permeability, allergic reaction risk, and drug denaturation [8].

## 2. Physiology of skin

The skin is the largest organ of the body, covering approximately 16% of the total body weight. It integrates with the membranes that line body orifices and features accessory structures, including glands, hair, and nails, in specific regions [9]. The skin consists of three main layers: the epidermis, dermis, and subcutaneous tissue (Figure 1) [10].

The epidermis is the outermost layer of the skin, consisting of stratified keratinized squamous epithelium. It lacks blood vessels and nerve endings but is nourished by interstitial fluid from the underlying dermis [11]. The dermis is a resilient and flexible layer of

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skin, made up of connective tissue with a matrix of collagen and elastic fibres. It houses fibroblasts, macrophages, and mast cells and contains areolar tissue and varying amounts of adipose tissue beneath its deepest layer [11].

The subcutaneous glands, also known as sebaceous glands, are made of secretory epithelial cells that originate from the same tissue as hair follicles. They produce an oily substance called sebum and are found throughout the skin, except on the palms and soles [11]

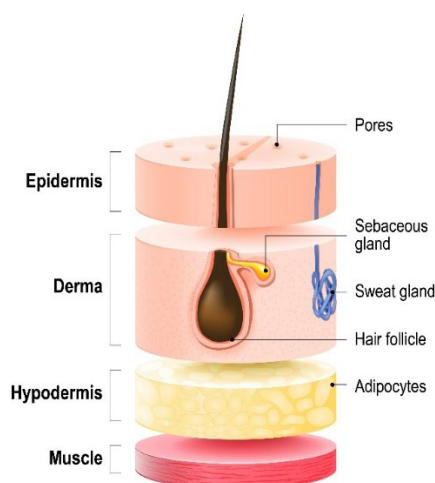


Figure 1. Anatomy of Skin

### 3. Herbal Creams

Herbal creams are mixtures of oil and water and may feature ingredients such as neem, papaya, aloe vera, Tulsi, and turmeric. These products often include various tinctures, extracts, and essential oils. They are abundant in natural vitamins and minerals and do not include synthetic additives that might be harmful [12].

#### 3.1. Types of Herbal Cold Creams

##### 3.1.1. Oil in water (O/W) Creams

Oil-in-water (O/W) creams are formulations where tiny oil droplets are dispersed within a continuous water phase. In an O/W emulsion, the oil droplets are suspended throughout the water phase, which acts as the dispersion medium [13]

##### 3.1.2. Water in oil (W/O) Creams

Water-in-oil (W/O) creams are formulations where water is blended with oil in a continuous phase. In a W/O emulsion, water is dispersed throughout the oil phase, which acts as the dispersion medium [14]

#### 3.2. Ideal Properties of Herbal Cold Creams

Herbal cold creams should possess certain ideal properties to ensure their effectiveness and acceptability. These properties include [15,16]:

1. No dilution under normal conditions
2. Optimum pH range of 4.6–6.0
3. Optimum consistency for easy application
4. Cooling effect on the skin after external application
5. Formation of a thin waxy protective layer to prevent water evaporation from the skin surface
6. Fast emollient effect to soften very dry skin within a short time
7. Less greasy than ointments and easily spreadable on the skin
8. Physical and chemical stability throughout the shelf-life
9. Compatibility of excipients
10. Sterility

### 3.3. Mechanism of action

When a topical drug is applied, it diffuses into the outer layer of the skin called the stratum corneum. There are three possible pathways for the drug to penetrate further. The first pathway involves the appendages, such as sweat glands, which provide a way for the drug to bypass the stratum corneum, often referred to as the "first cut" [17]. If the drug does not use the appendage pathway, it remains in the lipid layers of the stratum corneum and must traverse either the transcellular or paracellular routes to reach deeper skin layers like the subcutaneous tissue. The paracellular route involves moving through gaps between cells, while the transcellular route requires the drug to pass through the cells themselves [17].

In the transcellular route, the drug navigates through the lipid bilayers of the stratum corneum, encountering a water-soluble environment that aids in its diffusion into deeper skin layers. Additionally, the drug may bind to keratin in the stratum corneum during its transit [17].

### 3.4. Role of Natural Oils

Natural oils play a crucial role in enhancing the therapeutic potential of herbal cold creams. Some commonly used natural oils and their benefits include:

#### 3.4.1. *Neem Oil*

Neem oil possesses anti-inflammatory, antifungal, and antibacterial properties, making it effective in preventing skin inflammation, acne, and fungal infections [18].

#### 3.4.2. *Coconut Oil*

Coconut oil is known for its ability to moisturize the skin, minimize the appearance of fine lines, and protect the skin from environmental conditions [18].

#### 3.4.3. *Almond Oil*

Almond oil has moisturizing, anti-aging, and skin-conditioning properties. It can help treat dry skin, eczema, and psoriasis, and is high in vitamin E, which acts as an antioxidant [19].

#### 3.4.4. *Olive Oil*

Olive oil exhibits anti-inflammatory properties and can help treat sun damage and prevent acne-causing bacteria from forming [20].

#### 3.4.5. *Sesame Oil*

Sesame oil possesses antimicrobial properties and can help prevent signs of aging and hyperpigmentation due to its vitamin E content [21].

**Table 1.** Properties and benefits of natural oils used in herbal cold creams

Natural Oil	Key Properties	Potential Benefits
Neem Oil	- Anti-inflammatory - Antifungal- Antibacterial	- Prevents skin inflammation - Treats acne - Prevents fungal infections
Coconut Oil	- Moisturizing - Anti-aging - Protective	- Hydrates the skin - Reduces fine lines and wrinkles - Protects against environmental stressors
Almond Oil	- Moisturizing - Anti-aging - Skin-conditioning	- Treats dry skin - Reduces signs of aging - Soothes eczema and psoriasis
Olive Oil	- Anti-inflammatory - Antioxidant- Antibacterial	- Reduces skin inflammation - Protects against sun damage - Prevents acne-causing bacteria
Sesame Oil	- Antimicrobial - Antioxidant - Moisturizing	- Prevents microbial growth - Reduces signs of aging and hyperpigmentation - Hydrates the skin

### 3.5. Evaluation Parameters

To ensure the quality and stability of herbal cold creams, various evaluation parameters are employed. These include:

#### 3.5.1. pH Measurement:

A digital pH meter can be used to determine the pH level of the herbal cream. The cream is mixed with 100 mL of distilled water and allowed to stand for two hours. The pH is checked three times, and the average value is calculated [22].

#### 3.5.2. Irritancy Test:

An area of one square centimeter is outlined on the left dorsal side. The cream is applied to the marked area, and the starting time is noted. Any signs of irritation, redness, or swelling are monitored and documented at regular intervals over a 24-hour period [22].

#### 3.5.3. Spreadability:

A sufficient quantity of cream is applied onto two glass slides and pressed together with a weight of 100 grams for 5 minutes. The spreadability is evaluated by observing the movement of the top slide relative to the bottom slide or by noting the time required to separate them [22].

#### 3.5.4. Viscosity:

The viscosity of the herbal cream is measured using a Brookfield viscometer with spindle no. 7 operating at 100 rpm [22].

#### 3.5.5. Dilution Test:

The dilution test identifies the type of emulsion by mixing it with either water or oil. An O/W emulsion will mix completely with water but separate when mixed with oil, while a W/O emulsion will blend with oil but separate when mixed with water [23]

**Table 2.** Evaluation parameters for herbal cold creams

Parameter	Method	Significance
pH Measurement	- Digital pH meter - Cream mixed with distilled water - Average of three readings	- Ensures compatibility with skin pH - Determines the stability of the cream
Irritancy Test	- Applied to a marked area on the skin - Monitored for redness, swelling, or irritation - Observed over a 24-hour period	- Assesses the safety and tolerability of the cream - Identifies potential skin irritants
Spreadability	- Cream applied between two glass slides- Pressed with a weight for a fixed time - Spreadability observed or time to separate slides measured	- Evaluates the ease of application and distribution on the skin - Determines the consistency and texture of the cream
Viscosity	- Brookfield viscometer with spindle - Measured at a fixed speed (e.g., 100 rpm)	- Assesses the flow properties and stability of the cream - Ensures appropriate consistency for application
Dilution Test	- Cream mixed with water or oil - Observed for mixing or separation	- Identifies the type of emulsion (O/W or W/O) - Determines the stability and compatibility of the cream

## 4. Conclusion

Herbal cold creams incorporating natural oils have gained significant popularity due to their natural composition, enhanced safety, and potential therapeutic benefits. The formulation and evaluation of these creams involve careful consideration of the physiology of the skin, the mechanism of action of topical formulations, and the ideal properties of the cream. The incorporation of natural oils such as neem, coconut, almond, olive, and sesame oil enhances the therapeutic potential of herbal cold creams by providing moisturizing, anti-inflammatory, antimicrobial, and anti-aging properties. The evaluation of these creams using parameters such as pH measurement, irritancy test, spreadability, viscosity, and dilution test ensures their quality and stability. As the demand for natural and safe cosmetic products continues to grow, there is a need for further research to develop innovative and effective herbal cold cream formulations.

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