Development and Assessment of a Herbal Cream Enriched with Wild Rue, Winter Cherry and Turmeric for Skin Disease Treatment

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Skin disease and skin infections are mostly caused due to physical injuries or bacterial infections. Herbal cream is preferred over other creams due to less side effects of allergic reactions and itching. In the present study, three types of creams (F1, F2 and F3) were prepared by adding different quantities of methanolic extract in dry powder of seeds of wild rue, winter cherry and the rhizome of turmeric and compared them with standard cream Betadine. The formulations formed were evaluated physically by examining them visually for their color, odor, homogeneity, spreadability, type of smear, emulsion, viscosity and uniformity of weight and skin irritancy of all the three herbal formulations (F1, F2 and F3) and marketed medical betadine cream and noted on 5 different days i.e., 0, 5, 10, 15 and 20 days. The maximum percentage yield was shown by F1 i.e., 42.37% containing 30g turmeric powder and 60 ml methanol. While the lowest i.e., 35.69% was shown by F3 consisting of 50g winter cherry powder and 100 ml methanol. The maximum and minimum antibacterial activity was exhibited by formulation F1 and standard cream at 1.5 mg/ml and 0.5 mg/ml respectively. The creams were oil in water-based and there was no irritation on the skin. This study showed that herbal creams contain natural ingredients that help to improve and satisfy customers because they have fewer adverse effects than synthetic products.

Keywords. Herbal Cream, Bacterial Infection, Betadine Cream, Natural Ingredients

Introduction.

Herbal formulation is a medicinal, thick, semi-solid ointment designed for topical application. Herbal formulations are growing in popularity as alternatives to conventional ointments due to their low cost, greater effectiveness and reduced side effects in treating skin conditions [1]. Creams, whether synthetic or natural are a soft form of dose in which medication ingredients are uniformly dissolved. Because of their high standards in terms of quality, success and efficacy, as well as their availability of novel components, the demand for herbal creams is rising alongside other herbal treatments [2]. Herbal medicated ointments or creams have a variety of uses, including astringents, emollients, antiseptics, protectants and antipruritics. Generally, ointments or creams are anhydrous but these can be formulated as water-soluble, absorptive and oleaginous [3]. No herbal cream has previously been formulated by combining Wild Rue, Winter Cherry and Turmeric for the treatment of skin diseases.

Objectives.

This study aims to develop and evaluate the efficacy of a herbal cream formulated with turmeric, wild rue and winter cherry for the treatment of skin diseases.

Material and Methods.

Seed Collection.

The rhizome of *C. longa* (turmeric), seeds of *P. harmala (*wild rue) and *W. somnifera (*winter cherry) were collected from the local market. After procurement, the plant materials were cleaned thoroughly to remove dust and impurities. The seeds and rhizomes were then stored in airtight, labeled containers under controlled room temperature (approximately 25 ± 2 °C) in the Botany Laboratory of Minhaj University, Lahore. The materials were kept for one week before being used in the preparation of the herbal cream formulations to ensure stabilization and quality assessment.

Identification of Plant Materials.

The rhizome of *Curcuma longa* (turmeric) and the seeds of *Peganum harmala* (wild rue) and *Withania. somnifera* (winter cherry) was authenticated by taxonomists at Minhaj University, Lahore. The dried seeds and turmeric (haldi) powder were stored in a tightly sealed jar for further use.

Preparation of an Extract.

Extracts were prepared according to 1.2 solid-liquid ratio by maceration. Precisely weighed powdered plant materials (Wild Rue seeds, Winter Cherry seeds and Turmeric rhizomes) were soaked in methanol in clean, amber-colored glass containers to minimize light exposure. The maceration process was carried out at room temperature (25 ± 2 °C) for 72 hours with occasional shaking to enhance the extraction efficiency. After completion, the mixtures were filtered using muslin cloth followed by Whatman No. 1 filter paper. The filtrates were then concentrated using a rotary evaporator under reduced pressure at 40 ± 2 °C to obtain semi-solid extracts, which were subsequently stored in sterile containers at 4 °C until further use in the herbal cream formulations. For the formulation F1, F2 and F3, 30g of *Peganum harmala* (harmal), 40 g of *Withania somnifera* (winter cherry) and 50 g of *Curcuma longa* (haldi rhizome) were extracted with 60 ml, 80 ml and 100 ml of methanol respectively.

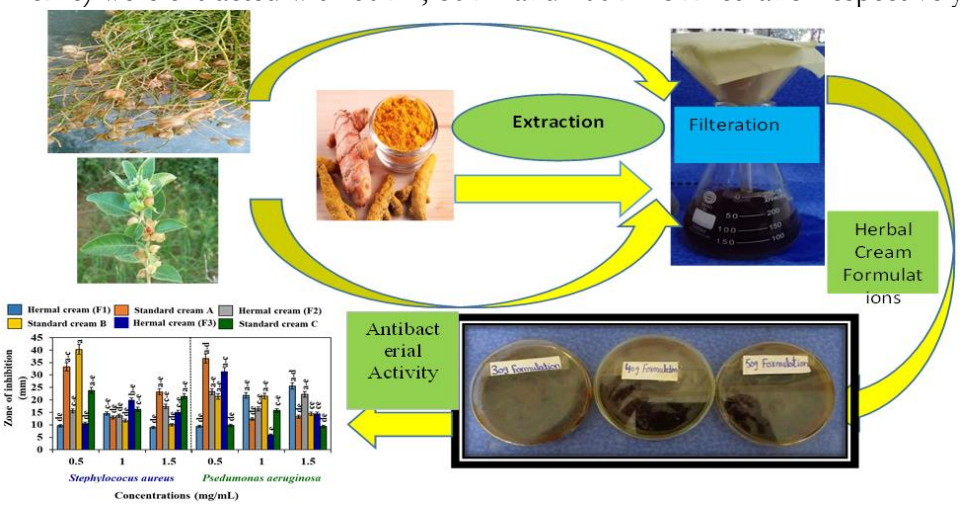

Figure 1. Systematic diagram of herbal formulations made by *P. harmala (*wild rue), *W. somnifera (*winter cherry) and rhizome of *C. longa*

Percentage Yield.

The percentage yield was calculated by following the formula. [4] % yield = (weight of extract/weight of ground plant material) × 100

Formation of the Formulation.

For the preparation of the formulation, required quantities of methanolic extract of seeds of wild rue, winter cherry and rhizome of turmeric (haldi) were weighed accurately, mixed well with paraffin base and then heated up to 70℃ to 75℃ by continuous stirring with a glass rod until a homogenous mixture was formed. [5].

Physical Evaluation of the Formulation.

The physical properties of the herbal cream formulations were assessed using both visual and instrumental techniques. Color was evaluated quantitatively using a colorimeter (e.g., CIE Lab *scale)* to ensure consistency across batches. Homogeneity was examined by spreading a small amount of cream on a glass slide and observing under uniform lighting for any phase separation, granules, or clumps. Spreadability was measured using a standard glass slide method, calculating the area covered under a specified weight. Additionally, odor was assessed using an olfactometry scale rated by a panel of trained volunteers on a 5-point intensity scale, ranging from 'no odor' to 'very strong odor.

Color. The color of each formulation was analyzed visually by observing them under natural light against a clear background.

Odor. The scent of mixtures was analyzed using smelling them to establish their scent. The odor of all three formulations was observed and evaluated on four different days with a five-day interval between each evaluation to assess their aroma.

Wetness. To determine the wetness, the mixture was applied to a human volunteer's skin, allowing researchers to gauge its moisture level. Wetness describes the presence of a liquid, most frequently water.

Skin Irritation Study. The main skin irritancy test was performed on human volunteers. A 50 mg amount of each formulation was applied to a 1 cm^2 area of skin for about 48 hours, after which the area was rinsed with tap water [6]**.** The alterations in skin tone and morphology were detected. Skin inflammation or irritation caused by an allergy or illness can occur naturally or as a result of a skin test.

Spread Ability. Spreadability is a quality or a state of being spreadable; which refers to the extent to which a substance can be spread. To analyze the spreadability, a substantial amount of formulation was obtained with sandwiched between two clean glass slides. A standard weight of 70g was then applied to compress the slides [7]. The spreadability was calculated using the following formula.

- S = M.L/T
- Here, M weight placed on the slides,
- L= length of the glass slides
- T= time taken to separate the slides

Ph Measurement. The pH was measured using a pH meter which was calibrated with a buffer solution before each use. Each time the pH was measured and the electrode was immersed in a sample for 5 to 10 minutes at room temperature before taking the reading.

Determination of Type of Smear.

To determine the type of smear, a small quantity of each of F1, F2 and F3 formulations and betadine cream was applied on the skin surface of human volunteers. The different types of smear were then examined and compared to that of Betadine cream.

Viscosity.

The viscosity was measured using a CAP-2000 Brookfield viscometer by following its standard operational techniques of viscometer by using spindles. The formulation to be tested was taken in a clean and dried 250ml beaker. Every spindle was used to measure the viscosity of the tested formulations.

Type of Emulsion.

Emulsions are mixtures of two or more liquids in which one is spread as minute or ultra-fine droplets[8]. A small quantity of three formulations was used on the skin surface of human volunteers and the type of emulsion was observed and recorded.

Uniformity of Weight.

Ten jars were correctly weighed after being randomly filled. The formulations were removed from the jars and methanol was used to clean each jar. The dry, empty jars were then weighed and the difference between the two weights was measured.

Antibacterial Activity.

The clinical bacterial strains of *Staphylococcus aureus* including a potent gram-positive bacteria and *Pseudomonas aeruginosa* and a potent gram-negative bacteria were used to determine the antibacterial activity of all three formulations using the agar well diffusion method. Betadine cream was employed as the standard and positive control due to its well-documented antimicrobial efficacy. A plain cream base without any plant extracts was used as the negative control to assess the inherent antibacterial activity of the base formulation. Zones of inhibition were measured in millimeters after incubation at 37 ± 1 °C for 24 hours. These test organisms were collected from the Pathology Department of the University of Veterinary and Animal Sciences, Lahore.

Quantitative Assessment.

Temperature, PH and viscosity are mentioned in Table 5 for evaluation of various parameters of herbal formulations.

Results.

This study was carried out to formulate herbal cream using three wild plants including turmeric (*Curcuma longa*), wild rue (*Peganum harmala*) & winter cherry (*Withania somnifera*) and compared it with the commercially available cream betadine. Betadine is the standard cream which is used for comparison. Three extracts, FI, F2 and F3 of selected plants were prepared with methanol according to the following concentrations (Table 1).

Table 1. Extracts preparation of wild rue, winter cherry and turmeric

Extracts	Seeds powder and rhizome of selected plants	Methanol
F1	30 g	60 ml
F2	40 g	80 ml
F3	50 g	100 ml

The color of the turmeric extracts varied from brown to dark brown, specifically, F1 (30 g), F2 (40 g) and F3 (50g) where all exhibited different shades of brown. While the extract of wild rue used in the three formulations (F1, F2 and F3) was all black. Conversely, winter cherry extracts for F1, F2 and F3 were light brownish, brown and black respectively (Figure 2). For F1, F2 and F3, the extracts of turmeric had a camphoraceous smell. F1, F2 and F3 of the wild rue extracts had ethereal, musky and pungent aromas respectively. Winter cherry extract had a foul fragrance for F1 and F3 & a pungent odor for F2 (Table 2). About (0.5–2) % of Peppermint essential oil was added to overcome the odor of F1 and F3 formulations.

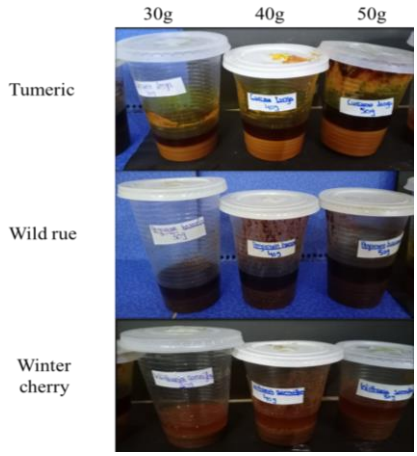

Figure 2. Extract of wild rue, winter cherry and turmeric at various concentrations.

Table 2. Percentage yield (%), color and odor of selected plants

Plant Extract	Percentage Yield	Colour of Extract	Odourof Extract
Turmeric (Curcuma longa)			
F1 (30g)	43.38%	Brown	Punget
F2 (40 g)	42.20%	Brown	Campharaceous
F3 (50 g)	39.37%	Dark Brown	Campharaceous
Wild rue (Peganum harmala)			
F1 (30 g)	39.71%	Black	Ethereal
F2 (40 g)	39.95%	Black	Musky
F3 (50 g)	38.93%	Black	Pungent
Winter cherry (Withania somnifera)			
F1 (30 g)	40.04%	Light Brown	Putrid
F2 (40 g)	35.84%	Light Brown	Pungent
F3 (50 g)	34.66%	Brown	Putrid

Preparation of Cream /Formulation.

Three different creams/formulations (F1, F2 and F3) were prepared by mixing varying amounts of seed extracts. The F1, formulation was prepared by mixing Ig of winter cherry seed extract (30 g), 1.5 g of harmal, 2 g of turmeric and 5 g of white paraffin. The F2 cream was made by mixing with 2g of winter cherry seeds extract (40g), 1g of wild rue seeds extract (40g), 1.5g of turmeric extract (40g) and 5g of white paraffin. Similarly, the F3 cream contains 1.5g of winter cherry seeds extract (50g), 2g of wild rue seeds extract (50g), 1g of turmeric extract (40g) and 5g of white paraffin (Table 3).

Table 3. Composition of the formulations of selected plants

Ingredients	Formulations		
	F1 (30g)	F2 (40g)	F3 (50g)
Winter cherry	1 g	2 g	1.5 g
Wild rue seeds	1.5 g	1 g	2 g
Turmeric	2 g	1.5 g	1 g
White Parafin	5 g	5 g	5 g

Physical Evaluation of Formulations.

Various parameters including the color, smell, wetness, irritancy and spreadability of the three formulations (F1, F2 and F3) were assessed on five different days (0, 5, 10, 15 and 20 days). The observed color ranged from dark brown to light brown. The F1 exhibited a black color in 0 and 5 days but changed into dark brown in 10, 15 and 20 days with camphoraceous smell. F2, except for days 0 and 5 (dark brown and camphoraceous smell), maintained a brown color with a pungent smell throughout the whole experiment. F3 consistently exhibited a light brown shade throughout the experiment except day 0 where it had a brown color with a pungent smell (Table 4).

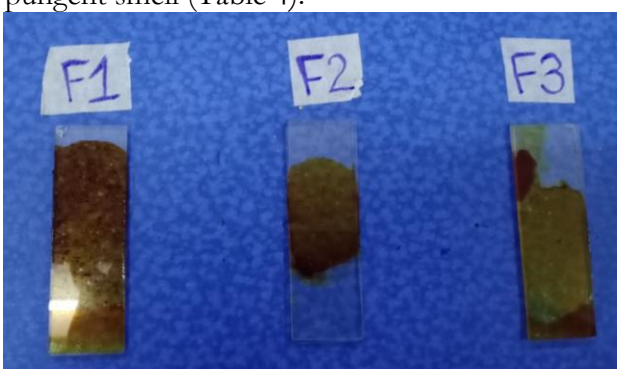

Figure 3. Analysis of spreadability of F1, F2, F3 on slides

Table 4. List of all parameters measured during the physical valuation of the formulations.

Days	Formulation	Colour	Odour	Wetness	Irritancy	Spreadability
0	F1	Black	Campharaceous	Normal	None	111.3 (g.cm/s)
	F2	Dark brown	Campharaceous	Normal	None	101.25 (g.cm/s)
	F3	Brown	Pungent	Normal	None	124.02 (g.cm/s)
5	F1	Black	Campharaceous	Normal	None	110.59 (g.cm/s)
	F2	Dark brown	Pungent	Normal	None	101.33 (g.cm/s)
	F3	Light brown	Pungent	Normal	None	124.12 (g.cm/s)
10	F1	Dark brown	Campharaceous	Normal	None	111.44 (g.cm/s)
	F2	Brown	Campharaceous	Normal	None	101.76 (g.cm/s)
	F3	Light brown	Pungent	Normal	None	124.70 (g.cm/s)
15	F1	Dark brown	Campharaceous	Normal	None	111.58 (g.cm/s)
	F2	Brown	Pungent	Normal	None	101.80 (g.cm/s)
	F3	Light brown	Pungent	Normal	None	124.90 (g.cm/s)
20	F1	Dark brown	Campharaceous	Normal	None	111.96(g.cm/s)
	F2	Brown	Pungent	Normal	None	101.73 (g.cm/s)
	F3	Light brown	Pungent	Normal	None	101.75 (g.cm/s)

Various parameters including pH, temperature and viscosity were measured. The pH value ranges between 6.55 and 6.58. F2 had the lowest pH and F1 had the highest. The temperature range was between 90.3±1°F to 91.0±°F. The viscosity ranged from 9457 to 1195 cps. Betadine exhibited a white hue, a strong fragrance, a pH of 6.47, a temperature of 87.8°F 1°F, a Spreadability of 130.81 and a viscosity ranging from 1175 cps to 1195 cps. For all three formulations, the emulsion type was oil in water, while the Betadine cream maintained a semi-solid consistency on each of the five test days. The smear type was non-greasy for all three formulations (Table 5).

Table 5. Evaluation of various parameters of herbal formulations

Day	Formulations	pH	Type of smear	Temperature	Viscosity	Emulsion
0	F1	6.55	Oil in Water	91.3°F ±1°F	9977±10 cps	Non-greasy
	F2	6.54	"	89.4°F ±1°F	9653±10 cps	"
	F3	6.57	"	89.4°F ±1°F	9356±10 cps	"
	Betadine	6.47	Semi-solid	86.5°F ±1°F	1086±10 cps	"
5	F1	6.55	"	89.2°F ±1°F	1041±10 cps	"
	F2	6.55	"	89.2°F ±1°F	1017±10 cps	"
	F3	6.57	"	89.4°F ±1°F	1024±10 cps	"
	Betadine	6.44	Semi-solid	86.6°F ±1°F	1073±10 cps	"
10	F1	6.57	"	90.1°F ±1°F	1096±10 cps	"
	F2	6.54	"	90.1°F ±1°F	1028±10 cps	"
	F3	6.54	"	91.7°F ±1°F	1067±10 cps	"
	Betadine	6.45	Semi-solid	86.6°F ±1°F	1187±10 cps	"
15	F1	6.56	"	90.0°F ±1°F	1008±10 cps	"
	F2	6.54	"	90.0°F ±1°F	1143±10 cps	"
	F3	6.55	"	89.7°F ±1°F	1177±10 cps	"
	Betadine	6.45	Semi-solid	86.7°F ±1°F	1181±10 cps	"
20	F1	6.58	"	90.0°F ±1°F	1120±10 cps	"
	F2	6.55	"	90.0°F ±1°F	1163±10 cps	"
	F3	6.54	"	89.7°F ±1°F	1081±10 cps	"
	Betadine	6.46	Semi-solid	86.7°F ±1°F	1094±10 cps	"

Uniformity of Weight.

Uniform weight shows that the manufacturing process (mixing, filling, etc.) is properly controlled. It determines that each unit (tablet, capsule, cream amount, etc.) contains approximately the same amount of active ingredients. The homogeneity of weight among the

formulations was analyzed by measuring 10 jars (empty and randomly filled with formulations 1, 2, 3 and betadine cream and measuring the net weight and percentage weight of those 10 samples). The average weight of the jar was also calculated. The net weight of formulation 1 was between 569 and 585 mg, with an average weight of 577.7 mg. The range of the percentage was 96.7% to 101.5% as depicted in Table 6. For formulation 2, the net weight ranges from 439 to 451 mg with a mass of 443.6 mg on average and the percentage varies from 98.4 to 102.0 percent. In addition, measurements of Formulation 3 showed net weight varying between 401 mg and 438 mg. The average weight was 418.8 mg and the percentage was between 95.6% to 103.6%. Similar measurements were carried out with the commercial betadine cream that showed a net weight of 581 mg to 499 mg with an average of 590.6 mg and a percentage range between 98.5% to 101.2% (Table 6)

Table 6. Uniformity of weight

	Formulation 1		**Formulation 2**		**Formulation 3**		**Betadine cream**	
Jar Number	Jar Weight (mg)	Percentage	Jar Weight (mg)	Percentage	Jar Weight (mg)	Percentage	Jar Weight (mg)	Percentage
1	580	99.6%	451	98.4%	401	104.4%	589	100.2%
2	570	101.3%	444	99.9%	431	97.1%	581	101.6%
3	585	98.7%	449	98.8%	426	98.3%	592	99.7%
4	582	99.2%	439	101.0%	408	102.6%	585	100.9%
5	572	100.9%	450	98.6%	418	100.1%	584	101.1%
6	578	99.9%	447	99.2%	413	101.4%	599	98.5%
7	569	101.5%	440	100.8%	404	103.6%	596	99.0%
8	571	101.1%	438	101.3%	415	100.9%	587	100.6%
9	581	99.4%	445	99.7%	434	96.4%	595	99.2%
10	579	96.7%	435	102.0%	438	95.6%	598	98.7%
Average	**577.7**		**443.8**		**418.8**		**590.6**	

All three herbal cream formulations (F1, F2 and F3), as well as Betadine (standard cream), were tested for antibacterial efficacy against *S. aureus* and *P. aeruginosa*. The standard cream showed the maximum activity at 0.5 mg/ml against *P. aeruginosa*. Among the herbal formulations, the highest and lowest activities against *P. aeruginosa* were exhibited by formulations F1 at 1.5 mg/ml and standard cream at 0.5 mg/ml respectively (Figure 4).

Discussion.

Bacteria enter the body through hair follicles or minute tears or hair follicles in the skin brought on by punctures, burns, scrapes, sunburn wounds, insect bites and skin disorders to develop bacterial skin infection [9]. A few of the medications that are applied to the skin are antibiotics and antifungals. All of these can be absorbed, which could cause unfavorable side effects, which is why a herbal skin formulation is usually necessary [10]. To formulate a novel herbal cream by combining Wild Rue, Winter Cherry and Turmeric—an unprecedented combination—and to evaluate its efficacy in the treatment of skin diseases. A highly effective antibacterial cream was formulated from the seeds of wild rue (*Peganum harmala)*, Winter cherry (*Withania somnifera*) and Turmeric (*Curcuma longa*) rhizome dry powder. It has antioxidant, antibacterial, anti-inflammatory and antifungal effects. This cream is not only an antibacterial herbal formulation but also possesses antifungal properties, which help enhance wound healing by reducing bacterial and fungal infections [11]. The herbal cream prepared using the rhizome of *Curcuma longa* (turmeric), seeds of *Peganum harmala* (wild rue) and *Withania somnifera* (winter cherry) can be potentially effective against several skin diseases but particularly Eczema and Acne due to their combined anti-inflammatory and antimicrobial properties.

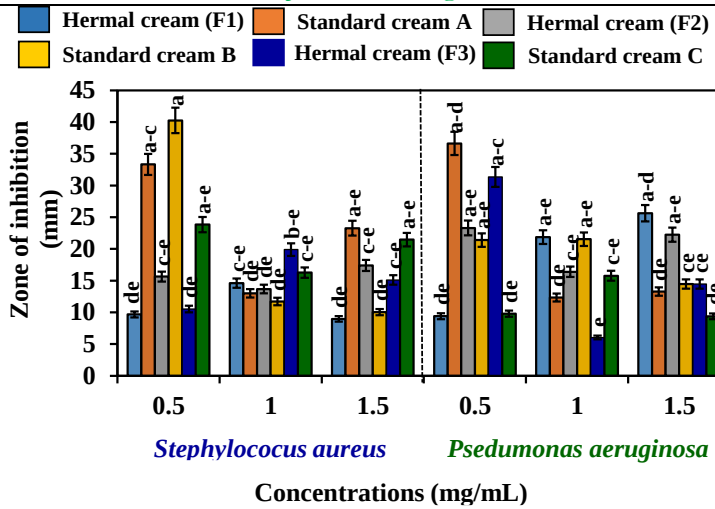

Figure 4. Comparison of antibacterial activity of herbal formulations and standard cream against *S. aureus* and *P. aeruginosa*

Withania somnifera is considered a miraculous plant in traditional medicine which is why its seed methanolic extract is commonly employed in antibacterial creams or formulations. It has a wide spectrum of therapeutic properties since it contains extremely active pharmacological components and has no side effects [12]. Turmeric, which contains bioactive compounds like polyphenols, flavonoids and antioxidants and is utilized in food and as a culinary ingredient as an antibiotic, is employed in antibacterial herbal creams and formulations. These turmeric rhizome active compounds have a wide range of biological effects. One spice that is widely used as an antibacterial treatment is turmeric[13].

In the current investigation, the highest percentage yield of cream formulation 1, 42.37% was obtained in the methanol extract of *C. longa's* rhizome among all the extracts of the selected plants and it was followed by cream formulation 2, 40.91% in the methanol extract of *P. har mala's* seed powder (Table 2). When compared to the other extracts of the chosen plant, the methanol extract of *W. somnifera's* seed powder showed the lowest percentage yield of cream formulation 3, or 35.69% (Table 2). According to recent research, the pH range of cream formulations between 6.55 to 6.59 is excellent for the skin. All the created formulations had pH values of 6.55 in F1, F2 and F3 from 0 to 20 days, which are closer to standard cream's 6.47 (Table 5) and close to the herbal creams made from *Aloe vera* and *Dacus carota*, which had pH values between 5.6 and 6.8 as described in the research the previous research [14].

The study found that the temperature ranged for all formulations between 90.3 ±1°F to 91.0 ±1°F °F in comparison to betadine standard medical cream, which had a temperature of 87.1 ±1°F. All formulations ranged in temperature from 90.3±1°F to 91.0±1°F. The temperature of the cream was similar to room temperature which is best and regenerating healthy skin and preventing bacterial and other skin diseases [15].

This study also revealed that all three herbal formulations or creams have viscosities that range between 9457 and 1195 cps. This demonstrated that the cream's texture affects both the absorption and the speed of absorption. The way a cream feels on the skin indicates how quickly it penetrates the skin and when that speed improves, like with sunscreen it effects the effectiveness [16]. All the said herbal formulations generated for the current investigation had oil in water emulsions, as opposed to the conventional cream and the betadine cream, which displayed a semi-solid emulsion. When treating skin conditions like those used by cancer patients, water-based lotions appear to be superior to all others in terms of effectiveness [17].

Additionally, the transition of the color of the formulation from dark brown to light in color in all formulations (Table 4) resembles the hue of an herbal cream derived from extracts of curry leaves and pigeon peas that had a blue-black and reddish-brown hue [18].

The aroma ranged from pungent to camphoraceous. For example, the scent of F1 remained camphoraceous throughout the experiment, while F2 was pungent except on days 0 and 10. In contrast, the fragrance of F3 persisted throughout the experiment. This is in contrast to the cream prepared from aloe vera gel extract and neem leaf demonstrated that increasing the concentration of these extracts reduced the scent to a more tolerable level rather than being overpowering [19].

Besides, all formulations were assessed using a variety of factors, including pH, viscosity, spreadability and stability. No negative consequences from the formulations were observed during irritancy trials i.e., the formulation exhibits no redness, edema, inflammation, or irritation indicating that this formulation could be used on the skin safely. According to this research, the base of the cream and the extract composition are more stable and safer, which may result in a synergistic effect. This study also revealed that none of the synthetic prepared herbal formulations or the usual medicated betadine cream caused any type of irritancy when applied to volunteer human skin using a standard patch irritancy test. In contrast to the aloe vera-containing cream, the herbal 0.5% Caesalpenia cream caused a small sort of irritancy-like itching in 1 out of 29 human volunteers [20].

All three of the herbal formulations generated for the current investigation had oil-in-water emulsions, as opposed to the conventional cream and the betadine cream which displayed a semi-solid emulsion. When treating skin conditions such as those experienced by cancer patients, water-based lotions seem to be more effective than other types of formulations [17] [18].

All three herbal cream formulations (F1, F2 and F3) demonstrated promising effectiveness against skin diseases like Eczema and Acne. Among them, formulation F1 showed the most potent activity at a concentration of 1.5 mg/ml. This formulation comprises 1 g of winter cherry, 1.5 g of wild rue seed powder, 2 g of turmeric and 5 g of a paraffin base (Figure 4).

The test organisms used to determine the antibacterial activity for all three evaluated formulations and the standard betadine cream were *Staphylococcus aureus* and *Pseudomonas aeruginosa* as they are the potent bacterial strains that cause infections and disease. *Staphylococcus aureus* (a Gram-positive bacterium) and *Pseudomonas aeruginosa* (a Gram-negative bacterium) are both known to cause various skin infections and diseases, such as infection of hair follicles, deep skin infections causing redness, swelling and pain, nail infections resulting in greenish discoloration and rashes. Therefore, these bacterial strains were chosen to test the antibacterial activity of all three herbal formulations made from the methanolic extracts of wild rue, winter cherry and Haldi (Turmeric). All three herbal cream formulations (F1, F2 and F3), along with Betadine (used as the standard cream), were evaluated for their antibacterial activity against *S. aureus* and *P. aeruginosa*. The standard cream demonstrated the highest activity against *P. aeruginosa* at a concentration of 0.5 mg/ml. Among the herbal formulations, F1 exhibited the strongest activity at 1.5 mg/ml, while the weakest activity was observed with the standard cream at 0.5 mg/ml. According to the present study, the F1 formulation contains the highest quantity of turmeric extract which is a potent source of antibacterial potential.

According to a previous study polyherbal formulations containing honey, Haldi (Turmeric), aloe vera and ethanolic extracts of bitter gourd and sunflower were used against *P. aeruginosa*. The mentioned formulation showed the best results [21] The antibacterial herbal cream made of extracts of *Piper betel* was tested for its antibacterial activity against acne i.e. skin infections caused by *S. aureus* [22].

Conclusion.

Three distinct creams with varying amounts of each of the three plant extracts were created using the herbal cream made from methanolic extract of seeds of wild rue, winter cherry and rhizome of turmeric. All three of the formulations had an oil-in-water base, were

non-irritating and demonstrated antibacterial action in comparison to conventional betadine cream. F1, with maximum turmeric, demonstrated the highest activity, followed by F3, with maximum wild rue and F2 with maximum winter cherry. The antibacterial activity of the cream was also evaluated based on quantity and the result showed that 1.5 mg of all three formulations showed maximum activity, proceeding with 1mg and then 0.5 mg quantity.

Competing Interest. The data included in the article have no competing interest.

Authors Contributions. MA made a significant contribution to the research design and supervision of the research experiment. UB performed all experimental research. SA and AS contributed to the revision of the manuscript. All authors read and finally approved the manuscript.

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