ISSN: 2231-3656
Print: 2231-3648

***International Journal of Pharmacy and Industrial Research* (IJPIR)**

IJPIR |Vol.15 | Issue 4 | Oct - Dec -2025
www.ijpir.com
DOI : https://doi.org/10.61096/ijpir.v15.iss4.2025.608-619

Research

Formulation and Evaluation of Anti-Acne and Anti-Aging Cream Using Banana Peel and Marigold Flower

S.Sathesh Kumar*, Sangameswaran Balakrishnan, K.G.Parthiban, P.S SatheeshKumar, M.Kalpanadevi

SSM College of Pharmacy, Erode, Tamilnadu, India

*Author for Correspondence: S. Satheesh Kumar
Email: Sankarsathessh99@gmail.com

Published on: 25 Oct 2025

Published by:
Futuristic Publications

Abstract

The present study focuses on the formulation and evaluation of a herbal cream possessing both anti-acne and anti-aging properties using natural ingredients derived from banana peel (Musa paradisiaca) and marigold flower (Tagetes erecta)**.** Banana peel is rich in antioxidants such as phenolic compounds, vitamins A, C, and E, and minerals that help reduce oxidative stress, promote collagen synthesis, and enhance skin elasticity. Marigold flower extracts are known for their potent anti-inflammatory, antimicrobial, and wound-healing activities, which help alleviate acne and promote skin regeneration. The extracts of banana peel and marigold flower were obtained using ethanol as the solvent through maceration. Different formulations of oil-in-water type creams were prepared using varying concentrations of the herbal extracts along with suitable excipients such as stearic acid, cetyl alcohol, glycerin, and preservatives. The formulations were evaluated for physicochemical parameters including pH, spreadability, viscosity, stability, and homogeneity. Additionally, in vitro studies were conducted to assess antimicrobial activity against *Propionibacterium acnes* and *Staphylococcus aureus*, and antioxidant activity using the DPPH assay. Among the prepared formulations, the optimized cream (F3) exhibited desirable pH (5.5–6.0), excellent spreadability, and high stability under accelerated conditions. It also demonstrated significant antibacterial activity and strong free radical scavenging capacity compared to the control formulation. The results indicate that the combination of banana peel and marigold flower extracts can serve as an effective natural alternative for developing multifunctional herbal skincare products with both anti-acne and anti-aging benefits.

Keywords: Banana peel, Marigold flower, Herbal cream, Anti-acne, Anti-aging, Antioxidant, Antimicrobial activity.

INTRODUCTION

Aging is a natural, expected and normal part of life, which is associated with passage of time. It is defined as a complex biological process characterized by impairment of various functions and accumulation of molecular damages at cellular level in the body. This progressive regression and deleterious changes dramatically decline the functioning capacity of organ (such as the heart, kidney and lungs), biological systems (such as the nervous, digestive and reproductive system) and ultimately the organism as a whole. Consequently, system is unable to fight and respond against various age-related diseases and disorders. Both genetic and environmental factors affect the aging process. Every individual has his or her own unique genetic profile, which is more dominant than environmental factors to affect aging process. Hutchinson-Gilford, Werner‟s and Down syndromes are some specific genetic disorders that speed up the aging process. Apart from genetic and heredity aspect, many environmental factors such as physical (degenerative changes, decrease in physical strength and decline in efficiency of body organs), biological (diet, exercise, leisure and past illnesses), psychological, (depression, attitude and self-satisfaction, healthy lifestyle) cognitive (loss of working memory), social (smoking, consumption of alcohol) and external factors (exposures, such as ultraviolet light, heat, not enough oxygen, toxins/poisons, and poor nutrition) also significantly influences the process of ageing in a variety of ways (Balcombe and Sinclair, 2001), Strehler (1962) classified five different types of ageing (Figure 1).

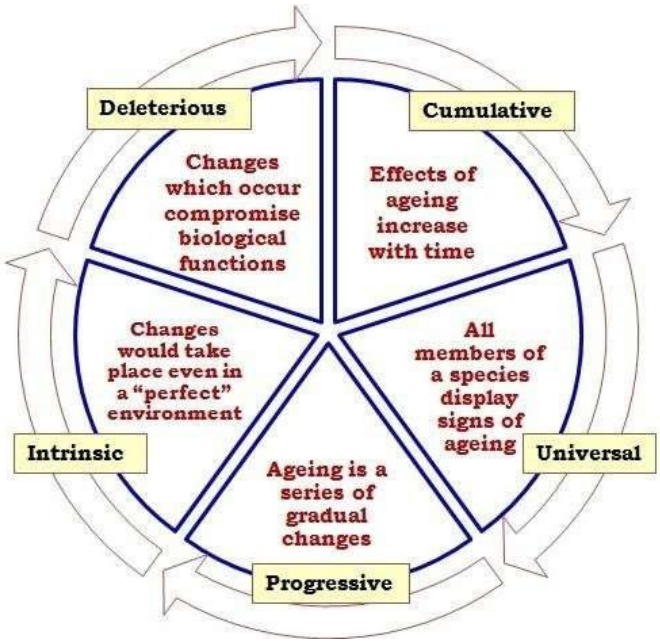


Fig 1: Classification for Types of Ageing

Populations around the world are rapidly ageing. The world's population of people of 60 years of age and older is expected to increase 22% from 10% (from 800 million to 2 billion) by 2050. Nearly one out of every four people will be older than 60 years. It has been estimated that over 8% of the population of the South-East Asia region are above the age of 60 years. Accordingly, it is expected that age- related diseases will also increase greatly over the coming decades (WHO, 2012). Age also interferes with an important process called apoptosis, which programs cells to self - destruct or die at appropriate times. This process is necessary for tissues to remain healthy, and it is especially important in slowing down immune responses once an infection has been cleared from the body. Different diseases that are common in elderly people can affect this process in different ways. For example, cancer results in a loss of apoptosis. The cancer cells continue to multiply and invade or take over surrounding tissue, instead of dying as originally programmed. Other diseases may cause cells to die too early.

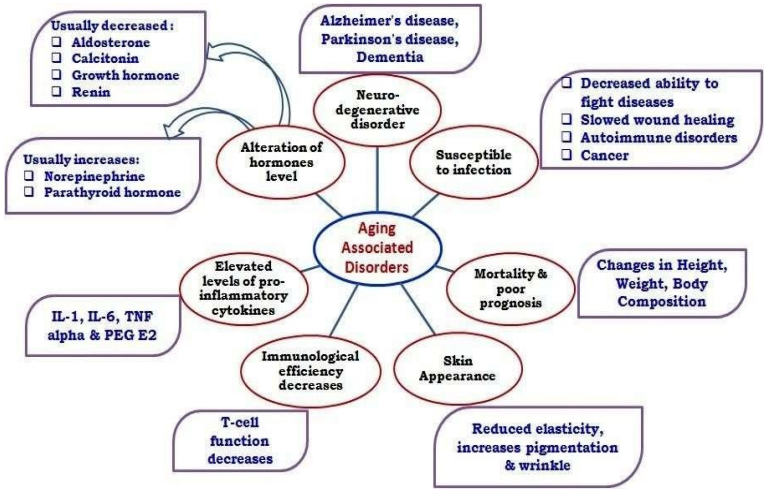


Fig 2: Disorders associated with aging process

Overview of the skin

The integumentary system includes the skin, hair, nails, and glands. The integument is the body's largest organ and accounts for 15% of body weight. Skin is a soft outer covering of the integumentary system in our body, made up of multiple layers of ectodermal tissue and guards the underlying muscles, bones, ligaments and internal organs. Skin is the first line of defense to play a key role in protecting the body against pathogens, external injuries and excessive water loss. The multifaceted functions of the skin include insulation, acting as an entry barrier to compounds, regulating body temperature and fluid and electrolyte balance, providing receptors for sensations such as touch, pain and pressure and the protection of vitamin D folates. Severely damaged skin tried to heal by forming scar tissue. This is often discolored and depigmented. To exert these vital functions, skin has evolved an elaborate structure comprised of tissues of various origins.

Functions of the skin

- Thermoregulation - Evaporation of sweat & Regulation of blood flow to the dermis.
- Cutaneous sensation - Sensations like touch, pressure, vibration, pain, warmth or coolness.
- Vitamin D production - UV sunlight and precursor molecule in skin make vitamin D.
- Protection - The layers acts as a physical barrier to prevent invasion of the organism and infectious hazards.
- Absorption and secretion - The skin is involved in the absorption of water-soluble molecules and excretion of water and sweat.
- Wound healing - When a minor burn or abrasion occurs basal cells of the epidermis break away from the basement membrane, migrate across the wound, and heals them.

Anti-aging theories

The International Anti-Aging Systems described numerous "Theories of Aging". In personal care and cosmetic industries, five most well-known theory are accepted (Wilson, 2008).

Wear and tear theory

Biologist Dr. August Weissman proposed the wear and tear theory of aging in 1882 and suggested that accumulation of damage cell; tissue and organs overtime eventually wear them out and kill them. Body has the capacity to repair DNA damage but genes sustain repeated damage from toxins, radiation and ultraviolet light therefore progressively body loses its ability to repair damage. This damage accumulates because all repairs are not accurate or complete and leading to visible wrinkles and age spots (Klatz and Goldman, 1997).

Cross-linking or Glycosylation theory

The cross-linking theory was first proposed by Dr. Johan Bjorksten in 1941. This theory is based on the observation that during aging, protein and other molecular structures begin to cross link by covalent bonds to make larger polymeric molecules but this polymerization leads to a decrease in the elasticity and mobility of the molecules. Lastly protein becomes damaged and inefficient in its tasks. Reactive oxygen species attract these molecules leading to the appearance of tough, leathery, yellow skin and appearance of wrinkles (Ward, 2000).

Neuroendocrine theory

The neuroendocrine theory was first addressed by Dr. Vladimir Dilman in 1954. It is suggested that the hypothalamus loses its ability to precisely regulate the release of hormones, which regulates certain metabolic cascades and autonomic activities of the body. The secretions of key hormones decline their efficacy finally enhance catabolism, breaking down of muscle tissue as well as degradation of collagen responsible for aged skin.

An Anti-Ageing Herbal Cream often employ synthetic compounds such as retinoids, peptides, and hydroxy acids, which, although effective, may cause adverse reactions like irritation, erythema, and photosensitivity. In contrast, herbal-based formulations have gained significant attention due to their biocompatibility, safety, and multifunctional properties. Herbal extracts are rich in antioxidants, polyphenols, flavonoids, vitamins, and essential oils, which help neutralize free radicals, stimulate collagen synthesis, and enhance skin barrier function. Therefore, the development of an Anti-Ageing Herbal Cream aims to integrate the therapeutic efficacy of traditional medicinal plants with modern dermatological science. Such formulations represent a promising, sustainable, and safer alternative for maintaining youthful skin and delaying the visible signs of aging.

AIM AND OBJECTIVE

The goal of this study is to formulate Marigold Flower and Banana Peel Cream related with Anti-acne and skin aging. The work was divided into several major section including collections and authentication of the plant materials; extract preparation; biological assessment followed by formulation of cream.

3.2 OBJECTIVE

Prominent objectives of the works were based on the following aspects:

- Selection of plants on basis of ethno-meditational uses.
- Extraction of the plant materials by using ethanol as solvent depending on the literature review and condition of the raw material.
- Development of topical anti-aging formulations with selected medicinal plants.
- Evaluation of formulation by means of physical, chemical, microbiological and functional valuation. Storage, stability study of prepared formulations
- Screening of in vitro anti-aging potential of selected medicinal plants extract through hyaluronidase, elastase (UV spectrophotometric) assays.

MATERIALSAND METHODS

Table 1: List of Excipients Used and Their Sources

S.No.	MATERIALSNAME	CATEGORY	COMPANYNAME
1.	CetosterylAlcohols	Emulsion Stabilier, Surfactant,	Sisco Research Laborators Pvt Ltd, Mumbai
2.	Ethanol	Solvent	Loba Chemie Private Limited, Mumbai.
3.	White softparaffin	Moisturizing	Sisco Research Laboratories Pvt Ltd, Mumbai
4.	MethylParaben	Preservatives	Lepid Life Sciences Private Limited, Bangalore
5.	Almond oil	Emollient	Spectrum laboratories, Mumbai
6.	Olive oil	emollient	Spectrum laboratories, Mumbai
7.	Sodium benzoate	Preservative	Spectrum laboratories, Mumbai

Table 2: List of Equipment Used

S.No.	EQUIPMENT	MAKE	PURPOSE
1.	Electronic Balance	Precision Balance	For weighing purpose
2.	Digital pH Meter	ElicoL1120	Surface pH study
3.	Fourier Trans form-IR	Perkin-Elmer	Compatibility studies
4.	UV Spectrometer	Shimadzu	Determination of absorption maxima & concentration of active substances
5.	Environment Test Chamber	Heco	Stability Studies
6.	Brookfield Viscometer	Brookfield	Determine the viscosity of the gel
7.	Melting Point Apparatus	Digital electronic melting point apparatus	To measure the melting point of drug

Collection of Selected Herb

Banana peel and marigold flower was collected from in and around Tiruchirappalli district, Tamilnadu. Collected herbs were authenticated by Botanist, Department of Botany, National College, Tiruchirappalli.

Extraction of Selected Plant Material

Preparation of ethanolic extract of selected herb

The extract of Banana peels was prepared by maceration using solvents system of 96% ethanol and acetone with ratio 4:1. A total of 2.5 kg of Banana peels powder was soaked in 10 L of ethanol 96% and 2.5 L of acetone, which was kept away from sunlight and stirred for 3 days. The maceration was then filtered with a Buchner funnel. The remaining pulps were subjectedto remaceration for another two times. The filtration of extracts was combined and concentrated using an evaporator to obtain a dried extract.

Fig 3: Extraction by Maceration

The marigold leaf extract was made by drying at room temperature without direct sunlight, and waiting for a week for the plants to dry. ensure that the leaves are not affected by pests and there is no oxidation. then the sample was cut into fine pieces to form simplicia. then maceration process in using ethanol liquid in a maceration tube that has been coated with cotton and the outside is wrapped with aluminum foil and this process is stirred every morning and evening. then evaporated with a rotary evaporator to obtain marigold leaf extract in the form of a paste.

FORMULATION DEVELOPMENT

- ✓ The oil phase consists of oil soluble component like cetyl alcohol and liquid paraffin olive oil , almond oil were dissolved within the oil phase.
- ✓ The oil phase was placed inside the beaker within the water bath.
- ✓ The temperature of water bath was set to 75°C during the heating time.
- ✓ The water soluble components and preservatives, methyl paraben were dissolved within the aqueous phase and heated within the same water bath at temperature 75°C.
- ✓ After heating, the aqueous phase was added in portions to the oil phase with continuous stirring until the cooling of emulsifier occurred.
- ✓ Marigold extract and Bana peel extract is not completely soluble in water hence dissolve in ethanol with constant stirring drop by drop add marigold extract and Bana peel extract to the cream .
- ✓ Stop stirring until a light yellow coloured cream appeared.

Table 3: Formulation of Phytosomal Forming Hydrogel

S.No.	INGREDIENTS	F1	F2	F3	F4
1.	Bananapeel extract	0.1g	0.5g	0.25g	0.75g
2.	Marigold flowerextract	0.1g	0.5g	0.25g	0.75g
3.	Cetosterylalcohol	4 g	4.5 g	5 g	4 g
4.	Whitesoftparaffin	1.00 g	0.25 g	0.25 g	0.25 g
5.	Almond oil	2ml	2ml	2ml	2ml
6.	Olive oil	2ml	2ml	2ml	2ml
7.	Methylparaben	0.002g	0.002g	0.002g	0.002g
8.	Distilledwater(Upto10g)	10 g	10 g	10 g	10 g

PHYSICOCHEMICAL EVALUATION

a) Clarity[8]

The clarity of all the formulations was measured visually against a black and white background was categorized as turbid, clear, or very clear.

b) pH[92]

2.5 g of cream were precisely weighed and dissolved in 25 ml of distilled water. A digital Ph meter was used to measure the pH of the mixture.

c) Homogeneity[93-95]

After the cream had been placed in the container, all prepared gels were visually inspected for their appearance and the presence of any aggregates.

d) Spreadability [93-95]

The spreadability of the formulation was determined by measuring the spreading diameter of 0.5 g of cream formulation placed between two horizontal smooth surface glass plates (20 cm × 20 cm). The initial diameter in centimeters formed by placing the gel on the glass plate was noted. Another glass plate (weighing 200 g) with the same dimensions was placed over the gelfor 1 min until no more expansion of the gel was observed. The upper plate was gradually removed and diameter of the circle formed after spreading of the gel was measured in centimeters.

e) Extrudability[93-95]

In this method the formulated cream were filled in standard capped collapsible aluminium tube and sealed by crimping to the end. The weights of the tubes were recorded. The tubes were placed between two glass slides and clamped. 500g was placed over the slide and the cap was removed. The amount of the extruded gel was collected and weighed. The percent of extruded gel was calculated (> 90% extrudability excellent, >80% extrudability satisfactory).

f) Viscosity Measurement[93-95]

A viscometer was used to assess the g cream viscosities. The spindle (6) was revolved at 100 revolutions per minute. The formed creme samples were allowed to settle for 30 minutes before the measurements were taken. The mean of the three samples was calculated.

g) Acid Value

10g of the cream was dissolved in 50 ml mixture of equal volume of alcohol and solvent ether in a flask. The flask is connected to a reflux condenser and slowly heated, until the sample dissolve completely, to this 1ml of phenolphthalein was added and titrated with 0.1N NaOH, until faintly pink colour appears after shaking for 30sec. Acid value = n*5.61/w

Where, n = The number of ml of NaOH required w = The weight of the cream

h) Saponification Value

2g of the cream was refluxed with 25 ml of 0.5N alcoholic KOH for 30min, to this 1ml of phenolphthalein is added and titrated immediately, with 0.5N HCL.

Saponification value=(b a)*28.05/w

Where, a= volume of titrant ,b= volume of titrate w= weight of the cream.

i) Accelerated Stability Testing

The purpose of stability testing is to provide evidence on how the quality of drug substance or drug product varies with time under the influence of variety of environmental factors such as temperature, humidity and light and enables to recommend storage condition and to predict the shelf life. Stability study for cream was performed at accelerated condition i.e., 40°C±2°C / 75% RH ± 5% RH. The formulations were kept both at room and elevated temperature and observed on 0th, 5th, 10th, 15th and 20th day for the various parameters

j) Irritancy Test

Mark an area (1sq.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 Hrs.

k) In vitro Diffusion Study[96]

1g of the formulation was placed in the donor compartment over an egg membrane that had been washed and immersed in the diffusion medium for 24hrs. The donor compartment is dipped in the receptor compartment, which contains 400ml of pH 7.4 phosphate buffers, and the beaker holding diffusion medium (receptor compartment) is kept at 37° C with constant stirring at 22 rpm using a magnetic stirrer. Every hour for 12 hours, 5 ml aliquots are removed from the diffusion medium and replaced with the same amount of new, pre-warmed diffusion medium. The materials were tested spectrophotometrically at 280 nm using a Shimazdu Double beam UV-Visible spectrophotometer.

Parameters for In-Vitro Diffusion Study

a. Diffusion Medium: a.Phosphate buffer pH 7.4 b. Volume: 400 ml c. RPM: 22

d. Temperature: 37ºC ± 1ºC e. UV Absorbance Measurement: 280 nm

The diffusion study was carried out for all the fair formulations and the release profiles were compared using kinetic model and statistical method.

Drug Release Kinetics

Several theories and kinetic models describe the diffusion of drug release dosage forms. There are several models to represent the drug dissolution profiles where f (t) is a function of time related to the amount of drug dissolved from the pharmaceutical dosage form. The quantitative interpretation of the values obtained in the diffusion assay is facilitated by the usage of a generic equation that mathematically translates the diffusion curve function of some parameters related with the pharmaceutical dosage forms. Drug diffusion from liquid dosage forms has been described by kinetic models in which the dissolved amount of drug (Q) is a function of the test time 't' or Q (t). Some analytical definitions of the Q (t) function are commonly used, such as zero order, first order, Higuchi, Korsmeyer - Peppas, Hixson - Crowell models, Weibull models. These models are used to characterize drug dissolution/release profiles.

Zero Order Kinetics

This model represents an ideal release profile in order to achieve the pharmacological prolonged action. Zero order release constitutes drug release from the dosage form that is independent of the amount of drug in the delivery system (that is, a constant release rate).

First Order Kinetics

First order release constitutes drug release in a way that is proportional to the amount of drug remaining in its interior; in such a way that amount of drug released by unit time.

Higuchi Model

Higuchi describes drug release as a diffusion process based in Fick's law, square root dependent. This model is applicable to systems with drug dispersed in uniform swellable polymer matrix as in case of matrix tablets with water soluble drugs.

Peppas-Korsmeyer Model

This model is widely used when the release mechanism is not well known or when more than one type of release phenomenon could be involved. For practical purposes the equation is rearranged:

$$\text{Log percent drug released} = \log k + n \log t$$

Peppas used 'n' value in order to characterize different release mechanism concluding for values of n = 0.5 for Fickian diffusion and values of n, between 0.5 to 1.0 for anomalous transport (corresponds to diffusion, erosion and swelling mechanism or mixed order kinetics) and higher values of n, n=1 or n>1 for case-II transport (corresponds to erosion and relaxation of swollen polymer layer).

The diffusion study was carried out for all the fair formulations and the release profiles were compared using kinetic model and statistical methods.

RESULTS AND DISSCUSION

PREFORMULATION STUDIES

Phytochemical Studies

The phytochemical studies of peel of Banana were done. The presence and absence of ethanolic extract of above sample was shown in Table 4.

Table 4: Phytochemical Studies

S.No.	Phytoconstituents	Ethanolic Extract of *Banana* Peel
1.	Alkaloids	+
2.	Glycosides	+
3.	Saponinglycosides	+
4.	Tannins&Phenolic compounds	+
5.	Reducingsugar	-
6.	Amino acids	-
7.	Flavanoids	+

8.	Terpenoids	+
9.	Steroids	+

(+) Presence of phytoconstituents (-) Absence of phytoconstituents. The phytochemical studies revealed that the presence and absence of phytoconstituents in the ethanolic extract of Banana peel.

Description
Color: Color was found to be light yellow
Appearance: Appearance was found to be good with no clogs and smooth to apply without any roughness.
Hygroscopic Nature:

Table 5: Hygroscopic Nature of Banana Peel Extract

At Room Temperature	75% RH at 40ºC
Weight gain observed nil	Weight gain observed nil

Table 6: Hygroscopic Nature of Marigold Extract

At Room Temperature	75% RH at 40ºC
Weight gain observed nil	Weight gain observe dnil

Solubility Studies

Table 7: Solubility Profile *Banana* Peel Extract

S. No.	Solvent	Solubility
1.	Distilled water	Practically insoluble
2.	Phosphate buffer	Very soluble
3.	Ethanol	Freely soluble
4.	Chloroform and Ether	Insoluble
5.	Propylene glycol	Soluble

CHARACTERIZATION OF Cream
In-vitro Drug Diffusion Study of Cream

Table 8: Comparative *In-Vitro* Diffusion Studies of Cream

Time (in mins)	F1(%)	F2(%)	F3(%)	F4(%)
5	3.07	4.7	3.51	3.22
10	7.33	11.59	10.27	9.89
15	13.42	21.30	20.07	18.98
20	16.66	33.17	27.28	25.75
25	25.13	40.65	38.12	36.20
30	31.05	51.37	44.52	42.19
35	39.11	58.62	50.65	48.2
40	45.28	65.78	57.85	57.51
45	51.11	75.32	66.13	62.08
50	58.19	84.34	74.29	69.52
55	61.13	89.18	82.89	77.25
60	65.31	91.28	86.44	82.36

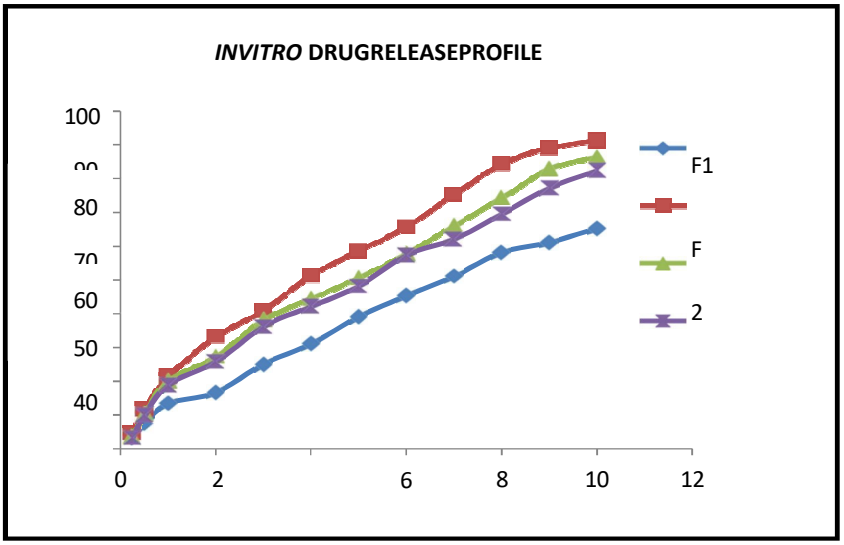


Fig 4: *In-Vitro* Drug Release Profile

Table 9: Comparative pH of Formulations

S. No.	Formulation	pH
1.	F1	6.41
2.	F2	6.58
3.	F3	6.60
4.	F4	6.31

Spread ability

S.No.	Formulation	Spreadability(cm)
1.	F1	6.79
2.	F2	6.11
3.	F3	5.54
4.	F4	7.39

Extrudability

Table 10: Comparative Extrudability of Formulations

S.No.	Formulation	Extrudability
1.	F1	+
2.	F2	++
3.	F3	++
4.	F4	+

(+) - Satisfactory (++) – Excellent

Drug Release Kinetics

Table 11: Comparative Release Kinetic Studies of Formulations

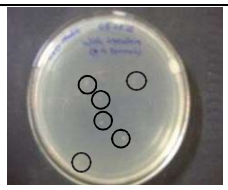
Formulation Code	Zero Order	Higuchi Model	Peppas Model		First Order
	r^2	r^2	r^2	n	r^2
F3	0.8795	0.9782	0.9773	0.874	0.9566
F6	0.9715	0.9723	0.9354	0.852	0.8890

Test for Specified micro-organism

Pretreatment of test cream sample was done as earlier described procedure. For this purpose, lactose broth was used instead of buffered NaCl-peptone solution (pH 7.0).

Staphylococcus Aureus

Pretreated preparation was examined as described above. Each of the test cream sample (1 mL) inoculated in 100 mL of fluid Soyabean-Casein digest (SCD) medium. Whole system was incubated at 35 ºC - 37 ºC for 24 to 48 h. If growth was observed, then streaked on the medium surface of Manitol-Salt Agar (Himedia, M118-500G) medium each plate on Petri dishes (Borosil) and incubated it at 35 ºC to 37 ºC for 18 to 24 h. A positive control also was taken [1 mL of S. aureus (ATCC 49775) organisms was added in SCD media] for this study. If, none of the plates contains yellowish colonies with yellow zone, then Staphylococcus aureus was absent in the test cream sample.

Plate Count for Bacteria		
		
SCD media Test sample(1)	SCD media Test sample (2)	SCD media (Positive control)
Colonies have been found on the SCD medium surface but it is not more than200 Colonies per plate both in test control and positive control plate.		
Plate Count for Fungi		
		
PDA media Test sample (1)	PDA media Test sample (2)	PDA media (Positive control)
No colonies were found in PDA medium surface.		

Elastase Inhibition Assay

Formulations F-2 and F-3 were showed significant (bP < 0.01; aP < 0.05) elastase inhibitory activity with IC50 value of 20.06 ± 1.31 and 47.86 ± 1.44 µg/mL (Figure 9.14) respectively as compared to standard oleanolic acid at IC50 value of 63.82 ± 1.37 µg/mL. Apart from prepared formulations, marketed anti-aging cream was also showed elastase inhibition with IC50 value of 12.61 ± 0.99 µg/mL. In elastase inhibition assay formulation Fm showed similar type of significant results as hyaluronidase inhibition assay and. Prepared formulations F-2 and F-3 were showed high inhibition compared to oleanolic acid. This may be presence of number of constituents, which together responsible for synergistic effect in prepared formulations. All values are expressed as mean ± S.E.M. (n = 6). aP < 0.05; bP < 0.01; cP < 0.001 compared with oleanolic acid.

Stability Studies

Table 12: Various Characteristics of F3 Formulation After Stability Study

S.No.	Parameters	Initial	After1Month	After3Months
1.	Homogeneity	Homogeneous	Homogeneous	Homogeneous
2.	DrugContent(%)	98.95±0.10	98.95± 0.34	98.95±0.21
3.	pH	6.6±0.04	6.6±0.19	6.5±0.05
4.	Spreadability(cm)	5.40±0.07	5.40±0.05	5.50±0.11

5.	Extrudability(g/cm^2)	++	++	++
6.	Viscosity(cps)	4900	4900	4900

Table 13: Drug release of F3 formulation after stability study

Time (in hrs)	Initial drug release (%)	Drug release after1 month (%)	Drug release after3 months (%)
0	0	0	0
5	15.42±0.31	13.05±0.12	11.34± 0.12
10	18.27±0.56	14.19±0.05	15.76± 0.33
15	23.27±0.33	22.45±0.25	20.12± 0.47
20	30.18±0.23	27.55±0.13	23.57± 0.24
25	47.39±0.13	45.29± 0.13	43.67± 0.19
30	58.53±0.08	57.89±0.23	56.37± 0.25
35	66.59±0.15	64.55±0.35	63.45± 0.19
40	79.95±0.22	78.62±0.15	76.89± 0.54
45	82.05±0.35	81.42±0.33	79.98± 0.18
50	95.53±0.22	93.52±0.22	92.78± 0.39
55	96.12±0.23	95.22±0.56	94.23± 0.34
60	98.21±0.11	97.12±0.19	96.97± 0.16

SUMMARY AND CONCLUSION

Banana peel and marigold contains a high concentration of secondary metabolites, which contribute to the plant's pharmacological activity. Secondary metabolites found in Banana peel and marigold include glycosides, polymethoxylated flavones, and flavonoids. Due to constant exposure of human skin to the UV radiations present in sunlight, several pathobiological alterations in cells occur such as irregular pigmentation, increased wrinkling, loss of elasticity, dryness, and roughness. For the protection of this signs of aging herbal cosmetic are used as a therapy. Various active constituents such as flavonoids and phenolic acids appear efficient against UV radiation-induced damage: The use of natural compounds in skin protection especially topical application of antioxidants indicates their popularity in decreasing the effect of aging on the skin. Thus, the aim of this research is to develop and evaluate herbal anti-aging cream containing in Banana peel and marigold are rich in antioxidants, and they thicken and stimulate the collagen to reduce wrinkles and fine lines, improving the elasticity of the skin and providing a healthy skin. Antioxidants fight the harsh rays of the sun, protecting from sun damage. Moreover, our research study presented that formulation of F3 is stable for 3 months. The formulations F3 were homogeneous, emollient, non-greasy, and easily removed after the application and showed good spreadability, no evidence of phase separation and good consistency during the study period. Formulation F3 shows the proper pH range which confirms the compatibility of the formulation with skin secretions. From this study, it is concluded that it is possible to develop anti-aging cream containing in Banana peel and marigold extract and it will help in reducing oxidative damage. However, further clinical studies to be conducted in the same direction to enhance the therapeutic efficacy and improve the patient compliance.

BIBLIOGRAPHY

1. Aburjai,T.,Natsheh,F.M.,2003.Plantsusedincosmetics,Phytotherapy Research 17,987- 1000.
2. Ademorati,C.M.A.,1996.EnvironmentalChemistryandToxicologyPollutionby Heavy metals, Foludex press Ibadan. pp 171-172.
3. Afaq,F.,Mukhtar,H.,2002.Photochemopreventionbybotanicalanti-oxidants.Skin Pharmacology and Applied Skin Physiology 15(5), 297-306.
4. Afaq,F.,Mukhtar,H.,2006.Botanicalanti-oxidantsinthepreventionof photocarcinogenesis and photoaging. Experimental Dermatology 15(9), 678-684.
5. Afaq,F.,Mukhtar,H.,Ahmad,N.,2005.Abstract695.JournalofInvestigative Dermatology 117, 505.
6. Aguirre,M.C.,Delporte, C.,Backhouse,N.,Erazo,S.,Letelier,M.E.,Cassels,B.K., Silva, X., Alegría, S., Negrete, R., 2006. Topical anti-inflammatory activity of 2 alphahydroxy pentacyclic triterpene acids from the leaves of Ugni molinae. Bioorganic and Medicinal Chemistry 14, 5673-5677.
7. Ahuja,M.,1965.MedicinalPlantsofSaharanpur:SurveyofMedicinalPlants. DharmpalVidyalankarPublishers,

Saharanpur.
8. Ajabnoor,M.A.,1990.Effectofaloesonbloodglucoselevelsinnormalandalloxan diabetic mice. Journal of Ethnopharmacology 28, 215-220.
9. Ajasa,A.M.O.,Bello,M.O.,Ibrahim,A.O.,Ogunwande,I.A.,Olawore,N.O.2004.Heavy trace metals and macronutrients status in herbal plants of Nigeria. Food Chemistry 85, 67-71.
10. Akhtar,N, Khan, B.A., Khan,M.S.,Mahmood, T.,Khan,H.M.S., Iqbal, M.,Bashir, S., 2011. Formulation Development and MoisturizingEffects of a Topical Cream of *Aloevera*Extract.WorldAcademyofScience,EngineeringandTechnology75,172- 180.
11. Akhtar, N., Mehmood, A., Khan, B.A., Mahmood, T., Muhammad, H., Khan, S., Saeed, T., 2011. Exploring cucumber extract for skin rejuvenation. African Journal of Biotechnology. 10, 1206- 1216.
12. Allen, A.K., 1979. A lectin from the exudate of the fruit of the vegetable marrow (Cucurbita pepo) that has a specificity for beta-1, 4-linked N-acetylglucosamine oligosaccharides, Biochemical Journal 183, 133-137.
13. Amirghofran, Z., Azadbakht, M., Karimi, M.H., 2000, Evaluation of the immunomodulatory effects of five herbal plants. Journal of Ethnopharmacology 72, 167-172.
14. Anonymous, 1992. The Wealth of India Vol.-3rd, The Controller of Publication, NationalInstituteofScienceCommunicationandInformationResources(NISCAIR), New Delhi.
15. Anonymous,2001.AyurvedicPharmacopoeiaof India,TheControllerofPublication, NationalInstituteofScienceCommunicationandInformationResources(NISCAIR), New Delhi.
16. Anonymous, 2005a. American Academyof Dermatology, “Turning Back the Hands ofTime”.Anonymous,2005b.AmericanAcademyofDermatology“CausesofAging Skin”.
17. Anonymous,2010.TheWealthofIndia,Vol.-1st,NationalInstituteofSciences Communication and Information Resources (NISCAIR), New Delhi.
18. Anonymous,2010.TheWealthofIndia,Vol.-2nd,NationalInstituteofSciences Communication and Information Resources (NISCAIR), New Delhi.
19. Ansari,T.M., Ikram, N.,Najam-ul-Haq,M.,Fayyaz,O.,Ghafoor,I.,Khalid,N.,2004. Journalof BiologicalSciences 4, 95-99.
20. Antognoni, F., Perellino, N. C., Sergio, C., Toso, R. D., Danieli, B., Minghetti, A., Poli,F.,Pressi, G.,2011. Irbic acid,a dicaffeoylquinicacidderivativefromCentella asiatica cell cultures. Fitoterapia 82, 950-954.