



Formulation And Evaluation Of Polyherbal Antifungal Lotion Of *Psidium Guajava* And *Ocimum Tenuiflorum*

Dudhekar Onkar^{1*}, Gaikwad Ashwini, Ghodge Avinash, Gautam Lokesh, Gaikwad Vaishnavi, Kendre Sanket

D K patil Institute of pharmacy loha nanded

ABSTRACT

Fungal infection pose a significant health concern, leading to various skin disorders. The present study focuses on the formulation and evaluation of a polyherbal antifungal lotion using medicinal plants known for their antifungal properties. Selected herb for *Psidium guajava* (*Guava*) and *Ocimum tenuiflorum* (*Tulsi*) were incorporated into a lotion base to create a natural effective and skin-friendly antifungal formulation

The herbal extracts were prepared using suitable solvents and incorporated into an emulsion bases lotion. The formulated lotion was evaluated for physicochemical parameters such as pH, viscosity, spreadability, in vitro antifungal activity, phytochemical investigation was tested against common fungal pathogen lobe *Candida albicans* and *E.coil* using the agar well diffusion method and agar disk diffusion method. The result demonstrated that the polyherbal lotion exhibited significant to standard antifungal agents.

Stability studies confirmed that the formulation remained stable over time without phase separation or microbial contamination. The study concludes that the polyherbal antifungal lotion offers a promising alternatives to synthetic antifungal treatments, Providing a safe and effective herbal remedy fungal infection. Further clinical studies are recommended to validate its efficacy and safety for widespread use.

KEYWORDS: Antifungal, Herbal lotion, *Psidium guajava*, *Ocimum tenuiflorum*,

1. INTRODUCTION

Lotion are defined as a monophasic or biphasic solution, emulsion or suspension design to apply on unbroken and also broken or inflamed skin without friction.^[1]

Lotion may be used for local action as cooling, soothing or protective purposes.^[1]

An herbal lotion that can give effective protection to skin from any toxicity. As they are natural and are found to be safe to use as compared to chemical based formulation. Lotions are semi-liquid form it directly applied on the body.^[2]

Herbal lotion are concoctions made with Phytochemicals derived from various plant sources, which impact skin functions and supply essential nutrients for maintaining healthy skin. Herbal lotion are

applied directly on the body and come in a semi-solid state.^[2]

Herbal lotions use fragrant herbs and their derivatives in cosmetics. This method has been popular with herbal product buyers, increasing cosmetics demand for natural ingredients and extracts. Lotions are non-friction liquids for external use. The skin is directly applied to substances using absorbent materials like cotton wool or gauze saturated with them. Lotions can chill, calm, or protect locally.^[3]

A herbal body lotion is a liquid composition applied to the skin to improve aesthetics. Lotions remove sebum and cleanse the skin. This chemical improves blood circulation, skin moisturization, astringency, freshness, bleaching, and therapeutic effects^[3]

The herbal lotion are those when natural herbs and their products Used for their aromatic value in cosmetic preparation among consumers for herbal product triggered the Demand for natural products and natural extracts in cosmetics preparations. Lotions are liquid preparations that is for external application without friction.^[4]

Herbal lotion thoroughly nourishes and moisturises skin while absorbing swiftly into the skin. Because of its natural qualities, skin becomes elastic, smooth, soft, and radiant while also maintaining the right pH balance.^[4]

A Fungal infection is called a mycosis, whereas mycology is the study of fungi. Fungal infection affecting the skin are sometimes referred as dermatophytic.^[5]

Psidium guajava is commonly known as guava, belonging to the genus *psidium*, family of *Myrtaceae*. The common name consists of yellow- fruited cherry guava, apple guava, red and strawberry guava^[6]

Ocimum Sanctum (Tulsi) is a member of family *Lamiaceae*. Tulsi means ‘Matchless one’ and also known as “Queen of herbs” . It is one of the holiest plant which exhibits tremendous healing potential.^[6]

Lotion benefits:^[7]

- Re- hydrate dried skin
- Feel and smell good
- Help yourself
- Soften the roughest parts of your body
- Make your skin glow

Advantages of herbal lotion:^[7]

- Easy to manufacture
- Easy to available and found in large of plants
- They do not provoke allergic reactions and do not have any negative side effects
- They are easily incorporated with skin and hair
- Extracts form of the plants decreases the bulk properties of the cosmetics and gives appropriate pharmacological effects.

Local names of guava (*Psidium Guajava*)^[6]

- English: Apple guava
- Spanish :Guayaba
- Chinese :Fan Shiliu
- French: Gouyave
- Bengali :Piara
- Thailand: Farang
- Brazil; Araca

Local names of tulsi (*Ocimum Tenuiflorum*)^[12]

- English : Holy basil
- Marathi : Tulas
- Hindi : Tulsi
- Sanskrit : Tulsi

2. PLANT PROFILE**A. Guava leaf**

Psidium guajava which is considered a native to Mexico extends throughout the South America, Europe, Africa and Asia.

It grows in all the tropical and subtropical areas of the world under different climatic conditions but prefers dry climates.

It is used as an antifungal agent.^[6]

I) Scientific classification^[6]

- Botanical name: *Psidium Guajava*
- Kingdom: *Plantae*
- Phylum: *Tracheophyta*
- Genus: *Psidium*
- Species: *Psidium guajava*
- Family: *Myrtaceae*

ii) Chemical constituents:^[8]

- Luteolin: Leaves
- Myricaphenone-B: Leaves
- Flavonoids: Leaves

iii) Uses:^[9]

- Antifungal
- Anti-inflammatory
- Antibacterial



Image no 1: Guava leaves

B. Tulsi leaf

Ocimum Sanctum L. as known as the “Tulsi”. The native of Tulsi Plant of India. A wide distribution covering the entire Indian sub- continent ascending up to 1,800 mm in the Himalaya and Andaman Nicobar islands. It is a broadly distributed in Asia and Australia. It shows antifungal and antibacterial activity. Sanctum has revealed the presence of five fatty acids (stearic, palmitic, Oleic, linolic and linolonic acid)^[9]

I) Scientific classification :^[9]

- Botanical name: *Ocimum sanctum*
- Kingdom: *Plantae*
- Phylum: *Spermatophyta*
- Class: *Magnoliopsida*
- Family: *Lamiaceae*
- Genus: *Ocimum*
- Species: *Ocimum Sanctum*

ii) Chemical constituents^[10]

- 71% eugenol: leaves
- 20% Methyl eugenol : Leaves
- Flavonoids : Leaves
- Urosolic acid :Leaves

iii) Uses:^[10]

It is used as antibacterial, antilipidemic, antidiabetic, antiacne, antiulcer and promoting eye health

Image no 2: Tulsi leaves

**3. MATERIALS AND METHOD****a) MATERIALS:**

- ✓ *Psidium Guajava* powder
- ✓ *Ocimum Tenuiflorum* powder
- ✓ Beeswax
- ✓ Borax
- ✓ Methyl paraben
- ✓ Coconut Oil
- ✓ Ethanol

- ✓ Levender oil

b) APPARATUS:

- ✓ Beaker
- ✓ Measuring cylinder
- ✓ Conical flask stopper
- ✓ Porcelain dish
- ✓ Crucible
- ✓ Test tube
- ✓ Test tube holder

4) PERFORMULATION STUDY:

- ✓ Angle of repose
- ✓ Loss of drying
- ✓ Percentage of ash value

➤ **Angle of repose:**

Angle of repose is the steepest angle at which loose material remains stable without sliding or collapsing under gravity.

$$\phi = \tan^{-1}(h/r)$$

Where,

- ✓ h : the height in cm
- ✓ r : the radius in cm
- ✓ ϕ : the angle of repose

➤ **Loss of drying:**

Loss on drying (LOD) measures the amount of moisture and volatile substances lost from a sample when heated under specified conditions.

$$\text{Percentage of Loss of drying} : \frac{\text{Weight loss}}{\text{Weight of sample}} \times 100$$

➤ **Percentage of ash value:**

Ash value is the residue remaining after incineration of a substance, indicating the amount of inorganic material present.

$$\text{Percentage of ash value} : \frac{W_3 - W_1}{W_2} \times 100$$

- W_3 : weight of sample with ash
- W_2 Weight of sample
- W_1 : weight of empty crucible

5) PREPARATION OF LOTION

a) The Process typically involve steps:

i) Collection of materials:

Fresh leaves of *Psidium guajava* and *ocimum tenuiflorum* was collected from local area nanded

ii) Authentication of plant material:

The sample was authenticated by Dr. V. R. Marathe, HOD (Botany dept.) of NES Science College, Nanded.

iii) Processing of crude drug:

Shade dried and crushed leaves was used for extraction

iv) Preparation of extract

Simple maceration^[12]

In this process, the whole or coarsely powdered crude drug is placed in a stoppered container with the solvent and allowed to stand at room temperature for a period of at least 3 days with frequent agitation until the soluble matter has dissolved.

The mixture then is strained, the marc (the damp solid material) is pressed, and the combined liquids are clarified by filtration or decantation after standing.



Image no 3 :Tulsi powder extraction



Image no 4 :Tulsi powder extraction

Vi) Procedure

Lotion of Oil-in-water (O/W) emulsion based of extracts of *Psidium guajava* and *Ocimum tenuiflorum* was formulated. All the oil soluble components were in oil phase (Part A) and all the water soluble compounds were in water phase (Part B). Part A compounds were all together added and heated at 80°C, so that all the oil based compounds are melted. Part B components are mainly preservatives, *Psidium guajava* and *Ocimum Tenuiflorum* extract and other excipients, were dissolved homogenously in water phase and kept for heating at 80°C. As soon as both the phases were homogenously dissolved, the oil phase was added directly to the water phase with the help of continuous stirring to maintain proper homogeneity. And it was allowed to cool down to get stable emulsion in the formulated lotion. The proper Formula comprising of list of ingredients is mentioned in Table No.3. The base formula played a very significant role in getting righteous formula because of its properties such as turbidity, greasy effect and consistency. At the beginning, the formulations were altered in the oil phases to get the righteous formula and four formulations B1, B2, B3, B4 and B5 were prepared. At last, all these 5 formulations were undertaken for varied testing to check for their stability and were evaluated thoroughly based on their physical and chemical parameters.

Image no 5: Ingredients



6) FORMULATION TABLE:

Sr.no	Ingredients	B1	B2	B3	B4	B5
1	Beeswax	2	2	2	2	2
2	Coconut oil	3.5	3.5	3.5	3.5	3.5
3	Glycerine	3	3	3	3	3
4	Borax	0.2	0.2	0.2	0.2	0.2
5	Methyl paraben	0.14	0.14	0.14	0.14	0.14
6	Levender oil	0.1	0.1	0.1	0.1	0.1
7	Plant extraction	0.5	1	1.5	2	2.5
8	Water	q.s	q.s	q.s	q.s	q.s

Table no: 1 Formulation table

7) EVALUATION OF POLYHERBAL LOTION**i) Appearance:****Colour:** whitish in colour**Odour:** Slight floral**ii) pH:**

pH meter or pH paper

Result: pH between 5.0 to 6.0 ideally close to the skin natural pH 5.6.**iii) Spreadability test:**

Good spreadability and absorbency with no greasy residue

iv) Stability test:

Accelerated stability testing

No significant changes in appearance, pH, Viscosity or texture. No separation, sedimentation, or crystallization.

V) Irritation test:**Test:** Patch testing on human subjects**Result:** No significant irritation or sensitization reactions.**vi) Washability test:**

Lotion with contain a pH level around 5-6 and containing natural ingredients to have a good washability

vii) Antimicrobial test**a) Agar disk-diffusion method:**

agar plates are inoculated with a standardized inoculum of the test microorganism. Then, filter paper discs (about 6 mm in diameter), containing the test compound at a desired concentration, are

placed on the agar surface. The Petri dishes are incubated under suitable conditions. Generally, antimicrobial agent diffuses into the agar and inhibits germination and growth of the test microorganism and then the di-ameters of inhibition growth zones are measured.

b) Agar well diffusion method:

the agar plate surface is inoculated by spreading a volume of the microbial inoculum over the entire agar surface. Then, a hole with a diameter of 6 to 8 mm is punched aseptically with a sterile cork borer or a tip, and a volume (20–100 μL) of the antimicrobial agent or extract solution at desired concentration is introduced into the well. Then, agar plates are incubated under suitable conditions depending upon the test micro-organism. The antimicrobial agent diffuses in the agar medium and inhibits the growth of the microbial strain tested.

viii) preliminary phytochemical constituent evaluation:

a) Carbohydrate:

a) Molish Test:

Procedure: Add a few drops of Molisch's reagent (α -naphthol in ethanol) to the lotion, then carefully add concentrated sulfuric acid along the side of the test tube.

Result: A violet ring at the interface indicates the presence of carbohydrates.

b) Benedict's Test:

Procedure: Mix the lotion with water, add Benedict's reagent, and heat in a boiling water bath for 5 minutes.

Result: A color change from blue to green, yellow, or brick-red indicates reducing sugar

c) Fehling's Test:

Procedure: Add Fehling's solutions A and B to the lotion extract and heat.

Result: Formation of a red precipitate indicates reducing sugars

b) Alkaloid:

a) Wagner test:

Procedure: Add Wagner's reagent (iodine in potassium iodide) to the lotion extract.

Result: Formation of a reddish-brown precipitate confirms alkaloids.

b) Hager's Test:

Procedure: Add Hager's reagent (picric acid solution) to the lotion extract.

Result: Formation of a yellow precipitate confirms the presence of alkaloids.

c) Glycosides:**Borntrager's Test:**

Procedure: Treat with dilute sulfuric acid, extract with organic solvent, and add ammonia.

Result: A pink or red color in the alkaline layer confirms anthraquinone glycosides.

d) Tannin:**Ferric chloride test:**

Procedure: Add FeCl_3 solution; in the lotion extract

Result: A blue-black or greenish color indicates tannin

e) Flavonoids:**a) Lead acetate test:**

Procedure : Addition of lead acetate forms

Result: Yellow precipitate, confirming flavonoids.

b) Alkaline reagent test:

Procedure : Add sodium hydroxide to the extract.

Result: Yellow coloration indicates flavonoids.

f) Phenols:**Liebermann's test:**

Procedure: Add Sulfuric acid to the extract

Result: Pink colour appear

8) OBSERVATION & RESULT

i) loss of drying :

	Guava	Tulsi
Weight of empty dish (a)	49.68 gm	56.09 gm
Weight of sample (b)	2 gm	2 gm
Weight of empty dish(a) + weight of sample (b) (c)	51.70 gm	58.10 gm

Table no 2: loss of drying

Time	Guava	Tulsi
15 min	51.68	58.09
30 min	51.65	58.07
1 hr	51.65	58.07
Average	51.66	58.07

Table no 3: Time of loss of drying

Calculation

$$\text{Average weight of guava:} = \frac{51.68+51.65+51.65}{3}$$

$$= \frac{154.98}{3}$$

$$= 51.66$$

$$\text{Average weight of tulsi:} = \frac{58.09+58.07+58.07}{3}$$

$$= \frac{174.23}{3}$$

$$= 58.07$$

Weight of sample guava:

$$\begin{aligned}
 &= C- \text{ average weight of guava} \\
 &= 51.70- 51.66 \\
 &= 0.04
 \end{aligned}$$

Weight of sample tulsi:

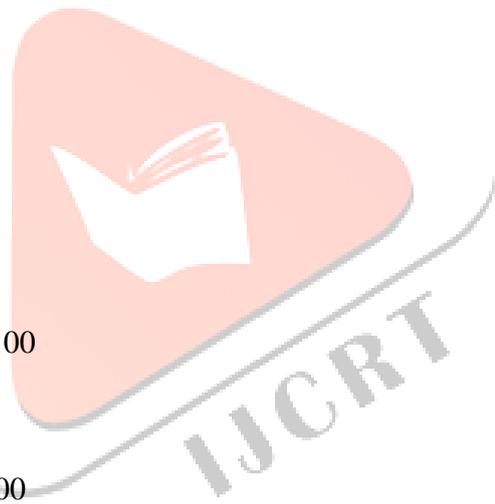
$$\begin{aligned}
 &= C- \text{ average weight of tulsi} \\
 &= 58.10- 58.07 \\
 &= 0.03
 \end{aligned}$$

Percentage of loss of drying of guava:

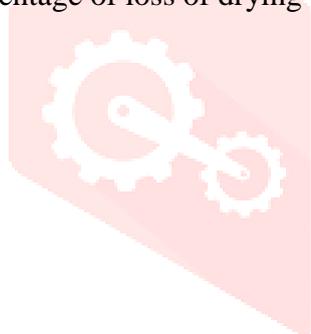
$$= \frac{\text{Weight loss}}{\text{Weight of sample}} \times 100$$



$$\begin{aligned}
 &= \frac{0.04}{51.66} \times 100 \\
 &= 0.07\%
 \end{aligned}$$



Percentage of loss of drying of tulsi:



$$\begin{aligned}
 &= \frac{\text{Weight loss}}{\text{Weight of loss}} \times 100 \\
 &= \frac{0.03}{58.07} \times 100
 \end{aligned}$$

$$= 0.05\%$$

ii) Ash value

	GUAVA	TULSI
weight of empty crucible (w ₁)	17.37 gm	17.37 gm
weight of sample (W ₂)	2 gm	2 gm
weight of sample with ash (W ₃)	17.89 gm	17.83 gm

Table no 4: Ash value

Ash value of guava

$$= \frac{W_3 - W_1}{W_2} \times 100$$

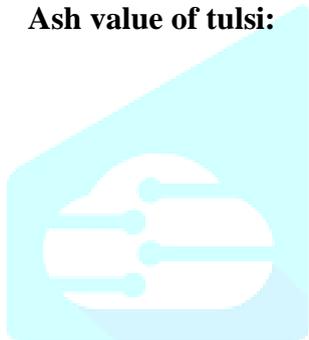
$$= \frac{17.89 - 17.37}{2} \times 100$$

$$= \frac{0.52}{2} \times 100$$

$$= 0.26 \times 100$$

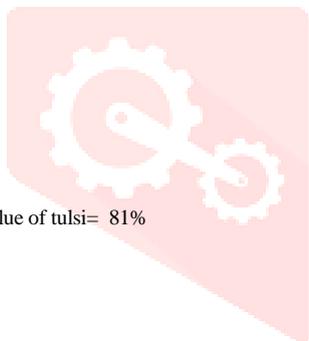
$$= 26 \%$$

Ash value of guava= 26 %

Ash value of tulsi:

$$= \frac{W_3 - W_1}{W_2} \times 100$$

$$= \frac{17.83 - 16.21}{2} \times 100$$



$$= \frac{1.62}{2} \times 100$$

$$= 0.81 \times 100$$

$$= 81 \%$$

Ash value of tulsi= 81%



Test	Psidium guajava (Guava)	Ocimum tenuiflorum (tulsi)
Ash value	26 %	81 %
Loss of drying	0.07 %	0.05 %
Angle of repose	40 ⁰ 36 ⁱ	42 ⁰ 61 ⁱ

Table no 5: Test

iii) Appearance

a) Appearance:

Colour: whitish in colour

Odour: Slight floral

b) pH:

pH determines by using pH meter

Sr.no	Formulation	pH
1	B1	5.5
2	B2	5.7
3	B3	5.3
4	B4	5.8
5	B5	5.9

Table no 6: Determination pH

C) Irritancy:

After the application of the herbal lotion in all formulation the irritancy test revealed no indication of Irritation

Sr. no	Formulation	Irritancy
1	B1	No Irritation
2	B2	No Irritation
3	B3	No Irritation
4	B4	No Irritation
5	B5	No Irritation

Table no 7: Irritancy

d) Spreadability test:

The lotion should be easy to spread the skin.

Sr.no	Formulation	Spread
1	B1	Spread smoothly
2	B2	Spread smoothly
3	B3	Spread smoothly
4	B4	Spread smoothly
5	B5	Spread smoothly

Table no 8: Spreadability test

e) Stability test :

Accelerated stability testing

No significant changes in appearance, pH, Viscosity or texture. No separation, sedimentation, or crystallization.

f) Washability test :

Lotion with contain a pH level around 5-6 and containing natural ingredients to have a good washability.

g) Antimicrobial activity:

Guava

Tulsi

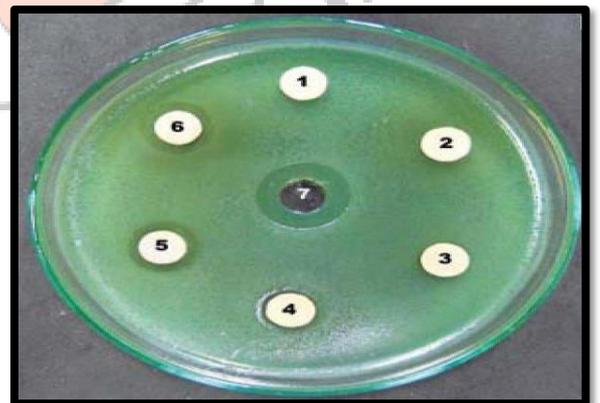
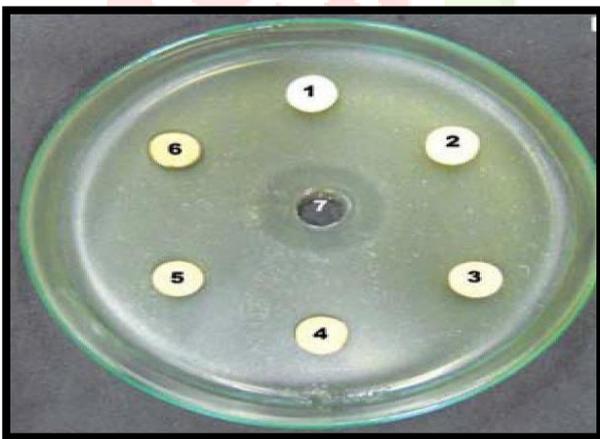


Image no 6: Antifungal activity of guava extract activity of tulsi extract against candida albicans against candida albicans

Image no 7: Antifungal extract

Sr.no	Concentration of extract	Zone of inhibition
1	A1 (25 µg/ml)	Nil
2	A2 (25 µg/ml)	Nil
3	A3 (50 µg/ml)	Nil
4	A1 (25µg/ml)	Nil
5	A2 (50µg/ml)	Nil
6	A3 (50µg/ml)	5 mm
7	Fluconazole	15 mm

Table no 9:Guava extract against candida albicans

albican

Sr.no	Concentration of extract	Zone of inhibition
1	C1 (25µg/ml)	Nil
2	C2(25µg/ml)	Nil
3	C3(25µg/ml)	Nil
4	C1 (50 µg/ml)	3 mm
5	C2(50 µg/ml)	8 mm
6	C3(50 µg/ml)	11 mm
7	Fluconazole	15 mm

Table no10: Tulsi extract against *candida*

g) preliminary phytochemical constituent evaluation :

Sr..no	Chemical test	Result
1	Carbohydrate	
	a) Molish test	Positive
	b) Benedict's test	Positive
	c) Fehling test	Positive
2	Alkaloids	
	a) Wagner test	Positive
	b) Hager test	Positive
3	Glycosides	
	Borntrager test	Positive
4	Flavonoids	
	Ferric chloride test	Positive
	Lead acetate test	Positive
5	Alkaline reagent test	Positive
6	Liebermann test	Positive

Table no 11: Chemical test result

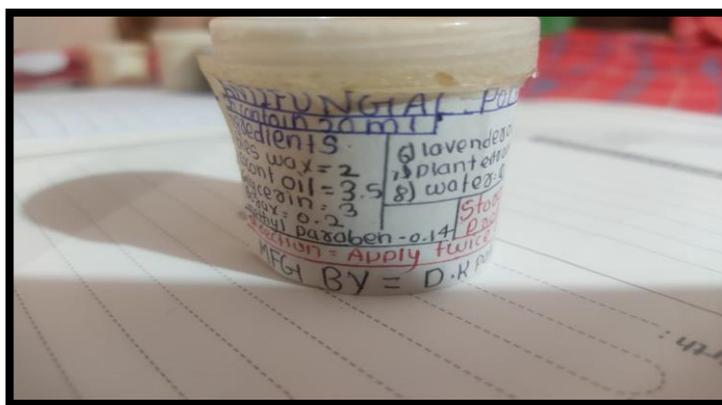


Image no 8: Antifungal herbal lotion

9) CONCLUSION :

The polyherbal antifungal lotion formulated with *Psidium guajava* and *Ocimum tenuiflorum* showed promising antifungal activity, indicating its potential as an effective and natural topical treatment.

10) DISCUSSION:

The formulated polyherbal antifungal lotion using *Psidium guajava* and *Ocimum tenuiflorum* exhibited good consistency, stability, and antifungal activity, supporting its potential use in herbal dermatological applications.

11) REFERENCE

1. Vishvam kunde, Sneha Sonawane, Akshay katkale, and siddhant hagavne.- A review on lotion as a skin care products vol11 iss 4 503-519 (2022)
2. R. Anusha, P. Prathibha, G.Ganesh goud, Resma Khatum and Al Aziz Ahmed -A review of preparation and evaluation method of Herbal Body Lotion vol 3 iss (2023)
3. Sunil Mishra, Dr. Shashank Tiwari, Kartikay Prakash, Prachi Jaiswal and Harsh Rajpoot- Pharmaceutical assessment of body lotion: A herbal formulation and its potential benefits (2023)
4. Gudade Gayatri Ashok, Gaikwad Vishal Shivaji- A Review on Herbal Lotion Vol 10 iss 10 (2022)
5. Dr. Sanjay G. Walode, Dr. Chandan R. S, Dr. Mrs. Alpana J. Asnani- A Textbook Of Medicinal Chemistry- III (2018)
6. Khush jain, fariah Rizwani,dr. Shefaiil Thakkar- Formulation and evaluation of herbal lotion of psidium guajava Vol 12 iss 9 (2023)
7. Ms. Kalyani, G. Dubhashe, Ms. Bhavana, D. Tambe- Formulation and Evaluation of herbal lotion vol 4,no 5 page no6543-6547 (2023)
8. Eziuche Amadike Ugbogu, Okezie Emmanuel, Miracle Ebubechi Uche, Emmanuel Dike Dike, Benedict Chukwuebuka Okora, Chibuike ibe, Victor Chibueze Ude, Celestine Nwabu Ekweogu, Ositadinma Chinyere ugbogu- The ethnobotanical phytochemistry and pharmacological activities of psidium guajava l. (2022)

9. Bono N. Ahmed A, tanveer M, Khan GM, Ansari MT- Pharmacological evaluation of ocimum sanctum (2017)
10. Sunita verma – Chemical constituents and pharmacological action of ociimum sanctum (2016)
11. S. B. Kakurde, N. A. Reshi ,C.V. Patil: A Review on Ethnobotanical, Phytochemical and Pharmacological Studies on Some Species of Ocimum sanctum (2024)
12. Sukhdev Swami handa, suman preet Singh Khanja, Gennaro, Longa, Dev Dutt Rakesh-Extraction Technologies for medicinal and aromatic plants (2008)

