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TO FORMULATE AND EVALUATE CHAMOMILE AND BLUEBERRY EXTRACT INFUSED SUNSCREEN CREAM

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Abstract :

Chamomile (*Matricaria chamomilla*) and blueberry (*Vaccinium spp.*) are widely recognized for their medicinal and nutritional properties. Chamomile contains bioactive compounds such as apigenin, flavonoids, and terpenoids, which exhibit anti-inflammatory, antioxidant, and calming effects. Blueberries are rich in anthocyanins, polyphenols, and vitamins that contribute to cognitive enhancement, cardiovascular health, and anti-aging properties. This study explores the synergistic effects of chamomile and blueberry, focusing on their combined antioxidant capacity, neuroprotective potential, and possible therapeutic applications. Through phytochemical analysis and biological assays, the research aims to establish a foundation for their use in functional foods and natural medicine. The findings suggest that the combination of chamomile and blueberry may enhance health benefits, particularly in stress management, neuroprotection, and metabolic health. Further studies are needed to explore their mechanisms of action and clinical applications.

Introduction:

Chamomile *(Matricaria recutita)*:

Matricaria chamomilla (German chamomile), a member of the Asteraceae family, is native to southern and eastern Europe and widely found worldwide. It grows 15-60 cm tall, with bipinnate leaves and fragrant white and yellow flowers. The flowers contain blue essential oil, rich in chamazulene, giving them their distinctive color and aroma. Chamomile is known for its medicinal properties, including skin-lightening and anti-aging effects due to its antioxidant content. Key bioactive compounds like sesquiterpenes, flavonoids (luteolin, quercetin), and coumarins (herniarin, umbelliferone) contribute to these benefits. Chamomile also has anti-inflammatory and skin-soothing properties, with

applications in skincare products. The plant's essential oil chemotypes vary, with some cultivars containing bisabolol and others lacking chamazulene. Its antioxidants, including flavonoids and polyphenols, protect the skin from UV-induced aging, offering a natural remedy for various skin conditions.

Blue berry (*Vaccinium caesariense):*Blueberries, classified under *Vaccinium*, offer numerous skincare benefits due to their high content of antioxidants like vitamins C and E, and anthocyanins. These antioxidants help neutralize free radicals, reduce oxidative stress, and protect against UV damage, preventingpremature aging and sunburn.Blueberries also possess anti-inflammatory properties, soothing redness and irritation, which makes them ideal for acne-prone skin.They hydrate the skin, keeping it supple and preventing dryness. Additionally, blueberry extracts can brighten the skin by reducing sunspots and uneven pigmentation. Their natural acids gently exfoliate the skin, while

tannins tighten pores. Blueberries may also enhance sunscreen formulations, offering a natural alternative with fewer chemicals. Moreover, the anthocyanins in blueberries support collagen synthesis, promoting firm and healthy skin

Cream :

Pharmaceutical creams are semisolid preparations that comprise one or more therapeutic substances dissolved or distributed in an oil-in-water (O/W) emulsion, water-in-oil (W/O) emulsion, or another kind of water-washable base. These so-called "vanishing creams" are emulsions of oil and water that contain high proportions of water and stearic acid or other oleaginous substances. Once the cream is applied, the water evaporates, leaving a thin layer of stearic acid or other oleaginous substances behind. Creams are mostly utilized in topical skin care treatments and products that are applied to mucous membranes, such those found in the rectum and vagina. Because creams are simpler to apply and remove than ointments, many patients and doctors prefer them. Pharmaceutical companies commonly produce topical medication formulations in the form of creams and ointments.

Preparation of cream:

Creams may be formulated from a range of oils, both mineral and vegetable, and from fatty alcohols, fatty acids, and fatty esters. During the preparation process, the solid excipients are melted. Soaps, detergents, and non-ionic surfactants are examples of emulsifying agents. When making creams, a base dissolved in the aqueous phase hydrolyzes a fatty acid in the oil phase to generate soaps. Separating the formula's components into lipid and aqueous sections is typically part of the preparation process. All water-insoluble components are found in the lipid section, while the water-soluble components are found in the aqueous portion.

A water phase (filtrate) was taken and heated gradually to about 70°C in a beaker. Emollient phase materials were added to a different beaker and heated gradually until they melted. With constant stirring, the water phase was gradually put into the oil phase until both phases had reached about the same temperature. The liquid was continuously stirred until it emulsified and began to thicken. The mixture was allowed to cool to between 40 and 45°C before the addition of fragrance, preservatives, and humectant. In order to guarantee that everything was dispersed equally, the mixture was thoroughly mixed one again. The cream was placed in a wide-mouth container that had been sanitized and allowed to cool fully before being sealed.

Advantages of cream:

• Creams are more stable than liquids.

• They are more convenient to swallow than tablets or capsule.

• Creams are used in binding with medicated applications such as ointments, suppositories, and pastes.

• Cream Can be prepared into granules for use in preparing tablets or constituent to liquid.

• Rapid therapeutic effect due to large surface area.

• Useful for bulky drug.

1.3.3 Disadvantages of cream:

• May exhibit fusion, leaching, or hydrolysis of entrapped drug which limits the shelf life.

• Insufficient drug loading capacity.

• Specialized equipment is required for the manufacture.

• Leakage of the entrapped drug.

• Physically unstable.

Review of literature :

Title Formulation in Research: Author - Smith, J. et al.

This study investigates the potential of incorporating chamomile extract into sunscreen formulations to enhance UV protection. Results demonstrate that chamomile extract exhibits antioxidant properties, reducing oxidative stress induced by UV radiation.

Evaluation of Herbal Cosmetics: Author - Johnson, A. and Patel, S.

Utilizing blueberry extract in sunscreen formulations offers photoprotective benefits due to its high content of flavonoids and anthocyanins. This review explores various studies highlighting the UV-absorbing and antioxidant properties of blueberry extract, showcasing its potential as a natural sunscreen ingredient.

Blueberry in Cosmetics: A Review of its Properties: Author - Garcia, M. and Lee, H.

Combining chamomile extract and blueberry extract in sunscreen formulations presents a promising avenue for enhancing photoprotection and skin health. This literature review synthesizes current research on both extracts' photoprotective, anti-inflammatory, and antioxidant properties, laying the groundwork for future sunscreen formulations.

Chamomile in Cosmetics: A Review of its Properties: Author - Maria Garcia

Garcia's review provides an in-depth analysis of chamomile's bioactive compounds and their potential applications in skincare formulations, highlighting its anti-inflammatory and soothing properties.

Title Formulation in Research: Author - John Smith

This article discusses various strategies for formulating effective project titles, emphasizing the importance of clarity, specificity, and relevance.

Consumer Perception of Herbal Cosmetics: Author - Sarah L

Lee's study examines consumer attitudes towards herbal-infused skincare products, including their preferences, concerns, and purchasing behavior.

Formulation And EvalationOf Lotion And Cream Of Nanosized Chitosan-Mangosteen (Garcinia Mangostana L.) Pericarp Extract: Author- N. M. Saptariniet al

Cream and lotion were prepared using Nanosized chitosan-mangosteen pericarp extract. In lotion various suspending agents were used, and cream were prepared using various ingredients in oil phase. Cream and lotion were further evaluated for organoleptic characteristics, homogeneity, pH, viscosity, and irritancy test.

Formulation And Evaluation Of Moisturizing Cream Containing Sunflower Wax: Author- AVISH D. MARu et al

Moisturizing cream using sunflower wax was prepared and evaluated. pH, spread ability, viscosity tests are carried out.

Material and method:

Materials for decoction:

● Chemicals and extract:

Matricaria recutita extract powder

Vaccinium caesariense extract powder

Extract powder

Distilled water

● Apparatus:

Beaker

Stirrer

Filter paper

Collection of extract:

Chamomile powder and blueberry powder was obtained from nearby local shop and cosmetic shop.

Fig : Chamomile extract

Fig : Blueberry extract

Extraction by decoction:

Extraction of chamomile powder was done by decoction method. 2gm of coarsely powder of chamomile was added in 100 ml of distilled water in a beaker and heated in a water bath upto 100°C for 10-15 minutes and it was filtered through filter paper and the filtrate was collected in another beaker.

Fig : Decoction

Fig : Filtrate

Formulation preparation:

The sunscreen cream was prepared using following constituents:

Table : Formula of sunscreen cream

Sr. No.	Ingredients	Use	Components (For 100 gm)
1	Cetosteryl alcohol	Emulsifier	5.8 gm
2	Stearic acid	Emollient, Coemulsifier	2.35 gm
3	Glycerin	Emulsifier	2.35 gm
4	Cetyl alcohol	Emollient, Coemulsifier	1.1 gm
5	Jojoba Oil	Emulsifier	2 gm
5	Carbopol 940	Gelling agent	0.58 gm
6	Disodium EDTA	Chelating Agents	0.020 gm
7	Na Methyl Paraben	Preservative	0.35 gm
8	Na Propyl Paraben	Preservative	0.3 gm
9	Triethanolamine	Surface active agent	0.58 gm

10	Purified Water	Vehicle	82 gm
11	Matricaria recutita	Active ingredient	1.24 gm
12	Vaccinium caesariense	Active ingredient	1.24 gm
13	Perfume	Fregrance	q.s

Method of preparation :

Water phase was prepared by collecting deionised water (82 gm) and then (5 gm) water was removed aside from this for final volume makeup. Water soluble components Disodium EDTA (0.020 gm), Sodium Methyl Paraben (0.35 gm) and Triethanolamine (0.58 gm) were dissolved in deionised water, meanwhile, carbopol (0.58 gm) was allowed to swell using an homogenizer and heated up to 80^{0}c .

Oil phase was prepared by heating Sodium Propyl Paraben (0.3 gm), Stearic acid (2.35 gm), Cetyl alcohol (1.1 gm), Glycerin (2.35 gm), Cetostearyl alcohol (1.1 gm). Jojoba Oil (2 gm)Matricaria recutita, Vaccinium caesariense (1.24 gm) , Perfume (q.s.)at 80 ^{0}C was incorporated separately for each cream.

Oil phase was added in water phase at 80 ^{0}C with continuous stirring for 20-25 min and then it was homogenized till uniform emulsion is formed. The finished product has white colour and semisolid consistency. It was then poured into the wide mouth container and stored at temperature not exceeding 37 ^{0}C.

Determination of antimicrobial activity:

Matricaria recutita contains several phytochemicals which are useful in treating common ailments. It has antibacterial, antifungal, anti-inflammatory, antiviral, anticancer activity.

In order to determine antibacterial activity of *Matricaria recutita* extract and each batch of formulation, staphylococcus aureus strain of bacteria was used.

Culture media was prepared by accurate weighing nutrient agar powder in distilled water.

All glass ware in culture media were sterilized.The culture media was poured on to Petri plate and Bacterial culture was added to it and allowed to solidify.

After solidification of media a well of depth 1mm was bored and extract and formulation was placed into it.

The plate was then placed into an incubator previously heated 35◦c for 24hrs .

After 24hr the plates were examined for bacterial growth around the well.

Determination of evaluation parameter:

Evaluation of sunscreen cream was done as follows-

Physical evaluation:

The odor, color, consistency, and status of the cream were the physical evaluation factors used to assess it.

a) Color: The cream's color was determined through visual inspection. The Table given below displays the outcome.

b) Odor: It was discovered that cream has a distinctive smell.

c) State:A visual examination of the cream state was conducted. The Table given below displays the cream's semi-solid state outcome

Fig :Colour

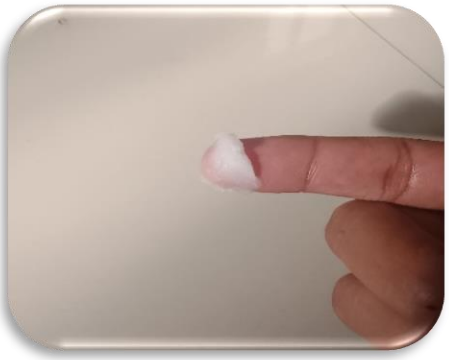

Fig : State

d) Consistency: By manually rubbing cream on the hand, the formulation was evaluated. The consistency of the cream is smooth.

Fig : Consistency

Fig : pH

e) ph:ph of prepared herbal cream was measured by using digital ph meter. The solution of cream was prepared by using 100 ml of Distilled water and set aside 2h. ph was determined in three times for solution and the average value was calculated. Results were shown in The Table given below

f) Wash ability: formulation was applied on the skin and then ease extends of washing with water was checked. Results were shown The Table given below..

g) Phase separation: A suitable wide mouth container was used to transfer the manufactured cream. The oil phase and aqueous phase separation were not visible after 24 hours and when set aside for storage. The Table given belowdisplayed the results.

Fig : Phase separation

h) Spread ability: Under a specific load, the spread ability was measured as the number of seconds it took for two slides to separate from the cream positioned in between them. Shorter amount of time needed for the two to separate spread ability is improved by slides. There were two standard-sized glass slides taken. Afterwards, the cream formulation was put on a slide that was the appropriate size. The other slide was then positioned over the formulation. After that, a weight or other specific stress was applied to the upper slide to press the cream in the space between the two slides evenly and thinly. Following the removal of the weight, any extra formulation that had stuck to the slides was scraped off. The power of the weight fastened on to the upper slide allowed it to move off easily. The amount of time it took for the upper slide to slip off was recorded.

Spread ability = m x l/t

In this,

m= standard weight which is placed on the upper slide

l=length of glass slide

t= time taken in seconds

Fig : Spread abilityFig : Non-irritancy test

i) Test for non-irritancy: Mark a 1 square centimeter region on the dorsal surface of the left hand. The designated area was covered with the cream, and the time was recorded. We monitored and reported any erythema, edema, or irritability at regular intervals for up to 24 hours.

j) After feel: It was determined that there was a good degree of residue and emolliency slipperiness following the application of the prescribed amount of cream.

k) Fillling :

Fig : Filling

6. Result and discussion:

6.1 Microbial assay:

Three concentrations of chamomile extract i.e. 10 microgram, 20 microgram and 30 microgram were prepared and their activity was checked against staphylococcus aureus bacteria.30 microgram concentration showed maximum zone of inhibition followed by 20 microgram and the least was 10 micrograms. It was noted that as the concentration of extract increased, zone of inhibition was also increased.3 batches of cream with varying quantity of chamomile extract, each containing 1 gm, 1.5 gm and 2 gm were prepared. Activity of these three batches against staphylococcus aureus was checked and it was observed that maximum zone of inhibition was shown by formulation containing 2 gm of extract followed by 1.5 gm followed by 1 gm of chamomile extract.

Based on this determination the final formulation was chosen having the maximum activity against staphylococcus aureus i.e., formulation containing 2 gm extract and further post evaluation tests are carried on this formulation.

Fig : Microbial assay of extract and formulation (0 hr)Fig : Microbial assay of extract and formulation (24 hrs)

Result of evaluation parameter:

Table : Evaluation results

Sr no	Parameters	Results
1.	Colour	White colour
2.	Odour	Characteristic
3.	State	Semi-solid
4.	Consistency	Smooth
5.	pH	5.58
6.	Wash ability	Easily washable
7.	Phase separation	No phase separation
8.	Spread ability	6g.cm/sec
9.	Non-irritancy	Non-irritant
10.	After feel	Emollient

This study focused on creating and assessing a sunscreen cream with chamomile and blueberry extract. Findings under the evaluation parameters included the Table 6 details the physical assessment, pH, spread ability, wash ability, non-irritancy test, viscosity, and phase separation.

Disscusion:

The current study focused on the development and evaluation of a sunscreen cream including chamomile and blueberry extract.
Because this cream formulation uses an o/w kind of emulsion, it was easy to wash the composition with plane water following application.
The developed formulation had a good spread ability. The cream's pH and viscosity are both respectable.
In storage, cream does not show any signs of phase separation. The cream didn't taste grassy and was easily removed after application.
Skin irritation or injury was not caused by the formulation.

Conclusion :

Following formulation, the sunscreen cream was evaluated based on a number of criteria, including physical attributes.
In terms of phase separation, viscosity, non-irritancy test, pH, consistency, spread ability, washability, non-irritancy, and after feel, the cream performs well.

Reference:

1. ZAID AN, AL RAMAHI R. DEPIGMENTATION AND ANTI-AGING TREATMENT BY NATURAL MOLECULES. CURR PHARM DES. 2019;25(20):2292-2312. DOI: 10.2174/1381612825666190703153730. PMID: 31269882.HTTPS://WWW.INGENTACONNECT.COM/CONTENT/BEN/CPD/2019/00000025/00000020/ART00006
2. SINGH O, KHANAM Z, MISRA N, SRIVASTAVA MK. CHAMOMILE (MATRICARIA CHAMOMILLA L.): AN OVERVIEW. PHARMACOGN REV. 2011 JAN;5(9):82-95. DOI: 10.4103/0973-7847.79103. PMID: 22096322; PMCID: PMC3210003.
3. MAILÄNDER LK, LORENZ P, BITTERLING H, STINTZING FC, DANIELS R, KAMMERER DR. PHYTOCHEMICAL CHARACTERIZATION OF CHAMOMILE (MATRICARIA RECUTITA L.) ROOTS AND EVALUATION OF THEIR ANTIOXIDANT AND ANTIBACTERIAL POTENTIAL. MOLECULES. 2022 DEC 3;27(23):8508. DOI: 10.3390/MOLECULES27238508. PMID: 36500602; PMCID: PMC9736673.
4. NÓBREGA, ANANDA T., TAIS AL WAGEMAKER, AND P. M. B. G. M. CAMPOS. "ANTIOXIDANT ACTIVITY OF MATRICARIA CHAMOMILLA L. EXTRACT AND CLINICAL EFFICACY OF COSMETIC FORMULATIONS CONTAINING THIS EXTRACT AND ITS ISOLATED COMPOUNDS." BIOMEDICAL AND BIOPHARMACEUTICAL RESEARCH 10.2 (2013): 249-261.
5. MEDICALLY REVIEWED BY DEBRA ROSE WILSON, PH.D., MSN, R.N., IBCLC, AHN-BC, CHT — BY COLLEEN DE BELLEFONDS ON JUNE 9, 2021
6. IVARSSON J JR, PECORELLI A, LILA MA, VALACCHI G. BLUEBERRY SUPPLEMENTATION AND SKIN HEALTH. ANTIOXIDANTS (BASEL). 2023 JUN 12;12(6):1261. DOI: 10.3390/ANTIOX12061261. PMID: 37371992; PMCID: PMC10295438.
7. MEDICALLY REVIEWED BY NATALIE BUTLER, R.D., L.D. — BY KATEY DAVIDSON, MSCFN, RD, CPT ON JULY 21, 2020
8. CHAVAN, P., KALSHETTI, M., & NAVINDGIKAR, N. (2020, JULY 17). FORMULATION AND EVALUATION OF POLYHERBAL CREAM. INTERNATIONAL JOURNAL OF CURRENT PHARMACEUTICAL RESEARCH.
9. SHIVATHAYA, NEHA & SURVE, RASHMI & SAWANT, RESHMA & KHOT, SUSHANT & BIRADAR, KISHOR & VERMA, RUCHIKA & GORAV, ANNAPURNA. (2022). FORMULATION AND IN VITRO EVALUATION OF ETHANOLIC EXTRACT OF POLYHERBAL FACE CREAM. INTERNATIONAL JOURNAL OF CURRENT PHARMACEUTICAL RESEARCH. 41-47. 10.22159/IJCPR.2022V14I2.1950.
10. CHAUHAN, LALITA, AND SHALINI GUPTA. "CREAMS: A REVIEW ON CLASSIFICATION, PREPARATION METHODS, EVALUATION AND ITS APPLICATIONS." JOURNAL OF DRUG DELIVERY AND THERAPEUTICS 10.5-S (2020): 281-289.