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FORMULATION AND EVALUATION OF POLYHERBAL CREAM: A BOTANICAL BLEND FOR ENHANCED SKIN CARE

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ABSTRACT

Herbal medicines play an important role in health services around the globe. About three quarters of the world population relies on plants and plant extracts for health care. A large number of Indian medicinal plants are attributed with various pharmacological activities that are widely incorporated into various formulations of cosmetics as well as other medicines.

The study focuses on formulation of a Polyherbal Cream that incorporates the potential benefits of turmeric, aloe vera, hibiscus, and moringa oleifera. These natural ingredients have been widely recognized for their medicinal properties and have been traditionally used in skincare remedies.

Furthermore, phytochemical screening was performed to identify and quantify the bioactive compounds present in the polyherbal cream. Screening of phytochemical constituents facilitates the assessment of potential therapeutic properties of the cream and understand the chemical composition responsible for its effectiveness. In the evaluation phase, various parameters were assessed to determine the cream's quality and efficacy. These included appearance, texture analysis, spreadability, homogeneity, viscosity and potential therapeutic benefits such as antioxidant and anti-bacterial properties. Among all the prepared formulations (F1-F5). F5 optimized formulation was found to be good in terms of Antibacterial activity, spreadability, Homogeneity, Irritancy, pH, Washability and Dye-solubility. The presence of bioactive compounds and the synergistic effect of these ingredients contribute to the cream's therapeutic properties, including antioxidant and anti-bacterial effects.

Keywords: Polyherbal cream, Turmeric, Aloe vera, *Hibiscus*, *Moringa oleifera*, Anti-oxidant, Anti-bacterial

INTRODUCTION:

Skincare has always been a topic of interest, and in recent years, there has been a growing demand for natural and plant-based products in the cosmetic industry. This is because of their high-quality properties and less side effects. Additionally, it also provides the skin with necessary nutrients and required moisture. The natural content in the herbs does not cause any effects on the human body but these herbal remedies enrich the body with other useful minerals. There is now, however, increased scientific evidence that plants possess a vast and complex arsenal of active ingredients (photochemical) which could not only calm or smooth the skin but also restore actively, heal and protect the skin **[1]**.

Herbal cosmetics can be defined as "The preparations that contain phytochemical constituents from a wide range of botanical sources, that influences the function of skin and provide necessary nutrients and minerals that aid in maintenance of healthy skin". One such successful formulations include Polyherbal creams **[2, 3]**.

The Polyherbal cosmetic formulation is receiving recognition all over the world, as they give the enhanced feeling of purity, protection and effectiveness. A large quantity of cream exists in the market that use synthetic polymers, emulsifiers, perfuming agents, pigments, surfactant and thinkers to form the base. There is wide need to substitute such toxic synthetic agents from base using natural agents **[4]**.

The Polyherbal creams combine multiple plant extracts to harness their potential benefits for the skin. In this study, we focus on four major ingredients: turmeric, aloe vera, hibiscus, and moringa oleifera. These plants have been widely recognized for their potential therapeutic properties and have shown promising results in various skincare applications.

In this study, our main objective is to prepare and evaluate a polyherbal cream using these four major ingredients. We aim to develop a formulation that combines the potential benefits of each ingredient to create a synergistic effect, enhancing the overall efficacy of the cream. To achieve this, we carefully selected and combined the ingredients in optimized proportions, considering their compatibility and stability **[5]**.

The preparation process involves various techniques, including extraction methods to obtain the active components from each plant. We also focus on the formulation methods, ensuring the stability and consistency of the final product.

Furthermore, phytochemical screening was performed to identify and quantify the bioactive compounds present in the polyherbal cream. This screening facilitates the assessment of potential therapeutic

properties of the cream and understand the chemical composition responsible for its effectiveness. The physical characteristics of the cream, such as its appearance, texture analysis, spreadability, homogeneity, viscosity and potential therapeutic benefits such as antioxidant and anti-bacterial properties are evaluated to ensure an appealing and user-friendly product **[5]**.

MATERIALS AND METHODS

Collection of plant material:

Aloe vera, Hibiscus Flowers, Moringa leaves were collected from the garden of Gokaraju Rangaraju College of Pharmacy, and the dried rhizomes of turmeric were collected from the local market.

Table 1: Excipients and herbal ingredients with their roles [6]

S. No.	Ingredients	Role
1.	Aloe vera extract	Anti-Ageing, Anti inflammatory
2.	Turmeric extract	Anti-bacterial
3.	Hibiscus extract	Anti-oxidant property
4.	Moringa extract	Anti-oxidant property
5.	Methyl paraben	Preservative
6.	Ethyl cellulose	Binder
7.	Cetyl alcohol	Stabiliser, emulsifier
8.	Lanolin	Emollient
9.	Mineral oil	Prevents water loss
10.	Stearic acid	Thickening agent
11.	Glycerine	Moisturizing agent
12.	Potassium Hydroxide (KOH)	pH adjuster
13.	Triethanolamine	Emulsion stabiliser
14.	Rose water	Essence, reduce redness
15.	Water	Vehicle

EXTRACTION PROCESS:

Method of extraction of Aloe vera:

Fresh, mature leaves were removed from the plant and cleaned with distilled water. A sterilized knife is used to cut the leaf longitudinally. Next, semi-solid aloe vera is gathered. To get a uniform extract, the semi-solid mass was constantly crushed in a mortar and pestle. Aloe vera extract is acquired and kept in storage **[7]**.

Method for extraction of Turmeric rhizomes:

Turmeric rhizomes that had been dried and ground into powder were gathered from the market. Five grams of the aforementioned powder were taken, and it was cooked for five to 10 minutes in 50ml of ethanol. To get rid of the contaminants, filter paper was used to filter the resulting extract **[8]**.

Method of extraction of Moringa:

After being plucked from the plant, fresh moringa leaves were properly cleaned. For 15 minutes, 5 grams of leaves were cooked in 25 ml of ethanol. The extract was boiled, cooled, and the filtrate was collected **[9]**.

Method of extraction of Hibiscus Flowers:

Fresh hibiscus flowers were picked and thoroughly cleaned. Superfluous material was eliminated. After boiling flowers in 50 ml of ethanol for 20 to 30 minutes, the extract is cooled and filtered **[10]**.

Figure 1: Prepared herbal extracts

PHYTOCHEMICAL SCREENING OF EXTRACTS [11]

To determine the nature and chemical makeup of an extract, various qualitative chemical tests are conducted to create a profile. To identify the different phytoconstituents that were present in the extracts, the following tests were run on them.

Test for Flavonoids:

1) Shinoda test: Add 0.5 gm of magnesium turnings, a few drops of concentrated hydrochloric acid, and 5ml of 95% ethanol/t-butyl alcohol to dry powder or extract. Flavanols, dihydro derivatives, and xanthene appear in colours ranging from orange to pink, red, and purple. To prevent accidents from a violent reaction and to dissolve the coloured compounds into the upper phase, add t-butyl alcohol before adding the acid. Only flavanols, not flavanones or flavanols, produce a strong pink to magenta colour or no colour when zinc is substituted for magnesium.

2) Sulphuric acid test: Flavones and flavanols dissolve into the sulphuric acid (66% or 80%) and produce a rich yellow solution. Red or reddish-blue solutions are produced by chalcones and aurones. Orange to red colours come from flavones.

3) Lead acetate solution should be added to modest amounts of residue. Precipitation with a yellow hue formed.

4) When HCl and zinc dust are heated together, a pink to red colour is produced.

Test for alkaloids:

1) Dragan Dorf's test: Add a few drops of Dragan Dorf's reagent (potassium bismuth iodide solution, comprising potassium iodide (KI), tartaric acid, and basic bismuth nitrate (Bi $(NO_3)_3$) to 2-3 ml of filtrate. Precipitate in orange is produced.

2) Mayer's test: A few drops of Mayer's reagent (a solution of potassium iodide (5g) and mercuric chloride (1.36g) in 100ml of

water) were added to 2-3ml of filtrate, along with the test tube's sides. A white or creamy precipitate is produced if the test is positive.

3) Wagner's test: Wagner's reagent (2 grams of iodine and 6 grams of potassium iodide in 100 ml of distilled water) was added to a few ml of filtrate, along with the test tube's sides. The reddish-brown precipitate's formation verifies a positive test result.

4) Hager's test: Hager's reagent (dissolved 1 g of picric acid in 100 mL of water) was added to a few ml of filtrate, 1-2 ml at a time. A noticeable yellow precipitate suggests a successful test.

5) Tannic acid test: Precipitate with a buff colour is produced when tannic acid solution is added to the test solution.

Test for Tannins and Phenolic compounds:

1) **5% ferric chloride test:** Add a few drops of 5% ferric chloride solution to 2-3 ml of alcoholic or aqueous extract; a vivid blue-black colour develops.
2) **Lead acetate test:** Add a few drops of lead acetate solution to 2-3 ml of alcoholic or aqueous extract, and watch for the precipitate.
3) **Gelatin test**: Add a few drops of the gelatin test solution to 2-3 ml of alcoholic or aqueous extract; a white precipitate was formed.
4) **Diluted iodine solution test:** Add a few drops of diluted iodine solution to 2-3 ml of aqueous extract or alcoholic extract; a brief red coloration results were obtained.
5) **Bromine water test:** A few drops of bromine water were added to 2-3 ml of aqueous or alcoholic extract, and the result was a decolorization of the water.

FORMULATION OF HERBAL CREAM: [12]

Polyherbal cream (F1-F5) formulations were formulated using various natural herbal extracts like aloe vera, turmeric, moringa and hibiscus extracts respectively given in **Table 2**.

Table 2: Formulation table of herbal cream (100g)

S. No.	Ingredients	F1 (Aloe vera)	F2 (turmeric)	F3 (moringa)	F4 (hibiscus)	F5 (poly herbal cream)
1	Aloe extract	2ml	-	-	-	2ml
2	Turmeric extract	-	2ml	-	-	2ml
3	Moringa extract		-	2ml	-	2ml
4	Hibiscus extract	-	-	-	2ml	2ml
5	Cetyl alcohol	2ml	2ml	2ml	2ml	2ml
6	Lanolin	1ml	1ml	1ml	1ml	1ml
7	Mineral oil	2ml	2ml	2ml	2ml	2ml
8	Stearic acid	13 ml	13ml	13ml	13ml	13ml
9	Glycerine	12ml	12ml	12ml	12ml	12ml
10	Methyl paraben	o.15ml	0.15ml	0.15ml	0.15ml	0.15ml
11	KOH	1ml	1ml	1ml	1ml	1ml
12	Ethyl cellulose	3ml	3ml	3ml	3ml	3ml
13	Tri- ethanolamine	3ml	3ml	3ml	3ml	3ml
14	water	q. s	q. s	q. s	q. s	q. s
15	Rose water	q. s	q. s	q. s	q. s	q. s

Preparation of Oil phase

After weighing and heating lanolin and stearic acid to 70°C in a glass beaker, mineral oil and cetyl alcohol were added. Using the stirrer, the contents were continuously combined. The temperature was kept constant at 70°C. used a thermometer to regularly check the temperature.

Figure 2: Preparation of cream

Preparation of Aqueous Phase

Each watery ingredient (KOH, ethyl cellulose, triethanolamine, methyl paraben, and glycerine) was weighed and added to a beaker along with a predetermined volume of water. Using a stirrer, the contents were well combined until they were completely dissolved. A constant temperature of 70°C was maintained.

Preparation of cream base

Once the necessary temperature was reached, the contents of the aqueous phase were put into a mortar, and the contents of the oil phase were gradually added to the mixture above while being stirred constantly until a smooth, uniform cream was produced.

Preparation of Herbal Cream

Fresh herbal extracts, such as F1 (aloe vera extract), F2 (turmeric extract), F3 (moringa extract), F4 (hibiscus extract), and F5 (combination of all extracts), were added to the produced cream in amounts of 2 milli-litre each, and stirring was continued until a smooth cream was formed. For aroma, rose oil (q.s) was added. Prepared herbal creams were shown in **Figure 3**.

Figure 3: Herbal cream Formulations (F1-F5)

EVALUATION OF HERBAL CREAM: [13]

1. Physical evaluation

Every prepared cream (F1–F5) underwent a physical evaluation for the colour, odour, texture and state of cream and observations was recorded.

2. Irritancy test:

A 1cm^2 region on the lefthand dorsal surface was marked to test for irritability. Up to twelve hours, cream was applied to that region, and it was monitored every hour. Erythema, oedema, and irritant impact were examined.

3. Appearance

The formulations were stored for a considerable amount of time, and a colour shift was noted.

4. Texture:

A predetermined quantity of herbal cream was administered, and any greasiness or emollience was observed.

5. Homogeneity:

A tiny amount of prepared cream was pressed between the thumb and index finger for this test. Visual inspection was used to analyse it and report any clogs found or made visible.

6. Spreadability:

One gram of cream was placed on a glass slide, and the diameter of the cream spread was measured both before and after 150 grams of weight were maintained. The term "spreadability" refers to the region across which a cream spreads easily when applied to the skin.

7. Dye solubility test:

In order to conduct the tests, the cream is mixed with amaranth, a red dye that dissolves in water. A drop of the cream is then placed on a glass slide, covered with a coverslip, and examined under a microscope. The cream is of the o/w type if the continuous phase is red in colour. The cream is w/o type if the dispersion phase appears red in colour **[14]**.

8. pH:

A digital pH meter was used to measure the produced cream's pH. After making the cream solution with 100 milli-litres of distilled water, it was left for two hours. The pH average (n=3) was found.

9. Viscosity:

The viscosity of the formed cream (F1-F5) was measured using a Brookfield viscometer with spindle number 63, 2.5 rpm, and 25˚C.By multiplying the matching dial value by the factor listed in the Brookfield Viscometer catalogue, the viscosity of the cream was determined.

10. Anti-Bacterial Studies: [15]

Zone of Inhibition:

Antimicrobial discs have a distinct circular zone surrounding them that is impermeable to bacterial growth. The bacteria's sensitivity to antibiotics can be gauged using the zone of inhibition. Due to the antibacterial properties of turmeric, several extracts are used to make polyherbal cream. The cup diffusion method is utilized to ascertain their antibacterial activity.

Preparation of agar medium:

Weighed amounts of the specified ingredients given in **Table 3** should be taken first. In a conical flask, bring the necessary amount of water to a boil. Once the boiling is complete, gradually add the measured amount of peptone. Next, pour in the measured amount of beef extract. Finally, sodium chloride had to be added. should fully combine all of the ingredients. Cool the contents now to prevent bacterial deterioration. The bacteria will break down if the contents are heated. Add the bacillus positive bacteria to the flask when it has cooled. (To avoid contamination, the whole bacterial addition process should be carried out in a laminar flow.)

Now fill the petri dish with the bacterial agar solution and set it aside to cool and harden. Now, use the borer to create the cavities in the agar medium. Once each petri dish has two cavities created, fill the wells with various extracts. Place the petri plates in an incubator for a full day after pouring to allow for microbial development and to prevent contamination. Measure the diameter of the zone of inhibition and examine the proliferation of microorganisms **[16]**.

Table 3: Ingredients for preparation of agar medium

S. No.	Ingredients	Quantity (gm)
1	Beef extract	10
2	Peptone	10
3	Sodium Chloride	5
4	Agar	4
5	Water	Quantity sufficient

RESLUTS AND DISCUSSION

Creams are dosage forms that are semisolid and mostly intended for external use. They usually have an oily internal phase and an aqueous outside phase, which are two immiscible phases. Cream dosage forms were chosen because of the emulsified nature of skin, which allows them to interact with skin more effectively and pass through biological membranes more readily. An attempt has been made to compare each extract separately with the combination of all extracts in this inquiry. Different herbal extracts, such as aloe vera (F1), turmeric (F2), moringa (F3), and hibiscus flower (F4), have been used both separately and in combination to moisturise the membrane in the form of a cream.

Aloe vera (F1), turmeric (F2), moringa (F3), hibiscus flower (F4), and a mixture of all extracts (F5) were the extracts that were used to create the herbal moisturizing creams (o/w) emulsion. Each extract was used at a concentration of 2 milli-litres to create a poly herbal cream.

1. Phytochemical screening test were done for the obtained extracts

The prepared herbal extracts of aloe vera, hibiscus, turmeric, and moringa were used to make herbal creams and are now being screened for phytochemicals. **Table 4** displays the presence of flavonoids, alkaloids, phenols, and tannins as a result of the results.

2. Antioxidant activity of moringa extract

The antioxidant properties of moringa extract and hydrogen peroxide scavenging assay technique have been examined. When compared to the conventional antioxidant property of ascorbic acid of value (34) for moringa extract, the obtained Ic 50 values are around 31. Consequently, it was discovered that moringa extract had strong antioxidant qualities given in **Table 5**. In order to include this feature into the cream, this extract has been employed in the creation of poly herbal creams.

3. Evaluation tests:

a) Physical evaluation:

The prepared formulations were evaluated for colour, odour, texture and state and results given in **Table 6**. All the formulations prepared F1-F5 were found to be smooth, pleasant and were semisolid in nature.

b) Irritancy test:

The made-up herbal formulations F1 through F5 were tested for irritancy given in **Table 7**. During irritancy trials, no indications of redness, oedema, inflammation, or irritation were seen for any of the formulations. Therefore, using these formulations on skin is harmless.

c) Appearance

The created herbal formulations (F1–F5) were stored for a considerable amount of time, and throughout that time, no changes in the cream's colour were noticed.

d) Texture

After applying a specific volume of cream, all five of the herbal preparations (F1–F5) demonstrated good slipperiness, emollience, and the amount of residue left behind was determined to be satisfactory and results given in **Table 8**.

e) Homogeneity

The extracts were distributed uniformly throughout the cream in all five formulations (F1–F5). Both touch and visual appearance supported this.

f) Spreadability

Spreadability testing is done on all of the formulations, F1 through F5. The spreadability is improved if it takes less time to separate the two slides. As a result, F5 has superior spreadability over the other preparations, per the data given in **Table 9**.

g) Dye solubility test

The dye will dissolve in the water used to create the o/w type cream, giving it its red colour in the dye solubility test. Due to the presence of red in the continuous phase, all of the generated formulations (F1–F5) were determined to be oil in water type emulsions shown in **Figure 5**.

h) pH

It was discovered that the pH of the manufactured herbal creams F1–F5 ranged from 5 to 6.8. Every cream formulation had a pH that was closer to what was needed for skin. The poly herbal cream has a pH of 5.5, which is extremely close to the pH of the skin among the preparations given in **Table 10**.

i) Viscosity

The creams' viscosity, which ranged between 500 and 1000 cps, suggests that they spread easily with little shear. The spreadability of F3 and F4 is better than that of the other formulations and results given in **Table 10**.

j) Washability

When compared to the conventional limitations, which are less than 15 minutes, the formulated creams F1–F5, which were assessed for washability, are easily washable in 8–9 seconds given in **Table 10**.

k) Antibacterial activity

The diameter of the zones of inhibition (measured in milli-meters) for each product was measured and compared in order to conduct the antibacterial investigation. The area surrounding the well that is clear and contains an antimicrobial agent is known as the zone of inhibition. It is well established that an antimicrobial agent's potency increases with its zone of inhibition. The antibacterial activity against Bacillus positive was assessed separately for F1–F4 and collectively for F5 as shown in **Figure 6**.

According to the study, the poly herbal cream had the largest zone of inhibition (33 mm) when compared to other herbal creams made using separate extracts.

Table 4: phytochemical screening tests

S. No.	Chemical test	Turmeric	Hibiscus	Alo vera	moringa	colour
1	Test for Flavonoids Sulphuric acid test	✓	✓	✓	✓	Orange to red
2	Test for Phenols\Tannins Lead acetate test	✓	✓	✓	✓	Precipitate formed
3	Test for alkaloids Hager's test	✓	✓	✓	✓	Prominent yellow

Table 5: Anti-oxidant activity of moringa extract

S. No.	Treatment	Concentration (µg/mL)	% Inhibition	IC_{50}
1	Moringa extract	10 20 30 40 50	12.08± 0.5 24.08±0.22 39.09±0.6 47.16±0.3 54.02±0.1	31
2	Ascorbic acid	10 20 30 40 50	19.11 ± 0.22 30.07 ± 0.26 44.20 ± 0.32 54.16 ± 0.46 60.13 ± 0.29	34

Table 6: Physical properties of herbal creams F1-F5

S. No.	Parameters	F1 (Aloe vera)	F2 (Turmeric)	F3 (Moringa)	F4 (Hibiscus)	F5 (Polyherbal cream)
1	Colour	White	Yellow	Pale green	Ash	Mustard yellow
2	Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
3	Texture	Smooth	Smooth	Smooth	Smooth	Smooth
4	Physical state	Semi solid	Semi solid	Semi solid	Semi solid	Semi solid

Table 7: Irritancy test for herbal formulations F1-F5

S. No	Parameter	F1 (Aloe vera)	F2 (Turmeric)	F3 (Moringa)	F4 (Hibiscus)	F5 (poly herbal)
1	Erythema	Nil	Nil	Nil	Nil	Nil
2	oedema	Nil	Nil	Nil	Nil	Nil
3	Irritant effect	Nil	Nil	Nil	Nil	Nil
4	Inflammation	Nil	Nil	Nil	Nil	Nil

Table 8: Texture test for F1-F5

S. No.	Formulation	Texture	Homogeneity
1	F1(aloe vera)	Emollient, no greasy	Homogeneous
2	F2 (turmeric)	Emollient, no greasy	Homogeneous
3	F3 (moringa)	Emollient, no greasy	Homogeneous
4	F4 (hibiscus)	Emollient, no greasy	Homogeneous
5	F5 (poly herbal)	Emollient, no greasy	Homogeneous

Table 9: Spreadability test for formulations F1-F5

S. No	Formulation	Before diameter (in cm)	After diameter (in cm)
1	F1 (aloe vera)	2.5	7
2	F2 (turmeric)	2.0	6.5
3	F3 (Moringa	2.0	5.5
4	F4 (hibiscus)	2.5	7.0
5	F5 (polyherbal)	2.5	8.0

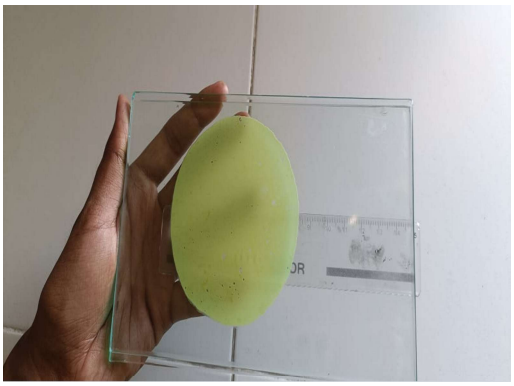
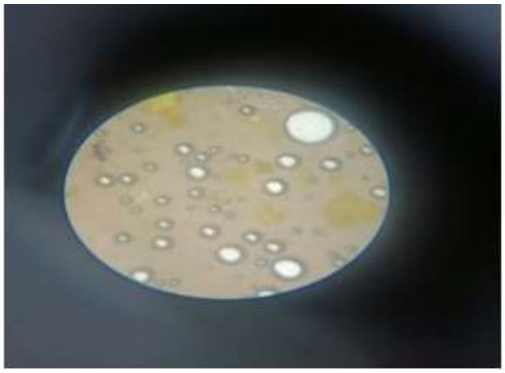


Figure 4: Spreadability of poly herbal cream



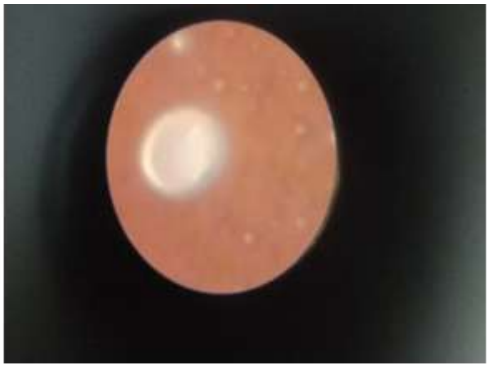


Figure 5: Before the addition of dye (F5) After the addition of dye (F5)

Table 10: pH, Viscosity and Washability of the herbal creams prepared F1-F5

S. No	Formulation	pH	Viscosity (cps)	Washability (in secs)
1	F1 (aloe vera)	5	630	10
2	F2 (turmeric)	5.9	591	8
3	F3 (moringa	6	580	9
4	F4 (hibiscus)	6.8	612	8
5	F5 (polyherbal)	5.5	720	8

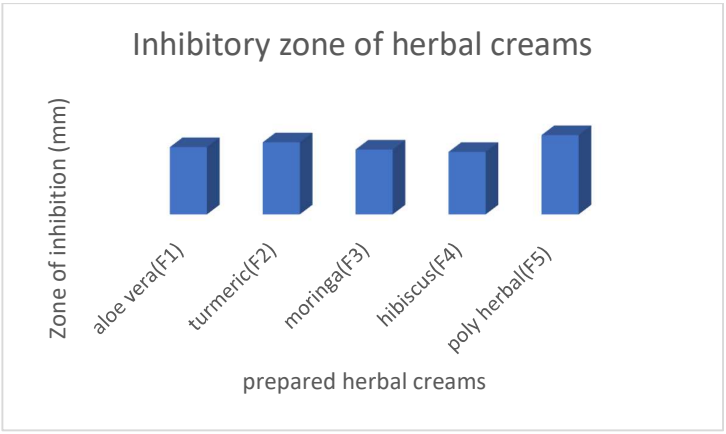


Figure 6: Zone of inhibition chart of the formulations F1-F5

CONCLUSION

The personal care system has seen a multiplication in the usage of cosmetics. The development of a multipurpose herbal skin cream that satisfied pertinent pharmacological requirements was accomplished by the use of extracts from aloe vera, turmeric, moringa, and hibiscus,

both alone and in combination (poly herbal) in the cream compositions. The manufactured creams (F1–F5) demonstrated a multifunctional impact, and each of the important activities of the herbal components utilized varied.

According to the results, all five formulations (F1–F5) were stable at room temperature and could be applied to the skin without risk. The herbal cream formulations that are developed have a semisolid consistency. Throughout the trial period, it was discovered that the herbal creams (F1–F5) had a decent appearance, were quite smooth, distributed well, were easily washable, and demonstrated good consistency.

Viscosity (720 cps), for example, was within the range. The developed formulations displayed an appropriate pH range of 5.5, which is around the pH range of human skin. This attests to the compositions' suitability for skin secretions.

The cream is also inexpensive because it was made with basic materials and a straightforward procedure. The herbal cosmetic formulation can be applied as a barrier to protect skin and is safe to use. The outcomes of various creams demonstrated that the composition might be applied topically to shield skin from harm.

Based on the current study, it can be said that creams with various herbs were superior to creams with just one herb since the qualities of each herb could be combined to provide a variety of benefits.

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COMPETING INTERESTS

Authors declare no competing of interests.

REFERENCES:

[1] Ribeiro, A.S.; Estanqueiro, M.; Oliveira, M.B.; Sousa Lobo, J.M. Main Benefits and Applicability of Plant Extracts in Skin Care Products. *Cosmetics* 2015, *2*, 48-65.

[2] Kumar M, Sumith & Swarnkar, Vandana & Sharma, Suhani & Baldi, Ashish. (2012). Herbal Cosmetics: Used for Skin and Hair. Inventi Rapid Cosmeceuticals. 2012. 1-7.

[3] Harry R.G, In: Modern Cosmeticology, Vol 1(Revision Eds), Wilkinson J.B., Clark.R., Green E., Mclaughlin T.P., 1962, Leonard Hill (Books) Ltd, London.

[4] 4. Kapoor, Shweta & Saraf, Prof. Swarnlata. (2010). Formulation and Evaluation of Moisturizer Containing Herbal Extracts for the Management of Dry Skin. Pharmacognosy Journal. 2. 409–417. 10.1016/S0975-3575(10)80024-0.

[5] Ankush Sharma, Bharat Prasar. Formulation and Evaluation of herbal cosmetic cream to produce multipurpose effect on skin. Res.J.Topical and Cosmetic Sci. 4(1): Jan.-June 2013 page 1-4.

[6] Bommakanti, V.; Puthenparambil Ajikumar, A.; Sivi, C.M.; Prakash, G.; Mundanat, A.S.; Ahmad, F.; Haque, S.; Prieto, M.A.; Rana, S.S. An Overview of Herbal Nutraceuticals, Their Extraction, Formulation, Therapeutic Effects and Potential Toxicity. *Separations* 2023, *10*, 177. https://doi.org/10.3390/separations10030177

[7] Sang-Tae Kim, Peter Pressman, Roger Clemens, Allison Moore, Ryan Hamilton, A. Wallace Hayes, The absence of genotoxicity of Aloe vera beverages: A review of the literature, Food and Chemical Toxicology, Volume 174, 2023, 113628, ISSN 0278-6915,

[8] Zielińska, Aleksandra *et al*. "Properties, Extraction Methods, and Delivery Systems for Curcumin as a Natural Source of Beneficial Health Effects." *Medicina (Kaunas, Lithuania)* vol. 56,7 336. 3 Jul. 2020, doi:10.3390/medicina56070336

[9] Nizioł-Łukaszewska, Zofia *et al*. "*Moringa oleifera L*. Extracts as Bioactive Ingredients That Increase Safety of Body Wash Cosmetics." *Dermatology research and practice* vol. 2020 8197902. 1 Jul. 2020, doi:10.1155/2020/8197902

[10] Ruban, P, and K Gajalakshmi. "In vitro antibacterial activity of Hibiscus rosa-sinensis flower extract against human pathogens." *Asian Pacific journal of tropical biomedicine* vol. 2,5 (2012): 399-403. doi:10.1016/S2221-1691(12)60064-1

[11] Dubale, Sileshi *et al*. "Phytochemical Screening and Antimicrobial Activity Evaluation of Selected Medicinal Plants in Ethiopia." *Journal of experimental pharmacology* vol. 15 51-62. 8 Feb. 2023, doi:10.2147/JEP.S379805

[12] Chavan, Prashant & Kalshetti, Mallinath & Navindgikar, Nikhil. (2020). Formulation And Evaluation of Polyherbal Cream. International Journal of Current Pharmaceutical Research. 75-77. 10.22159/ijcpr.2020v12i4.39086.

[13] Chauhan, Lalita & Gupta, Shalini. (2020). Creams: A Review on

Classification, Preparation Methods, Evaluation and its Applications. Journal of Drug Delivery and Therapeutics. 10. 281-289. 10.22270/jddt.v10i5-s.4430.

[14] Savrikar, Shriram & Lagad, C. (2010). Study of Preparation and Standardization of 'Maadhutailika Basti' with special reference to Emulsion Stability. Ayu. 31. 1-6. 10.4103/0974-8520.68190**.**

[15] Chen, Mei X *et al*. "Formulation and Evaluation of Antibacterial Creams and Gels Containing Metal Ions for Topical Application." *Journal of pharmaceutics* vol. 2016 (2016): 5754349. doi:10.1155/2016/5754349

[16] Tanaka, Tomohiro *et al*. "A hidden pitfall in the preparation of agar media undermines microorganism cultivability." *Applied and environmental microbiology* vol. 80,24 (2014): 7659-66. doi:10.1128/AEM.02741-14