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Research Article

# FORMULATION AND EVALUATION OF HERBAL GEL FOR WOUND HEALING

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### ABSTRACT

The aim of the present investigation was to formulate and evaluate the herbal gel containing honey and curcumin for wound healing and antimicrobial potential. Curcumin and honey used in the preparation possess an excellent anti-inflammatory, antioxidant and healing potential. Gelling agent used in this study was Carbopol 934P. In the present study five formulations containing different concentration of carbopol and honey were formulated and optimized. The optimized formulations were selected for further studies. Optimized gel was then loaded with active drug. The formulations were characterized for initial physicochemical parameters i.e. surface pH, spreadability, viscosity and antimicrobial susceptibility test to observe toxicity or side effects. The result revealed that the surface pH was within the range of skin pH. The viscosity and spreadability of the gel was appropriate and zone of inhibition was also satisfactory for optimized formulations G4 and G5. The preparations were stable under normal storage conditions and did not produce any skin irritation, i.e., erythema and oedema for about a month, when applied over the skin.

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### INTRODUCTION:

Herbal markets are globally increasing due to safe drug delivery with fewer side effects compared to synthetic drugs. In India, medicines based on herbal origin have been the basis of treatment and cure for various diseases. Herbal drugs are used to cure different diseased condition with different dosage form. The treatment of various diseases begins long ago with the use of herbs. Though they have very short half life if not prepared properly with proper precautions then they are not found effective and suitable for use. Topical formulations of gels at pathological sites offer a great advantage in a faster release of drug directly to site of action, independent of water solubility of the drug as compared to creams and ointments<sup>1,2</sup>. A wound has been defined as loss or breaking of cellular and anatomic continuity of living tissue. Wound healing is the process that is fundamentally a connective tissue response. Initial stage of this process involves an acute inflammatory phase followed by synthesis of collagen and extracellular macromolecules that are later remodeled to scar<sup>3</sup>. These processes basically divided into three overlapping phases are inflammation, proliferation and remodeling. There are various natural agents, which assist in wound healing process. The herbal moiety selected for the present work is curcumin and honey. Curcumin was

used in combination with honey which will enhance the wound healing activity. Both have reported to have anti-inflammatory and anti bacterial activity, which are complementary to wound healing process<sup>4</sup>.

### MATERIAL AND METHODS:

#### Materials

Curcumin was received as a gift sample from Ajmera Pharmaceuticals, Indore, M.P., India. Dabur honey was obtained from market. Carbopol 934, triethanolamine, glycerin and all other chemicals were of analytical grade and used without further purification. The bacterial strains used were *Staphylococcus aureus* ATCC 25923, *Bacillus subtilis* ATCC 6633 for gram positive and *Escherichia coli* ATCC 25922 and *Pseudomonas aeruginosa* ATCC 26731 for gram negative were collected from Institute of Microbial Technology (IMTECH), Chandigarh.

#### Method of preparation of gel

The topical gel was prepared by soaking the Carbopol 934 in water for 24 h. Drug was first dispersed in small quantity of glycerin with gentle heating and then preservatives were dissolved in glycerin and then added to Carbopol solution with stirring the remaining ingredients were added to it and triethanolamine was

added to the neutralize the Carbopol gel base<sup>3,4</sup>. The composition of gel is given in Table 1.

## RESULTS AND DISCUSSION:

The present study was aimed to prepare and evaluate the polyherbal gel for topical administration, for the treatment of a severe skin problem known as Wounds and antimicrobial activity. Different parameters studied were carried out for transdermal gel formulations.

Carbopol was found to be suitable candidate as it gives better consistency, viscosity, spreadability, pH, homogeneity, and in-vitro drug diffusion. Carbopol concentration was optimized by trial and error method. Triethanolamine was taken as a neutralizer so as to maintain the pH and it also enhance the stability and penetration property of the gel. Honey was added to the formulation to give additive effect along with curcumin.

**Table 1:** Composition and optimization of gel

S. No.	Ingredients	G1	G2	G3	G4	G5
1.	Carbopol 934P NF (%)	1.5	1.7	2	2.5	3
2.	Honey (%)	50	50	50	50	50
3.	Curcumin (%)	0.5	0.5	0.5	0.5	0.5
4.	Glycerin	5ml	5ml	5ml	5ml	5ml
5.	Triethanolamine	q.s.	q.s.	q.s.	q.s.	q.s.
6.	Methyl paraben (g)	0.2	0.2	0.2	0.2	0.2
7.	Propyl paraben (g)	0.1	0.1	0.1	0.1	0.1
8.	Distilled water	q.s.	q.s.	q.s.	q.s.	q.s.

**Table 2:** Physical properties of formulations

Formulation code	Surface pH	Viscosity cps	Spreadability Gm.cm <sup>2</sup>	Homogeneity
G1	5.44	4211	11.77	Poor
G2	5.46	4305	11.52	Poor
G3	5.75	4523	10.37	Poor
G4	6.0	4780	9.98	Good
G5	6.68	5370	9.25	Good

**Table 3:** Physical evaluation of formulations

Formulation code	Colour	Appearance	Feel on application
G1	Faint yellow	Translucent	Less Smooth
G2	Faint yellow	Translucent	Smooth
G3	Faint yellow	Translucent	smooth
G3	Faint yellow	Translucent	Smooth
G4	Yellowish orange	Translucent	Smooth

**Table 4:** Zone of inhibition diameters of optimized formulation

S.No.	Microbial strains	Zone of inhibition (mm)		
		G4 Formulation	G5 Formulation	Standard
1	<i>S. aureus</i>	13±0.57	13±0.57	18±0.74
2	<i>E. coli</i>	12±0.45	12±0.45	15±0.58
3	<i>B. subtilis</i>	10±0.29	10±0.29	14±0.64
4	<i>P. aeruginosa</i>	11±0.75	11±0.75	14±0.81

Various formulations with different concentration of Carbopol and honey were taken and prepared. Formulation G4 and G5 shows significant consistency among all the other formulations. The results of the physical evaluations of the formulated gels showed that all the formulations had a smooth appearance and were uniformly mixed with little or no lumps or gritty texture. They had an agreeable odour (no pungent or irritating smell). Formulations were translucent and faint yellow to yellowish orange in color.

## CONCLUSION:

The study demonstrated the good antimicrobial activities and the desired physical properties of the gel formulations containing the herbal isolates. These could make them potential topical antimicrobial agents effective in the treatment of skin infections with wound healing potential and is safe to apply.

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