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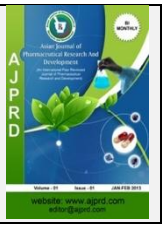

Open Access **Research Article**

Formulation, Development and Characterization of Herbal Cream

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A B S T R A C T

The greater part of the world's population relies on traditional medicine for their health care. This is also the case in the treatment of wounds. In developing countries, formulations prepared from plants have been widely used for the treatment of soft tissue wounds and burns by medical personnel trained in western medicine as well as by traditional practitioners. Skin nourishment is essential for maintaining healthy and radiant skin. With increasing awareness of the adverse effects of synthetic chemicals in cosmetic products, there has been a growing interest in natural alternatives. The objective of proposed work is to develop formulation and characterization of natural herbal cream containing aloe vera, Turmeric and masoor dal extract. The current research focuses on the formulation of a skin nourishing cream using Aloe vera, turmeric and masoor dal. Herbal cream containing *Aloe barbadensis* and *Curcuma longa* extracts and Red lentil (Massor dal) were formulated and evaluated for various parameters. From the results, obtained from the physical parameters such as spreadability, pH, viscosity and spreadability it was indicated that formulation ACHC2 was ideal and it was chosen for further characterization such as antimicrobial activity testing. The formulated polyherbal cream (ACHC2) was observed for its skin irritation study. From the result it was observed that it showed no skin irritation in animals.

Keywords: Herbal cream**,** aloe vera, Turmeric and masoor dal

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INTRODUCTION:

Creams are many dosage forms used in the pharmaceutical industry. Among them the semi-solid dosage forms are called creams. They are usually applied topically on skin. They are mixtures of oil and water. In the cosmetic industry cosmetics play an important role as they are known for their moisturizing effect. To make skin more attractive and to enhance its beauty cosmetic products are used. These cosmetic products also protect skin against exogenous and endogenous harmful agents [1]. The use of cosmetics is not only for developing an attractive external appearance, but also towards achieving longevity of good health by reducing skin disorders. Cosmetics are the substances intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, and altering the appearance without affecting the body's structure or functions [2].

Face cream has emerged in the last 50 years to improve complexion and attractiveness. Melanin is one of the reasons for dark complexion. Melanin is the primary determinant of “melanocytes” that are located in the epidermis. The increased production of melanin in human skin is called “melanogenesis”. Creams that are used for improving the complexion of skin are called face creams. These are semisolid preparations of oil and water O/W Creams which are composed of small droplets of Oil dispersed in the

continuous water phase. O/W type are more comfortable and more acceptable cosmetically they are less greasy, easily washed off using Water. W/O Creams are the formulation that is composed of droplets of Water dispersed in continuous oil phase. W/O types are more difficult to handle; they are also more moisturizing as they provide an oily barrier which reduces water loss from the stratum corneum [3].

These creams are based on one simple formula of controlling dispersion of Melanin. Melanin is the pigment that controls skin color. Creams are the topical preparations which can be applied on the skin. Creams are defined as "viscous liquid or semi-solid emulsions of either the oil-in-water or water-in-oil type" dosage forms which consistency varies by oil and water. Creams are used for cosmetic purposes such as cleansing, beautifying, improving appearances, protective or for therapeutic function [4]. These topical formulations are used for the localized effect for the delivery of the drug into the underlying layer of the skin or the mucous membrane. These products are designed to be used topically for the better site-specific delivery of the drug into the skin for skin disorders. Creams are considered as a pharmaceutical product as they are prepared based on techniques developed in the pharmaceutical industry; unmedicated and medicated creams are highly used for the treatment of various skin conditions or dermatoses. Creams can be ayurvedic, herbal or allopathic which are used by people according to their needs for their skin conditions. They contain one or more drugs substances dissolved or dispersed in a suitable base. Creams may be classified as o/w or w/o type of emulsion on the basis of phases. The term 'cream' has been traditionally applied to semisolid formulated as either water-in-oil (e.g.: cold cream) or oil-in-water (e.g.: vanishing cream) [5]. Herbal creams contain ingredients that are solely derived from herbs and shrubs.

They are widely used as they do not show any adverse effect when applied on skin. Another advantage is that they can be prepared easily as the ingredients are available naturally. There are different types of creams like cleansing, cold, foundation, vanishing, night, massage, hand and body creams [6]. Herbal creams have been widely developed since ancient ages in India because India is a country in which rich number of medicinal plants or herbs are obtained. India has very rich history of Ayurveda and traditional medicine in which many herbal creams are prepared. From pre historic times many herbal medicines were prepared to protect against inflammation or physical damage by external agents or by other infective organisms. Now many new herbal ingredients have been found hence there is huge demand for herbal cosmetics. Cosmetics are the products applied on the body.

Face cream is used as a cosmetic for softening and cleansing action. The Ayurveda system of medicine was one of the most important systems that used herbal plants and extract for the management of various cosmetics and some medicinal products. Cosmetics and some medicinal products are made up from the mucilaginous tissue in the center of aloe Vera leaf and called Aloe Vera gel. [7]. Aloe is believed to bring back youthful energy and femininity. Aloe is used as a tonic for the female reproductive system. According to Ayurveda, Aloe is said to have alliterative, tonic, rejuvenating, purgative, and vulnerary actions. Aloe extract is also topically used to treat eczema or psoriasis, in combination with liquorice root. Aloe is also used as food. People in Tamil Nadu, India often prepare a curry using A. vera which is taken along with Indian bread (nan bread) or rice [8]. Turmeric is a common spice that comes from the root of Curcuma longa. It contains a chemical called curcumin, which might reduce swelling. Turmeric has a warm, bitter taste and is frequently used to flavor or color curry powders, mustards, butters, and cheeses. Because curcumin and other chemicals in turmeric might decrease swelling, it is often used to treat conditions that involve pain and inflammation. People commonly use turmeric for osteoarthritis. It is also used for hay fever, depression, high cholesterol, a type of liver disease, and itching [9].

Turmeric is the dried rhizome powder of the Curcuma longa plant, composed of many phytochemicals. Concerning the approximate composition, turmeric is composed of water (80–90%), followed by carbohydrates (around 13%), proteins (2%), minerals (2%), and lipids (<1%). Among the minor components of turmeric, curcuminoids have a central role and may compose up to 10% of dry turmeric powder. This category mainly comprises curcumin, dimethoxy-curcumin, and bisdemethoxycurcumin, which can compose 62–90, 9–23, and 0.3–14 mg/g of commercial turmeric products (extracts and powders), respectively. Additionally, more than 50 curcuminoids (such as bisabocurcumin, curcumalongin, cyclocurcumin, and terpecurcumin) have been identified in turmeric, which produce the yellow color of turmeric [10].

Masoor dal, also known as red lentils, has many uses and health benefits: Masoor dal is a good source of calcium and phosphorus, both of which are essential for maintaining strong bones. Including it in your diet can help support bone density and reduce the risk of osteoporosis. Masoor dal can be eaten in many ways, including in curries, soups, and cutlets. It can also be used to make a face pack with milk or honey to help with acne and facial hair. Masoor dal is high in protein, fiber, and minerals, and low in fat. It has many health benefits, including: Masoor dal is a good source of vitamins A, C, and E, which can help prevent eye disorders like cataracts. Masoor dal's vitamin B can help keep skin healthy and moisturized. It also contains antioxidants that can help with anti-aging and lighten skin tone. Masoor dal can help reduce the risk of heart disease by lowering blood pressure and cholesterol levels. Masoor dal's high fiber content can help stabilize blood sugar levels.

Masoor dal's fiber can help with digestion and prevent constipation and bloating. Masoor dal contains iron and folate, which can help with fetal development [11]. Herbal formulations are known for their beneficial properties, minimal side effects, and biocompatibility. The skin, the largest organ of the human body, serves as the first line of defense against various environmental factors and provides essential protection against pathogens, UV radiation, and other harmful agents.

Proper skin nourishment is vital for maintaining its overall health and appearance, as well as ensuring optimal barrier function. Over time, exposure to these external factors can lead to premature aging, inflammation, and oxidative stress, affecting the skin's integrity and appearance. The objective of proposed work is to develop formulation and characterization of natural herbal cream containing aloe vera, Turmeric and masoor dal extract. The current research focuses on the formulation of a skin nourishing cream using Aloe vera, turmeric and masoor dal.

MATERIAL AND METHODS

Collection and extraction of plants: The plants *Aloe barbadensis*, *Curcuma longa* (Turmeric) and *Red lentil* (masoor dal) were collected from market or nursery. Botanical identification is necessary because it ensures the safety and efficacy of the natural plant. The collected material is compared with the published description of the drug and with authentic specimen and identification is verified by an acknowledged expert.

Pharmacognostic study: In view of its diverse medicinal applications and in order to ensure the quality, authenticity and assay, and in view of lack of pharmacognostic study the present investigation was undertaken with an objective to evaluate *Aloe barbadensis*, *Curcuma longa* (Turmeric) and *Red lentil* (masoor dal) on various pharmacognostic parameters, such as macroscopic, physiochemical, and phytochemical studies of the plant. Fresh galls were taken for morphological and histological studies. Coarse powder was used to study the microscopic characters and physicochemical investigations. The selected crude drugs were subjected to studies organoleptic characters viz., color, odour, appearance, taste, texture etc [12].

Physicochemical analysis: Physicochemical values such as % of ash values and extractive values were determined according to the well-established protocols. The following Physicochemical analysis was investigated for the powder drug.

Formulation of herbal cream: The oil phase ingredients i.e. cetyl alcohol, glyceryl stearate, and almond oil were combined in a beaker and gently heated until they fully melted and mixed. The aqueous phase ingredients i.e. glycerin, methylparaben, propylparaben, and xanthan gum were combined in another beaker along with an appropriate quantity of distilled water. This mixture was heated until all the ingredients dissolved. Once the oil and aqueous phases were both prepared and their temperatures were equivalent, the aqueous phase was slowly added to the oil phase under constant stirring. This mixing process continued until a uniform emulsion was formed.The previously prepared plant extracts (*Azadirachtaindica indica* and *Aloe barbadensis*) were added to the emulsion at varying concentrations, according to the specific formulation (1, 2, or 3). The mixture was stirred until the extracts were evenly distributed throughout the cream. The cream was allowed to cool down to room temperature while being stirred periodically to maintain homogeneity. Once cooled, it was packaged in airtight containers to protect it from contamination and to maintain its integrity [13].

Evaluation of herbal cream:

Physical appearance: The formulated herbal cream was inspected visually for their color, odor, homogeneity and consistency. All developed gels were tested for homogeneity by visual inspection after gels have been set in the container. They were tested for their appearance and presence of any aggregates.

Measurement of pH: The pH of various formulations was determined by using digital pH meter. One gram of herbal cream was dissolved in 100ml of distilled water and stored for two hours. The measurement of pH of each formulation was done in triplicate.

Determination of Viscosity: The measurements of viscosity of prepared herbal cream were carried out with Brookfield viscometer (Brookfield viscometer RVT) with spindle No.62.

Spreadability: Spreadability denotes the extent of area to which the herbal cream readily spreads on application to skin or the affected part. Two sets of glass slides of standard dimensions were taken. The herbal cream formulation was placed over one of the slides. The other slides were placed on the top of the gel, such that the herbal cream was sandwiched between the two slides in an area occupied by a distance of 6.0 cm along the slide.100gm weight was placed upon the upper slides so that the herbal cream between the two slides was pressed uniformly to form a thin layer. The weight was removed and the excess of herbal cream adhering to the slides was scrapped off. The two slides in position were fixed to a stand without slightest disturbance and in such a way that only the upper slide slip off freely by the force of weight tied to it. A 20gm weight was tied to the upper slide carefully. The time taken for the upper slide to travel the distance of 6.0 cm and separated away from the lower slide under the influence of the weight was noted. The experiment was repeated three times and the mean time taken for calculation [14].

Spreadability was calculated by using the following the formula:

$$S = \frac{(M \times L)}{T}$$

Where, S = Spreadability, M = Weight in the pan (tied to the upper slide) L = Length of the glass slide, T= Time (in sec) taken to separate the slides.

Bloom Strength: The bloom strength of the herbal cream was determined by means of Texture Analyzer equipped with 5 kg load cell using a cylindrical probe of 0.5 diameter as fixture. The sample in the container was placed centrally on

the platform beneath the cylindrical probe. After calibrating the height of the probe, the test was commenced. A trigger force of 10 g was used for the study.

Extrudability: The herbal cream were incubated at room temperature for 2 h before measuring their extrudability using an HDP/FE forward extrusion cell of the TA-XT2 Texture Analyzer equipped with a 5 kg load cell. Prior to measurement, the gel was manually stirred and loaded (100 g) into the cell. The compression force was measured at the following conditions: pre-test speed 1 mm/s, test speed 1 mm/s, trigger force 10 g, post-test speed 10 mm/s, compression distance 20 mm, and outlet diameter of extrusion cell 3 mm [15].

Table 1: Formulation of herbal cream

Ingredients	ACHC1	ACHC2	ACHC3
Aloe barbadensis extract	1% w/w	1.50% w/w	2% w/w
Curcuma longa (Turmeric) extract	1.50% w/w	2% w/w	1% w/w
Red lentil (Masoor dal)	1% w/w	2% w/w	3% w/w
Glyceryl stearate (emulsifier)	2% w/w	2% w/w	2% w/w
Almond oil	10% w/w	10% w/w	10% w/w
Glycerin (humectant)	5% w/w	5% w/w	5% w/w
Propylparaben (preservative)	0.05% w/w	0.05% w/w	0.05% w/w
Gum Karaya (thickener)	0.3% w/w	0.3% w/w	0.3% w/w
Distilled water	q.s. to 100% w/w	q.s. to 100% w/w	q.s. to 100% w/w

RESULTS AND DISCUSSION

Pharmacognostic Study Macroscopic Characteristics: Aloe Barbadensis Is An Evergreen Perennial Climber Belongs To The Family Menispermaceae. It Is A Plant Of Significant Medicinal Importance In The Indigenous Systems Of Medicine And Designated As Rasayana.

Curcuma Longa (Turmeric) Is A Perennial Herbaceous Plant Of The Ginger Family Zingiberaceae. It Is A Perennial, Rhizomatous, Herbaceous Plant Native To The Indian Subcontinent. Red Lentil Plants Are Short, Ranging From 20 To 65 Cm (Eight To 26 Inches) In Height; Depending On Variety And Growing Conditions. It Is About 40 Cm (16 In) Tall, And The Seeds Grow In Pods, Usually With Two Seeds In Each. All The Parts Of This Plant Are Reported For Various Ethnobotanical And Therapeutic Uses.

Physiochemical Constants: The Ash Values Of A Drug Give An Idea Of The Earthy Matter Or The Inorganic Composition And Other Impurities Present Along With The Drug Give An Idea Of The Earthy Matter Or The Inorganic Composition And Other Impurities Present Along With The Drug. The Loss On Drying And Foreign Matter Was 9.50 And 0.10 Respectively. The Extractive Values Are Primarily Useful For The Determination Of Exhausted Drugs (Table 2).

Table 2: Physiochemical parameters of *Aloe barbadensis and Curcuma longa*

Parameters	*Aloe barbadensis*	*Curcuma longa (Turmeric)*
Foreign matter (% w/w)	0.9	0.1
Loss on drying (% w/w)	8.7	9.5
Total ash value (% w/w)	4.53	5.02
Acid insoluble ash (% w/w)	2.31	1.51
Water soluble ash (% w/w)	2.49	3.22
Sulphated ash (% w/w)	0.35	0.21

Extraction of plant material: The yield of methanolic extract of Aloe barbadensis dark green with 20.23 % yield and Curcuma longa was yellowish with 19.68 %.

Preliminary phytochemical analysis: Investigations on the preliminary phytochemical screening of *Aloe barbadensis and Curcuma longa* extracts revealed the presence of phenols, flavonoids, tannins, saponins, alkaloids and carbohydrates in methanolic and aqueous extracts respectively.

Evaluation of Polyherbal Cream

Physical appearance: The formulated herbal cream was checked visually for color, appearance and homogeneity.

Measurement of pH: The pH of all prepared formulation ranged from 6.4-6.8. The pH of the prepared herbal cream formulation was considered to be acceptable to avoid the risk of irritation upon application to the skin.

Determination of Viscosity: Viscosity is an important property of fluids which describes a liquids resistance to flow and is related to the internal friction within the fluid. This rheological property helps in determining consistency and also the diffusion rate of drug from herbal cream. The measurement of viscosity of the prepared gel was done with Brookfield viscometer with spindle no: 60. By keeping the viscosity below about 15,000 cps, the advantages of more appealing cosmetic characteristics and ease of accurate application through improved flow and pourability are achieved.

Spreadability: Spreadability denotes the extent of area to which the cream readily spreads on application to skin or the affected part. The spreading was expressed in terms of time in seconds taken by two slides to slip off from the herbal cream, placed in between the slides, under certain load. Lesser the time taken for separation of the two slides, better the spreadability. Two sets of glass slides of standard dimensions were taken. The herbal cream formulation was placed over one of the slides. Spreadability of different cream

formulation were studied. The formulation ACHC2 produced good spreadability than the other formulation.

Selection of Optimized Formulation: In order to have a good permeation across the skin, cream should have ideal property and stable over the long period of time. From the results, obtained from the physical parameters such as spreadability, pH, viscosity and spreadability it was indicated that formulation ACHC2 was ideal and it was chosen for further characterization such as antimicrobial activity testing. Herbal cream containing *Aloe barbadensis* and *Curcuma longa* extracts were formulated and evaluated for various parameters. From the results, obtained from the physical parameters such as spreadability, pH, viscosity and spreadability it was indicated that formulation ACHC2 was ideal and it was chosen for further characterization such as antimicrobial activity testing. The formulated polyherbal cream (ACHC2) was observed for its antimicrobial property towards the organism such as Staphylococcus aureus, Escherchia coli, Candida albicans and it was also compared with standard such as Gentamicin (10µg) and Fluconazole (25 µg). From the result it was observed that it showed good zone of inhibition but lesser when compared to standard.

Table 3: Physical appearance of formulated cream

Parameters	ACHC1	ACHC2	ACHC3
Physical appearance	Transparent	Transparent	Transparent
Color	Yellow green	Pale Yellow green	Pale Yellow green
Homogeneity	Absence of aggregates	Slight aggregates	Slight aggregates
pH	6.8	7	6.4
Viscosity	1428±0.1	1425±0.75	1358±0.25
Spreadability (gm.cm/sec)	19.37	21.35	22.13

SUMMARY AND CONCLUSION:

Cream is defined as semisolid emulsions which are oil in water (o/w) or water in oil (w/o) type and these semisolid emulsions are intended for external application. Herbal cream containing *Aloe barbadensis* and *Curcuma longa* extracts and Red lentil (Massor dal) were formulated and evaluated for various parameters. From the results, obtained from the physical parameters such as spreadability, pH, viscosity and spreadability it was indicated that formulation ACHC2 was ideal and it was chosen for further characterization such as antimicrobial activity testing. The formulated polyherbal cream (ACHC2) was observed for its skin irritation study. From the result it was observed that it showed no skin irritation in animals. In light of these results, our study indicates that the topical cream formulation containing the phytochemical richness of *Aloe barbadensis Curcuma longa* and Red lentil (Massor dal) extracts could be a potential tool for skin health improvement. However, further in-vivo studies and human clinical trials are required to corroborate these promising findings and assess the long-term safety and efficacy of our formulations.

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