World Journal of Pharmaceutical Science and Research
www.wjpsronline.com
Research Article
ISSN: 2583-6579
SJIF Impact Factor: 5.111
Year - 2025
Volume: 4; Issue: 3
Page: 599-614

FORMULATION AND EVALUATION OF AN HERBAL FACE SCRUB CONTAINING NEEM, TULSI, AND MULTANI MITTI FOR SKIN REJUVENATION

[1]Aamir Raza, [2*]Nidhi Chaudhary, [2]Krati, [2]Dr. Esha Vatsa, [3]Dr. Amandeep Singh

[1]Student, School of Pharmaceutical Sciences, Jigyasa University (Formerly Himgiri Zee University), Dehradun.

[2]Assistant Professor, School of Pharmaceutical Sciences, Jigyasa University (Formerly Himgiri Zee University), Dehradun.

[3]Principal & Professor, School of Pharmaceutical Sciences, Jigyasa University (Formerly Himgiri Zee University), Dehradun.

Article Received: 03 May 2025 | | Article Revised: 24 May 2025 | | Article Accepted: 15 June 2025

***Corresponding Author: Nidhi Chaudhary**
Assistant Professor, School of Pharmaceutical Sciences, Jigyasa University (Formerly Himgiri Zee University), Dehradun.
DOI: https://doi.org/10.5281/zenodo.15772358

How to cite this Article Aamir Raza, Nidhi Chaudhary, Krati, Dr. Esha Vatsa, Dr. Amandeep Singh (2025) "FORMULATION AND EVALUATION OF AN HERBAL FACE SCRUB CONTAINING NEEM, TULSI, AND MULTANI MITTI FOR SKIN REJUVENATION". World Journal of Pharmaceutical Science and Research, 4(3), 599-614. https://doi.org/10.5281/zenodo.15772358

ABSTRACT

This herbal face scrub formulation is rooted in the evolving world of modern cosmetics, where traditional beauty products have transformed to include potent, natural ingredients that offer both cosmetic and therapeutic benefits. Drawing on the heritage of cosmetics—originating from the Greek word Kosmetikos, which connotes adornment and artistry—this formulation is designed to address a range of skin concerns by harnessing the power of herbal extracts. It is crafted to gently exfoliate the skin, effectively removing dead cells and impurities that accumulate on its surface while simultaneously enhancing the skin's natural radiance. By stimulating cell renewal and promoting better moisture absorption, the scrub not only improves texture but also helps diminish the appearance of acne scars. The formulation is mindful of different skin types, providing a balanced approach whether the skin is oily, dry, or sensitive, and it emphasises the use of gentle, natural components to maintain the skin's protective barrier. Ultimately, this herbal face scrub serves as a sophisticated yet holistic solution, merging the art of traditional skincare with modern cosmeceutical innovation to reveal smoother, healthier, and more luminous skin.

KEYWORDS: Herbal face scrub, Exfoliation, Natural Ingredients, Cosmeceuticals, Hydration.

1. INTRODUCTION

The period “cosmetic” originates from the Greek word Kosmetikos, signifying splendour, adornment, or the art of enhancement. Cutting-edge cosmetics encompass an extensive range of merchandise, including lotions, creams, perfumes, cleansers, and ornamental gadgets, lots of which now combine herbal components to meet growing purchaser demand for holistic skincare. As the industry advances, know-how of the science in the back of these formulations has become crucial, particularly with the upward push of “cosmeceuticals”—a hybrid class that mixes beauty and pharmaceutical properties. These products target worries like wrinkles, ageing, hyperpigmentation, and hair damage, providing measurable skin benefits even as being regulated as cosmetics in place of capsules.

The pores and skin, being the largest organ within the human body, envelops the entire outside surface, providing safety against a multitude of things. With a surface area starting from 1.5 to 2 m2, the pores and skin capabilities as the body's primary protection mechanism towards pathogens, ultraviolet (UV) light, chemical substances, and bodily trauma. Moreover, it performs a critical function in regulating frame temperature and controlling the release of water into the encircling surroundings.

The skin is not merely one layer—it's a complicated structure which includes three awesome layers, each serving a unique function. The outermost layer, the epidermis, has capabilities like a doorman at a nightclub. It's resilient, keratin-weighted down cells withstand microorganisms, viruses, and toxins, whilst melanocytes generate pigment to block UV radiation. Simply contact the floor? No concerns—the dermis completely renews every 28 days, sloughing off dead cells comparable to falling autumn leaves. Beneath is the epidermis, the skin’s “engine room.” This residue carries sweat glands that assist in cooling you while working out, oil glands that preserve your skin gently, and collagen fibres that hold elasticity. Have you ever felt your face redden whilst feeling embarrassed? Appreciate the blood vessels inside the epidermis that either dilate or constrict to govern temperature and sensations. Even further down, the hypodermis (or subcutaneous layer) presents insulation in your frame. Composed of fats and connective tissue, it absorbs shocks to guard bones, reserves strength, and also secures your skin to muscle tissue, performing as a real protection.

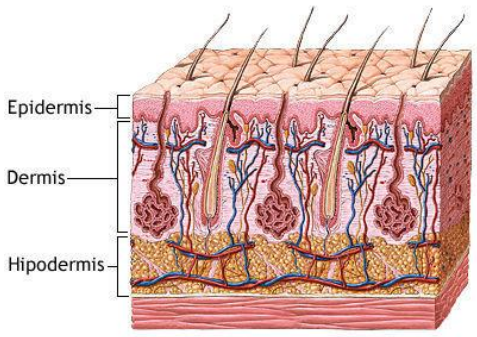

Figure 1: Structure of skin.

1.1 When the Skin Speaks

Our pores and skin regularly mirror inner health. A sudden rash might signal an allergic reaction, while a yellowish tint must be traced to liver problems. Chronic dryness or breakouts? Those need to replicate hormonal imbalances or stress. The skin’s “language” reminds us that it’s now not just a shell—it’s a window to our typical well-being.

1.2 Caring for Your Silent Partner

Regardless of its resilience, the pores and skin isn't invincible. Sunburns accelerate ageing, harsh chemical substances disrupt their microbiome, and dehydration weakens their barrier. Easy behaviour—like carrying sunscreen, staying hydrated, and using mild cleansers—moves in an extended manner in assisting its work.

1.3 Face Scrub

Think about your skin as a delicate canvas—through the years, dirt, oil, and lifeless cells hang to its surface like cussed cobwebs. Input the facial scrub, a skincare hero designed to brush away impurities and display clean, glowing pores and skin. However, no longer are all scrubs created the same. From gritty exfoliators to mild formulations, information a way to apply them for your unique skin type is the name of the game to unlocking their magic. Permit's ruin it down.

1.4 Benefits of Herbal Face Scrub

1. Assists with the removal of dead Cells: Facial or body scrubs are skin care merchandise that penetrate past the surface layer to do away with lifeless skin cells and reveal the radiant, wholesome pores and skin beneath.
2. Liberate the skin from Flakes: The shedding of the outermost layer of pores and skin (dermis) is generally known as flaky pores and skin, resulting in dry patches. Incorporating scrubbing into your skincare routine can efficiently cope with flaky skin. Three.
3. Profound cleansing of the skin: via exfoliating the pores and skin, one could successfully rid it of dirt, oil, and sweat that might not be eliminated by normal cleaning techniques, together with face wash or facial cleansers.
4. Correctly removing dust amassed at the pores and skin's surface, scrubbing proves to be a thorough method for this venture. Five. Complements the pores and skin's radiance and texture: Scrubbing plays an important role in imparting radiance and a smooth texture to the skin.
5. Eradicates pimples Scars: through the removal of useless skin cells, scrubbing also facilitates in getting rid of acne scars at the pores and skin.
6. Enhancing skin Hydration: Facial scrubs include moisturizing and hydrating marketers. Exfoliating the skin facilitates better absorption of moisture, leaving the skin feeling smooth and well-nourished.
7. Alleviates stress: The act of exfoliating or scrubbing the skin provides a healing rubdown that promotes rest and helps reduce stress levels.

1.5 Skin Type Matters: Choosing Your Perfect Match

1. Oily or pimple-prone pores and skin

Oily pores and pores and skin flourish on balance. Search for scrubs with salicylic acid (a beta-hydroxy acid that dives deep into pores) or clay-primarily based absolutely formulations to absorb more sebum. Keep away from overly abrasive particles—they are capable of worsening lively breakouts. Merchandise with 2% glycolic acid or polyhydroxy acids (PHAS) provides slight chemical exfoliation, dissolving lifeless cells without scrubbing. Dermatologists often propose exfoliating 2-three times weekly to prevent clogged pores and shine.

2. Dry or Flaky pores and skin

Dry pores and skin desire nourishment, not punishment. Choose creamy scrubs packed with hyaluronic acid, honey, or oatmeal to hydrate while sloughing off flakes. Physical exfoliants must be extremely fine (assume rice powder or jojoba beads) to avoid micro-tears. Limit use to as quickly as every week to prevent stripping natural oils. Put up-scrub and lock in moisture with a wealthy ceramide cream.

3. Sensitive or Reactive Skin

Touchy pores and pores and skin desires a youngster-glove remedy. Pass gritty textures and merciless acids. As a substitute, strive for enzyme-based scrubs (like papaya or pineapple extracts) that dissolve lifeless cells without friction. PHAS, a gentler cousin of glycolic acid, are also ideal. Start as soon as weekly and appear ahead of redness or stinging—these are symptoms and signs and symptoms to dial returned.

1.6 The Golden Rules of Scrubbing

Even the best scrub can backfire if used incorrectly. Follow these tips:

- Less is extra: Over-exfoliation strips your pores and skin's shielding barrier, leading to dryness or breakouts. Persist with 2-three times weekly for most kinds; sensitive skin can also want just as soon as.
- Be mild: Use mild, circular motions—no harsh scrubbing! Let the product do the painting.
- Timing is fundamental: Avoid scrubbing on days you use retinoids or strong acids to prevent inflammation.
- Rinse very well: Leftover debris can clog pores.

1.7 Common Mistakes to Avoid

The use of coffee grounds or walnut shells: these DIY scrubs might also revel in "herbal"; however, jagged edges can damage the pores and skin.

- Scrubbing active acne: This spreads microorganisms and worsens irritation. Spot with as an alternative.
- Ignoring your neck: Increase your scrub for your neck and décolletage—those regions age, too!

1.8 INGREDIENTS USED IN THE FORMULATION OF HERBAL SCRUB

1) NEEM LEAVES POWDER

Synonyms: *Azadirachta indica* powder, Indian Lilac powder

Figure 2: Neem leaf powder.

Biological Source: Neem leaves powder is derived from the leaves of the neem tree, scientifically known as ***Azadirachta indica***. The neem tree is native to the Indian subcontinent and is widely cultivated in tropical and subtropical regions around the world for its medicinal properties.

Organoleptic Characteristics

a. Colour: Dark green to brownish-green
b. Odour: Strong, pungent, slightly bitter
c. Taste: Bitter

Chemical Constituents

Neem leaves powder contains various bioactive compounds, including:

a. Nimbidin
b. Azadirachtin
c. Quercetin
d. Beta-sitosterol
e. Tannins
f. Flavonoids
g. Carotenoids
h. Essential oils (such as limonene, citronellal)

Uses: Skin toner, lightens skin blemishes, removes blackheads

2) TULSI LEAVES POWDER

Synonyms: Holy Basil powder, ***Ocimum sanctum*** powder

Biological Source: Tulsi leaves powder is derived from the leaves of the holy basil plant, scientifically known as ***Ocimum sanctum***. Tulsi, or holy basil, is an aromatic herb native to the Indian subcontinent and is revered for its medicinal properties in Ayurvedic medicine.

Figure 3: Tulsi leaves powder.

Organoleptic Characteristics

a. Colour: Dark green
b. Odour: Aromatic, herbal
c. Taste: Strong, slightly spicy, with hints of sweetness.

Chemical Constituents

a. Tulsi leaves powder contains a variety of bioactive compounds, including:
b. Eugenol
c. Rosmarinic acid
d. Ursolic acid Apigenin
e. Luteolin
f. Beta-sitosterol
g. Vitamins (such as vitamin C, vitamin A, and vitamin K)
h. Minerals (such as calcium, magnesium, and potassium) Essential oils (such as eugenol, eucalyptol, and limonene)

Uses - Prevents Acne and Pimples, improves skin texture, and Cleanser.

3) MULTANI MITTI

Synonyms: Fuller's Earth, Multani clay

Biological Source: Multani Mitti, also known as Fuller's Earth, is a type of clay that is formed from the decomposition of volcanic ash over thousands of years. It is found in various regions around the world, with significant deposits located in Multan, Pakistan, from which it derives its name.

Figure 4: Multani Mitti powder.

Organoleptic Characteristics

Colour: Light beige to pale yellow when dry; turns darker when wet

Odour: Earthy, slightly mineral-like

Taste: Not applicable (not consumed orally)

Chemical Constituents

Multani Mitti mainly consists of various minerals and compounds, including:

a. Aluminium silicate
b. Bentonite
c. Montmorillonite
d. Kaolinite
e. Quartz
f. Magnesium
g. Calcium
h. Iron oxides

Uses: Good for wrinkles and ageing, preventing acne, and removing dirt from pores.

4) ROSEWATER

Synonyms: Gulab Jal, Rose Hydrosol

Biological Source:

Rosewater is an aromatic liquid obtained by the steam distillation of fresh petals of the ***Rosa damascena*** (Damask rose) or **Rosa centifolia**. It is a by-product of rose essential oil production and has been traditionally used in cosmetics, perfumery, and medicine.

Organoleptic Characteristics

Figure 5: Rosewater.

a. **Colour:** Colourless to pale pink
b. **Odour:** Sweet, floral, and characteristic rose scent
c. **Taste:** Mildly sweet and floral (though primarily used externally)

Chemical Constituents

Rosewater contains water-soluble components of rose essential oil, such as:

a. Geraniol
b. Citronellol
c. Nerol
d. Phenyl ethanolLinalool
e. Terpenes
f. Flavonoids
g. Tannins

Uses

a. Acts as a natural toner and skin hydrator
b. Soothes skin irritation, redness, and inflammationHelps maintain skin ph balance and controls excess oil
c. Refreshes and rejuvenates tired skin
d. Rich in antioxidants, it protects against free radical damage
e. Used in facial mists, scrubs, masks, and lotions for its calming and aromatic properties

5) GLYCERINE

Synonyms: Glycerol, Glycerin

Biological Source:

Glycerine is a trihydroxy sugar alcohol derived from natural fats and oils (animal or vegetable) during the saponification or hydrolysis process. It may also be synthesised from petrochemical sources. It is commonly used in the pharmaceutical, cosmetic, and food industries.

Organoleptic Characteristics

a. Colour: Clear, colourless
b. Odor: Odorless
c. Taste: Sweet, syrupy

Chemical Constituents

a. Chemically, glycerine is **$C_3H_8O_3$ (1,2,3-propane-triol)** and consists of:

b. **Hydroxyl groups (–OH)** that are responsible for its solubility in water and hygroscopic nature

c. **Carbon backbone** derived from triglyceride hydrolysis

Uses

a. Acts as a powerful **humectant**, drawing moisture into the skin

b. Helps maintain skin hydration, softness, and smoothnessUsed as an **emollient** to treat or prevent dry, rough, scaly, or itchy skin

c. Enhances the **spreadability** and texture of cosmetic formulations

d. Soothes irritated or inflamed skin and promotes barrier repair

e. Used in scrubs, creams, lotions, cleansers, and serums for its moisturising benefits.

2. MATERIAL AND METHODOLOGY

Table no. 1: Formulation table.

SN	Ingredient	Quantity (ml/gm)	Use
1	Neem powder	20 gm	Skin toner lightens skin blemishes, removes blackheads
2	Tulsi powder	10 gm	Tulsi acts as a **soothing purifier** in a face scrub.
3	Multani mitti powder	10 gm	It serves as an **oil absorber** in a face scrub.
4	Rose water	40 ml	Rosewater functions as a **hydrating toner** in a face scrub.
5	Glycerine	20 ml	Glycerine acts as a **moisturising agent** in a face scrub.

2.1 Method or Procedure

1. **Procurement of Ingredients:** All required raw materials were sourced from the local market.
2. **Accurate Weighing:** Each ingredient was measured precisely according to the established formulation.
3. **Preparation of the Powder Phase (Phase 1):** The weighed powders and other dry ingredients were combined thoroughly to create a homogeneous blend.
4. **Sieving Process:** The blended powder mixture was passed through a **sieve number 40** to ensure uniform particle size and smooth texture, removing any coarse particles.
5. **Preparation of the Liquid Phase (Phase 2):** All liquid components were separately mixed in a clean beaker until a uniform solution was obtained.
6. **Final Blending:** The powder blend (Phase 1) was gradually incorporated into the liquid mixture (Phase 2) under continuous stirring to achieve a consistent scrub formulation.
7. **Evaluation and Packaging:** The prepared face scrub underwent a comprehensive evaluation for quality and efficacy before being packaged into a container and properly labelled.

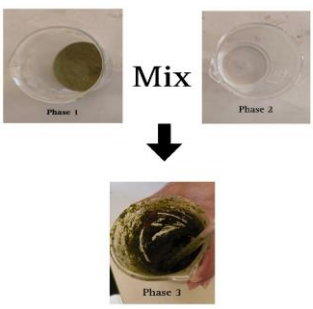

Figure 6: Method.

Evaluation Tests

The evaluation of the formulated **herbal face scrub** was conducted using various parameters to ensure its quality, safety, and effectiveness. These parameters included **organoleptic properties, ph level, irritability, washability, foamability, spreadability and stability** testing, all of which were tested to meet the required standards. The developed product demonstrated excellent **cleansing and exfoliating properties**, making it an ideal skincare solution for improving skin health and radiance.

1. **Organoleptic Properties:** Organoleptic characteristics refer to the **sensory attributes** of the product which contribute to user experience and satisfaction. These include:

a. **Color** – The visual appearance of the scrub was observed to ensure it had an appealing and natural hue.

b. **Fragrance** – The scent was analysed to ensure a pleasant, refreshing aroma, with the added **orange oil** helping to mask any undesirable odour.

c. **Texture** – The scrub was examined for its smoothness and consistency, ensuring it had a uniform blend without any excessive roughness.

d. **Consistency** – The formulation was checked for proper stability, ensuring that the scrub was neither too thick nor too runny, making it easy to apply.

2. **Spreadability:** The **spreadability** of the scrub is a key factor in determining its ease of application. To evaluate this, a small amount of the product was placed between two **glass slides**, and a **20g weight** was applied to measure how well it spreads across the surface. A well-spreadable scrub ensures smooth and even application, covering the skin effectively.

Figure 7: Spreadability Testing.

3. **pH Test**: The pH level of the exfoliant was assessed to confirm its suitability for **skin application**. A **litmus paper** was dipped into a **1% aqueous solution** of the scrub to determine its pH value. A well-balanced pH ensures the product is gentle on the skin, preventing any irritation or dryness.

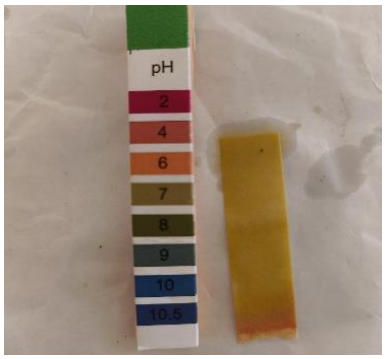

Figure 8: pH Testing.

4. **Washability:** Washability was tested by applying the scrub onto the skin and rinsing it off with water. A good **washability factor** ensures that the scrub can be easily removed without leaving any **residue**, providing a fresh and clean skin feel post-use.

Figure 14: Washability Testing.

5. **Stablity test:** The stability study of the herbal face scrub over 10 days demonstrated that the formulation remained stable under normal and refrigerated conditions, maintaining its texture, spreadability, and foaming ability. At elevated temperatures, slight changes in consistency and color were observed, but no phase separation or major degradation occurred, ensuring product effectiveness.

3. RESULT AND DISCUSSION

Table No. 2: Evaluation tests result.

Parameters	Result
Colour	Brownish Green
Odour	Pleasant
Texture	Good
Consistency	Good
Spreadability	Easily Spreadable
pH	5.4
Grittiness	Yes
Washability	Easily Washable

The prepared herbal face scrub formulation turned into an evaluation based on numerous parameters, such as **colour, odour, texture, thickness, spreadability**, **washability, pH and grittiness**. All Ingredients used—**Neem powder, Tulsi powder, Multani Mitti, Rosewater, and Glycerine**—are of a natural botanical foundation, ensuring minimum threat of unfavourable skin reactions. The final product exhibited a pleasant brownish-green colouration and did not have an undesirable odour, making it appropriate for ordinary use. As expected from an herbal scrub, it did not produce foam, indicating the absence of artificial surfactants. T**he consistency was appropriate for dermal application**, and the **texture contained fine, gritty particles**, offering effective yet gentle exfoliation. The scrub has top-notch spreadability and becomes easily washer-friendly with water, leaving the skin feeling clean and refreshed. The measured pH changed to **5.4**, which aligns nicely with the skin's natural ph and supports skin fitness.

4. CONCLUSION

The formulated herbal face scrub demonstrated favourable outcomes across all evaluated parameters, highlighting its potential as a safe and effective skincare product. The use of natural ingredients such as Neem powder, Tulsi powder, Multani Mitti, Rosewater, and Glycerine ensured a minimal risk of skin irritation or adverse reactions. The formulation exhibited a desirable brownish-green appearance with a pleasant natural odour, appropriate consistency, and a fine,

gritty texture suitable for gentle exfoliation. Its pH value of 5.4 closely aligns with the natural skin pH, supporting skin barrier function and overall dermal health.

Notably, the absence of artificial surfactants, as evidenced by the lack of foam formation, further supports its claim as a natural and skin-friendly product. The scrub showed excellent spreadability and washability, leaving the skin clean and refreshed post-application. Overall, the herbal face scrub presents a promising alternative to commercially available synthetic products, making it suitable for routine use across various skin types. Future studies may focus on stability testing, microbiological analysis, and consumer acceptability trials to further validate its commercial potential.

5. REFERENCES

1. Krati, Dr. Martolia Jaya, et. al, A comprehensive review on in-vitro methods for anti- microbial activity, IP International Journal of Comprehensive and Advanced Pharmacology, 2024; 9(3).
2. Neeru, Shilpi Kashyap, Esha Vatsa, Jitendra Singh and Ankush Sundriyal "Determination of Total Phenolic Content, Total flavonoid Content and Total Antioxidant capacity of different extracts of Roylea elegans Wall. (aerial parts)" World journal of pharmacy and pharmaceutical sciences (WJPPS), 2016; 5(6): 1884-1891.
3. Neeru, Esha Vatsa, Jitendra Singh and Ankush Sundriyal "Pharmacognostic Standardization Parameters of Roylea elegans Wall. (Aerial Parts)" International Journal for Pharmaceutical Research Scholars (IJPRS), 2016; 5(2):133-140.
4. Kundan Singh Bora and Esha Vatsa "Pharmacognostic Evaluation of Dendrobium macraei Lindl." Universities Journal of Phytochemistry and Ayurvedic Heights (UJPAH), 2016; 1(20):29-36.
5. Amit Sharma, Bharat Parashar, Esha Vatsa, Shilpa Chandel and Surbhi Sharma "Phyto chemical screening and Anthelmintic activity of leaves of Cedrus deodara (Roxb.)" World journal of pharmacy and pharmaceutical sciences (WJPPS), 2016; 5(8):1618-1628.
6. Amit Sharma, Surbhi Sharma, Shilpa Chandel, Esha Vatsa and Dr. Bharat Parashar "A review on Morchella esculanta: Therapeutically Potent plant" World journal of pharmacy and pharmaceutical sciences (WJPPS), 2016; 5(9): 685- 699.
7. Esha Vatsa and Kundan Singh Bora "Memory Enhancing Activity of Dendrobium macraei Lindl. in Swiss Albino Mice" British Journal of Pharmaceutical Research (BJPR), 2016; 13(2):1-11.
8. Vatsa Esha, Chandel Shilpa, Parashar Bharat, Neeru "Physico-Chemical and Phytochemical Evaluation of Dendrobium macraei Lindl. (Whole Plant)" International Journal of Pharmacognosy and Phytochemical Research (IJPPR), 2016; 8(11): 1801- 1811.
9. Esha Vatsa, Mehak Aggarwal, Shipra Gautam "Formulation and Evaluation of Polyherbal Facial Scrub" Just Agriculture multidisciplinary e-Newsletter, Article ID: 023, 2021; 1(9): 1-6.
10. Shipra Gautam, Madhubala Thakur, Mehak Aggarwal, Esha Vatsa"Azadirachta indica- A Review as a Potent Anti-Diabetic drug" Just Agriculture multidisciplinary e-Newsletter, Article ID:98,2021; 1(10): 1-6.
11. Esha Vatsa, Samriti Faujdar, Nidhi Sharma, Shilpa Chandel, Mehak Aggarwal"Dendrobium macraei Lindl.: A review on medicinally potent orchid on the basis of recent evidences" Chinese Journal of Medical Genetics, 2022; 31(3): 560-571.
12. Krati, Babita Rawat, Abhishek Bhardwaj, Amandeep Singh, A Comprehensive Review on Indian Barnyard Millet (Echinochloa frumentacea), International Journal of Pharmaceutical Technology and Biotechnology, 2025; 12(1): 01-07.

13. Krati, Dr. Martolia Jaya, et. al, A Comprehensive review on in-vitro methods for antimicrobial activity" Educational administration: Theory and Practice". 2024; 30(6), 8 (2977-2984).
14. Esha Vatsa, Dr. Samriti Faujdar, Shilpa Chandel, Nidhi Chaudhary, Ashok Kumar, Neeru, "Studies on anti-inflammatory activities of whole plant of Dendrobium macraei Lindl." European Chemical Bulletin, 2023; 12(Special Issue 1): 657-664.
15. Esha Vatsa, Dr. Samriti Faujdar, Nitin Kumar, Nidhi Chaudhary, Shilpa Chandel, Neeru, Mehak Aggarwal "Current studies to justify the medicinal potential of the orchid Dendrobium macraei Lindl." European Chemical Bulletin, 2023; 12(S3): 5822-5830.
16. Divya Negi Rawat, Anjali Bisht, Esha Vatsa, Deepika Chandra, Nidhi Chaudhary, Ashok Kumar "Urinary bacterial profile and antibiotic susceptibility pattern among patients of urinary tract infections" High Technology letters, 2023; 29(10): 115-128.
17. Mehak Aggarwal, Ujjwal Nautiyal, Harmeet Singh, Esha Vatsa, Nidhi Chaudhary, Anjali Bisht, Divya Negi "Development and evaluation of drug delivery system containing luliconazole" High Technology letters, 2023; 29(11): 633-652.
18. Jagriti Gairola, Prashant Kukreti, Anjali Bisht, Divya Negi, Nidhi Chaudhary, Esha Vatsa "Development of Chronotherapeutic Delivery System for the Oral Administration of Aceclofenac for Rheumatoid Arthritis by Using Different Polymers" Journal of Chemical Health Risks, 2023; 13(6): 1180-1192.
19. Nidhi Chaudhary, Dr. Deepak Nanda, Dr. Esha Vatsa, Mithilesh Kesari, Harshita Chandra, Simran Singh Rathore "The Promise of Usefulness of the Evergreen Shrub Cassia auriculata" Journal of Advanced Zoology, 2023; 44(4): 1249-1261.
20. Ms Pooja Yadav, Dr. Esha Vatsa, Dr Arti Rauthan, "Enhancing Menstrual Awareness among Adolescent Girls: Evaluating the Influence of School Initiatives" Journal of Chemical Health Risks, 2024; 14(02): 3141-3149.
21. Mehak Aggarwal, Esha Vatsa, Nidhi Chaudhary, Shilpa Chandel, Shipra Gautam, "Formulation and Evaluation of Polyherbal Face Pack" Research Journal of Pharmacy and Technology, 2024; 17(6): 2481-2485.
22. Esha Vatsa, Mehak Aggarwal, Nidhi Chaudhary, Shipra Gautam, Neeru, Nitin Kumar, "Comparison Based on Pharmacognostical and Pharmacological Profile of Thuja Orientalis Linn. And Thuja Occidentalis Linn.: A Review" Naturalista Campano, 2024; 28(1): 3208-3219.
23. Priya Pandey, Esha Vatsa, Gaurav Lakhchora, Md Shamsher Alam, Niyaz Ahamad Ansari, Mohammad Dabeer Ahamad, Sarafarz Ahamad, Mukul Singh, Nitin kumar, "Nano Medicine Advancements in Addressing Rare Neurological Disorders: A Focus on Globoid Cell Leukodystrophy (Krabbe's Disease) Treatment" African Journal of Biological Sciences, 2024; 6(3): 2654-2684.
24. Esha Vatsa, Nidhi Chaudhary, Priya Khadwal, Mehak Aggarwal, Tanya Aggarwal, and Nishant Bhardwaj, "In vitro Antidiabetic Effect and Phytochemical Screening of Cassia biflora Mill." Indian Journal of Natural Sciences, 2025; 15(88): 87726-87733.
25. Anil Kumar, Dr. Esha Vatsa, "AI-Powered Embryo Selection is revolutionized: A Review" South Eastern European Journal of Public Health, 2025; XXVI (1): 6223-6230.
26. Lohani, V., A R, A., Kundu, S., Akhter, M. Q., & Bag, S. Single-Cell Proteomics with Spatial Attributes: Tools and Techniques. ACS omega, 2023; 8(20): 17499–17510. https://doi.org/10.1021/acsomega.3c00795.

27. Amandeep Singh, Deepak Nanda, Ashok Kumar and Abhishek Bhardwaj . In vitro evaluation of anti-inflammatory activity of ageratum conyzoides leaves by Human Red Blood Cell (HRBC) membrane stabilization method, International Journal of Research in Pharmaceutical and Nano Sciences, 2023; 12(6): 196-202.
28. Amandeep Singh, Deepak Nanda, Ashok Kumar, Abhishek Bhardwaj. In vitro evaluation of anti-inflammatory activity of ageratum conyzoides leaves by Human Red Blood Cell (HRBC) membrane stabilization method, International Journal of Research in Pharmaceutical and Nano Sciences, 2023; 12(6): 196-202.
29. Singh A, Nanda D, Bhardwaj A, Kumar A. A pharmacological investigation for therapeutic potential of Callistemon citrinus as an anthelmintic agent (Bottle-Brush Plant). IP Int J Comprehensive Adv Pharmacol, 2024; 9(3): 206-210.
30. Yogesh Tiwari, Amandeep Singh, Bhupendra Kumar, Ashok Kumar. "In Vitro Evaluation of Alpha Amylase Activity of Bark Extracts of Ficus Auriculata". International Journal of Innovative Science and Research Technology. December, 2017; 2(12): 88-92.
31. Bhupendra Kumar, Amandeep Singh, Yogesh Tiwari, Ashok Kumar. UV PROTECTIVE ACTIVITY OF GLYCINE MAX SEEDS. Indian Research Journal of Pharmacy and Science, 2017;15: 1190-1195
32. Reena Bhatt, Ashok Kumar, Ankita Sharma. FORMULATION AND EVALUATION OF SHAMPOO FORMULATED BY GLYCINE MAX SEEDS.Indian Research Journal of Pharmacy and Science; 15(2017)1232-1238
33. Kumar A, Nanda D and Gupta A. "A Prospective Study on the Risk Determinants and Economic Burden ofAdverse Drug Reactions in Tertiary Care Hospital". Indian Journal of Natural Sciences, 2025;15(88): 87957-87961
34. Ashok Kumar, Deepak Nanda and Abhishek Gupta A holistic approach to adverse drug reactions in hospitals: Classification, risk factors, assessment and economic evaluation- A review. J. Exp. Zool. India, 2024; 27: 2337-2348. DOI: https://doi.org/10.51470/jez.2024.27.2.2337
35. Sakshi Garg, Ashok Kumar, Varsha Deva, Preeti Biswas, Harsh Rastogi, Heena Farooqui. Immediate-Release Drug Delivery System, Current Scenario, And Future Perspective-A Narrative Review. Jundishapur Journal of Microbiology, 2022; 15(1): 6509-6519
36. Ashok Kumar, Deepak Nanda, Abhishek Gupta Pattern of Adverse Drug Reactions and Their Economic Impact on Admitted Patients in Medicine Wards of a Tertiary Care Hospital. Library Progress International, 2024; 44(4): 1120-1139.
37. Alisha Rawat, Meenakshi Sajwan, Yamini Chandola,Nidhi Gaur "Assaultive role of thiamine in coalition with selenium in treatment of liver cancer", Journal of emerging technologies and innovative research, 2022; 9(1); 2349-5162.
38. Ghildiyal, P., Bhatt, A., Chaudhary, N., Narwal, S.,Sehgal, P. "Study of various biochemical parameters on atrazine induced glucose-6-phosphate dehydrogenase deficiency in brain" International Journal of Health Sciences, 2022; 6(S7): 2552-2558.
39. Alok Bhatt, Arun Kumar, Pallavi Ghildiyal, Jyoti Maithani, Nidhi Chaudhary, Manish Nawani, Sonia Narwal "Phytochemical Profile of Melissa parviflora Benth" Neuro Quantology, 2022; 20(9); 2426-2428.
40. Palika Sehgal, Alok Bhatt, Sonia Narwal, Deepak P. Bhagwat, Nidhi Chaudhary et.al Formulation Characterization Optimization and In Vitro Evaluation of Aceclofenac Topical Emulgel, Neuro Quantology, 2022; 20(14): 1-09.

41. Sneha Rawat, Praveen Kumar Ashok, Abhishek bhardwaj "A review on Oro dispersible Tablet of Telmisartan" Org-Journal of Emerging Technologies and Innovative research (JETIR), May 2023; 10(5):i104-i112.
42. Jaison Varghese, Nitin kumar, Sapna Chaudhar, Abhishek Bhardwaj(2024) "Comparative In-Vitro Antioxidant and Antimicrobial Potential of Some Medicinal Plants"African Journal of Biological Sciences, https://doi.org/10.48047/AFJBS.6.Si3.2024.3340-3346.
43. Asima Imtiyaz, Ajay Singh, Abhishek Bhardwaj(2024) "Green synthesis of iron oxide nanoparticles from Iris kashmiriana (Mazar-Graveyard) Plant Extract its characterization of biological activities and photocatalytic activity" Journal of Industrial and Engineering Chemistry, https://doi.org/10.1016/j.jiec.2024.09.004.
44. Hem Chandra Pant, Bhawana Goswami, Ashok Kumar, Abhishek Bhardwaj, Shanti Rauthan and Amita pandey "A Review Paper on Bacopa monniera and Role of Artificial Intelligence (AI) in Medicinal Plant for Management and Treatment of Various Diseases" Indian Journal of Natural Sciences, 2025; 15(88): 01-10.
45. Vishwajeet Bachhar, Vibha Joshi , Ajay Singh,, M. Amin Mir , Abhishek Bhardwaj(2025)"Antibacterial, Antioxidant, and Antidiabetic Activities of TiO2 Nanoparticles Synthesized Through Ultrasonication Assisted Cold Maceration from Stem Extract of Euphorbia hirta"Nano Bioscience, https://doi.org/10.33263/LIANBS141.001.
46. Nidhi Chaudhary, "A review on: The deciduous shrub "Punica granatum" , European journal of biomedical and pharmaceutical sciences, 2016; 3(7); 2349-2388.
47. Singh Harmeet and Nidhi Chaudhary, "Evaluation of Lakshadi Guggul on experimentally induced global cerebral ischemia/reperfusion injury". World journal of Pharmacy and Pharmaceutical Sciences, 2016; 6(1); ISSN 2278-4357.
48. Nidhi Chaudhary and Harmeet Singh, "Evaluation of Punica Granatum Leaves Extract In Scopolamine Induced Learning And Memory Impairment In Mice". World journal of Pharmacy and Pharmaceutical Sciences ,6(6); 1677-1703.
49. Amandeep Singh, Pankaj Nainwal ,Deepak Nanda ,D.A. Jain, SOLUBILITY ENHENCEMENT OF PIOGLITAZONE WITH COMPLEXATION OF HYDROXYPROPYL-β-CYCLODEXTRIN, Digest Journal of Nanomaterials and Biostructures, Apr 2012 2(4): p.91-97.
50. Pankaj Nainwal Deepak Nanda, Amandeep Singh, D. A. Jain, QUANTITATIVE SPECTROPHOTOMETRIC DETERMINATION OF DOMPERIDONE TABLET FORMULATIONS USING IBUPROFEN SODIUM AS HYDROTROPIC SOLUBILIZING AGENT, Digest Journal of Nanomaterials and Biostructures, 2012; 2(4): 751 – 753
51. Deepak Nanda, Pankaj Nainwal, Amandeep Singh, D.A.Jain, REVIEW ON MIXED-SOLVENCY CONCEPT: A NOVEL CONCEPT OF SOLUBILIZATION, Deepak Nanda et al. ,Journal of Pharmacy Research, 2012; 3(2):411-413
52. Pankaj Nainwal, Amandeep Singh, Deepak Nanda, D.A.Jain, NEW QUANTITATIVE ESTIMATION OF ROSUVASTATIN BULK SAMPLE USING SODIUM BENZOATE AS HYDROTROPIC SOLUBILIZING AGENT, Journal of Pharmacy Research, 2012; 3(1): 6-8
53. Nainwal.P, Bhagla.A, Nanda.D, STUDY ON ANTIOXIDANT POTENTIAL AND WOUND HEALING ACTIVITY ON THE AQUEOUS EXTRACT OF FRUITS OF GARCINIA MANGOSTANA, IJPI's Journal of Pharmacognosy and Herbal Formulations, Volume-1

54. Pankaj Nainwal, Kapil Kalra, Deepak Nanda, Amandeep Singh, STUDY OF ANALGESIC AND ANTI-INFLAMMATORY ACTIVITIES OF THE ETHANOLIC EXTRACT ARIAL PARTS OF FUMARIA VAILLANTII LOISEL, Asian Journal of Pharmaceutical and Clinical Research, 2011; 4(1).
55. Amandeep Singh, Pankaj Nainwal, Deepak Nanda, D.A.Jain, SOLUBILITY ENHANCEMENT STUDY OF PIOGLITAZONE USING SOLID DISPERSION AS SOLUBILIZATION TECHNIQUE, International Journal of Science Innovations and Discoveries, Amandeep Singh et al., IJSID, 2011; 1(2): 95—100
56. Amandeep Singh, Pankaj Nainwal , Deepak Nanda, D. A. Jain, THE SOLUBILITY ENHANCEMENT STUDY OF PIOGLITAZONE USING DIFFERENT SOLUBLIZATION TECHNIQUIES, International Journal of Pharmacy & Pharmaceutical Sciences, 2012; 4(2).
57. Deepak Nanda, Pankaj Nainwal, Amandeep Singh, D.A.Jain, SOLUBILITY ENHANCEMENT STUDY OF DOMPERIDONE USING DIFFERENT SOLUBILIZATION TECHNIQUES, International Journal of Pharmacy and Pharmaceutical Sciences 2012; 2(3).
58. Pankaj Nainwal, Priyanka Sinha, Amandeep Singh, Deepak Nanda, D.A.Jain, A COMPARATIVE SOLUBILITY ENHANCEMENT STUDY OF ROSUVASTATIN USING SOLUBILIZATION TECHNIQUES, International Journal of Applied Biology & Pharmaceutical Technology, Oct - Dec -2011; 2(4).
59. Pankaj Nainwal , Deepak Nanda, Amandeep Singh, D. A. Jain, FORMULATION AND EVALUATION OF SOLID DISPERSION OF ROSUVASTATIN WITH VARIOUS CARRIERS, Pharmacie Globale International Journal Of Comprehensive Pharmacy, ISSN 0976-8157.
60. Pankaj Nainwal, Amandeep Singh1, Deepak Nanda, D.A.Jain, SOLUBILITY ENHANCEMENT OF AN ANTIHYPERLIPIDEMIC DRUG ROSUVASTATIN BY SOLID DISPERSION TECHNIQUE, International Journal of PharmTech Research IJPRIF ISSN : 0974-4304 , March-June 2012; 2: 3.
61. Kshitiz Agrawal, Pragati Bailwal, Amandeep Singh. Prem Saini, DEVELOPMENT OF QUALITY STANDARDS OF SUPRABHATAM CHURNA: A POLY HERBAL FORMULATION, International Journal of Pharmaceutical Research & Development, IJPRD, 2011; 4, June 2012.
62. Kapil Kalra, Amandeep Singh, Manisha Gaur, Ravindra P. Singh, and D. A. Jain, ENHANCEMENT OF BIOAVAILABLITY OF RIFAPENTINE BY SOLID DISPERSION TECHNIQUE , International Journal Of Pharmacy & Life Sciences, Kalra et al., April, 2011; 2(4).
63. Pankaj nainwal ,Ranveer batsa, Amandeep singh, Deepak nanda, MEDICINAL PLANT STUDIES INFLUECED BY THE BIOTECHNOLOGICAL METHODS: A UPDATED REVIEW, International Journal of Pharma and Bio Sciences Apr-June-2011; 2(2).
64. Amandeep Singh, Sandhiya Pal, Prem Saini, IN- VITRO EVALUTION OF ANTI-INFLAMMATOTRY ACTIVITY OF TERMANALIA ARJUNA BARK EXTRACT, Journal of Innovative trends in Pharmaceutical Sciences,Vol-1(1): 9-12.
65. Amandeep Singh, Pramila Chauhan, Prem Saini, IN-VITRO ANTI-INFLAMMATORY EVALUTION OF HYDROALCOHALIC LEAVES EXTACT OF PINUS ROXBURGHII BY HRBC METHOD, International journal of Research in Pharmaceutical and Nano Sciences, 2013; 2(3): 268-271.
66. Amandeep Singh, Sumit Negi, Prem Saini, In Vitro Anti-Inflammatory Evaluation Of Leaves Using Hydroalcohalic Extract Of “Mangifera indica” International Journal of Pharmacy and Integrated Life Sciences, V1-(I7) PG (93-98).

67. Aman Deep Baghla, Kshitij Agarwal, Ramesh Verma and Deepak Nanda, Wound Healing Effect of the Aqueous Extract of the Leaves of Psidium guajava Linn., International Journal of chemicals and Life Sciences, 2013; 02 (03): 1104-1106.
68. Aman Deep Baghla, Kshitij Agarwal, Ramesh Verma and Deepak Nanda, WOUND HEALING EFFECT OF THE AQUEOUS EXTRACT OF THE LEAVES OF PSIDIUM GUAJAVA LINN., International Journal of chemicals and Life Sciences, 2013; 02(03): 1104-1106.
69. Bhupendra Kumar, Meenakshi Ghildiyal, Yogesh Tiwari, Deepika Chauhan, Amandeep Singh, IN-VITRO ANTI-INFLAMMATORY ACTIVITY OF GLYCINE MAX SEEDS, Indo American Journal Of Pharmaceutical Sciences, 2018; 05(02): 868-871.
70. Piyali Dey, Jyoti Pandey, Bhupendra kumar, Amandeep Singh, IN VITRO ANTHELMINTIC ACTIVITY OF BARK EXTRACTS OF ARTOCARPUS HETEROPHYLLUS, International Journal of Pharmacy & Pharmaceutical Research, 2018; 03(11): 33-40.
71. Bhupendra Kumar, Yogesh Tiwari, Amandeep Singh, Vineet Kumar, IN VITRO ANTIUROLITHIC ACTIVITY OF FICUS PALMATA LEAVES, International Journal Of Pharmaceutical Technology And Biotechnology, 2019; 6(1): 01-09.
72. Md. Daneyal Khurshid, Vivek Shukla, Bhupendra Kumar and Amandeep A Review Paper on Medicinal Properties of Phyllanthus emblica , International Journal of Pharmacy and Biological Sciences, 2020; 10(3): 102-109.
73. Mr. Dwivedi Vishal, Mrs. Nisha A Bhatt, Dr. Amandeep Singh PREPARATION AND STANDARDIZATION OF NAVKARSHIKA CHURNA, World Journal Of Pharmacy And Pharmaceutical Sciences, 2020; 9(8).
74. Mitun Saha1, Mr. Bhupendra Kumar, Dr. Amandeep Singh Review Article on Various Phytochemicals and Different Medicinal Activities of Haritaki International Journal of Innovative Science and Research Technology, June 2020; 5(6).