

Formulation and evaluation of herbal cream from *Cassia alata* ethanolic leave extract

Paweena Porrawatkul^{*1}, Parichart Sukkasem¹, Montakan Changrueatham¹, Nichapa Rattanakomon¹ and Montakarn Thongsom²

¹Nanomaterials Chemistry Research Unit, Department of Chemistry, ²Department of Biology Science,

Faculty of Science and Technology, Nakhon Si Thammarat Rajabhat University, 80280, Thailand.

*Corresponding author. e-mail : paweena.n@gmail.com; Tel. +66-7537-7443, Fax +66-7537-7443

Abstract

The natural skin care products are growing in the present market because everyone needs natural and beautiful skin. Thus the main objective of this study was the antibacterial potency of herbal cream formulated with ethanolic leave extract of *Cassia alata* was evaluated by extracting the leave of *Cassia alata* with coconut oil. The prepared 2 formulations were evaluated for physical evaluation tests like color, odor, homogeneity and pH. Antibacterial activity was determined by disc diffusion method against strains of *Staphylococcus epidermidis* (*S. epidermidis*) and *Propionibacterium acnes* (*P. acnes*). Activity of extracts was compared against standard antibiotic Chloramphenicol and Clindamycin. The formulation 2 demonstrated excellent antibacterial activity for *Staphylococcus epidermidis* with inhibition zone was 27.25 ± 0.6 mm, while two formulated cream have no activity for *Propionibacterium acnes*. The prepared herbal cream of *Cassia alata* was found to be natural and could be used topically in order to treat skin infection further.

Keywords: *Cassia alata*, Herbal cream, Antioxidant activity

Introduction

Skin problems generally occur because of the improper blood, impurities that present in blood, circulation and due to individual lifestyle. The skin problems are inflammations, acne, rashes, etc¹. Cosmetic products are used to protect skin against exogenous and endogenous harmful agents and enhance the beauty and attractiveness of skin, but in cosmetic have a various synthetic compounds, chemicals, dye and their derivative proved to cause various skin diseases having numerous side effects. Thus the value of herbs in the cosmeceutical making has been extensively improved in personal care system and there is a great demand for the herbal cosmetics. Thus we are using herbal cosmetics as much as possible. In this work, ethanolic leave extract of *Cassia alata* was evaluated herbal cream. Many reports have shown that some *Cassia* species contain antimicrobial substances, particularly *Cassia alata*²⁻⁵. Recent studies revealed that *Cassia alata* has been proven to be effective against bacteria and fungi species⁶. The objective of his present work was carried out to evaluate the antioxidant, antibacterial (*Staphylococcus epidermidis* and *Propionibacteriu acnes*) activities of the ethanolic extract of *Cassia alata* in formulated cream.

Materials and methods

The leave of *Cassia alata* was corrected from surrounding area of Nakhon Si Thammarat Rajabhat university Tambon Tha-Ngio, Amphoe Mueang, Nakhon Si Thammarat Province, Thailand. All analytical reagents used in the study were of analytical grade and were purchased from Merck. Nutrient agar for bacterial culture and Mueller–Hinton broth and agar for antimicrobial activity were purchased from Hi-Media, Mumbai, India.

Preparation of leave extract and herbal cream formulation

Cassia alata leave 50 g was weighed, cut into fine pieces, crushed with 100 mL of ethanol for 24 h at 60 °C, and filtered through Whatman No.1 filter paper. The solvent was removed using rotary evaporator to get brown semisolid extract for blend in herbal cream. Oil in water (O/W) emulsion-based cream (semisolid formulation) was formulated. The emulsifier (stearic acid) and other oil soluble components were dissolved in the oil phase (Phase B) and heated to 50° C. The preservatives and other water soluble components was dissolved in the aqueous phase (Phase A) and heated to 50° C. After heating, the aqueous

phase was added in portions to the oil phase with continuous stirring until cooling of emulsifier took place and Phase C was added. The formula for the cream is given in table 1.

Table 1 Composition of herbal cream

Ingredients	Amount (g)	
	Formulation 1	Formulation 1
Phase A		
DI water	Up to 100 mL	Up to 100 mL
EDTA	0.50	0.50
Glycerin	2.00	2.00
Carbomer (Carbopol 940)	1.00	1.00
Phase B		
Cetearyl alcohol	4.00	4.00
Stearic Acid	6.00	6.00
Squalane	3.00	3.00
Coconut oil	3.00	3.00
Eumulgin B1	3.00	3.00
Vitamin E di-alpha tocopherol	1.00	1.00
Phase C		
Triethanolamine	1.00	1.00
Phenoxyethanol	2.00	2.00
Fragrance	1.00	1.00
Extract	5.00	10.00
Total	100	100

Phytochemical screening of leaf extract

Quantitative phytochemical tests for the identification of anthraquinones, flavonoids, steroids, terpenoids, saponins, alkaloids and tannins were carried out for the leave extract.

Antioxidant activity

:DPPH assay

The antioxidant activity of the leave extract was studied by using 2,2-diphenyl-1-picryl-hydrazyl (DPPH) assay. Briefly, 2 mL of 2×10^{-4} mM of DPPH in 95% ethanol was added to 1 mL of the samples having different concentrations. The samples were kept at room temperature in the dark and after 5 min the absorbance was measured at 518 nm against a blank of 95% ethanol. Ascorbic acid was used as a standard compound.

:The Ferric reducing antioxidant power (FRAP) assay

The Ferric reducing antioxidant power (FRAP) of *Cassia alata* leave extract was studied. Micro liters of sample and 100 μ L of standard was taken in different two tubes. 3 mL of FRAP reagent was added. Absorbance at 593 nm was measured at 0 minutes after vortexed. Samples were then placed at 37 °C in water bath and absorption was again measured after 4 minutes. Ascorbic acid standards (100 μ M-1000 μ M) were to be processed in the same way. The content of above tubes was mixed well. Absorbance of the standard and test were measured at zero minute and again after four minutes at 593 nm.

Antibacterial study

Cassia alata leave extract and herbal cream were tested for their antibacterial activity against *P. acne* and *S. epidermidis* by using the Agar-well diffusion method. The bacteria culture was spread evenly on the nutrient agar plate using sterile cotton swab. Wells were prepared on agar plates. To these wells standard antibiotic disc (chloramphenicol and clindamycin) were added. After incubation at 37 °C for 24 h, the diameter of inhibition zones around herbal cream were measured and compared with that around the commercial standard antibiotic Chloramphenicol, Clindamycin and aqueous leave extract.

Physical evaluation of formulated herbal cream

Physical assessments were carried out on the ointments and cream over a period of 30 days using the following parameters: Appearance, odour test by smelling, colour test by naked eye and homogeneity test by physical touch with hands. The pH of various formulations was determined by using Digital pH meter. 0.5 g of the weighed formulation was dispersed in 50 mL of distilled water and the pH was measured⁷.

Results and discussio

The percentage yield and nature of *Cassia alata* leave extract was 7.5%. The quantitative phytochemical analysis of leave extracts showed the presence of flavonoids, steroids, saponins, alkaloids and tannins.



(a)

(b)

(c)

Fig. 1 (a) *Cassia alata* leave (b) Formulation1 of herbal cream (c) Formulation2 of herbal cream.

Antioxidant activity

Free radicals contribute to more than one hundred disorders in humans including atherosclerosis, arthritis, and ischemia and reperfusion injury of many tissues, central nervous system

injury, gastritis, cancer and AIDS. These free radicals are the major points in lipid peroxidation. The antioxidants may mediate their effect by directly reacting with ROS, quenching them and/or chelating the catalytic metal ions. Natural antioxidants, especially phenolics and flavonoids, are safe and also bioactive which are capable of absorb and neutralize free radicals, quenching singlet and triplet oxygen or decomposing peroxides. Recently focus has been concentrated on identification of plants with antioxidant ability that may be used for human consumption⁸.

The antioxidant activity of the ethanolic *Cassia alata* leave extract was evaluated using DPPH scavenging assay and FRAP assay. The IC₅₀ value of the leaf extracts was 57.56 µg/mL. The Ferric reducing antioxidant power of extracts was 22.08 mg Fe/g of extract. These result showed good antioxidant activity versus with this properties of ascorbic acid as standard reagent.

Antibacterial activity

The *Cassia alata*-based herbal cream formulation 2 demonstrated excellent antibacterial activity for *S. epidermidis*. The order of antibacterial activity of *Cassia alata* in the topical bases was as follows: formulation 2 > formulation 1 > leave extract. The results also revealed that the extracts

incorporated into the cream bases showed better activity than that of the crude extract of *Cassia alata*. The activity against *Staphylococcus aureus* is of significant interest because it is commonly found on the hands, face and in deep layers of the skin and is perhaps the most widely encountered and very undesirable. *S. epidermidis* is not easily eliminated especially in the deeper skin layers, sweat gland, sebaceous gland, and the hair-follicles by routine washing and scrubbing even with some antiseptic soap. *Cassia alata* herbal cream did not show any activity against *P. acne* while the standard drug clindamycin and chloramphenicol showed relatively high activity against *S. epidermidis* and *P. acne* (Table 2).

Table 2 Preliminary *in vitro* antibacterial activity of ethanolic extract of *Cassia alata* leave (Zone of inhibition in mm)

Test organism	Zone of Inhibition (mm)				
	Formulation 1	Formulation 2	Leave extract	Chloramphenicol	Clindamycin
<i>S. epidermidis</i>	24.75 ± 1.4	27.25 ± 0.6	21.0 ± 0.3	45.33 ± 1.2	-
<i>P. acnes</i>	NA	NA	16.75 ± 1.1	-	18.15 ± 0.1

NA : no activity

The prepared formulations (Table 3) show a smooth and homogeneous appearance. The pH values of all the prepared formulations ranged from 7.1 to 7.5, which are measured acceptable to avoid the risk of irritation upon application to the skin. The pH values of the

formulations are within the normal pH range of the human skin (6.8 ± 1). From the study, the cream showed no changes in pH.

Table 3 Evaluation parameters of the formulations

Formulatio n	color	odour	pH	homogeneity
1	green	coconut oil	7.2 ± 1	homogenous
2	dark-green	coconut oil	7.4 ± 1	homogenous

Conclusion

Cassia alata has been reported in the literature as a good antibacterial agent and anti-inflammatory agent. The developed formulations 2 with more *Cassia alata* leave extract than formulations 1 was evaluated for their *in vitro* anti-bacterial activity excellence against *S. epidermidis*. The Zones of inhibitions for the antibacterial activity were compared with the standard Chloramphenicol. Moreover, the formulated *Cassia alata* creams were homogenous appearance, good smell and good pH. The prepared herbal cream of *Cassia alata* was found to be natural and could be used topically in order to treat skin infection further.

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