



FORMULATION AND EVALUATION OF *passiflora edulis* FACE CREAM

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ABSTRACT

Cosmetics are composed of a mixture of naturally occurring or synthetically produced compounds. According to the definition of, cosmetics are "products intended to be applied to purify, beautify, enhance the attractiveness and change the appearance of the human body without affecting the structure and function of the body". People suffering from skin problems are looking for treatments to improve their skin problems. Face cream is used to moisturize the skin. Like the passion fruit here, it is made from a variety of natural and synthetic ingredients. Passion fruit contains a large amount of antioxidant properties, whitening and anti-acne to help protect the skin from damage⁽¹⁾. Here, the plant *Passiflora edulis* is used it is considered a miracle plant for skin problems. It is used to treat acne, improve complexion and delay the signs of premature aging. Passion fruit is the valuable source of vitamin A. It contains vitamin C and B vitamins, which are also essential for skin health. The creams formulated were tested and various criteria were determined and recorded. Appearance, viscosity, pH, stability, irritation, diffusivity, microbial contamination. The cream produced was found to be pale yellow. The texture of the formulation is smooth, The pH was good ductility and was within the stated viscosity limit of 46. Also, there is no redness even after applying for 1 hour. Passion fruit has skin-protecting properties that can protect it from carcinogens. It also preserves collagen and elastin, which are important for keeping the skin young and firm⁽²⁾.

KEY WORDS: *passiflora edulis*, purple passion fruit.

INTRODUCTION

The global cosmetic industry has grown at an average annual rate of 4.5% over the last 20 years. The beauty market continues to work steadily at over 3%. It's a supply-driven market underpinned by innovation, likewise as efficacy and quality". The wonder market is mostly categorized into five segments as follows: skincare, hair care, colour cosmetics, fragrances and toiletries. Also cosmetic product is divided into premium segment and also the mass market. The premium segment represents 28% of total sales worldwide and therefore the other account for 72%. Product innovation is important in gaining competitive advantage within the cosmetic industry, due to the short life cycle of beauty products. In addition, the miracle industry "is characterized by a constant need to bring new products to market and a high reliance on new ingredients, especially essences and functional agents". The cosmetic industry employs the advertising industry to assist sell its products. In addition, certain cosmetic companies openly advise women to be completely infants in their skin care routines. The feminine devotee of women's magazines is commonly given conflicting messages. For example, the pores must be cleansed in any respect costs to prevent them from getting clogged, in order that the skin can breath, but at the identical time her skin must be moisturised to forestall excessive environmental wear and tear⁽³⁾.7 billion in 2011 and with predicted sales of 11.7 billion by 2016. Cosmeceuticals promise highly desirable effect on the skin, including anti-aging, skin tightening, improved radiance, and more. The abundant cosmeceutical options and also the validity of their claims are often challenging to navigate for both consumers and physicians. Consumers can pay a premium for products perceived as high-performance, and expect that the things will function as claimed. Moreover patients expect physicians, particularly dermatologists, to possess expert insight into which products are worthwhile. Intrinsically it behoves dermatologists to bear in mind of the available clinical and basic science evidence describing cosmeceuticals efficacy ⁽³⁾. They even have different regulatory definitions and registration regulatory processes in numerous parts of the planet. The objectives of cosmeceutical industry that, manufactures tend to differentiate their products with novel formulations to extend market appeal and sales and to assess the present patents and research adopting novel formulation strategies in nutraceutical and cosmeceutical⁽⁴⁾.

Pharmaceutical excipients are often defined as non-active ingredients that are mixed with therapeutically active compounds to make medicines. Excipients affect the nature and strength of the drug products are more functionality and significantly. Pharmaceutical excipients are any substance aside from the active drug or pro-drug that has been appropriately evaluated for safety and is include during a drug delivery system to either aid processing of the system during manufacture, or protect, support or enhance stability, bioavailability or patient acceptability, or assist in product identification, or enhance the other attribute of the general safety and effectiveness of the drug product during storage. Excipient is considered to be the "Cinderellas" of formulation science and drug delivery. They don't treat disease, nor should they need a pharmacological effect of their own.

Natural colorants are dye or pigment differ in respect that, dye is actually absorbed by the material when applied to give it a permanent colour which is resistant to the action of light, water or soap. For example, naphthaquinine, carotenoids. Natural sweeteners are agents evoking a sweet taste or improving awareness of sweet taste for example are Glycyrrhiza Glabara, Stevia Rebaudiana. Natural adhesives are an agent used to transmit beads into particles. This ensures that tablets are still intact after compression. They added to the formulation to impart plasticity and thus increase the inter-particulate bonding strength within the tablet. For example, Acacia. Natural diluents are usually added to the construction of tablets for secondary reasons that want to provide better tablet properties such as improved cohesion, for Direct compression, examples are mannitol, lactose. Viscosity builders are the substances added to the mixture, to expand the viscosity without significantly modifying other characteristics examples are carrageenan. Natural disintegrants are the agents are added to tablet formulations to commercialize the distribution of tablets in smaller pieces in the water environment, increasing the area available and promoting the release of the drug examples are guar gums, starch. A compound transmits taste for perfume components or improves the fragrance of an existing perfume component, for example sandal wood oil, rose oil ⁽⁵⁾. Here, we use excipients such as liquid paraffin (moisturizer), stearic acid (anion oil in water emulsifier and effective thickener), beeswax (humectant, emollient and stabilizer, opacifying agent), glyceryl monostearate (emulsifier), Cetostearyl alcohol (emulsion stabilizer, opacifying agent, surfactants, enhanced foam, increase viscosity), triethanolamine (adjustable substance pH, emulsion stabilizer and surfactant, glycerin (humectants), methyl paraben and propyl paraben (preservative), hard paraffin wax (lubricant).

Purple passion fruit is edible fruit (*Passiflora Edulis Sims*), originally grown in tropical and subtropical countries. Consumer eating habits become more diverse all over the world, this fruit has become popular even in the quarters temperate grounds. In Kenya, over 16,260 tons of edible fruits produced in 1991, 620 costs of fresh fruits are exported primarily to European countries. It is a perennial vine, creating fruit throughout the year in Kenya, although there is a seasonal fluctuation in production so that fruits are much compared to different types available in most time. The commonly used harvest method is to allow fruits to fall to the bottom after maturity. The fruits are purple with relatively small sizes (4-9 cm long and diameter from 3.5 to 7 cm). Its skin is purple and black seeds ⁽⁶⁾. The fruit was developed in a garden scene with extremely family cuisine in coonamble in a warm and dry climate with low rainfall, but the garden bed was irrigated by the water of the creek. The vine grows on a agricultural barrier with three horizontal wires ⁽⁷⁾.

The *Passiflora edulis* include polyphenols, triterpenes, and its glycosides, carotinoids, cyanogenic glycosides, polysaccharides, amino acids, volatile oil, microelements as constituents. edible fruit contains nutritionally valuable compounds like vitamin C, dietary fiber, B vitamins, niacin, iron, phosphorus. a large range of in vitro and in vivo pharmacological studies have revealed various promising bioactivities of *P. edulis*, like antioxidant, antimicrobial, anti-inflammatory, anti-hypertensive, hepato protective and lung- protective activities, anti-diabetic, sedative, antidepressant activity and anxiolytic actions ⁽⁶⁾. Edible fruit oil comes from the seed of the fruit, and is usually yellow to vibrant yellow in colour. thanks to the nutrients within the oil moreover because the fatty

acids and antioxidants, it's now used as a natural nourishing moisturizer in skin care, and is especially beneficial for those with aging, oily, or mature skin. The take leave edible fruit is rich in fiber which has properties love food additives. Thus, during this study, the technological properties of flour obtained from yellow edible fruit peel were determined and compared to those of 5 commercial additives. Two flour samples were prepared from edible fruit shells through a modified process so as to judge their potential use as a stabilizing agent, emulsifier, thickener and gelling agent. edible fruit pulp is rich in vitamin A and C, and may be a good source of potassium, carbohydrate, phosphorous and iron ⁽⁸⁾ .

Nanoencapsulation of edible fruit by-products extracts for enhanced anti microbial activity. Great amount of edible fruit residues are under utilized by juice industries that may potentially be a source of bioactive compounds including antimicrobials⁽¹⁹⁾. Characterization analyses indicated extracts encapsulation, controlled delivery and spherical shape for many treatments. The polymer used plays a crucial role on the ultimate product quality as, besides the protection, it determines how the encapsulated compounds are released. Its application may be useful within the food industry to disperse hydrophobic compounds in hydrophilic composition. Considering the good amount of edible fruit juice produced in Brazil and therefore the scarce number of studies concerning its by-products reuse, this work demonstrates opportunities to feature value to the present agro-industrial junks⁽⁹⁾ .

Structure and application of pectin in food and pharmaceutical: The commercial pectin is usually extracted from apples and citrus fruits. However, researches are focused on the extraction of pectin from various industrial by-products, which presents itself as a green option for agricultural waste recovery, consistent with the concept of circular bio-economy⁽²⁰⁾ . Pectin is mostly utilized in the food industry as a gelling, thickening, stabilizing, and emulsifying agent. Pectin forms hydro-gels and is therefore widely employed in hydrated and viscous foods. Popular to be used in jams, fruit juices, deserts, dairy products, and jellies, which is by the gelling properties of pectin are well-known. Another major application of pectin within the food industry is to provide packaging materials and edible coatings. Other uses are manufacturing of hydrogel, development of nano-liposomal system, coating, membrane production, bio-composite dressings, Nano cell manufacturing, manufacturing of nasal spray⁽¹⁰⁾ .



PLANT PROFILE

TAXONOMY	PASSION FRUIT ⁽¹¹⁾
Kingdom	Plantae
Phylum	Tracheophytes
Division	Magnoliophyta
Class	Magnoliopsida
Family	Passifloraceae
Genus	Passiflora
Species	edulis

Passiflora edulis

Synonyms: Passion fruit, Grenadelle, Grenadine, Passion flower ⁽¹¹⁾

Uses:

Passion fruit are used in manufacturing of colour cosmetics. Skin whitening, antioxidant, and sun protection are the features of *passiflora edulis*. Thus, passion fruit extracts attracts a lot consumers who are more inclined towards natural or colour cosmetics with added benefits. Edible flesh of the fruit is eaten uncooked, juiced or decorative. Also used as wine, juice, jams, and decoration. Its have the blood pressure lowering properties. It contain High vitamin C content ⁽¹⁸⁾

FORMULATION AND OPTIMIZATION OF PASSIFLORA EDULIS CREAM

OIL PHASE:

INGREDIENTS	F1	F2	F3	F4
Light liquid paraffin	6.96ml	6.96ml	6.96ml	27.85ml
Stearic acid (1-20%)	2.14g	2.14g	2.14g	8.57g
Glyceryl monostearate	1.87g	1.87g	1.87g	7.5g
Cetostearyl alcohol	1.07g	1.07g	1.07g	4.28g
Beeswax	0.052g	0.052g	0.052g	0.21g
Hard paraffin wax	0.125g	0.125g	0.125g	0.5g

AQUEOUS PHASE:

INGREDIENTS	F1	F2	F3	F4
Triethanolamine	0.43ml	0.43ml	0.43ml	1.72ml
Glycerine	2.67ml	2.67ml	2.67ml	10.71ml
Methyl paraben (0.02-0.3%)	0.052g	0.052g	0.052g	0.21g
Propyl paraben (0.01-0.6%)	0.052g	0.052g	0.052g	0.21g
Water	10ml	10ml	10ml	15ml
Purple passion fruit pulp	Without	5ml	7.5ml	10ml

METHODOLOGY

Light liquid paraffin, stearic acid, glyceryl monostearate, cetostearyl alcohol, bees wax and hard paraffin waxes were heated to $75 \pm 0.5^\circ\text{C}$ on a water bath with constant stirring. The water soluble components like triethanolamine, glycerine are taken in a beaker and added the required amount of water. Then the above aqueous phase heated to the same temperature. After mixing the oil phase slowly to the aqueous phase with continuous

stirring emulsion was formed. After cooling to room temperature add required quantity passion fruit pulp and add methyl and propyl paraben stirr continuously to get the cream.

CHARACTERIZATION AND EVALUATION OF **PASSIFLORA EDULIS CREAM**

- Determination of Physical parameters of prepared cream.
- Determination of PH.
- Determination of Viscosity.
- Spreadability test.
- Irritancy test.
- Stability test.

Determination of physical parameter

The physical parameters like appearance, consistency, odour by physically.

Parameters	F1	F2	F3	F4	F5	F6
Appearance	+	++	++	+++	+++	+++
Consistency	+	++	+	+++	+++	++
Odour	-	++	++	+++	+++	++

Abbreviation: + poor, ++ good, +++ better

Determination of pH

pH is defined as the decimal logarithm of the reciprocal of the hydrogen ion activity, a H^+ , in a solution ⁽¹²⁾.

Calibration of pH Meters

Use the following four steps in the calibration of pH meters.

Step 1: Clean the Electrodes

If working with laboratory equipment and chemicals, it is important to wear proper safety equipment, such as gloves and safety glasses. After turning on the power to the pH meter, take the pH meter electrode from its storage solution and rinse with distilled water. Wipe it clean with a lint-free tissue.

Step 2: Calibrate With the pH 7 Buffer

Submerge the rinsed electrode into the pH 7 buffer solution. Press the calibrate button and wait for the pH icon to stop flashing. If the pH reads 7, accept; if it does not, edit the entry using the keypad on the instrument. Rinse the electrode again with distilled water and wipe clean with a lint-free tissue.

Step 3: Calibrate With the pH 10 Buffer

Now submerge the rinsed electrode into the pH 10 buffer. Press the calibrate button once the pH icon stops flashing. If the pH reads 10, accept; if it does not, edit the entry using the keypad on the instrument. Rinse the electrode with distilled water and wipe with a lint-free tissue.

Step 4: Measure the pH of Solutions

The pH meter is now ready to measure the pH of other substances. Be sure to submerge the electrode and rinse with distilled water in between multiple samples ⁽¹³⁾.

	F1	F2	F3	F4
pH readings	6.6	6.28	5.41	5.20

Discussion: The pH test was performed for the cream formulation using PH metre .The PH of the cream was found to be in range of 5.2 to 6.6 which is good for skin PH. All the formulations of cream were shown PH nearer to skin required. So, the cream is safe to use on skin.

❖ Determination of viscosity

“Viscosity is property of liquids that is closely related to the resistance of flow”. ⁽¹⁴⁾

Formulations	F1	F2	F3	F4
Spindle number	64	64	64	64
RPM				
20	464.9	18.3	292.4	538.4
50	241.7	28.2	153.6	310.7
100	71.1	40.2	129.6	184.5
% Torque				
20	31.0%	5.3%	19.5%	35.9%
50	40.3%	4.7%	30.6%	51.8%
100	23.7%	13.4%	43.2%	61.5%

Discussion: Viscosity test were performed for cream formulations using brook field viscometer.

Spreadability test

Spreadability is the ease with which a product can be spread. It is commonly a desired characteristic of margarines, butter, jams, chocolate spreads, etc. but is also an important characteristic of ointments, creams and waxes. It is related to the firmness of a product and more often than not the ease of spreading is associated with a loss in firmness ⁽¹⁵⁾.

	<u>F1</u>	<u>F2</u>	<u>F3</u>	<u>F4</u>
Spreadability	++	++	++	+++

Abbreviation: + poor, ++ good, +++ better

Discussion: From the above observation, the formulation F4 showed desired spreadability than F1, F2, F3

Irritancy test

The Skin Irritation Test (SIT) is an in vitro, non-animal test designed to identify those chemicals and mixtures capable of inducing moderate skin irritation. Some cosmetic products can cause skin irritation by passing through the outer layer of the skin (called the stratum corneum) and enter the layers beneath causing toxic effects to those cells ⁽¹⁶⁾.

Formulation	Irritant effect	Erythema	Edema
F1	Nil	Nil	Nil
F2	Nil	Nil	Nil
F3	Nil	Nil	Nil
F4	Nil	Nil	Nil

Discussion: All formulation shows no redness, edema, inflammation and irritation during irritancy studies. These formulations are safe to use for skin.

Stability test

The purpose of stability testing cosmetic products is to ensure that a new or modified product meets the intended physical, chemical and microbiological quality standards as well as functionality and aesthetics when stored under appropriate conditions. Because the development cycle of cosmetic products is relatively short each manufacturer should

design their own stability testing program such that it is economically reasonable and efficiently addresses the testing required ⁽¹⁷⁾ .

Discussion:

The each formulation were stored at 30+/-2 °C and 65+/-5% RH in opened, closed condition and also in room temperature.

In open condition changed their colour, odour, consistency.

But in closed condition no such change in colour, odour, and consistency.

Also in room temperature change in colour, odour are changed and consistency is good.

So, it is better to store in closed condition for better quality and use.

❖ Different parameters of prepared cream

Sl no	paramete r	F1	F2	F3	F4
1	colour	white	pale yellow	pale yellow	pale yellow
2	odour	no characteristic smell	slight fruity smell	fruity smell	pleasant fruity smell
3	pH	6.6	6.28	5.41	5.20
4	Irritancy	no irritancy and redness	no irritancy and redness	no irritancy and redness	no irritancy and redness
5	spreadability	rough	smooth	smooth	smooth
6	method	o/w	o/w	o/w	o/w
7	After feel	Emollient	Emollient	Emollient	Emollient
8	viscosity	<u>71.1</u>	<u>40.2</u>	<u>129.6</u>	<u>184.5</u>
10	stability	no change in colour, odour, consistency in closed condition			

CONCLUSION

From the above discussion it is concluded that the prepared formulation showed good spreadability, no evidence of phase separation and good consistency during the study period, it is possible to develop creams with herbal extracts. The formulation was evaluated by various evaluation parameters such as physical properties show the formulation having good appearance, odour and consistency. In determination of pH range for this formulation between 4-6 and this range is good for skin. Spreadability test give the formulation is smooth to the skin. Irritancy test shows formulation has no redness, edema, inflammation and irritation. Viscosity test give acceptable range of viscosity for skin. Stability test shows the formulation is better to stored in closed condition for good result. These studies suggest that the formulation F4 is more stable and safe. From the above study it can be concluded that herbal cream is safe to use as it developed from herbal substances.

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