FORMULATION OF HERBAL ANTIBACTERIAL GEL

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Abstract

Traditional medicine has been practised in many countries of the world, including India, because of its accessibility and low cost. Natural sources have offered a source of therapeutic agents for modern drugs, many of which are based on their use and traditional medicine. The emergence of bacterial resistance to currently existing antibiotics necessitated the development of novel bacterial agents. Various plant extracts have been used in numerous research to screen for antibacterial activity and discover new antibacterial compounds. The antibacterial activity of *A. auriculiformis* was measured using the "disc diffusion method." Gram-positive bacteria such as *Staphylococcus aureus*, *Escherichia coli*, *Proteus Vulgaris*, and *Salmonella Typhi* are utilized as test microbes. According to the findings, the antibacterial activity of various sections of *A.auriculiformis* can be used to treat various topical infections. The gel of *A.auriculiformis* is tested for various qualities utilizing leaves extract. The antibacterial properties of the gel containing leaf extract of *A. auriculiformis* is shown to be excellent.

Introduction

Since the dawn of time, medicinal plants have been a key source of cures for human diseases. The use of eco-friendly and bio-friendly plant-based products for the prevention and healing of many human ailments has recently received a lot of attention. Traditional medicine, particularly plant drugs, is used by the majority of the world's population for primary health care. *Acacia auriculiformis* is an ornamental tree species with a wide distribution. It is high in secondary metabolites such as phenolic, tannins, saponin, and terpenoids, and is mostly utilised in agriculture for pest control. It's used in the production of wood composites, pulp, paper, and furniture as a raw material. It is used to treat wounds, paracetamol-induced liver injury, alloxan-induced type II diabetes, pains, sore eyes, rheumatism in aborigines, inflammatory malaria, and skin problems such as itching, allergies, and rashes, among other things. It's also used as an anti-diabetic, anti-helminthic, and anti-oxidant. The bark of the stem is used to make wound ointment and the bark of the stem is utilized to scavenge free radicals.

The goal of this work was to develop and analyze herbal gel containing *A. auriculiformis* leaves extract for antibacterial screening against pathogenic microorganisms.

Materials and methods

Collection of plant material: The plant *A. auriculiformis* was collected from the Butibori, Nagpur. The fresh leaves were separated from the plant and used for extraction.

Preparation of leaves extract of *A. auriculiformis*: The collected fresh leaves of *A. auriculiformis* were washed with water and dried in shade. After drying plant leaves were coarsely powdered and kept in well closed container. About coarse powder of leaf was weighed and material was then subjected to ethanol extraction with Soxhlet apparatus. After maceration the extract was concentrated and used for further formulations. % yield of extract was determined

Formulation of Placebo Gel (Control formulation) and Development of Herbal gel formulations :

For the preparation of gel formulation, firstly take carbopol 940 which was then dispersed in distilled water along with methyl paraben, propyl paraben and glycerine kept for overnight. Take the leaves extract of *A. auriculiformis* in propylene glycol which was then added in polymer dispersion. Remaining quantity of water was then added and neutralized to pH 7 with tri-ethanolamine by constant stirring for 10 minutes.

The various formulations of herbal gels are shown in following Table 1.

Ingredients	F1	F2	F3	F4	F5
A. auriculiformis	0.5 gm	1.0 gm	1.5 gm	2.5 gm	3.0 gm
Carbopol 940	1.0 gm	1.0 gm	1.0 gm	1.0 gm	1.0 gm
Propylene glycol 10 ml	10 ml	10 ml	10 ml	10 ml	10 ml
Methyl paraben (0.5 %)	0.2 ml	0.2 ml	0.2 ml	0.2 ml	0.2 ml
Propyl paraben (0.2%)	0.1 ml	0.1 ml	0.1 ml	0.1 ml	0.1 ml
Glycerine	1 ml	1 ml	1 ml	1 ml	1 ml
Tri-ethanolamine (to adjust pH)	q.s.	q.s.	q.s.	q.s.	q.s.
Distilled water	100 ml	100 ml	100 ml	100 ml	100 ml

Discussion

Carbapol 940*, A. auriculiformis* leaf extract, propylene glycol, methyl paraben, propyl paraben, glycerine, and the needed amount of distilled water were used to make the gel formulations. Tri-ethanolamine was added drop by drop to keep the skin pH (6.8-7) stable. Physical properties of formed gels were assessed, including colour, homogeneity, pH, viscosity, and spreadability. The antibacterial efficacy of the gels was tested using the agar diffusion method against a variety of bacteria. Formulations including *A. auriculiformis* leaves extract have superior antibacterial efficacy, according to the herbal gels.

All of the formulated herbal gels were greenish to dark greenish in colour, and they were uniformly homogeneous. All of the created gels had a pH of 6.4-7.1, which corresponded to the pH of the skin. The viscosity of all the herbal gels evaluated with a Brookfield viscometer ranged from 4530 to 4875 cp at 100 rpm. All of the herbal gels were spreadable between 36 and 48 mm. All of the prepared herbal gels had good antibacterial activity and a good zone of inhibition against skin infections.

Results

Physical properties of prepared herbal gels such as colour, homogeneity, pH, viscosity, and spredibility were measured and the findings are presented below.

Table 2: Results of physical parameters of all formulated herbal gels

Formulation code	Colour	Homogeneity	pH	Viscosity	Spredibility
F1	Dark greenish	Good	6.4	4556	36
F2	Dark greenish	Good	6.4	4630	38
F3	Dark greenish	Good	7.1	4675	40
	Dark greenish	Good	6.8	4788	44
F5	Dark greenish	Good	6.7	4875	48

The disc diffusion method was used to screen herbal gels for antibacterial activity. The gels were tested against B. subtilis, P. aeruginosa, S. aureus, and E. coli bacteria. In nutritional broth, a loopful of pure bacterial culture was suspended and cultured for 24 hours. Sterilized nutrient agar media was poured into petri dishes. After the inoculum had solidified, 0.1ml of it was dispersed equally over the agar with a rod. A cavity with a diameter of 6mm was constructed, and the formed gel was placed inside. As a control, a common antibiotic was utilised. The plates are inoculated and incubated for 24 hours. Later, the disc's zone of inhibition was measured and recorded.

Conclusion

It was reported in this study that herbal gels of *A. auriculiformis* leaves extract can be made using carbopol 940 as a polymer and other ingredients, and that the examination of physical parameters yielded good results. Prepared herbal gels of *A. auriculiformis* leaves extract were significantly active against tested pathogens, comparable to typical antibiotics, according to antibacterial activity. As a result of the overall findings, it was determined that the formulated herbal gels have strong antibacterial activity and will thus be preferable to allopathic drugs in terms of efficacy, safety.

References

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