

Formulation and Evaluation of Moisturizing Cream containing *Punica granatum* Powder

Kanisma.R.M *, Dr J. PadmaPreetha, Gladwin Paul.P, Gokul.S, Menaka.R , Ezhil Mathi .S
Department of pharmaceuticals, KMCH College of Pharmacy, Coimbatore- 641048, India

Abstract- *Punica granatum* commonly known as Pomegranate, is a member of monogeneric family Punicaceae. It is a deciduous shrub. In which fruits are obscurely six-sided, it has several chamber containing transparent arils of reddish, juicy pulp having angular elongated seed. The purpose of this work is to incorporate *Punica granatum* powder extract which has anti-oxidant and anti-aging properties into topical moisturizing cream formulation. The aim of this study is to formulate and evaluate moisturizing cream containing *Punica granatum* powder extract. The formulation F2 showed the acceptable pH, viscosity, spreadability and extrudability. Based on the IC50 values of formulation F2 helps in producing antioxidant effect. The results obtained in this research work showed a promising potential of moisturizing cream containing *Punica granatum* with a specific ratio of stearic acid and sunflower wax as emulsifier.

Keywords: *Punica granatum*, moisturizing cream, antioxidant effect, sunflower wax.

INTRODUCTION

STRUCTURE OF THE SKIN: A variety of cosmetics are applied to the skin. These cosmetics can be classified into two main groups. One, those which provide decoration, two, those which supplement the natural function of the skin. Therefore, it will be useful to describe briefly the structure of the skin. The skin is not only a protective covering but it controls loss of valuable fluids, prevents penetration of noxious foreign materials and radiation, cushion against mechanical shock, regulates heat loss and transduces incoming stimuli. It also by its colour, texture and odour, transmits sexual and social signals. The skin has several layers. The overlying outer layer are called epidermis. The layers of epidermis are Stratum germinativum, Malpighian layer, Stratum granulosum, Stratum lucidum, Cornified layer. Inner layer of epidermis continually move towards outer layer and change their form ultimately to become the horny

layer. This process of cellular change in the epidermal cells is called cornification or keratization. The oldest cells are shed from the skin and horny cells formed below take their place. The layer below epidermis is called dermis. The dermis contains a network of blood vessels, hair follicles, sweat glands and sebaceous glands. Beneath the dermis are subcutaneous fatty tissues. Bulbs of hair project into these fatty tissues. Cells from lower layer of the skin travel upward during their life cycle and become flat dead cells of the corneum. This upward movement of cells provide barrier against inward movement of foreign materials. These gland consist of small saccules which communicate through a duct opening either into neck of the hair follicle or directly on to skin surface. These glands secrete sebum, an oily fluid which lubricates the hair shaft and skin. The sebaceous glands are found all over the body except the palms of the hand and soles of the feet. The size and form of sebaceous glands differ in different parts. There are large numbers on the face and head and few on four limbs. The parts which have the most sebaceous glands include scalp, face, and armpit and pubic area. Sweat glands present in dermis are of two types, eccrine glands and apocrine glands. The eccrine glands are present over most of the body but apocrine glands are present only in certain region e.g. under the arms. The eccrine glands secrete clear, aqueous fluid which regulates body temperature. The apocrine glands secrete a whitish, turbid fluid the function of which is not known. Thus, normally the skin surface is covered with secretion products of sebaceous, eccrine and apocrine glands. As mentioned above, the cells from lower layers of skin move upward and become flat and dead ending in exfoliation. As a result of this, cells and skin flake of the cornified epithelium are also present on skin surface. These conditions are of concern to a cosmetic chemist as these influence the creation of functional cosmetic products. ^[1]

SKIN AGING: It is a part of a natural human aging mosaic which become evident and follow different trajectories in different organs, tissue and cells with time. While the aging signs of internal organ are masked from the ambient “eyes” the skin provides first obvious marks of the passing time. Skin aging is a complex biological process influenced by combination of endogenous or intrinsic (genetics, cellular metabolism, hormone and metabolic processes) and exogenous or extrinsic (chronic light exposure, pollution, ionizing radiation, chemicals, toxins) factors. These factors lead together to cumulative structure and physiological alteration and progressive change in each skin layer as well as changes in skin appearance, especially, on the sun-exposed skin areas. In contrast to thin and atrophic, finely wrinkles, laxity, dullness and roughness. Gradual loss of skin elasticity leads to the phenomenon of sagging. Slowing of the epidermal turnover rate and cell cycle lengthening coincides with a slower wound healing and less effective desquamation in older adults. This fact is important when procedures are scheduled. On the other side, many of these features are targets to product application or procedures to accelerate the cell cycle, in the belief that a faster turnover rate. Skin aging is complex biological process influenced by a combination of endogenous or intrinsic and exogenous or extrinsic factors. Because of the fact that skin health and beauty is considered one of the principal factors representing overall “well-being” and the perception of “health” inhuman, several anti-aging strategies have been developed during the last years.

ANTI-AGING: Creams are predominantly moisturizer-based cosmeceutical skin care products marketed with the promise of making the consumer look younger by reduction, masking or preventing signs of skin aging. [2]

MOISTURIZING CREAM: Moisturizer or emollient, is a cosmetic preparation used for protecting, moisturizing, and lubricating the skin. These functions are normally performed by sebum produced by healthy skin. The word “emollient” is derived from the Latin verb molliesto soften. [3]

COSMECEUTICALS: It represent a new category of products placed between cosmetics and

pharmaceuticals that are intended for the enhancement of both the health and beauty of skin.

ADVANTAGES OF MOISTURIZING CREAM

- It has the ability to fight of free radicals that are damaging your skin.
- It gently moisturizes the skin without stripping it of its natural oils.
- It is free from harsh chemicals.
- Moisturizers reduces the chances of skin problems.
- It fights wrinkles.

DISADVANTAGES OF MOISTURIZING CREAM

- They block water evaporation and can actually clog pores and increase acne.

MATERIALS AND METHODS

COLLECTION AND PREPARATION

Pomegranate powder: Marketed pomegranate powder (100% pure) was purchased and made into use.

MACERATION: 40g of powder was taken and dissolved in 100ml of methanol and it was allowed to stand for 72 hours with gentle shaking.

FILTRATION: The methanolic extract was filtered and the filtrate was collected.

LYOPHILIZATION: The filtrate was taken and evaporated using Rotary Evaporator apparatus and the residue was collected. The residue was allowed to cool. Then the residue was taken in a conical flask and kept in a freeze dryer (Lyodel-Delvac pumps Pvt.Ltd.USA) to get lyophilized powdered form.

PREPARATION OF MOISTURIZING CREAM.

PHASE A (Oil phase): Stearic acid, Cetyl alcohol, Bees wax, Mineral oil, Propyl paraben and Sunflower wax

PHASE B (Aqueous phase): Glycerin, Triethanolamine, Methyl paraben, and Distilled water Both phase A and B were taken in a separate china dish and heated to 70°C in a water bath. After reaching 70°C phase A was added into phase B with continuous stirring until the cream base was formed. [5]

Formulation of moisturizing cream containing Punica granatum lyophilized powder: The prepared cream

base was allowed to cool and then the lyophilized pomegranate powder was incorporated to the cream base.

Tab no: 3

s.no	Ingredients	F1	F2	F3
1	<i>Punica granatum</i> extract	5%	5%	5%
2	Stearic Acid	4%	4%	4%
3	Cetyl alcohol	2%	2%	2%
4	Bees-wax	1%	1%	1%
5	Liquid Paraffin	8%	8%	8%
6	Sunflower wax	1%	2%	4%
7	Propyl Paraben	0.05%	0.05%	0.05%
8	Glycerin	4%	4%	4%
9	Triethanolamine	0.2%	0.2%	0.2%
10	Methyl Paraben	0.02%	0.02%	0.02%
11	Distilled Water	100	100	100

PHYSICAL EVALUATION

- 1. Homogeneity test:** Homogeneity test was determined by visual appearance and by touch. [6]
- 2. pH:** The pH of formulations was determined by using digital pH meter. 1g of cream was dissolved in 100ml of distilled water and stored for 2hours. The measurements of pH of the formulation were done in triplicate and average values were taken. [7]
- 3. Viscosity:** The measurements of viscosity of prepared cream was carried out with Brooke field viscometer. The reading of each formulation was taken. [8]
- 4. Spreadability:** It denotes extent of area to which the gel readily spreads on application to the skin or affected part. The bioavailability efficiency of the gel also depends on its spreading value. The Spreadability was expressed in terms of time in seconds taken by two slides to slipoff from the gel, placed in between the slides, under certain load. Procedure: Two sets of glass slides of standard dimensions were taken. The cream formulation was placed over the slides. The other slides were placed on the top of the cream, such that cream was sandwiched between the two slides in an area occupied by a distance of 6cm along the slide. 100g weights were placed upon the upper slides so that the cream between the two slides was pressed uniformly to form a thin layer. The weights were removed and the excess of cream adhering to the slide were scrapped off. The two slides in position were fixed to a stand without slightest disturbance

and in such a way that only the upper slide to slip off freely by the force of weight tied to it. 20g weights were tied to upper sided carefully. The time taken for the upper slide to travel the distance of 6cm and separated way from the lower side under the influence of weight were noted. The experiment was repeated 3 times and the mean time taken for calculation was calculated. [9] Spreadability was calculated using the formula:

$$S = \frac{M}{T}$$

Where, S = Spreadability
M = Weight tied to upper slide (20g)
L = Length of the glass
T = Time taken in second

- 5. Extrudability:** It is usual empirical test to measure the force required to extrude the material from tube. More quantity extruded better was Extrudability. The formulation under study was filled in clean, lacquered aluminium collapsible tube with nozzle tube of 5mm opening and applies pressure on tube by the help of finger. Extrudability was then determined by measuring amount of cream extruded through the tip when the pressure was applied on tube.

$$E = \frac{M}{A}$$

Where, E= Extrudability
M=weight applied on tube (500g)
A=Area of the extruded cream.

- 6. Antioxidant Assay:** Control sample was prepared containing the same volume without any extract and reference ascorbic acid; 95% methanol was used. % scavenging of the DPPH free radical was measured using the following equation: [10]
% inhibition = $\frac{(A \text{ control} - A \text{ sample})}{(A \text{ control})} \times 100$
A control = Absorbance of DPPH alone
A sample = Absorbance of DPPH along with different concentrations of extracts.

RESULTS

Homogeneity test: Homogeneity test was determined by visual appearance and by touch.

Tab no: 4

FORMULATION CODE	COLOUR	HOMOGENIETY	CONSISTENCY
F1	Pale ivory	Good	++
F2	Pale ivory	Excellent	+++
F3	Pale ivory	Good	++

pH: The pH of formulations was determined by using

digital pH meter. 1g of cream was dissolved in 100ml of distilled water and stored for 2hours. The measurements of pH of the formulation were taken.

Tab no: 5

Formulations	pH
F1	6.37
F2	6.41
F3	6.15

Viscosity: The measurements of viscosity of prepared cream was carried out with Brooke field viscometer. The values of each formulation was taken.

Tab no: 6

Formulations	Viscosity
F1	1256
F2	1268
F3	1274

Spreadability: It denotes extent of area to which the cream readily spreads on application to the skin or affected part. The bioavailability efficiency of the cream also depends on its spreading value. The Spreadability was expressed in terms of time in seconds taken by two slides to slip off from the cream, placed in between the slides, under certain load.

Tab no: 7

Formulations	Spreadability
F1	6.8
F2	8.4
F3	7.6

Extrudability: It is usual empirical test to measure the force required to extrude the material from tube. The formulation under study was filled in clean, lacquered aluminium collapsible tube with nozzle tube of 5mm

opening and applies pressure on tube by the help of finger. Tube Extrudability was then determined by measuring amount of cream extruded through the tip when the pressure was applied on tube.

Tab no: 8

Formulations	Extrudability
F1	33.33
F2	35.14
F3	34.27

Antioxidant assay: It was determined spectrophotometrically using a UV-visible spectrophotometer at 520 nm. Control and reference samples were prepared containing the same volume without any extract and with extract respectively. Ascorbic acid and 95% methanol was used. % scavenging of the DPPH free radical was measured using the following equation:

$$\% \text{ inhibition} = \{ (A \text{ control} - A \text{ sample}) / (A \text{ control}) \} \times 100$$

A control= absorbance of DPPH alone

A sample=absorbance of DPPH along with different concentrations of extracts.

Tab no: 9

Concentration (µg/ml)	Percentage Inhibition (%)	
	Ascorbic acid	Methanolic Extract
10	74.4	56.6
15	78.8	63.4
25	86.6	77
50	92.4	82.8
60	96	88
IC 50 Value (%)	57.51	40.48

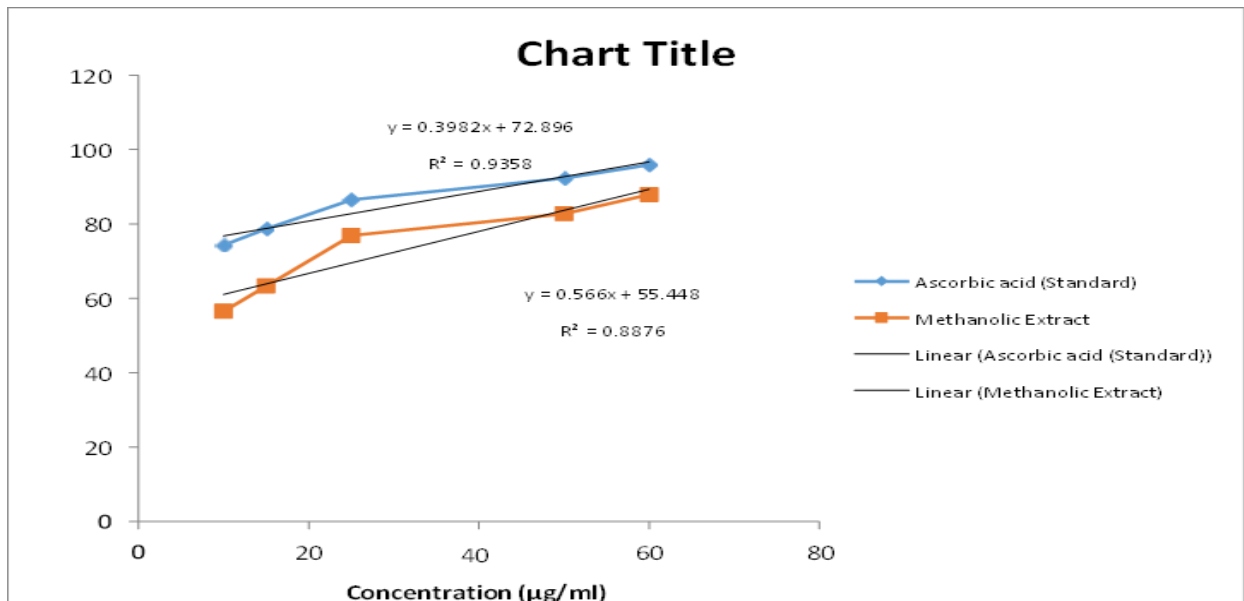


Fig no.1

DISCUSSION

The pomegranate powder was macerated using methanol and the filtrate was obtained. The filtrate was lyophilized as a solvent. The moisturizing cream base was prepared and the lyophilized Punica granatum powder was added into the cream base.

- The pH of the Formulation F2 was found to be 6.41 which is within optimum skin pH.
- The viscosity of Formulation F2 was found to be 1268 centipoise.
- The Spreadability of Formulation F2 was found to be 8.4 cm.
- The Extrudability of Formulation F2 was found to be 35.14 g/cm². Thus the prepared moisturizing cream possess optimum extrudability.
- The IC50 value of DPPH activity for standard and methanolic extract values was found 57.51 and 40.48 % respectively.

CONCLUSION

In this study, the results showed that the moisturizing Cream containing Punica Granatum was prepared.

- The Formulation F2 showed the acceptable pH, viscosity, Spreadability and Extrudability.
- Based on the IC50 values of formulation F2 helps in producing antioxidant effect.

The results obtained in this research work showed a promising potential of moisturizing cream containing Punica Granatum with a specific ratio of stearic acid and sunflower wax as emulsifier.

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