

FORMULATION, OPTIMIZATION AND EVALUATION OF HERBAL ALOEVERA GEL FOR WOUND HEALING

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Gels are semisolid systems in which a liquid phase is constrained within a three dimensional polymeric matrix in which a high degree of physical cross linking has been introduced.

The polymer used to prepare pharmaceutical gels include the natural gums, Tragacanth, pectin, carrageen, agar and alginic acid, synthetic and semisynthetic materials such as methyl Cellulose, Hydroxy ethylcellulose, carboxymethyl cellulose and the carbopols, which are synthetic vinyl polymers with ionizable carboxyl groups. The bulk of these semisolid preparation are applied to the skin, where they usually serve as vehicles for topically applied drugs, as emollients or as protective or occlusive dressings.

Alovera belonging to the lily (Liliaceae) family is a perennial succulent plant.

This plant has been known as "the healing plant" Aloe vera has been used for traditional medical purposes. Many studies have shown that treatment with whole Aloe Vera gel, extracts resulted in faster healing of wounds; Aloevera gel has a beneficial influence on the wound healing. Skin serves as a barrier to water and various pathogens. Wounds and injuries destroy this barrier that normally prevents invasion of bacteria, fungi and viruses. Wound Healing is a complex and dynamic process of restoring cellular structures and tissue layers. In addition to alovera another herbal remedies were used to prepare wound healing gels are as below.

1. Synonym – Garlic, Allium Garlic is a powerful antiseptic and antibiotic,

Biological source - It consist of bulbs of plant known as Allium sativum belongs to family liliaceae. It contains chief active constituents alliin and allicin, has been used to disinfect wounds since from ancient rome.^[3]

2. Synonym-Marigold- petals of marigold have antioxidant & anti-inflammatory properties and used to promote skin regrowth. Marigold accelerates wound healing by encouraging skin regret in people with lower leg venous ulcers. It is used externally to heal stubborn wounds, bed sores, Persistent ulcers and skin rashes. It is used for cleansing softening and soothing the skin.^{[4] & [5]}

3. Synonym-Clove oil- Clove is beckoned as Devapuspa meaning 'Heavenly flower' for its exotic aroma and pts stupendous healing benefits. It can heal wounds, cuts and injuries. Eugenol is the active constituents of clove. The clove oil buds is known for its antimicrobial, antiseptic, antiviral properties.

It is applied topically to assist in addressing fungal infection wounds and cuts.

4. Sodium alginate is used as a gelling agents. Sodium alginate consists chiefly of the sodium salt of alginic acid. Sodium alginate occurs as an odorless and tasteless, white to pale yellow with brown colored powder. It is extracted from the cell walls of brown algae with chelating activity.
5. Triethanolamine -It is a clear, colorless to pale yellow colored viscous liquid having a slight ammoniacal odor. It is used as alkalizing agent & emulsifying agent. Triethanolamine is a strong base.
6. Sodium metabisulfite- occurs as colorless prismatic, crystals or as white to creamy white crystalline powder that has the odor of sulfur dioxide and an acidic, saline taste. It is used as antioxidant, disinfectant and preservative agent.
7. Methyl paraben is colorless crystals or white powder. It is soluble in water, ethanol slightly soluble in benzene and acetone. It is used as preservative in pharmaceutical formulation to inhibit the growth of microorganisms.^[6]

Objective of present research is to, prepare a gel of Aloe Vera extract for wound healing and to check antimicrobial activity of gel against two gram + ve bacteria, two gram – ve bacteria and one fungal strain and also to check consistency of Aloe Vera gel by different evaluation test.

MATERIALS AND METHOD

1. Micro – organism: Two gram + ve bacterial strain- Bacillus Subtilis & streptococcus aureus. Two gram – ve

bacterial strain i.e. *Pseudomonas aeruginosa* & *E. coli*. & one fungal strain is *Aspergillus niger*.

Separate culture broth of each microbial strain such as *Bacillus subtilis*, *E.coli*, *Pseudomonas aeruginosa*, *Streptococcus aureus* and *Aspergillus Niger* were prepared.

2. Chemicals: All the chemicals used in this present research project study were analytical grade.

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5. Nutrient agar & Nutrient broth-to make culture of proposed bacterial strain.

6. Laminar Air flow for aseptic condition and transfer of culture, whereas incubator for study of zone of inhibition with microbial growth.

EXTRACTION OF ALOVE VERA GEL

- Thick succulent leaves of Aloe vera plant obtained from neighbours garden, Osmanabad. Was used to obtain Aloe vera extract.
- The mucilaginous jelly obtained from the centre (the parenchyma) of the plant leaf of Aloe vera.
- The leaves of Aloe vera were collected washed with water and a mild chlorine solution and were with a vegetable peeler.
- The thick epidermis was selectively removed and the inner gel like pulp in the center of the leaf was separated with a spoon, minced, and homogenized in a mixer.

Selection and optimization of gelling agent

- One of the main ingredients of the formulation is the gelling agent.
- In order to optimize the concentration of gelling agent to achieve proper consistency of the gel formulation were prepared with different gel former i.e Acacia, Tragacanth and sodium alginate.
- Gel that showed good spreadability and consistency with sodium alginate hence sodium alginate was selected as a gelling agent.

- To prepare Aloe vera gel sodium metabisulfite, methyl paraben, propyl paraben were dissolved in water.
- Gelling agent was added to it and stirred continuously till it got swollen completely.
- Triethanolamine, clove oil, Garlic mixture, marigold mixture was slowly added to the dispersion with continuous stirring which resulted in a stiff gel.
- Aloe extract was added to it and stirred for 15 to 20 ml; volume was made with water and stirred continuously till a uniform gel was formed.

Evaluation test of Gel-Following test were analyze for to evaluate the gel.

Color, Odor, pH, Skin irritation test, Spread ability, Smoothness & Homogeneity.

RESULT AND DISCUSSION

Wound is nothing but bacterial & fungal infection, so the present gel was analyzed against bacterial as well as fungal strain. For this purpose antimicrobial activity of the formulation was checked by using bacterial and fungal strain. For to cheak the inhibition power of alovera jel, the gel were apply against two gram positive bacteria are *Bacillus subtilis*, *Streptococcus aureus* and two gram negative bacteria are *E.coli*, *Pseudomonas aeruginosa* and one fungal strain i.e *Aspergillus niger*.

By using prescribe period of incubation, the zone of inhibition was calculated, which shows the potency of alovera gel against infection. It shows zone of inhibition against negative bacterial strain i.e. *E.coli* (gram -ve) 1 cm and *Pseudomonas aeruginosa* (gram-ve) 1.1 cm. Whereas positive bacterial strain i.e. *Bacillus subtilis* (gram+ve) 0.9cm and *Streptococcus Aureus* (gram+ve) 0.8 cm. As compare to two bacterial strain i.e. gram positive and gram negative, the fungal strain *Aspergillus niger* (fungi) showing highest zone of inhibition 1.3 cm.

By comparing the zone of inhibition, we concluded that the present formulation shows good anti-microbial activity against *Aspergillus niger* and gram-ve bacteria than the gram +ve bacteria.

As we check antimicrobial activity of formulation it shows good antimicrobial activity against different microbial strain.

The Aloe vera gel evaluated for paramenters such as physical appearance, pH, skin irritation test, spread ability, smoothness, Homogeneity.

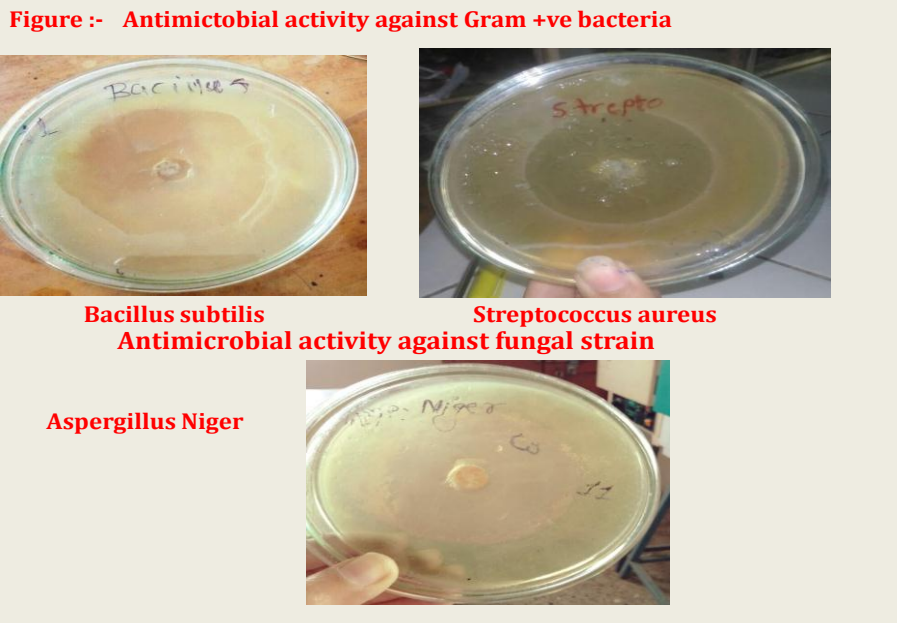


Fig. No.1-Antimicrobial activity against gram +ve & fungal strain.



Fig. No. 2- Antimicrobial activity against gram -Ve bacterial strain.

Table No 01: Showing Physiochemical parameters of Aloe Vera gel.

Sr. No	Physiochemical parameters	Observation
1	Color	Yellowish brown
2	odor	Characterstic
3	P ^h	7
4	Skin irritation	No irritation
5	spread ability	Easy to spread
6	Smoothness	Smooth in nature
7	Homogeneity	Homogenous

Table No 02: Showing Zone of inhibition of microbial strain, showing antibacterial activity of Aloe Vera gel.

Sr.No.	Microbial Strain	Zone of Inhibition
1	Bacillus Subtillis	0.9cm
2	Streptococcus aureus	0.8cm
3	E.Coli	1cm
4	Pseudomonas aeruginosa	1.1cm
5	Aspergillus niger	1.3cm

CONCLUSION

- From the above work we conclude that.

- Aloe Vera gel showing the good spreadability and consistency by assaying different evaluation test. By observing zone of inhibition by different microbial strain it is conclude that the present formulation is good to apply for wound healing.

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