

Preliminary Study on the Possible Use of *Garcinia Mangostana* L. (Fam. Guttiferae) Hulls as Colorant

Judilynn N. Solidum⁺ and Jea Giezl N. Solidum
College of Pharmacy, University of the Philippines, Manila

Abstract. The integrity of the earth is continually deteriorating. With the increasing trend in population, there is also an increase in both biodegradable and non-biodegradable wastes. The former promotes global warming with the release of greenhouse gases. The reuse and recycling of hulls from fruits like *Garcinia mangostana* L.(Fam. Guttiferae) will not only discover novel materials for both pharmacologic and non-pharmacologic formulations but will also aid in the improvement of the environment.. In general this study aimed to determine if fruit hulls of the sample has potential ability to be used as paint on paper or be incorporated in cosmetics. Specifically, this research aimed to determine the different phytochemicals present in the said fruit hulls and to assess its safety when used as part of cosmetics. The results of the study showed that fruit hulls from *Garcinia mangostana* contain tannins, carbohydrates and glycosides. It is acidic in nature. It was proven to be safe when used as part of cosmetic lip sheen. The results of the safety assessment test gave zero rating for both erythema and edema formation. It showed promise as colorant for lip sheen and as paint on paper.

Keywords: *Garcinia mangostana*, Fruit hulls, Tannins, Glycosides, Carbohydrates, Cosmetics, Paint

1. Introduction

1.1. Background of the Study

Biodegradable wastes increase with continued increase in population. Degradation of these wastes is not healthy for the environment and thus public health. Reuse and recycling of wastes will help improve environmental integrity.

Extracts of young fruits of *Garcinia mangostana* L. showed the following phytochemicals methylparaben, methyl 3,4,5- trihydroxybenzoate, parvifoliol A1, methyl 2,3-dihydroxybenzoate, 4-hydroxybenzoic acid, epicatechin, xanthone, mangostanin [1] The plant under study was found to have the following medicinal uses namely as astringent medicines for use in dysentery, diarrhea, ailments of genito-urinary tract (resin from rind of fruit, rind and young leaves), and enteritis [2, 3,4]. It has antifungal, antibacterial, anti-inflammatory actions that may be used for cosmetic preparations as soap. wash and creams [5].It was made into an ointment for eczema and other skin disorders [6]. *Garcinia mangostana* rind had been found to contain a good colorant. It has been extracted and used as natural dye to cotton and silk yarn [7]

The dye coming from *Garcinia mangostana* may be used in cosmetics particularly in lip sheen formulation to enhance product color. Cosmetics should be created in manners that will improve the user's appearance [8]. Utilization of natural colorant from fruit hulls of the plant in study as painting material is also possible. Such reuse of ideally biodegradable wastes will help better the deteriorating environment.

⁺ Corresponding author. Tel.: + 0639228183361
E-mail address: graloheus@yahoo.com

1.2. Objectives

In general this study aimed to determine if fruit hulls of *Garcinia mangostana* has potential ability to be used as paint on paper or be incorporated in cosmetics. Specifically, this research aimed to determine the different phytochemicals present in fruit hulls of *Garcinia mangostana* . Also it aimed to assess its safety when used as part of cosmetics.

1.3. Scope and Limitation

In this study only dried mature fruit hulls were used. Both aqueous and ethanolic extracts were used for the phytochemical screening. Qualitative chemical analysis was used. Only the aqueous extract was used as colorant. Only safety assessment for cosmetics of the extract was performed.

1.4. Significance of the study

The utilization of fruit hulls of *Garcinia mangostana* Linn will help lessen biodegradable wastes in the environment. Its reuse or recycling will aid in the halting of the release of greenhouse gases. At the same time if the dye present in the material may be used as part of lipstick cosmetic or paint on paper, waste materials as this will find better use. Natural colorant especially from less expensive hulls from a fruit with a wide range of medicinal properties is hoped to be welcomed by Pharmaceutical and cosmetic industries It is hoped that this study will catalyze other similar studies to help improve the environment and discover novel materials which may prove to be more cost effective than what is existing in the market. Also government agencies related to the topic as Food and Drug Authority and Department of Agriculture may draw on the result of this study for further refinement of the use of this fruit.

2. 2. Methodology

2.1. Research Design

This study employed descriptive, exploratory and experimental design. Phytochemical screening of the fruit hulls were performed with chemical standards. Cosmetic safety was assessed using guinea pigs. The ability of fruit hull extract as colorant was explored and described.

2.2. Locale of the Study

The collection of the samples was done in Manila, Philippines. The samples were prepared, stored and chemically tested at the University of the Philippines, Manila. Cosmetic safety was performed at Cavite, Philippines.

2.3. Sample Preparation

The fruit hulls were taken. These were washed with running water for ten minutes, damped with a clean cloth, oven dried and comminuted. Twenty percent aqueous and thirty percent ethanolic extracts were used for the phytochemical tests. Fifty grams of the fruit hulls were macerated overnight in two hundred milliliters of distilled water. The mixture with 15%w/v citric acid, was heated to 80 C [7] until syrupy consistency was reached.

2.4. Phytochemical Screening

The acidity and different components tannins, glycosides, reducing substances, alkaloids, plant acids, saponins, proteins, mucins, flavonoids,of the test sample were analyzed following the phytochemical tests from the Plant Chemistry Manual of the Department of Pharmaceutical Chemistry Faculty, 2008 [9]

2.5. Safety Assessment Test

For the evaluation of the safety of the aqueous extract from the fruit hulls of *Garcinia mangostana*, the skin patch and scratch tests were performed using male and female guinea pigs from 24 to 72 hour observation periods [10]. The scoring criteria for the evaluation of skin reactions are given in Table 1 below.

2.6. Colorant Use

The aqueous extract resulting from the sample preparation was divided into two parts. The first half of the residue was taken up by enough distilled water and was used for doodling on paper. The other half was taken up by about 5 grams of petroleum jelly and mixed for homogeneity.

Table 1: Evaluation Of Skin Reactions (Scoring Criteria) [10,11]

Erythema and Eschar Formation	Scores
No erythema	0
Very slight erythema	1
Well defined erythema	2
Moderate erythema	3
Severe erythema	4
Total Possible Erythema Score	4
Edema Formation	Scores
No edema	0
Very slight edema (barely perceptible)	1
Slight edema (edges of area well defined)	2
Slight edema (definite raising)	3
Moderate edema (raised approximately 1 mm)	4
Severe edema (raised more than 1 mm and extending beyond area of exposure)	4
Total Possible Edema Score	4

3. Results and Discussion

The phytochemical screening performed on the fruit hull extracts of *Garcinia mangostana* showed that it is acidic with pH 5, tannins, carbohydrates, and glycosides were prominently present (Table 2). As such, it may further be explored for the production of pharmacologic preparations. It may be used as an anti-inflammatory agent, used against diarrhea, ulceration and has antioxidant potentials [12]. Carbohydrates from the fruit hulls may serve as nutritional supplement especially with impending food security crisis. Glycosides have prominent therapeutic uses particularly for heart related ailments.

Table 2: Phytochemical screening results of *Garcinia mangostana* Linn (Fam Guttifera)

Phytochemical screening results	<i>Garcinia mangostana</i> L.
pH	5
Tannins	Blue-black ppt
Glycosides	Bluish green fine ppt
Alkaloids	
Mayer's	Cherry red solution
Valser's	Cherry red solution
Wagner's	Cherry red solution
Dragendorff's	Cherry red solution
Plant acids	Brownish black solution;no stable and dense froth
Saponins	No froth; <1cm temporary on standing
Liebermann Burchard	Dark red solution with red ppt
Salkowski	Bloody red to two layers (upper-black turbid, lower-yellowish clear solution)
Satd alcoholic solution of cholesteol	Amber solution
Flavonoids	Black solution with white gelatinous ppt
Standard	Red coloration
2N HCl in 1 propanol	

No erythema and edema were observed on the 24th and the 72nd hour on male and female guinea pigs. The primary irritation index then is zero (0). The standard for primary irritation index of tested samples have the following rates: 0-8, 9-29, 30-59, 60-80, above 81 mean same as control or non-irritant, mild, moderate,

strong and severe irritant, respectively [10]. The aqueous extract of the fruit hulls are then non-irritant and safe for cosmetic use.

The preliminary formulation for lip sheen using the colorant from *Garcinia mangostana* showed promise since the color is subdued and stayed around five hours on lips(Figure 1). With the plants' numerous known medicinal benefits, its use in cosmetics may prove more beneficial than other similar preparations. It also showed promise as paint on paper (Figure 2 and 3) The color however faded from reddish to golden brown after three weeks of paint display.



Fig. 1: Preliminary Formulation of lip sheen



Fig. 2: Doodle 1 using the extract of lip sheen



Fig. 3: Doodle 2 using the extract of lip sheen

4. Conclusions and Recommendations

The results of the study showed that fruit hulls from *Garcinia mangostana* Linn contain tannins, carbohydrates and glycosides. It is acidic in nature. It was proven to be safe when used as part of cosmetic lip sheen as the results of the safety assessment test gave zero rating for both erythema and edema formation. It showed promise as colorant for lip sheen and as paint on paper.

It is recommended that different lip cosmetic formulations be prepared including lipstick, lip balm as well as lip gloss. Other preparations containing the extract like blush on and eye shadow must also be explored. Although its safety on skin had been determined, in-depth toxicologic profiling and stability tests must also be performed to ascertain its safety and shelf life, respectively. Refinement of the colorant for paper paint and studies on maintenance of its color integrity must be studied.

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