IJARSCT
ISSN (Online) 2581-9429
International Journal of Advanced Research in Science, Communication and Technology (IJARSCT)
Volume 2, Issue 2, July 2022
Impact Factor: 6.252

Formulation and Evaluation of Herbal Ointment of *Punica Granatum* Peel

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Abstract: *The present study was aimed to developed formulation on the Antiinflamatory, & Analgesic activity of Punicagranatum peels waste. Non steroidal antiinflamatory drugs (NSAIDs) are associated with too much side effects and adverce drug reactions. Constant used of NSAIDs produces gastrointestinal irritation and another side effects on body organs like liver and kidneys. Antiinflamatory, & Analgesic activity of Punicagranatum peel extract was previously reported on different experimental models. Generally pomegranate peels are waste material obtained from many pomegranate processing industries. These peels consists important polyphenols, flavonoids & β-sitosterol as a active chemical constituents which is useful in the inflammation. Inflamation are associate with pain, readness & swelling. Flavonoids shows antioxidant activity with indirect inhibition of inflammatory markers such as tumor necrosis factor alpha. Analgesic activity of punicagranatum peels are useful in the management of pain. Ointment formulation of punicagranatum peel shows a good result in all the evaluation test parameters such as General appearance, Consistency, pH, Spreadability, Extrudability, Diffusion study, Non irritancy test, & Stability study etc.*

Keywords: Punicagranatum, Herbal Ointment, Antiinflamatory, Analgesic, β-Sitosterol, etc

I. INTRODUCTION

In the last few years there has been rapid growth in the field of herbal medicine and these drugs gaining popularity both in developing & developed countries due to their natural origin and less side effects. Therefore used of herbal medicine is essential for to overcome the problem of adverse drug reactions. The genus punica consists at the present time of two species, the one under consideration and punicaprotopunica. The pomegranate, is one of the oldest known edible fruits. Punicagranatum has been used for long time as a therapeutic agent for the treatment of inflammatory diseases. The aqueous-ethanolic extracts of fruit rind, flower, and leaves of Punicagranatum have shows antiinflammatory activity. The pomegranate peels consider as a waste material, this peels contained active chemical constituents such as tannins, flavonoids β-Sitosterol responsible for antiinflamatory activity.

Biological Sources [2-4]

1. **Botanical Name:** Punicagranatum
2. **Family Name:** Puniacaceae
3. **Common Name:** Pomegranate, Anar
4. **Part Used:** Seeds, flowers, peels, roots etc.

Common Name[2-4]

1. **Hindi :** Anar
2. **English :** Pomegranate
3. **Latin :** Punicagranatum
4. **Sanskrit :** Dadimah
5. **Marathi :** Dalimba

II. MATERIALS & METHODS

Materials: Fresh Fruits of punicagranatum was collected from local market of Buldana, Maharashtra and transported to laboratory, authenticated from Center for Biodiversity Jijamata Mahavidyalaya, Buldana, Maharashtra. This

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authentication is done by Dr. S.V. Ambekar Sir. The fruits were washed with tap water, rinsed well and dried at room temperature for about 10min in open air. The peel from the fruit was removed carefully by knife and sun-dried. The dried material was properly ground into powder. This powder material was seperated according to particle size with the help of sieves no; #44, #60, #80, #85 to obtained different batches for further Preformulation Study.

Excipients: Cholesterol, Petroleum Jelly, Cetyl alcohol, White soft paraffin etc. obtained from Samarth Istitute of pharmacy Laboratory.

METHOD

Preformulation study

General Appearance

Physical examination like Colour, Odor, Taste is done by visual Inspection.

Bulk Density

It refer to packing of particles in powder sample. Bulk density is used to determine the amount of powder sample that occupies the volume in g/ml. Weighed quantity of powder sample was transferred into 100ml measuring cylinder. The volume occupied by powder material was measured. Bulk density was calculated by using formula;

$$\text{Bulk Density} = \frac{\text{mass of powder}}{\text{Bulk Volume of powder}}$$

Tapped density: Weighed accurate quantity of powder sample was transfer into a graduated measuring cylinder. Volume occupied by the powder was noted down. Then cylinder was subjected to 100-300 taps in tap density apparatus. Tapped density was calculated by using formula

$$\text{Tapped Density} = \frac{\text{mass of powder}}{\text{Tapped Volume}}$$

Carr's Index (Compressibility)

The compressibility index and Hausner's ratio was measures the property of powder to be compressed. The packing ability of powder material was evaluated from change in volume, which is due to rearrangement of packing occurring during tapping. It was indicated as Carr's compressibility index was calculated by following formula;

$$\text{Carr's index} = \frac{[\text{Tapped density} - \text{Bulk density}]}{\text{Tapped density}} \text{ X } 100$$

Hausner s' Ratio

It is measurement of frictional resistance of powder. The ideal range should be 1.2-1.5. It was determined by the ratio of tapped density and bulk density.

$$\text{Hausner s}' = \text{Tapped density/Bulk density}$$

Angle of Repose (θ)

It is defined as the maximum angle that can be obtained between the free standing of powder heap and horizontal plane, which is determined by the equation;

$$\text{Angle of repose } (\theta) = \tan^{-1}(h/r)$$

Flow Rate

Weighed accurate quantity of powder sample . Place a cotton plug at the neck of a clean and dry funnel of stem diameter 1-2.5cm. Place powder sample in the funnel. Remove plug from the neck & Record the total time required for all the powder to flow. Calculate flow rate by using formula.

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$$\text{Flow rate} = \frac{\text{Weight of powder}}{\text{Time Required to flow}}$$

Water Soluble Extractive [3-4]

Useful for the evaluation of a crude drug. Give idea about the nature of the chemical constituents present in a crude drug. Weigh about 5gm of the coarsely powdered drug and transfer it to a dry 250ml conical flask. Fill a 100ml graduated flask with water and transfer into conical flask. Cork the flask and set aside for 24 hours, shaking frequently. Filter into a 50ml cylinder. When sufficient filtrate has collected, transfer 25ml of the filtrate to a weigh thin porcelain dish. Evaporate to dryness on a water- bath and complete the drying in an oven at 1050C for 6 hours. Cool and weigh immediately. Calculate the percentage w/w of extractive with reference to the air dried drug.

Calculation

a) Weight of empty porcelain dish =.....(X).....gm
b) Weight of porcelain dish with residue =.....(Y).....gm
c) Weight of residue = ...(X –Y).....gm

$$\text{W.S.E.}(\%) = \frac{\text{Weight of residue X 100 X 100}}{\text{Weight of drug taken X Volume of filtrate (25 ml)}}$$

Preparation of Ointment Base: By Using Fusion Method

1. Weigh an accurate gm of all excipients such as cholesterol (1 gm) , petroleum jelly (1gm),cetyl alcohol (1 gm), white soft paraffin (17 gm).
2. For small scale: porcelain dish is place on water bath.
3. For large scale: carried out in large steam jack.

Procedure:

1. The ingredient and base are melted & properly mixed to obtain a uniform product.
2. Initially the ingredients of highest melting point is melted then remaining are added indecreasing orders of melting points.
3. Mixture is removed from water bath and stir to cool it.

Preparation of Ointment

1. All ingredients were mixed and heated gently with stirring then cooled.
2. The extract of *punica granatum* peel was added in respectively in 40 gm of base.
3. Then clove oil is added as a penetration enchancer in 40 gm of base.
4. Mixed it properly by using ointment slab.
5. Transfer it into a suitable container.

Extraction method

Maceration Method

- In this process solid ingredients are placed in a stoppered container with the whole of the solvent and allowed to stand for a periods of at least 3 days with frequent agitation, until soluble matter is dissolved.
- The mixture is then strained the mare pressed and combined liquid clarified or by decantation after standing.
- Weigh about 20 gm of crude powder then add 100 ml ethanol kept for 4 hours with continuous shaking on magnetic stirrer then filter it.
- For preparation of filtrate 1 add residue then add 25 ml ethanol kept for four hours with continuous shaking.
- For prepartion of fitrate 2 add residue add 25 ml ethanol kept for overnight.
- For preparation of filtrate 3 add residue 25 ml ethanol kept for a night.

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- For preparation of filtrate 4 add residue 25 ml ethanol and pool all filtrates and kept for evapouration then the extract was obtained.

Soxhlet Apparatus Method

1. This is continuous process of extraction with a hot organic solvent.
2. Take a powder (crude drug) is taken in the thimble which is place in soxhlet extractor.
3. The extractor, which has siphoning system is fitted on top on round bottom flask.
4. A condenser, is fitted at the of extractor.
5. Enough quantity of the extracting solvent is poured into the flask place on a heating metal.
6. On heating the solvent evapourate, rise to the condenser, where it condenses and drains back to theextractor holding the thimble with the crude drug material
7. When the extractor become full with hot solvent.the solvent siphons down to the flask along with extracted constituents.
8. The recycling of the evaporated solvent is allowed to continue until the extraction is complete.

Formulation Designing:

Table 1: Formulation of Herbal Ointment**.**

SR.NO	Ingredients	Batch
	In (gm)	**F1**
	Conc	**25%**
1	*Punica granatum* PeelExtract	2
2	Clove Oil	2
3	Base Material	q.s.
	Total	10 gm

Table 2: Formulation of Ointment Base

Sr. No	Ingredients (gm)	Quantity Taken
1	Cholesterol	2 gm
2	Petroleum Jelly (Vaseline)	2 gm
3	Cetyl alcohol	2 gm
4	White Soft Paraffin	34 gm
5	Total	40 m

III. EVALUATION OF HERBAL OINTMENT

Prepared punicagranatum Ointment were evaluated for the following evaluation parameters.

1. Color & Odor: Color and odor were examined by Visual Inspection.
2. Consistancy: Smooth and no greetiness is observed.
3. pH: pH of Herbal ointment was determined by using a digital pH meter. The solution of ointment was prepared by using 100 ml of distilled water and set aside for 2 hrs, pH was determined.
4. Spreadability: The spreadability was determined by placing sample between two glass slides which was compressed to uniform thickness by applying definite weight for definite time period. The time required to separate the two slides was measured as spreadability. Less time taken for separation of two slides shows better spreadability calculated by using formula
5. Extrudability: The ointment was filled in collapsible tube. The extrudability was determined in terms of weight of ointment required to extrude 0.5 cm ribbon of ointment in 10 second

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1. Diffusion Study: The diffusion study was carried by preparing agar nutrient medium by using boher method. The hole is created on agar medium by using open mouth ampule and ointment place in it. The time taken by ointment to get diffused through was noted.(after 60 min).
2. L.O.D: LOD was determined by placing the formulation in china dish and dried for the temperature 105 C in hot air oven.
3. Solubility: Soluble in boiling water, miscible with alcohol & ether.
4. Washability: Ointment was applied to the skin then washability with water was checked.
5. Non Irritancy: Prepared formulation was applied to the skin of human being and observed the effect.
6. Stability study: Physical stability of the prepared herbal ointment was carried out for 3 month at various temperature conditions like 2˚C, 25˚C, 37˚C.

Sr. No.	Bacteria	Zone of inhibition (in cms)	
1	*Staphylococcus aureus*	F-1	F-2
		3.8	4.3

IV. RESULT & DISCUSSION

Preformulation Study of powder sample:

SR. NO	Parameters	Sieve No.#44	Sieve No.#60	Sieve No. #80	Sieve No. #85
1	Colour	Brown	Brown	Brown	Brown
2	Bulk Density (Gm/ml)	0.545	0.465	0.376	0.354
3	Tapped Density(gm/ml)	0.672	0.549	0.538	0.456
4	Carrs Index (%)	15.45	11.5	24.39	17.34
5	Hausners Ratio	1.196	1.14	1.34	1.22
6	Porosity (%)	24	15.66	22.80	18.04
7	Angle Of Repose(Θ)	32℃ 42	28℃ 98	25℃ 56	30℃ 29
8	Moisture Content (%)	9	8	9	19
9	Flow Rate(gm/sec)	0.68	0.56	0.34	0.23
10	Ash value (NMT 4%)	0.22	0.22	0.22	0.22
11	Water Soluble Extractive (NLT35%)	44.6	44.6	44.6	44.6
12	Alcohol SolubleExtractive (20%)	48.6	48.6	48.6	48.6

From above preformulation data powder from sieve no#60 shows acceability angle of repose, tapped density, bulk density, cars index & hausners ratio, flow rate, moisture content. The batch shows group data as compared with other bathches.

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Evalution of Formulation

Sr .No	Parameters	F1
1	Colour	Yellowish brown
2	Odour	Characteristic
3	Consistency	Smooth
4	pH	5.4
5	Spreadiability(sec)	7
6	Extrudability (gm)	0.3
7	Diffusion Study (after 60 min)	0.6
8	L.O.D.	25%
9	Boiling Water	Freely Soluble
	Alcohol	Miscible
	Ether	Miscible
10	Washability	Good
11	Non Irritancy	Non irritant
12	Stability Study (2℃,25℃, 37℃)	Stable

V. CONCLUSION

The punica granatum peel powder were used to formulate herbal ointment & evaluated for physical parameters. Preformulation study & physical parameter exposed that all the values were acceptable limit. The herbal ointment useful for an anti-microbial activity. The punica granatum was useful in various body part. It having various pharamacological activities which are useful in our life.

ACKNOWLEDGEMENT

Author take it as a privilege to sincerely express my gratitude to Dr. Subhash Kumbhar, Principle, Samarth Institute of Pharmacy, Belhe for providing project amenities and permission to carry out this work. This author is also thankful to respected Mrs. Shelke Dipali S. for her valuable guidance, support and encouragement.

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