WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 4, 977-989. Research Article ISSN 2277–7105

FORMULATION AND EVALUATION OF AMARANTHUS DUBIUS ANTIOXIDANT CREAM

Ms. Ahalya P.R.*[1], Ms. Aleena S.S.[2], Ms. Amrutha A.S.[3], Ms. Meenakshi L. Jayan[4], Ms. Sivani Sajan[5], Mrs. Silpa S.S.[6]

[1,2,3,4,5]Students of The Dale View College of Pharmacy and Research Centre

[6]Assistant Professor, Department of Pharmaceutics, The Dale View College of Pharmacy and Research Centre, Punalal 695575, Kerala, India.

Article Received on
29 Dec. 2024,

Revised on 19 Jan. 2025,
Accepted on 09 Feb. 2025

DOI: 10.20959/wjpr20254-35604

***Corresponding Author**
Ms. Ahalya P.R.
Students of The Dale View College of Pharmacy and Research Centre Punalal 695575, Kerala, India.

ABSTRACT

Cosmetics means any article intended to be used by means of rubbing, sprinkling or by similar application to the human body for cleansing, beautifying, promoting attractiveness, altering the appearance of the human body and for maintaining health of the skin and hair. The aim of this project was to formulate and evaluate the cold cream containing *Amaranthus dubius* extract. The main ingredient of our study was *Amaranthus dubius*, and it was choosen because of its high antioxidant property. Free radicals causes damage to the skin and interfere with our appearance, so flavonoids such as lutein, quercetin etc…which are found in red spinach, can be utilized as an antioxidant source to prevent free radical damage. The herbal cosmetics have been the first choice of customers due to its potency, accessibility, and perceived lack of negative effects. Several techniques were used to evaluate the formulated cream's quality. The prepared cream's physical characteristics remained unchanged. During the research period, the cream's formulation demonstrated satisfactory consistency, spreadability, pH, and no signs of phase separation. The red spinach extract containing cold cream provides cooling effect due to slow evaporation of water.

KEYWORDS: Cosmetics, *Amaranthus dubius*, antioxidant property, cold cream.

INTRODUCTION

Cosmetics refers to any product designed to be applied to the human body by rubbing,

sprinkling or other similar ways inorder to cleanse, beautify, promote attractiveness or change the appearance. Examples of cosmetics: Skin care creams, powders, lotions, lipsticks, nail polishes, eye and face makeup, deodorants, baby products, hair colorants and sprays etc.[1]

Cosmetics are classified into 4 types

1. Skin cosmetics
2. Hair cosmetics
3. Nail cosmetics
4. Cosmetics for hygiene purpose.[1]

Cold cream

Cold cream is a water in oil type emulsion used to smoothen the skin and remove makeup. Cold creams are so named because of the cooling impact they have when applied. The oil phase makes up the majority of cold cream. Therefore, it is an oil based semi-solid preparation. The cold cream base was prepared using natural materials like beeswax, lavender oil, coconut oil, aloe vera and different amounts of red spinach extract.

Ideal characteristics of cold cream

- It should have a low sensitivity index and elegant in appearance
- It should not cause dehydration or irritation.
- It must provide a smooth consistency and must be non greasy.
- It should not impair the membrane or skin functions.[2]

Advantages of cold cream

- It acts as a moisturizer and generally beneficial for dry skin.
- Makeup removal is possible by using it.
- It is sometimes used to prep the face for makeup application.
- They keeps the skin hydrated and protected from harm.

Uses of cold cream

Uses of cold cream depend on the ingredient present in the cream are:

- Medicated cold cream is a topical medication used to treat skin conditions.
- Helps to keep the skin's moisture balance and prevent harsh skin problems.
- It is primarily used for non-medicinal purposes and as a makeup-removing cleanser.
- Used to produce an emollient effect.

- Acts as a chemical barrier along with sunscreen compounds.
- To eliminate oil soluble contaminants from skin.[3]

Cosmeceuticals

Cosmeceuticals is a term that combines medications and cosmetics. Cosmeceuticals are cosmetics that contain biologically active chemicals that claim to have therapeutic or pharmacological properties. In addition to being used to cure various dermatological disorders, cosmetics are utilized to nourish and enhance the appearance of skin.

Herbal cosmetics

Herbal cosmetics, often known as nature cosmetics. Herbal skin care products are safe and protect the skin from external factors. It enhances the look of the skin. Cosmetics are substances used to the face and hands to soothe skin, promote beauty, and enhance appearance without altering body functions or structure. Herbal cosmetics are becoming increasingly popular and essential for daily skin care.[4]

Advantages of herbal cosmetics

- Herbal cosmetics are free of synthetic chemicals.
- They are hypoallergenic and dermatologist tested for safety.
- These natural substances prevent skin rashes and itching.
- These products are less expensive than synthetic ones.[5]

MATERIALS AND METHODS

Materials

1. **Red spinach (*Amaranthus Dubius*):** Red spinach contains lutein, vitamin c, beta carotene which acts as antioxidants and they can act inhibit free radicals and reactive oxygen species (ROS). Antioxidant effect for facial skin care would be better formulated in a topical form.[6,7]

Fig. 1: Red spinach.

2. **Beeswax:** It can protect the skin from irritants when applied to the skin. It acts as an emulsifier. They moisturises and soothens the skin and act as natural exfoliator. It is an antibacterial agent and can fight against skin conditions like acne, dry skin and eczema.[8]

Fig 2: Beeswax.

3. **Aloe vera:** Aloe vera produces soothing effect on skin and reduces inflammation. It also provides a cooling sensation and can shield from sunburn. They helps in wound healing and promotes collagen synthesis. They are also rich in antioxidants and minerals which accelerates healing process.[9]

Fig 3: Aloevera.

4. **Shea butter:** They have high release rate and spreadability due to unique composition of fatty acid. It nourishes the skin and prevents dryness. They also have sun protecting properties at a mild level due to presence of vitamin A and E.[10]

Fig. 4: Shea butter.

5. **Almond oil:** They can enhance skin tone, hydrates and moisturizes the skin and also aid with puffiness beneath the eyes and dark circles.[11]

Fig. 5: Almond oil.

6. **Glycerine:** Glycerine is used as humectant, providing deep hydration and preventing moisture loss. It is especially beneficial for dry conditions, effective in cold weather keeping the skin soft.[12]

Fig 6: Glycerine.

7. **Lavender oil:** Lavender oil which is commonly used as a fragrance, prevent and heal acne

break-outs, unclog pores and reduces inflammation. It soothens eczema, dry, itchy and scaly skin.[13]

Fig. 7: Lavender oil.

8. Methylparaben: Methyl paraben is commonly used as an antibacterial preservative in cosmetics, food, and pharmaceutical formulations. Most of the parabens like methyl paraben, ethyl paraben and propyl paraben are found in makeup, moisturisers, hair care and shaving products. They helps to prevent microbial growth and maintain product purity.[14]

Fig. 8: Methyl paraben.

METHODOLOGY

Collection of Red spinach (*Amaranthus dubius*)

The fresh leaves were collected, washed, and shade dried and the dried leaves were powdered and weighed.

Preparation of Red spinach extract

The dried powder of red spinach was accurately weighed and extracted with 95% ethanol (1:10) using Soxhlet apparatus. The extraction was carried out for 6- 8 hours. The collected extract

has undergone the steam distillation in order to remove the excess of ethanolic solvent and the remaining concentrate was used for the preparation of cream.[15]

Fig. 9: Red spinach extraction by soxhlet apparatus.

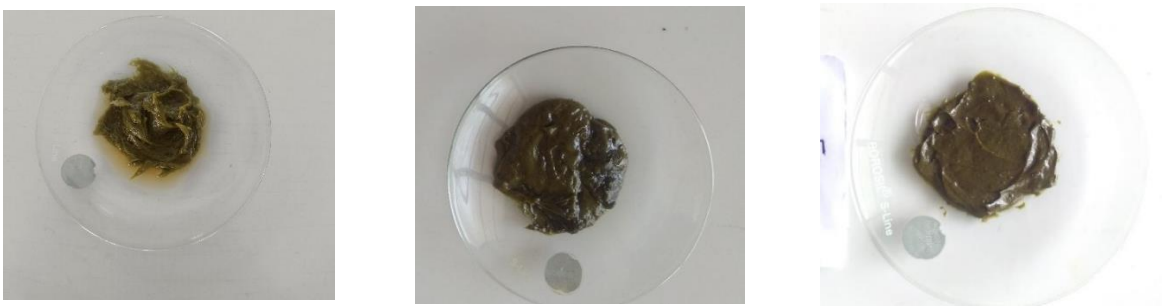
Formulation table and uses of the ingredients

Ingredients	F1	F2	F3	Uses
Redspinach extract	2	2	2	Antioxidant
Shea butter	3.5	4	4.5	Emollient
Bees wax	2.5	2	1.5	Thickening agent and emulsifier
Aloe vera gel	7.5	7.5	7.5	Soothing effect
Almond oil	6	6	6	Emollient
Glycerine	4	4	4	Humectant
Lavender oil	0.6	0.6	0.6	Fragrance
Methyl paraben	0.3	0.3	0.3	Preservative
Water	q.s	q.s	q.s	Solvent

Preparation of red spinach cold cream

To prepare the oil phase weigh bees wax, shea butter in required quantities and transferred to a beaker, add almond oil along with it and heat at a temperature of 70 ℃ to melt the ingredients. To another beaker add aloevera gel, glycerine, methyl paraben, distilled water and heat it at same temperature which is the aqueous phase The aqueous phase is added to oil phase with

continuous stirring until the smooth creamy emulsion is formed. Then, add red spinach extract and lavender oil to the prepared cream at 40 ℃.



F1 **F2** **F3**

Fig. 10: Preparation of *Amaranthus dubius* cold cream.

Evaluation of *Amaranthus dubius* antioxidant cream

1. Organoleptic characters: This is done by the manual evaluation of the physical characteristics of the cream based on its colour, odour, consistency or texture.
2. pH: The pH meter was calibrated using standard buffer solution. Weigh about 0.5 g of cream and dissolved in 50 ml distilled water and pH was measured using the digital pH meter.[16],[17]
3. Spreadability: Spreadability may be expressed as the extent of the area to which the topical application spreads when applied to the affected parts on the skin. 1g sample was placed between two glass slides and a weight of 100g was applied above it for a specified time period.[18]

   The spreadability was calculated by the formula,

   S = m x L/T, where S- spreadability

   m- weight applied on glass slide L- length moved on glass slide

   T – time taken
4. Test for microbial growth: Agar media was prepared and then the formulated cream was inoculated on the plate's agar media by streak plate method and a controlled is prepared by omitting the sample. These plates were incubated in 37 ℃ for 24 hours. After the incubation period the plates were taken out and the microbial growth were checked and compared with the control.[2]
5. Dilution test: In this test type of emulsion is determined by diluting the emulsion either with water or oil. The emulsion is completely miscible with water if its is o/w type, as the dispersion medium is water and separates out if it is w/o type emulsion. Similarly, w/o

type emulsion is miscible, if the emulsion is dissolved in oil but o/w type of emulsion is immiscible in oily liquid.[19]

6. Determination of antioxidant activity by DPPH ASSAY: DPPH Radical Scavenging Assay Procedure: Different concentrations of sample such as 125ug/mL-200ug/mL from stock solution were made up to a final volume of 20ul with DMSO and 1.48ml DPPH (0.1mM) solution was added. The test substance was omitted from the control, but the same volume of distilled water was added. The reaction mixture was allowed to sit at room temperature for 20 minutes in a dark room. After 20 minutes, the absorbance of the mixture was read at 517nm (SHIMADZU(UV-1900i)UV-VIS spectrophotometer). 3ml of DPPH was taken as control.[20]

RESULTS AND DISCUSSION

1. Organoleptic properties:

Colour -green colour

Odour - characteristic odour

Texture -smooth texture

Fig: *Amaranthus dubius* antioxidant cold cream

2. pH: Generally the pH of the cold cream should be ideally in the range of 4.5 to 6.5. The pH of the *Amaranthus dubius* antioxidant cream for F3 formula was found to be 5.83.

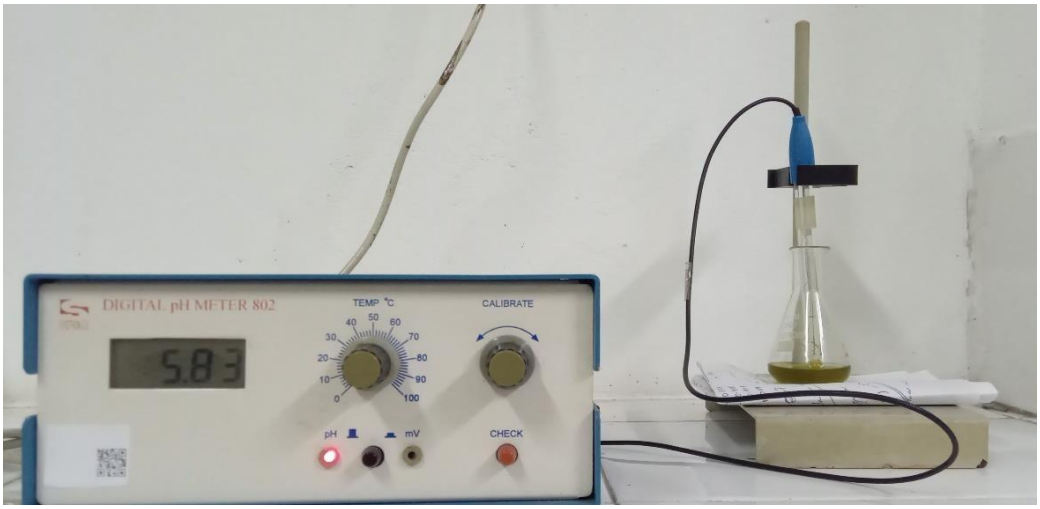


Fig 12: pH meter.

3. Spreadability test: The spreadability test showed that the formulated cream has good spreadable property.

Fig. 13: Spreadability test.

4. Test for microbial growth: There was no signs of microbial growth after 24 hours of incubation at 37 ℃ and it was comparable with the control.

Fig 14: Microbial test.

5. Dilution test: The formulated cream is w/o type emulsion.

Fig 15: Dilution test.

6. Determination of antioxidant activity by DPPH ASSAY

Result

- The antioxidant activity of F3 was evaluated using the DPPH assay. The results are presented as the percentage inhibition of DPPH radical by different concentrations of the sample.[7]
- The percentage of inhibition increased with increasing concentrations of the sample, indicating a dose-dependent antioxidant effect.
- The IC50 value of sample F3 was determined to be 223.09026 ug/ml, indicating its moderate antioxidant potential.

DISCUSSION

- IC50 represents the concentration required to inhibit 50% of DPPH radicals, with lower values suggesting stronger antioxidant activity. The results suggests that Sample F3 possesses free radical scavenging activity, which may be attributed to the presence of bioactive compounds with antioxidant properties.
- These findings highlight the potential of Sample F3 as a natural antioxidant source. However, further studies, such as total phenolic content analysis and mechanistic evaluations, are necessary to confirm the active constituents responsible for the observed activity.

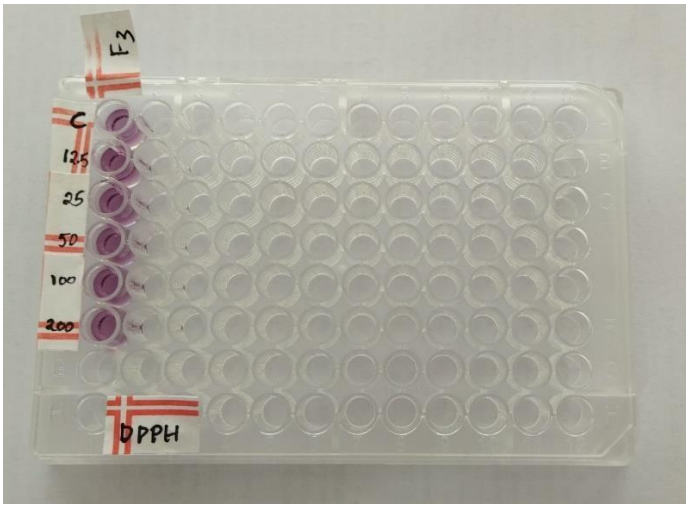


Fig. 16: Determination of antioxidant activity by DPPH ASSAY.

CONCLUSION

The aim of our study was to formulate an antioxidant cream using *Amaranthus dubius*. Soxhlet method was used for the extraction process. This extract was then used to prepare three formulations: F1, F2, and F3 by mixing aqueous and oil phase. Various evaluation tests were conducted as per the established protocol among the three formulations. The spreadability test of F3 confirmed that the cream spreads easily also the dilution test demonstrated that it is readily diluted. The microbial test was conducted and no sign of microbial growth was detected. The antioxidant activity of the final formulation was assessed using the DPPH assay method, and the highest antioxidant activity was observed at a concentration of 223.09 ug/ml. Based on these evaluation parameters, F3 was determined to be the most suitable formulation for cream preparation.

REFERENCES

1. Sharma G, Gadhiya J, Dhanawat MJDoP, Mewar University, Rajasthan-312. Textbook of cosmetic formulations, 2018; 901.
2. Sharma A, Banyal M, Gupta J, Joshi SJI. Formulation and evaluation of herbal cold cream, 2019; 9(3): 2578-87.
3. Patil R, Patil G, Patil M, Patil PJAJoBS, Research. Formulation and Evaluation of Herbal Cold Cream by Mimosa pudica Plant Extract, 2024; 6(3): 28-37.
4. Devi N, Kumar A, Garg A, Hussain A, Khathuriya RJWJoPR. A review on herbal cosmetics, 2018; 7(8): 298-310.
5. Kaur L, Singh AP, Singh AP, Kaur TJIJoP, Analysis D. A review on herbal cosmetics, 2021; 9(3): 196-201.

6. Rosyidah KA, Rahmawati RP, Fadel MN, editors. the effect of red spinach (Amaranthus Tricolor L.) leaf ethanol extract concentration on the physical quality of face serum and antioxidant activity using 2, 2-diphenyl-1-picryl-hydrazyl-hydrate (DPPH) method. The International Conference on Public Health Proceeding, 2021.
7. Rahman A, Latief R, Kartono H, editors. Extraction and analysis of lutein and antioxidant activities from red spinach's root, stem, and leaf. IOP Conference Series: Earth and Environmental Science; 2023: IOP Publishing.
8. Bogdanov SJTBB. Beeswax: uses and trade, 2009; 1-16.
9. Sharma P, Kharkwal AC, Kharkwal H, Abdin M, Varma AJIJPSRR. A review on pharmacological properties of Aloe vera, 2014; 29(2): 31-7.
10. Abdul-Mumeen I, Beauty D, Adam AJAJoBR. Shea butter extraction technologies: Current status and future perspective, 2019; 13(2): 9-22.
11. Javaid T, Mahmood S, Saeed W, Qamrosh MJAsnh. A critical review in varieties and benefits of almond (Prunus dulcis), 2019; 3(11): 70-2.
12. Lindsay WLJEMJ. Experimental Notes on Glycerine, 1856; 2(3): 207.
13. Cavanagh HM, Wilkinson JMJAic. Lavender essential oil: a review, 2005; 10(1): 35-7.
14. Naik KM, Nandibewoor STJS, Physical AA. Electroanalytical method for the determination of methylparaben, 2014; 212: 127-32.
15. Pradana DA, Pondawinata M, Widyarini S, editors. Red spinach (Amaranthus tricolor L.) ethanolic extract as prevention against atherosclerosis based on the level of Low-Density Lipoprotein and histopathological feature of aorta in male Sprague-Dawley rats. AIP Conference Proceedings; 2017: AIP Publishing.
16. Mahajan A, Godi S. FORMULATION AND EVALUATION OF MULTIPURPOSE HERBAL COLD CREAM.
17. Nayana P, Navyashree P, Nithyashree H, Pavan N, Preethi N, Rakshitha CJJoPI, et al. A Review on the Formulation and Evaluation of Herbal Cold Creams Incorporating Natural Oils., 2024; 2(4): 207-11.
18. Yadav R, Thakur S, Parihar R, Chauhan U, Chanana A, Chawra HSJIJISRT. Pharmaceutical preparation and evaluation of cold cream, 2018; 8(5): 1069-72.
19. Sirsat SV, Rathi NM, Hiwale AS, Shelke PBJWJoPR. A review on preparation and evaluation of herbal cold cream, 2022; 11(5): 690-7.
20. Chang S-T, Wu J-H, Wang S-Y, Kang P-L, Yang N-S, Shyur L-FJJoA, et al. Antioxidant activity of extracts from Acacia confusa bark and heartwood, 2001; 49(7): 3420-4.