International Journal of Pharmaceutical research and Applications
Volume 11, Issue 3, May-June2026, pp:1830-1840 www.ijprajournal.com ISSN:2456-4494

"Formulation and Evaluation of Herbal Paste Containing Mimusops elengi for Topical Application "

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2025-2026

Date of Submission: 05-01-2026 Date of Acceptance: 15-06-2026

I. INTRODUCTION

Herbal medicines have been used since ancient times for the prevention and treatment of diseases. Due to increasing awareness regarding the adverse effects of synthetic drugs, people are now shifting towards herbal products because they are considered safer, economical, and biocompatible.

Topical herbal formulations are widely used in the pharmaceutical and cosmetic industries for the treatment of skin disorders. Among them, herbal pastes are semi-solid dosage forms that remain in contact with the skin for a longer duration and provide prolonged therapeutic action.

Mimusops elengi, commonly known as Bakul, is an evergreen medicinal plant belonging to the family Sapotaceae. Different parts of the plant such as bark, flowers, leaves, and fruits possess several medicinal properties. Traditionally, it has been used for wound healing, skin diseases, dental disorders, inflammation, and microbial infections.

The phytoconstituents present in Mimusops elengi such as tannins, flavonoids, saponins, alkaloids, and glycosides are responsible for its therapeutic activities. Because of these medicinal properties, the plant is considered suitable for the development of topical herbal formulations.

II. NEED OF STUDY

1. Synthetic topical products may cause irritation and allergic reactions.
2. Herbal preparations are safer and have fewer side effects.
3. Mimusops elengi possesses antimicrobial and wound healing properties useful for skin applications.
4. Herbal paste provides prolonged contact with the skin and better therapeutic effect.
5. There is increasing demand for herbal and natural cosmetic preparations.

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III. LITERATURE REVIEW

Sr. No	Title	Authors	Summary
1	Review on Medicinal Uses of Mimusops elengi	Kokate CK et al.	The review explained various medicinal properties of Mimusops elengi such as antimicrobial, antioxidant, anti-inflammatory, and wound healing activities.
2	Phytochemical and Pharmacological Studies on Mimusops elengi	Khandelwal KR	The study reported presence of tannins, flavonoids, alkaloids, glycosides, and saponins responsible for therapeutic activity of the plant.
3	Herbal Topical Formulations for Skin Disorders	Harborne JB	The paper discussed advantages of herbal topical preparations including better safety, prolonged action, and fewer side effects compared to synthetic products.
4	Evaluation of Herbal Paste Formulations	Sharma A et al.	The study evaluated different herbal paste formulations for pH, spreadability, consistency, and stability for topical application.
5	Antimicrobial Activity of Medicinal Plants .	Patel RM et al.	The research confirmed that medicinal plants containing tannins and flavonoids possess strong antimicrobial activity against skin pathogens.
6	Wound Healing Potential of Herbal Preparation.	Singh R et al.	The study reported that herbal formulations enhance tissue regeneration and accelerate wound healing process.
7	Formulation and Evaluation of Polyherbal Topical Paste	Gupta P et al.	The paper explained preparation methods and evaluation parameters of herbal paste formulations for skin treatment.

IV. AIM AND OBJECTIVES

AIM

To formulate and evaluate a herbal paste containing Mimusops elengi for topical application.

OBJECTIVES

To prepare herbal paste using Mimusops elengi powder/extract. To evaluate physicochemical properties of prepared formulations. To study spreadability, consistency, and stability of formulations. To identify optimized formulation based on evaluation parameters.

To develop a safe and effective herbal topical preparation with minimal side effects. To explore therapeutic potential of Mimusops elengi in skin-related conditions.

V. PLAN OF WORK

1. Selection of research topic.
2. Literature survey related to Mimusops elengi and herbal topical formulations.
3. Collection and authentication of plant material.
4. Washing and shade drying of plant material.
5. Preparation of fine powder of Mimusops elengi.
6. Selection of suitable excipients for formulation.
7. Preparation of different herbal paste formulations (F1, F2, F3).
8. Mixing and trituration to obtain smooth homogeneous paste.
9. Evaluation of prepared formulations for:
10. Selection of optimized formulation.
11. Interpretation of results and discussion.
12. Preparation of final thesis report.

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PLAN OF WORK

The present research work entitled "Formulation and Evaluation of Herbal Paste Containing Mimusops elengi" was planned systematically to develop a stable, effective, and safe herbal topical formulation. The entire work was carried out in different stages including collection of plant material, preparation of formulation, evaluation studies, and interpretation of results.
The complete plan of work is described below:

Step 1: Selection of Research Topic

The research topic was selected based on the medicinal importance of Mimusops elengi and increasing demand for herbal topical preparations. The plant possesses antimicrobial, anti-inflammatory, antioxidant, and wound healing activities which make it suitable for preparation of herbal paste.

Step 2: Literature Survey

- A detailed literature review was carried out using:
- Research articles
- Review papers
- Pharmacognosy books
- Herbal journals
- Indian Herbal Pharmacopoeia
- The literature survey helped in understanding:
- Medicinal uses of Mimusops elengi
- Phytochemical constituents
- Previous herbal topical formulations
- Evaluation parameters
- Stability studies

Step 3: Collection and Authentication of Plant Material

- The plant material (Mimusops elengi) was collected from local sources and authenticated based on morphological characteristics. The collected material was washed, shade dried, and powdered properly.

Step 4: Preparation of Plant Powder

- The dried plant material was powdered using grinder and sieved to obtain fine uniform powder suitable for formulation.

Step 5: Selection of Excipients

- Suitable excipients were selected according to their pharmaceutical role:

Material	Role
Mimusops elengi powder	Active ingredient
Kaolin	Base
Glycerin	Humectant
Acacia	Binder
Methyl paraben	Preservative
Propyl paraben	Preservative
Rose water	Vehicle

These ingredients were selected to improve texture, stability, spreadability, and overall performance of the formulation.

Step 6: Formulation of Herbal Paste

Different formulations (F1, F2, and F3) were prepared using varying concentrations of Mimusops elengi powder.

Procedure:

1) All ingredients were accurately weighed.
2) Kaolin and plant powder were mixed uniformly.
3) Acacia was added as binding agent.
4) Glycerin was incorporated gradually.
5) Preservatives were added.
6) Rose water was added slowly with continuous mixing.
7) The mixture was triturated properly to obtain smooth homogeneous paste.

Step 7: Evaluation of Prepared Formulations

Prepared formulations were evaluated for different physicochemical parameters such as:

- Color
- Odor
- Texture
- Homogeneity
- pH
- Spreadability
- Consistency
- Washability

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- Irritancy
- Stability

Step 8: Stability Study
The prepared formulations were stored under suitable storage conditions and evaluated periodically for:

- Change in color
- Change in odor
- Change in pH
- Consistency
- Stability

Step 9: Interpretation of Results
The obtained results were compared and analyzed to determine optimized formulation with better spreadability, smooth texture, stability, and overall performance.

Step 10: Preparation of Final Thesis
After completion of experimental work and result analysis, final thesis was prepared systematically including:

- Introduction
- Literature review
- Methodology
- Evaluation
- Results and discussion
- Conclusion
- References

VI. PLANT PROFILE

PLANT PROFILE OF MIMUSOPS ELENGI

Taxonomical Classification
Kingdom - Plantae Family - Sapotaceae Genus - Mimusops
Species - **Mimusops elengi Synonyms**
Bakul, Spanish Cherry , Bullet Wood Tree

Biological Source
Mimusops elengi consists of dried bark, leaves, flowers, and fruits of the plant belonging to family Sapotaceae.

Chemical Constituents

- Tannins
- Flavonoids
- Alkaloids
- Glycosides
- Saponins
- Terpenoids
- Phenolic compounds

Medicinal Uses

1. Antimicrobial activity
2. Anti-inflammatory activity
3. Antioxidant activity

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4. Wound healing activity
5. Skin protective activity
6. Astringent action

A
DVANTAGES OF HERBAL PASTE

1. Easy topical application
2. Prolonged skin contact
3. Better local action
4. Reduced systemic side effects
5. Natural and economical
6. Good patient compliance

AUTHENTICATON AND IDENTIFICATION
AUTHENTICATION OF HERB: -

- It is a scientific process of identifying the herb on basis of their Botanical, Taxonomical profile of herb.
- Identifying the herb on basis of morphological and anatomical analysis of herb.(Botanical name, Family, Genus, Species ,Class, Order, Subclass , kingdom etc.)

VII. EXPERIMENTAL WORK

MATERIALS REQUIRED

Material	Role
Mimusops elengi powder	Active ingredient
Kaolin	Base
Glycerin	Humectant
Acacia	Binder
Methyl paraben	Preservative
Propyl paraben	Preservative
Rose water	Vehicle

METHOD OF PREPARATION

Preparation of Herbal Paste Step 1: Weighing
Required quantities of all ingredients were accurately weighed using a digital balance. Step 2: Mixing of Base
Kaolin was taken in a mortar and mixed uniformly with Mimusops elengi powder. Step 3: Addition of Binder
Acacia was added slowly to improve consistency and binding property. Step 4: Addition of Humectant
Glycerin was incorporated gradually to provide smooth texture and moisture retention. Step 5: Addition of Preservatives
Methyl paraben and propyl paraben were added to prevent microbial contamination. Step 6: Addition of Vehicle

Rose water/distilled water was added gradually with continuous mixing. Step 7: Trituration
The mixture was triturated properly to obtain smooth, homogeneous, and lump-free paste.

FORMULATION TABLE

Ingredients	F1	F2	F3
Mimusops elengi (%)	**5**	**10**	**15**
Kaolin (%)	**40**	**40**	**40**
Glycerin (%)	10	10	10
Acacia (%)	**5**	**5**	**5**
Methyl paraben (%)	0.1	0.1	0.1
Propyl paraben (%)	0.05	0.05	0.05
Rose water	q.s.	q.s.	q.s.

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VIII. EVALUATION PARAMETERS

1] Physical Appearance

The prepared formulations were visually observed for: Color
Odor Texture Homogeneity Smoothness
Observation
All formulations showed acceptable appearance and smooth texture.

2] pH Determination

Procedure
1 g of paste was dissolved in 10 mL distilled water and pH was measured using digital pH meter. Ideal Range
Skin-compatible pH: 4.5–7 Result
Formulation pH
F1 6.2 F2 6.5 F3 6.8

3]Spreadability

Principle
Spreadability indicates ease of application on skin.
Where:
S = Spreadability
M = Weight tied to upper slide L = Length moved by slide
T = Time taken Result Formulation Spreadability F1 Good F2

Excellent F3
Good Discussion
F2 showed optimum spreadability due to balanced concentration of ingredients.

4] Consistency

Procedure
Consistency was checked manually by pressing paste between fingers. Result
Formulation Observation F1
Smooth F2
Very smooth F3
Thick

5] Washability

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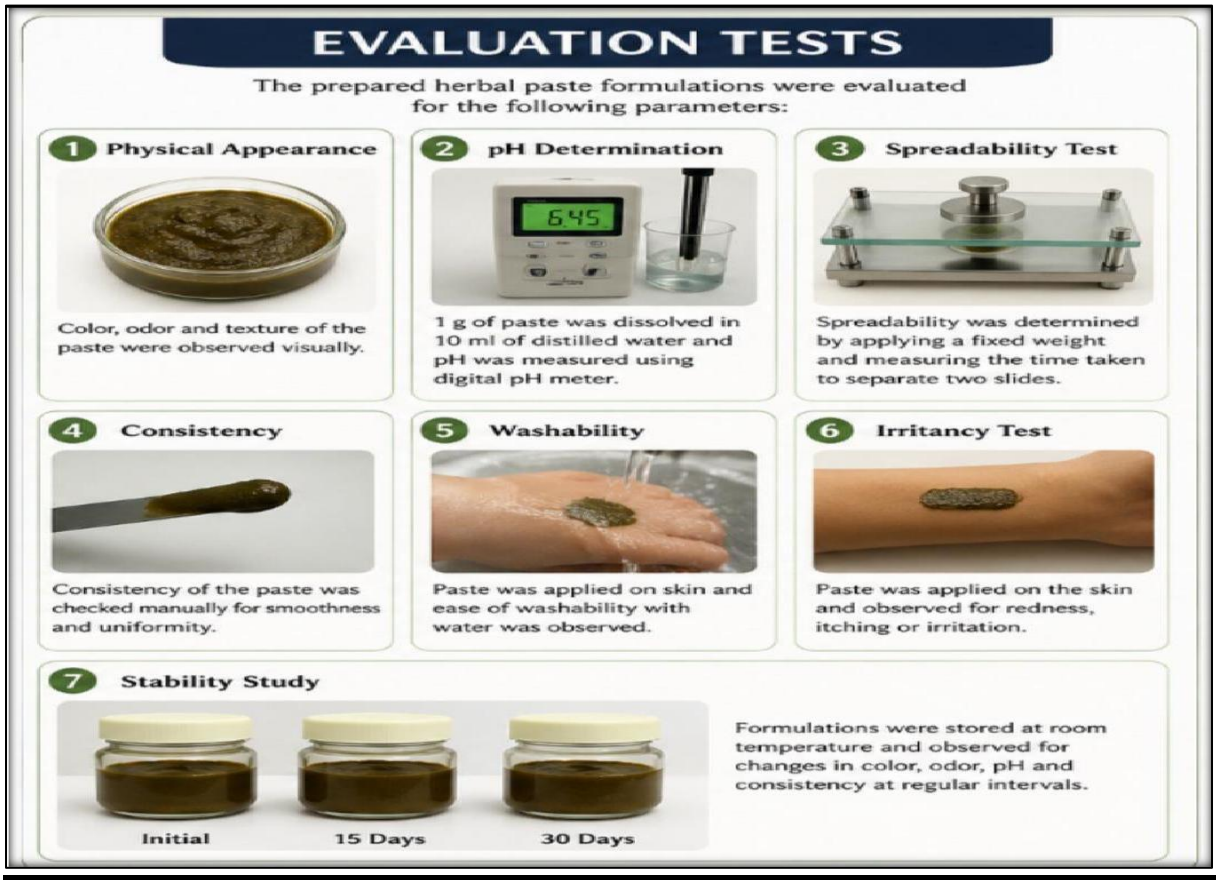
Procedure
Paste was applied on skin and washed with water.
Result
Formulation Washability F1
Good F2
Good F3
Moderate

6] Irritancy Test
Procedure
Small quantity of formulation was applied on skin and observed for irritation. Observation
No redness, itching, or irritation was observed.

7] Stability Study
Procedure
Formulations were stored at room temperature for one month and observed periodically. Parameters Checked
Color Odor pH
Consistency Result
No significant changes were observed in F2 formulation.



IX. RESULT AND DISCUSSION

The present research work was carried out to formulate and evaluate herbal paste containing Mimusops elengi for topical application. Three different formulations namely F1, F2, and F3 were prepared using varying concentrations of Mimusops elengi powder along with suitable pharmaceutical excipients such as kaolin, glycerin, acacia, methyl paraben, propyl paraben, and rose water.

The prepared formulations were evaluated for various physicochemical parameters including physical appearance, color, odor, texture, homogeneity, pH, spreadability, consistency, washability, irritancy, and stability.

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The detailed results obtained during evaluation studies are discussed below.

Sr No.	Evaluation Parameter	F1	F2	F3	Observation
1)	Color	Light Brown	Brown	Dark Brown	Color intensity increased with concentration of herbal powder
2)	Odor	Characteristic	Characteristic	Strong Characte ristic	Pleasant herbal odor observed
3)	Texture	Smooth	Very Smooth	Slightly Thick	F2 showed superior smoothness
4)	Homogeneity	Good	Excellent	Good	No lumps or phase separation
5)	pH	6.2	6.5	6.8	Suitable for skin application
6)	Spreadability	Good	Excellent	Moderat e	F2 spread easily on skin
7)	Consistency	Smooth	Optimum	Thick	Increased concentration increased viscosity
8)	Washability	Good	Good	Moderat e	F3 required more washing
9)	Irritancy Test	No Irritation	No Irritation	No Irritation	No redness or itching observed
10)	Stability	Stable	Highly Stable	Slight Change	F2 remained stable throughout study

Detailed Discussion of Evaluation Parameters

1. Physical Appearance

Physical appearance is one of the most important evaluation parameters for topical herbal preparations because it directly affects patient acceptability and product quality. The prepared herbal paste formulations were visually observed for color, odor, texture, smoothness, and overall appearance.

All formulations showed acceptable appearance without any signs of phase separation or grittiness. The formulations appeared smooth and semi-solid in nature, which indicated proper mixing and uniform distribution of ingredients.

The color of the formulations gradually changed from light brown to dark brown with increase in concentration of Mimusops elengi powder. F1 showed light brown appearance because of lower concentration of plant material, whereas F3 showed comparatively darker color due to higher concentration of herbal powder.

Among all formulations, F2 exhibited most acceptable appearance with optimum color, smooth texture, and elegant consistency. The pleasant herbal odor observed in all formulations confirmed presence of natural plant constituents.

2. Homogeneity

Homogeneity is an important parameter for determining uniform distribution of ingredients within the formulation. A homogeneous preparation ensures uniform therapeutic action and better product quality.

The prepared formulations were examined visually by pressing small quantity of paste between fingers and observing for presence of lumps, aggregates, or phase separation.

All formulations showed good homogeneity and smoothness. No coarse particles or grittiness were observed in any formulation. Proper trituration and gradual addition of excipients helped in obtaining uniform distribution of herbal powder within the base.

F2 formulation exhibited excellent homogeneity compared to F1 and F3 due to optimum concentration of ingredients and better consistency.

3. pH Determination

The pH of topical formulations plays a significant

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role in determining compatibility with skin. An ideal topical preparation should possess pH near to skin pH to avoid irritation, redness, or dryness.
The pH values of prepared formulations were found within the range of 6.2 to 6.8, which is considered suitable for skin application.
Formulation pH
F1 6.2 F2 6.5 F3 6.8
The results indicated that all prepared formulations were skin compatible and safe for external application. Slight increase in pH was observed with increase in concentration of herbal powder.
F2 formulation showed optimum pH value which was closer to physiological skin pH and hence considered more suitable for topical application.

4. Spreadability

Spreadability is an important parameter which determines ease of application of formulation on skin surface. Good spreadability helps in uniform distribution of formulation and improves patient compliance.
The spreadability of prepared formulations was evaluated by slide method.
The spreadability values indicated that F2 formulation possessed best spreading property among all formulations. The formulation spread uniformly on skin surface without excessive friction.
F1 also showed good spreadability due to lower viscosity, while F3 showed comparatively lower spreadability because higher concentration of herbal powder increased thickness and resistance during spreading.
Good spreadability observed in F2 may be attributed to balanced concentration of kaolin, glycerin, and herbal powder.

5. Consistency

Consistency is an important characteristic of semi-solid dosage forms because it affects application, spreadability, stability, and patient acceptability.
The consistency of formulations was evaluated manually by pressing paste between fingers.

F1 formulation showed smooth consistency due to lower concentration of plant material. F3 showed comparatively thick consistency because of higher concentration of herbal powder.
F2 formulation exhibited optimum consistency with balanced viscosity, smooth texture, and better applicability on skin.
The study indicated that increase in concentration of herbal powder directly increased thickness and viscosity of formulation.

6. Washability

Washability is an important parameter for topical formulations because it affects ease of removal from skin after application.
The prepared formulations were applied on skin and washed using water.
F1 and F2 formulations were easily washable and removed completely with small quantity of water. F3 required comparatively more washing because of increased viscosity and thicker consistency.
Good washability observed in F2 improved patient convenience and overall acceptability of formulation.

7. Irritancy Test

The prepared herbal paste formulations were evaluated for irritancy by applying small quantity on skin surface and observing for redness, itching, inflammation, or allergic reaction.
No signs of irritation, erythema, itching, or swelling were observed during study period. The results indicated that all prepared formulations were safe and suitable for topical application.
Absence of irritation may be due to natural origin of ingredients and skin compatible pH of formulations.
This result confirmed safety and biocompatibility of prepared herbal paste.

8. Stability Study

Stability study is an essential parameter for evaluating quality and shelf life of pharmaceutical formulations. The prepared formulations were stored at room temperature and evaluated periodically for changes in:
Color Odor Texture pH
Consistency Homogeneity

During storage study, F1 and F2 formulations remained stable without significant changes in physicochemical properties. Slight increase in thickness was observed in F3 formulation due to higher concentration of plant material.
No microbial growth, phase separation, or significant change in color and odor was observed during storage period.
F2 formulation showed best stability profile among all formulations and maintained acceptable consistency, smoothness, and spreadability throughout the study.

Overall Discussion

The present study successfully formulated herbal paste containing Mimusops elengi using suitable pharmaceutical excipients. All prepared

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formulations showed acceptable physicochemical characteristics and were suitable for topical application.

The results demonstrated that concentration of herbal powder significantly affected color, consistency, spreadability, and washability of formulations. Increase in concentration increased thickness and reduced spreadability.

Among all formulations, F2 exhibited:

- Better homogeneity
- Excellent spreadability
- Smooth texture
- Optimum consistency
- Suitable pH
- Good washability
- Excellent stability

Therefore, F2 was selected as optimized formulation for topical application.

The study confirmed that Mimusops elengi possesses promising potential for development of safe, stable, and effective herbal topical formulations because of its antimicrobial, anti-inflammatory, antioxidant, and wound healing properties

X. CONCLUSION

The present research work entitled "Formulation and Evaluation of Herbal Paste Containing Mimusops elengi" was successfully carried out. Herbal formulations are gaining increasing importance in pharmaceutical and cosmetic fields because of their natural origin, safety, therapeutic effectiveness, and minimal side effects compared to synthetic preparations.

In the present study, herbal paste formulations were prepared using Mimusops elengi powder along with suitable pharmaceutical excipients such as kaolin, glycerin, acacia, methyl paraben, propyl paraben, and rose water. Different formulations (F1, F2, and F3) were prepared using varying concentrations of herbal powder.

The prepared formulations were evaluated for different physicochemical parameters including physical appearance, color, odor, texture, homogeneity, pH, spreadability, consistency, washability, irritancy, and stability. All formulations showed acceptable properties suitable for topical application.

The pH values of all formulations were found within acceptable skin pH range, indicating compatibility with skin. Spreadability and consistency studies revealed that increase in concentration of herbal powder increased thickness of formulation and slightly reduced spreadability.

Among all formulations, F2 showed better smoothness, optimum consistency, excellent spreadability, good homogeneity, acceptable washability, and superior stability. No irritation, redness, or allergic reactions were observed during irritancy testing, indicating safety of the formulation for topical use.

The stability study confirmed that the prepared herbal paste remained stable during storage without significant changes in color, odor, pH, or consistency.

Thus, the present study concludes that Mimusops elengi can be effectively utilized for preparation of safe, stable, and effective herbal topical formulations due to its antimicrobial, anti-inflammatory, antioxidant, and wound healing properties.

The developed herbal paste may further be explored for advanced pharmacological studies, clinical evaluation, and commercial herbal product development in future.

ACNOWLEDGEMENT

Behind every success there are lot many efforts, but efforts are fruitful due to hands making the passage smoother. I express my deep sense of gratitude for the hands people extended to me during my work.

First and foremost I wanted to express my indepth thanks to my father and mother **Mr. Kharat Daulat Chandrabhan.** and **Mrs. Kharat Savita Daulat**, for all their hard work to bring me up with a high quality education and a very special thanks to my friends, colleagues whose full-hearted cooperation, encouragement, moral support made me complete my work successfully.

I take this opportunity to express my deep sincere gratitude and heart-felt thanks to my esteemed research guide **Mr.Gosavi Nilesh Balgir**. Associate professor at Dr. Ithape Institute of Pharmacy, Sangamner for his inspiring and instrumental role in providing me the research & Infrastructure facilities at the college and encouragement for the successful completion of my project work. His assurances and advice helped me in good stead. His guidance, support, enthusiasm and encouragement, made research work an educative and interesting experience.

I take this opportunity to express my deep sincere gratitude and heart-felt thanks to **Dr Mansukh Avinash G,** HOD and Associate professor at Dr. Ithape Institute of Pharmacy, Sangamner for his inspiring and instrumental role in providing me the

research & infrastructure facilities at the college and encouragement for the successful completion of my project work.
I express my sincere thanks to respected **Dr.Giri Mahendra A.** Principal Dr.Ithape Institute of Pharmacy, Sangamner for providing the enthusiastic academic environment and industrial facilities required for research work.

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