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Formulation and development of herbal wounding gel containing honey, Curcuma Longa linn and Aloe vera leaves extract

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ABSTRACT :

The current study set out to create and assess a herbal gel with antibacterial and wound-healing properties that included curcumin, honey, and aloe vera. The preparation's curcumin and honey have strong anti-inflammatory, antioxidant, and restorative properties. Due to their safe drug delivery and lower side effects as compared to synthetic drugs, herbal markets are growing worldwide. Herbal medicines have long served as the foundation for the treatment and curing of a wide range of illnesses in India. Several medical conditions are treated with herbal medications. Because of its high sugar content, honey is hygroscopic, which inhibits the growth of microbes. The antibacterial properties of honey are complex. Both human and animal wound healing was accelerated by honey. Honey was utilized by the ancient Egyptians to heal wounds. The green perennial herb aloe vera belongs to the Liliaceae family. It is applied to wounds, burns, ulcers, tumors, herpes, AIDS, and psoriasis. Skin sores can also be treated with aloe vera. Furthermore, gel is rich in organic acids, vitamins, and minerals. A mature medicinal plant that can be used to heal skin lesions is aloe vera. Polysaccharides such as acetylated polymannan and glucomannan are critical for the healing of wounds. Additionally significant are aloin, rhein, emodin, and aloesin. These mixtures contain anti-inflammatory, immunomodulatory, antioxidant, and antibacterial properties. These attributes aid in the healing process. Initial physicochemical characteristics, such as surface pH, spreadability, and viscosity, were measured for each formulation. typical storage circumstances, the preparations were stable and did not cause any skin irritation.

Key words : Aloe vera, wound healing .

INTRODUCTION :

Because herbal medicines have fewer side effects and safe drug delivery than synthetic treatments, the herbal business is growing rapidly. Herbal-based remedies have long been used in India to treat and cure a wide range of illnesses. Herbal medications are used in a variety of dose forms to treat various medical conditions. Herbs have long been used to cure a wide range of illnesses. Despite their extremely short half-life, they are not found to be effective or acceptable for usage if they are not prepared correctly and with the necessary safeguards. Compared to creams and ointments, topical gel formulations at pathological locations offer a significant advantage in that they release the medicine more quickly and directly to the site of action, regardless of the drug's water solubility.

The loss or disruption of the cellular and anatomic continuity of live tissue is referred to as a wound. The process that is essentially a connective tissue response is wound healing. This process begins with an acute inflammatory phase, which is followed by the creation of extracellular macromolecules and collagen, which are subsequently remodelled to form scars. Inflammation, proliferation, and remodeling are the three overlapping phases that make up these processes. Numerous natural substances can help promote the healing of wounds. The curcumin and honey herbal moiety was chosen for this study.

Honey and curcumin were combined to improve the healing process of wounds. Both have been shown to have antibacterial and anti-inflammatory properties, which support the healing process of wounds.

WOUNDS :

A wound is a sudden injury including a contusion from compression or blunt force trauma, or lacerated or perforated skin (an open wound). A wound in pathology is an acute injury that affects the skin's epidermis. The body goes through a sequence of events known as the wound healing process in order to repair a wound.

TYPES OF WOUND:

An acute wound is a type of skin injury that happens all at once as opposed to gradually. It heals in accordance with the typical wound healing process at a known and expected rate.

ACUTE WOUND:

Anywhere on the body might sustain an acute wound, which can range from a minor scratch to a severe wound that harms muscles, blood vessels, nerves, or other body parts.

Reasons for Severe Injury An acute wound can result from a variety of actions, such as:

Sharp points like nails pushing or jabbing into human tissue.

rough surfaces scraping and rubbing against the skin.

and sharp edges or blades, like knives, cleanly cutting the skin.

Any object that delivers a hard impact that rips the tissue brutally with sheer force.

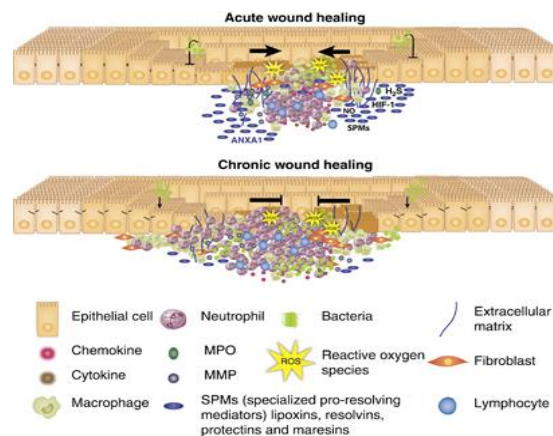
CHRONIC WOUND :

When any acute wound does not heal within the anticipated time frame (as little as two weeks or as long as six weeks in certain situations), a chronic wound develops.

Chronic Wound Causes –

Any wound that fails to heal may be the result of a deficiency in one or more of the essential elements needed for healing, such as an environment free from infections and with enough blood, oxygen, and nutrition. Removing the cause of the wound is crucial when it comes to wound care, especially in circumstances when the wound is from weight-bearing or continual pressure.

The tissue may gradually break down in wounds that are not relieved by continuous pressure.

**HONEY :**

Family -Apidae

Biological source-It is obtain from nectar of flowers by honeybees (*Apis mellifera*).



In wound care, honey is becoming more and more popular, particularly for burn wounds. Since ancient times, honey has been used for both nutrition and therapeutic purposes. Ancient Egyptians used honey to cure wounds between 2600 and 2200 BCE. Research has focused on the antibacterial properties of honey, even if the precise mechanism underlying its benefits for wound healing is unknown. Because of its high sugar content, honey has a hygroscopic quality that inhibits the growth of microbes. Research shows that honey's antibacterial properties go beyond its simple higher sugar content. Honey not only has antimicrobial properties, but it also spontaneously converts glucose to hydrogen peroxide. Moreover, honey's antibacterial properties appear to differ depending on the type of flower. The antimicrobial qualities of manuka and viper's bugloss honey did not require hydrogen peroxide.

It is believed that honey possesses antibacterial properties because of an unidentified ingredient. Additionally, MRSA, *P. aeruginosa* species, and vancomycin-resistant enterococci are inhibited by manuka honey. Ulmo honey performed better than manuka honey against MRSA in a research. Lastly, honey exhibited antifungal properties. Histological research has shown that honey accelerated the healing of wounds in mice. In rabbits, honey enhanced wound contraction, decreased inflammation, necrosis, and edema histologically. Additionally, honey accelerated the healing of mice's cutaneous lesions. According to research on humans, applying honey to wounds improved the development of granulation tissue, accelerated epithelization, and reduced inflammation.

TURMERIC :

Family: Zingiberaceae

Biological source: obtained from rhizomes of plant *curcuma longa*.



This plant's common name is *Curcuma odora*. Curcuminous plants are referred to as yellow zedoary (Salisb) or wild turmeric (vanaharidra) (*Curcuma longa* Linn.). The plant is native to India, where it is frequently grown in West Bengal and Kerala. It has the potential to be a therapeutic medication in addition to being an aromatic medicinal cosmetic. A potent anti-cancer herb, *Curcuma aromatic* (CA) is used in traditional Chinese medicine. In traditional medicine, it is used to treat skin disorders, sprains, bruises, snake venom, and to improve the skin's look. The volatile oil's chemical and fragrance characteristics differ from those of *curcuma long*, which is a (4–8%) volatile oil. Contrary to *C. longa*, CA's volatile oil contains camphene, camphor, and high-boiling alcohol.

CHEMICAL COMPOSITION :

d-camphor, germacrene, and turmerone and curcumin. The compounds that are present are D, p-methoxycinnamic acid, curzerene, a, and β pinenes, germacrene, borneol, a, and B Terpeniol, γ -Terpenolene, Myrcene, and B-Thujonene, limonine, β -thujone, a, and β Copoanes, as well as B-Bisabolene. Alpha and beta-pinene, isofurano-geracrene, 1,8-cineol, borneol, and its isoforms were among the eighteen distinct compounds found in the oil. Research on California's anti-inflammatory qualities was also done. The powdered rhizome of CA has been shown to have wound-healing abilities in rabbits. Excision wound models were employed in studies to assess the topical administration of CA rhizome extracts and its cream formulations' wound healing potential.

These studies also demonstrated a significant amount of wound healing activity.

ALOE VERA :

Family: Liliaceae

Biological source: The biological source of aloe is dried latex of leaves of it.



Aloe vera is the most effective perennial green herb in the Liliaceae family for aiding in wound healing. Clusters of thick, juicy leaves are seen at the apex of the stem. The plant is covered in lanceolate leaves with little teeth. The blossoms are either red, yellow, or mottled with red. It is being grown all over the world and is a very adaptable crop. These include lipid-lowering, antioxidation, anti-bacteria, and cancer prevention, counteracts hypertension, antioxidant, antimicrobial, anti-inflammatory, Protective agent, antiviral. These are but a handful of instances. Additionally, it is widely used to treat AIDS, herpes, diabetes, psoriasis, metabolic syndrome, burns, ulcers, tumors, constipation, and dental issues.

Because of its cosmetic qualities, it is used in skincare and cosmetic items, as well as in the culinary industry to create healthy drinks. Numerous pharmacological activities have been demonstrated to be attributed to the synergistic effects of over 200 physiologically active chemicals, including lipids, amino acids, carbohydrates, anthraquinones, chromones, and flavones, as well as alkaloids. The Aloe leaf is divided into three portions. The outermost layer of a green leaf, called the epidermis, is where photosynthesis takes place. The structure of the layer is made up of xylem and phloem. Water is transported by the xylem, whereas other small organic molecules including cellulose and carbohydrates are transported by the phloem. The reddish-yellow latex in the center of the formation is secreted by pericyclic cells of the leaf epidermis. Latex can be applied to the skin to act as a laxative. In the center of the aloe leaf, smooth, transparent gel is formed by tubular cells in the parenchyma. Gel has the potential to cure skin wounds. Polysaccharides are the main active ingredient in this product, with a water concentration of 98%. Minerals, vitamins, and organic acids are also abundant in gel.

ALOE VERA AND SKIN WOUND HEALING :

A mature medicinal plant used to cure skin lesions is ace vera. Polysaccharides such as acetylated polymannan and glucomannan are critical for the healing of wounds. Aloesin, emodin, rhein, and aloin are also significant. These mixtures contain anti-inflammatory, immunomodulatory, antioxidant, and antibacterial properties. These attributes aid in the healing process.

NEED AND OBJECTIVE :

NEED:

The preparation's curcumin and honey have significant anti-inflammatory, antioxidant, and restorative properties.

Aloe vera and honey aided in the quick healing process. In chronic wounds, turmeric-infused honey gel promotes healing and is both affordable and safe.

OBJECTIVES:

Creating and assessing a herbal gel to promote wound healing

METHODS :

We gathered the rhizomes of *Curcuma longa* and the leaves of *Aloe vera* plants.

PLANT EXTRACT PREPARATION:

1. A few aloe vera leaves were removed and given a thorough washing in water from an Aloe barbadensis Miller plant.
2. The top rind was removed, and the yellow layer that was immediately below the green rind was gently peeled off with a sharp knife while avoiding the vascular bundles.
3. The bottom rind was also cut off in order to get rid of the large amount of mucilage that adheres to this.
4. With a spoon, the transparent mucilaginous gel was removed.
5. A Whatman filter paper was used to filter the 50 ml of crude, clear Aloe vera extract after it had been evenly blended with a magnetic stirrer.

6. After that, it was put in a clean, sterile glass jar and kept in the refrigerator.



Chemicals :

Carbapol 934, glycerin, triethanolamine, honey, curcumin, methyl and propyl parabens.

Equipment :

Brookfield viscometer, magnetic stirrer, ph meter, digital balance, and ultra sonicator.

Digital Balance :

For at-the-line inspection stations or laboratories using plastic containers, the Digital Balance is an essential addition. This adaptable device has a digital display for accurate weight readings and straightforward use.

Brook-Field Viscometer :

Using the well-known principle of rotational viscometry, Brookfield viscometers detect the torque needed to spin a spindle at a steady pace while submerged in the fluid sample. This allows them to measure viscosity. The viscosity of the fluid and the viscous drag on the submerged spindle are directly connected to the torque.

pH Meter :

A pH meter is a device that determines a solution's acidity or alkalinity, or pH. The measurement used to express the degree of acidity or alkalinity is called pH. It is quantified using a range of 0 to 14.

A substance is acidic (pH less than 7) if the H⁺ concentration is higher than the OH⁻ concentration. A substance is basic and has a pH value higher than 7 if the OH⁻ concentration is higher than the H⁺ concentration. The substance has a pH of 7, making it neutral if there are equal concentrations of H⁺ and OH⁻ ions present. Free hydrogen and hydroxyl ions are present in bases and acids, respectively. For a given solution, the relationship between the hydroxyl and hydrogen ions is constant.

In a given solution, the relationship between the hydroxyl and hydrogen ions is constant under specific conditions; one may be found out by understanding the other.

Magnetic Stirrer :

A magnetic stirrer is a common laboratory instrument that generates a rotating magnetic field by use of a stationary electromagnet or a spinning magnet.

This tool is used to mix or stir a solution, fast spin, submerge in a liquid, and create stir bars.

A magnetic stirrer is a tool used to quickly rotate and stir a solution. It makes use of a standard bar magnet with a plastic coating. Its primary functions involve mixing or stirring fluid samples.

FORMULATION OF HERBAL WOUND GEL:**FORMULATION TABLE:**

Sr.no.	Ingredients	Quantity	Uses
1.	Carbopol 934P	2.5	As a gelling agent
2.	Honey (%)	50	As antioxidant
3.	Curcumin(%)	0.5	As anti-inflammatory
4.	Aloe vera		As analgesic
5.	Glycerin	5ml	As moisturising agent
6.	Triethanolamine	q.s.	As emulsifier
7.	Methyl paraben(g)	0.2	As anti-fungal agent
8.	Propyl paraben(g)	0.1	As fungistatic agent
9.	Distilled water	q.s.	vehicle

PREPARATION OF HERBAL WOUND GEL :

The Carbopol 934 was soaked in water for twenty-four hours to prepare the topical gel.



A small amount of glycerin was first heated gently to disperse the drug.



Next, the preservatives were dissolved in the glycerin and added to the Carbopol solution.



Stirring the mixture, the remaining components were added, and triethanolamine was added to neutralize the Carbopol gel base 3, 4.



After making the herbal wound gel, it was placed in a tightly sealed container.



EVALUATION PARAMETERS:

Physical Evaluation:

Visual inspection was used to verify physical factors such color, odor, and consistency.

- i. Color: A visual inspection was used to verify the color of the herbal gel composition. The formulation had a yellowish-green color.
- ii. Odor: By combining the gel with water and smelling it, the formulation's odor was evaluated. It smells distinctively.
- iii. Consistency: By putting the formulation to skin, the consistency was examined.

PARAMETERS	OBSERVATION
Colour	Yellowish orange
Odour	Characteristics
Consistency	good

Percentage yield :

Weigh the empty container which contained the gel formulation before weighing the gel formulation-filled container once more. Subtract the weight of the empty container from the weight of the container containing the gel formula to get the practical yield.

$$\begin{aligned}
 \text{Percentage yield} &= (\text{Practical yield} / \text{Theoretical yield}) \times 100 \\
 &= (40.8-12)/30 \times 100 \\
 &= 96\%
 \end{aligned}$$

The percentage yield of gel was found to be 96%

Measurement of pH :

The gel formulation's pH was measured using a digital pH meter. Dissolve 1 milliliter of gel in 10 milliliters of distilled water, and set aside to stand for 2 hours. After that, the glass electrode was fully submerged three times in the gel system to measure the formulation's pH, and the average readings were reported.

Sr.no.	Readings
1.	6.1
2.	6
3.	5.9
Average	6

The pH of formulated gel was found to be 6.

Homogeneity:

The prepared gel formulations were tested for homogeneity by visual inspection after the gels have been set in to the container. They were tested for their presence & appearance of any aggregates. The formulated herbal gel has smooth homogeneity.

Viscosity:

The viscosity of the prepared gel was measured at 25 C using a Brookfield viscometer with spindle number 63. The gels were rotated at speed 20 rotations per minute & the corresponding dial reading was noted. Then viscosity of the prepared gels were obtained by multiplication of the dial reading with factor given in the Brookfield Viscometer catalogues.

MEASURES	READINGS
Rpm	20
Torque	8
Spindle	63
Centipoise	4780

Spreadability :

Spreadability is measured in terms of the number of seconds it takes for two slides to separate from gel positioned in between them when a specific stress is applied.

If the time taken for separation of two slides is less then better the spreadability.

Spreadability is calculated by using the formula:

$$S = M * L / T$$

Where, M-weight tied to upper slide

L-length of glass slides

T-time taken to separate the slides

$$S=M \cdot L/T$$

$$S = 21 \cdot 7.5/16$$

$$S=9.98 \text{ gm.cm/sec}$$

The spreadability of formulated gel was found to be 9.98 gm.cm/sec.

Extrudability:

The formulated gel were filled in standard capped collapsible aluminium tubes and sealed by crimping to the end. The weight of filled tubes were recorded and the tubes were sandwiched between two glass slides and were clamped. After covering the slides with a 500 gram weight, the cap was taken off to allow for extrusion.

The amount of extruded gel was collected and weighed. The proportion of extruded gel was used to calculate extrudability.

- When it is greater than 90% then extrudability is excellent.
- When it is greater than 80% then extrudability is good.
- When it is 70% then extrudability is fair.

Extrudability of formulated gel was found to be good.

Clarity :

The clarity of the formulation was determined by visual inspection" The clarity of the gel found to be good.

Conclusion:

The investigation proved that the gel formulations comprising the herbal isolates had the intended physical qualities as well as strong antibacterial activity. This may make them safe to use and potentially useful topical antibacterial medicines that can treat skin infections and promote wound healing.

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