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Design and development of anti-aging potential of polyherbal cream containing Punica granatum seed oil.

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Abstract:

By using the antioxidant property of pomegranate seed oil, the present work designed to prepare and evaluate topical formulation. A topical preparation containing pomegranate seed oil and honey like herbal products which are widely known for its bioactive constituents it contains polyphenols, flavonoids, and polyunsaturated fatty acids. The formulation were prepared by using mixture of pomegranate seed oil and almond oil with carbopol, stearic acid,cetyl alcohol as emulsifying agent and thickening agents. Formulation from F1 to F4 was studied for their physicochemical parameters and stability study. Depending upon the physicochemical parameters and stability and antioxidant activity, F4 batch containing 5% pomegranate seed oil and 5% almond oil can be considered as good for skin use.

Keywords: pomegranate seed oil, polyherbal cream, anti-aging.

Introduction:

Cosmetic preparation is help to skin for preventing moisture loss, restoring youthfulness, to form protective layer on skin. As skin is the largest organ which protects body from external environment [1]. Hence it also protects body from microorganisms, environmental pollutants and photo radiation. By using antioxidant in the formulation, helps to neutralize free radicals [2]. Antioxidant also reduces effect of smoke, dust and pollution. Applying antioxidant cream to the skin which can be slow down aging process. Now a days, cosmetics formulations are developed which gives cleansing and moisturizing effect with antioxidant effect[3].

In herbal formulation many plant parts are used as additives due to functional properties like emollient, antioxidant, anti-irritant, ant aging etc. plants is rich source in vitamins, terpenoids, phenolic compounds and tannins [4]. High contents of triglycrides of saturated and unsaturated fatty acids are available in oils which are extracted from fruits and vegetables[5]. The unsaturated fatty acids like oleinic (ω-9), linoleic (ω-6), linolenic (ω-3) reduces trans-epidermal water loss and improve moisture level in the skin, it also activate regeneration of damaged lipid barrier of epidermis and heal inflammations[6,7]. The pomegranate contains high content of polyunsaturated fatty acids like linoleic, linolenic and other lipids such as oleic acid, stearic acid, palmitic acid[8,9]. Almond oil extremely rich in linoleic and oleic acid along with stearic palmitic acid. Hence almond oil is used as lipophilic vehicle to decrease UV catalyzed degradation and it also maintain elasticity of skin[8]. Based on the activities cream was prepared as oil in water emulsion using cetyl alcohol, stearic acid and carbopol 934 as emulsifier and stabilizing agent[10,11].

Material and method:

Chemicals: pomegranate seed oil procured from nutrifoods. All other chemicals and solvents used were of lab scale.

Equipment: Viscosity is measured by Brookfield DV-E viscometer + pro with small sample volume adaptor spindle (S63) and (S64),particle size analysis by Saglo software, mechanical stirrer, pH meter.

Characterization of seed oil:

Physicochemical parameters of seed oil[12] : As per procedure mentioned in I.P. following parameters of pomegranate seed oil were analyzed like Colour, odour, texture, refractive index, appearance, density, acid value, saponification value, Iodine value etc.

Formulation of cream[13,14,15]:

Add cetyl alcohol, glyceryl monostearate, stearic acid were mixed together and allow to stand for 10mins at 60˚c in water bath till it melts. Mix pomegranate seed oil and almond oil (oil phase: part1).

Add water soluble ingredients into water and mix thoroughly and allow to stand for 60˚c in water bath.(water phase: part 2).

Weighed quantity of carbopol 934 was added to weighed quantity of water with continuous stirring by using mechanical stirrer (base). Then the part1 is mixed with part2 with continuous stirring and this mixture then added into the base with continuous stirring followed by addition of perfume and pH of the formulation adjusted by triethanolamine. (table no.1)

Evaluation of formulation:

Physicochemical parameters of oil and formulation[16]

All the batches were manually tested for: appearance, colour, odour and texture, consistency, greasiness, homogeneity, grittiness etc.

pH determination[17]

pH were determined using digital pH meter. The range of pH for topical preparation is required to be 6.0-7.5. the electrode were prewashed with distilled water and dipped in the formulation and the pH recorded at ambient condition.

Spreadability

For spreadability determination spreadability apparatus was used. This apparatus consisted of two glass slides, one which is movable and another one is fixed onto the wooden board, tied to thread which is passed over pulley, it carries weight about 1gm of formulation was placed between the two

slides. On the upper slide 100gm was allowed to rest for 1 to 2 minutes to remove entrapped air between the slides and to provide uniform film of the gel. The weight was removed and top slide was subjected to pull of 5gm. The time required for top slide to travel premarked 6.5cm distance was noted. This can be used for relative spreadability of formulation. For spreadability calculation following formula was used:

$$S=M*L/T$$

Where, S is denoted by spredability, M is mass attached with slide in gms,L is length in cm, T is time required in seconds.

Viscosity

Viscosity was determined using Brookfield digital viscometer. Different types of spindles like S63, S64 were used at 100rpm/min and values recorded in centipoise.

Type of emulsion[18]:

Based on the solubility of emulsion's external phase in water in oil emulsion type was determined by using dilution test. Take the small amount of water in the test tube and add few drops of prepared emulsion into it. If it forms separate layer then it was W/O type, if it distribute evenly in water then it was determined as O/W type.

Irritancy test[19]:

On the dorsal left hand surface an area of 1 cm^2 was marked. The cream was applied and time was noted. Erythema, edema, irritancy was checked for regular intervals upto 24hrs and reported.

Particle size determination:

Oil globule size was determine by the microscope using the saglo software.

Stability study[20]:

By placing the formulation into stability chamber under controlled temperature at 30 ± 2˚c and 65% RH for three months. Evaluated the formulation for their physiological and organoleptic parameters at interval of 30 days for three months.

RESULT :

Physicochemical parameters[21-23]:

Physical parameters of oil like colour, odour, texture, appearance were tested and given in the table 2. Physiological parameters of oils like specific gravity and refractive index compared with the reference values.(table no.3)

Physical parameters:

All the formulation was found to be light buff colour, homogenous, non greasy,nongrity, pleasant odour.(table no.4)

pH determination:

The pH of topical formulation should b in the range of 5.5-7.2. triethanolamine was used to adjust the pH of formulation. pH of the formulation was maintained in the range of 6.0-6.5.(table no.5)

viscosity:

In formulation different concentration of cetyl alcohol, stearic acid and carbopol , formulation showed variation in viscosity

spreadability:

In spreadability parameter, it is used to see that the prepared formulation applied spread easily on the skin and it having the good absorption and efficacy. The formulation F3 & F4 batch having good spreadability as it contains stearic acid and cetyl alcohol.

Type of emulsion:

The dilution test confirmed that all formulations were O/W cream. But formulation F3 & F4 having more stability in O/W type emulsion.

Irritancy test:

When the formulations applied to the dorsal surface of hand in specified area and observed for erythema, edema, irritancy upto 24hrs. none of the formulation Showed any sign of edema, inflammation and irritation, redness. Hence it indicates that the preparation were safe.

Particle size determination:

The size of globule was in the range between 10-30 µm.(table no.6)

Stability study:

By placing the formulation into the stability chamber at controlled temperature for three months (table no.7). At the same temperature physical parameters and organoleptic parameters were examined and stability conditions to assess variation in colour, texture, appearance, pH, spreadability, viscosity. From this it was calculated that F4 formulation has good physicochemical properties and organoleptic properties.

Formulation table:

Sr. no.	Ingredients	F1(In %)	F2(In %)	F3(In %)	F4(In %)
1	Pomegranate seed oil	3	5	3	5
2	Almond oil	3	5	3	5
3	Glyceryl monostearate	2	3	4	5
4	Cetyl alcohol	4	-	-	4
5	Stearic acid	4	-	-	4
6	Propylene glycol	0.5	1	1.5	2
7	Honey	4	-	-	4
8	Tween 20	1.05	2.1	1.05	2.1
9	Glycerin	1.5	3	1.5	3
10	HPMC	0.6	-	-	0.6
11	Carbopol 940	0.3	0.4	0.5	0.6
12	Propyl paraben	0.3	0.3	0.3	0.3
13	Methyl paraben	0.3	0.3	0.3	0.3
14	Triethanolamine	q.s.	q.s.	q.s.	q.s.
15	Water	q.s.	q.s.	q.s.	q.s.

Table no.1

Physical parameters of oil:

Parameters	**Pomegranate seed oil**	**Almond oil**
Colour	Yellow	Yellow
Odour	Characteristics	Characteristics
Texture	Clear	Clear
Appearance	Clear liquid	Clear liquid

Table no.2

Physicochemical parameters :

Parameters	**Pomegranate seed oil**		**Almond oil**	
	Observed value	**Reference value**	**Observed value**	**Reference value**
Specific gravity	0.934	0.92-0.96	0.912	0.910-0.920
Refractive index	1.4630	1.45-1.47	1.324	1.405
Acid value	5.25	5-7	1.2	1.5-3.8
Iodine value	72.1	74.2	45.21	105.0
Saponification value	187.59	175-210	113.4	139

Table no.3

Physical parameters of formulations:

Parameters	**F1**	**F2**	**F3**	**F4**
Homogeneity	Yes	Yes	Yes	Yes
Grittiness	No	No	No	No
Greasiness	No	No	No	No
Consistency	++	++	+++	+++

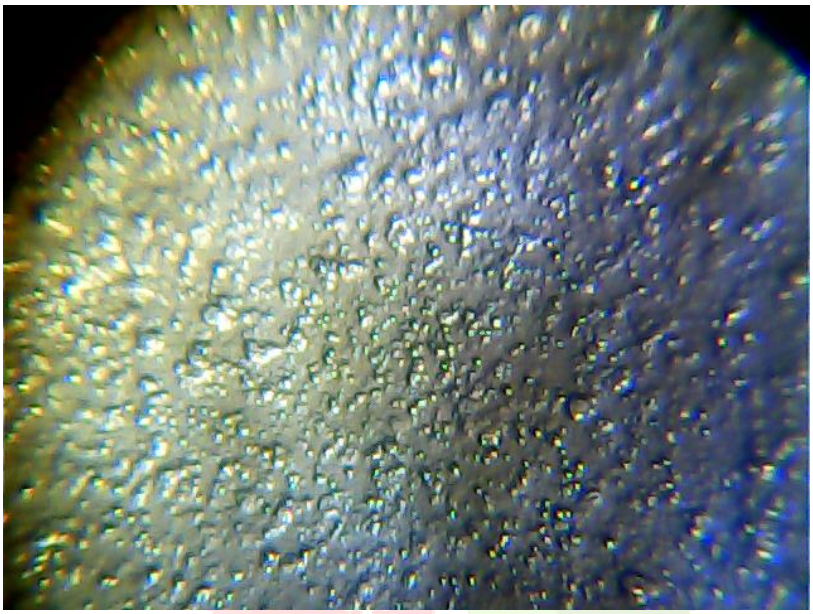
Good:++, very good:+++ **Table no.4**

pH of formulation:

Batch	pH of formulation
F1	6.15±0.035
F2	6.25±0.015
F3	6.35±0.042
F4	6.32±0.023

Table no.5

Particle size determination:



Size (µm)	Cell count (number)
0-10	132
10-20	172
20-30	21

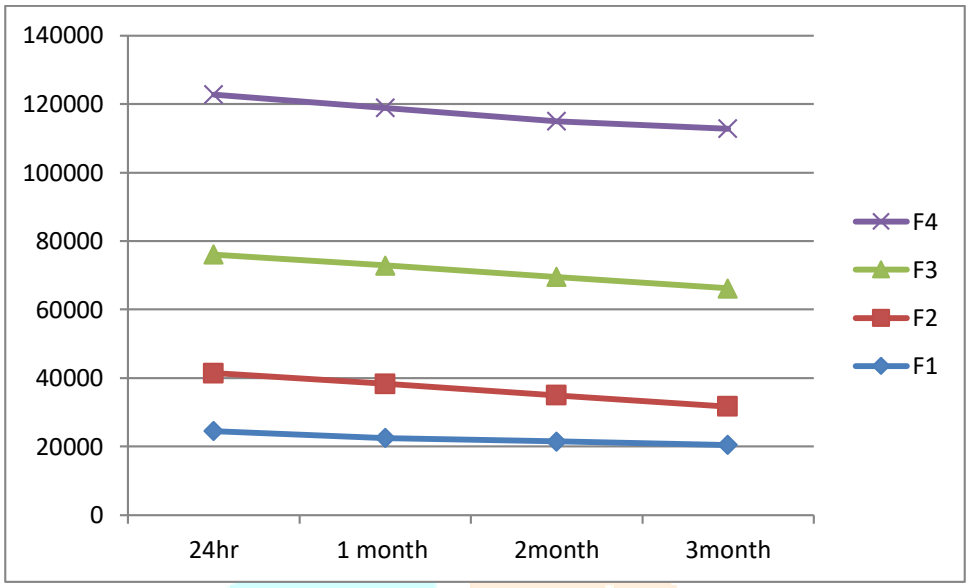
Table no.6

Stability study:

Batches	parameters	0 month	1 month	2 month	3 month
F1	Colour	Buff	Buff	Buff	Buff
	Texture	Very smooth	Very smooth	Smooth	Slight sticky
	pH	6.15	5.98	6.21	6.41
	Spreadability	85.36	84.52	78.53	72.25
	Viscosity	24500	22500	21500	20500
	Appearance	+++	++	++	+
F2	Colour	Buff	Buff	Buff	Buff
	Texture	Very smooth	Very smooth	Smooth	Slight sticky
	pH	6.25	6.38	6.46	6.74
	Spreadability	87.26	85.14	79.86	74.32
	Viscosity	16900	15800	13500	11200
	Appearance	+++	++	++	+
F3	Colour	Buff	Buff	Buff	Buff
	Texture	Very smooth	Very smooth	Smooth	smooth
	pH	6.35	6.23	6.42	6.59
	Spreadability	66.75	65.52	65.22	65.12
	Viscosity	34700	34600	34500	34500
	Appearance	+++	+++	++	++
F4	Colour	Buff	Buff	Buff	Buff
	Texture	Very smooth	Very smooth	Smooth	Smooth
	pH	6.29	6.41	6.49	6.55
	Spreadability	66.86	66.56	66.45	66.35
	Viscosity	46700	46000	45500	46600

	Appearance	+++	+++	+++	++

Very good:+++, good:++, poor:+ **Table no.7**



Viscosity at intervals of 1 month

Discussion:

When UV radiation comes in contact with the human skin it causes oxidation of cellular bio molecules and this leads to photo aging. Hence to prevent this antioxidant treatment is used. In plants many functional properties (antioxidant,moisturizing,anti-irritant,anti-aging) are present so they are used in the cosmetic formulation to enables the nourishment[24,25]. Almond oil and pomegranate seed oil are used for their different beneficial effects on skin. Therefore, the present work was carried out to formulate and evaluate a cream for their antioxidant activity. The study indicate that a mixture of oils with antioxidant activity (5%) in F4 formulation was nongreasy, stable and easily spradable. The formulation had no side effects including redness, irritation, itching etc. from the above results it is confirmed that F4 formulation can b best antioxidant cream.

Conclusion:

As the herbal products are safe to use and had no side effects their demand in the market is growing. In this formulation of cream mixture of oil was used. From the above batches, F4 batch having 5% PSO showed best results.

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