

**FORMULATION AND EVALUATION OF HERBAL SOAP BY USING
AZADIRACTAINDICA AND OCIMUM TENUIFLORUM****Pooja Bhati¹, Kirti Tomer², Saurabh Mundada³, Surbhi Choursiya⁴, Garima
Carpenter⁵, Vijay Ojha⁶, Mangal Singh Panwar⁷, Amit Kumar Jain⁸**¹Assistant Professor, B.R. Nahata College of Pharmacy, Faculty of Pharmacy, Mandsaur University, Mandsaur 458001²Assistant Professor, Modern Institute of Pharmaceutical Sciences, Indore 453111³Assistant Professor, Rao Saheb Patil Danve College of Pharmacy 431202⁴Institute of Pharmaceutical Sciences, Bhupal Noble's University Udaipur, Rajasthan 313001⁵Institute of Pharmacy, Vikram University, Ujjain 456010⁶Associate Professor, Gyanodaya Institute of Pharmacy, Neemuch 458468⁷Professor and Principal, Gyanodaya Institute of Pharmacy, Neemuch, 458468⁸Professor, Department of Pharmacy, Shri Krishna University, Chhatarpur, Madhya Pradesh 471001

Email: poojabhati812@gmail.com

KEYWORDS**ABSTRACT**Herbal soap,
Neem, Tulsi

Azadirachta indica and *Ocimum tenuiflorum* leaf extracts were used to create a herbal soap. Ayurvedic cosmetics are sometimes referred to as herbal cosmetics because most herbal supplements are based on many botanical substances that have been used for many years in traditional or folk medicine. The natural content of the herbs has no negative effects on human health. The many botanical ingredients that are now on the market. Cosmetics by themselves are insufficient to proper care of skin and body parts; a variety of chemical toxins and microorganisms found in the atmosphere may result in chemical infection and damage to skin. The *Azadirachta Indica*, or neem, tree is well-known throughout the world for its many medicinal uses. Studies have shown that neem leaves and their constituents have anti-inflammatory, antihyperglycemic, antiulcer, antimalarial, antifungal, antibacterial, antimutagenic, and anticarcinogenic effects. The purpose of this research study was to assess the effects of neem & tulsi leaf extracts that were aqueous, ethanolic, and ethyl acetate. Neem leaf were found to be beneficial against certain dermatophytes, and tulsi demonstrates antifungal and antiviral activity in the herbal soap formulation.

INTRODUCTION

A kind of soap called herbal soap is created with all-natural components derived from different herbs and plants. Herbal soap is frequently made with tulsi, neem, mint, rosemary, and chamomile, among other herbs. Due to its reputation for healing, revitalizing, and calming effects, herbal soap is a preferred option for those with dry or sensitive skin. Nowadays, a large portion of cosmetics are adulterated, and many other beauty preparations on the market are of lower quality, increasing the possibility of negative side effects including skin rashes, allergic responses, and even the emergence of skin illnesses.^[1] The main ingredients in herbal soaps are plant pieces like roots, chilies, and seeds. All of the artificial flavours, colours, fluorides, and other additives commonly found in commercial soap are absent from herbal soap. Most people are ignorant of the long-term consequences associated with using commercial soaps. The goal of the herbs and essential oils utilized in

the natural remedy shouldn't be to penetrate the skin's outermost layer. Extracts have been shown to reduce oxidative stress in the skin, which has been linked to a delay in the aging process, when applied topically. Extracts have been shown to reduce oxidative stress in the skin, which has been linked to delaying the aging process, when applied topically. They produce less allergies and are safer to use. Herbal soap is free of artificial colouring, flavourings, fluorides, and other additives that are present in commercial soap. ^[2]

Herbal soaps are highly valuable therapeutic products because they harness the healing properties of natural herbs, which are commonly used to cure a wide range of illnesses and skin disorders. Value, affordability, ease of use, and suitability. The demand towards herbal cosmetics is rising quickly worldwide, demonstrating the invaluable gifts that Mother Nature has given upon us. They frequently apply plant materials, including as fruit, leaves, stems, and roots, to treat wounds, fend off illness, and generally improve health. Its long-lasting fragrance and excellent moisturizing qualities are only two of its many advantages.

Preparations for herbal soap are drugs or pharmaceuticals that have antifungal and antibacterial components. They are mostly created from plant components, including fruits, leaves, stems, and roots, and they are used to treat wounds, infections, and general health. This preparation has antimicrobial properties and can be used topically. It comes in a variety of forms, including creams, lotions, gels, soaps, solvent extracts, and ointments. Different skin problems have been treated with the properties of creams and soaps. Staphylococcus aureus and streptococcus species are the most frequent causes of skin infections. In traditional medicine, the juice and extract from the plants' leaves are applied topically to treat skin conditions like ringworm, eczema, and itch. These properties function as antibacterial and anti-inflammatory agents. The soft gel form is used to treat psoriasis conditions. Unprocessed soapy plant preparations have the power to cleanse and soften acne lesions while also enhancing deeper penetration and speedy healing.



Figure 1: Herbal soap^[3]

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Neem and tulsi are natural plant ingredients in this research article's herbal soap, which has antibacterial, antifungal, and anti-inflammatory properties (figure 1). The primary ingredient in this soap is neem, which has therapeutic qualities. Neem leaf and extract contain immunomodulatory qualities that include anti-inflammatory, anti-ulcer, antimalarial, antifungal, antibacterial, and anticarcinogenic effects. The most potent therapeutic ingredient is tulsi. For diabetics, tulsi is beneficial since it lowers blood glucose levels. In cases of

severe acute respiratory syndrome, tulsi is also employed. Its leaf juice relieves cough, bronchitis, and cold fever. Tulsi is the key ingredient in this herbal soap because it has antifungal properties, boosts stamina, reduces inflammation, and reduces stress. Tulsi's primary antifungal action is advantageous when used in soapmaking. ^[4]

NEED OF HERBAL SOAP

The body's greatest sense organ is the skin. It collects sensory information from the environment and acts as a barrier to safeguard the body's organs. It additionally assists in maintaining a healthy body temperature. The many distinct cells and structures that make up the skin. The dermis, epidermis, and hypodermis are the three primary layers (figure 2). The functions of the skin as a whole are influenced by each layer differently. Since the skin provides a specific function for bodily health, we must protect it from skin disorders and misalignment. A common type of illness are Skin diseases. It causes harm in multiple ways to individuals of all ages, including the elderly and neonates. Skin problems can be caused by infections allergies sun exposure trauma and other things ^[5]

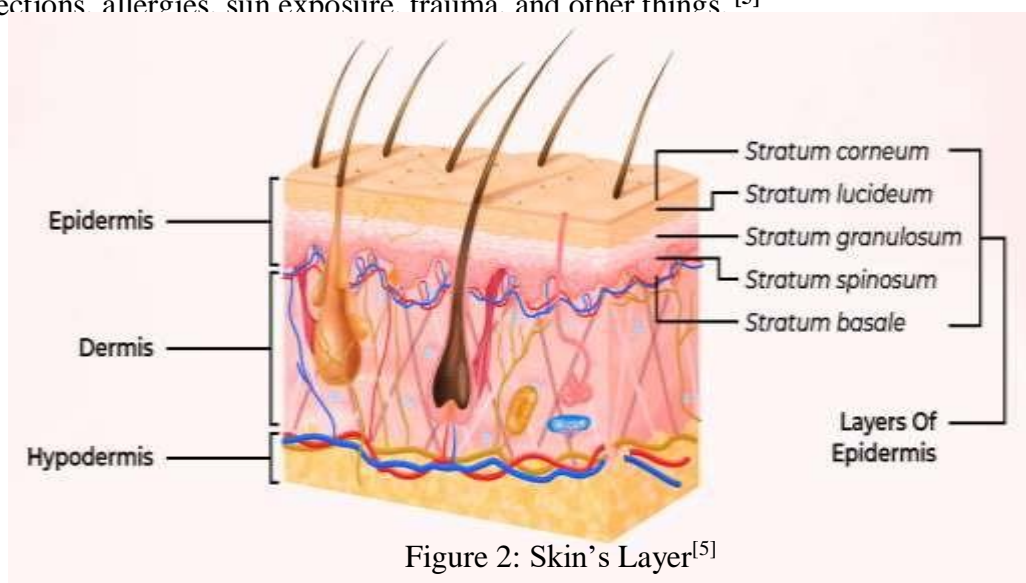


Figure 2: Skin's Layer^[5]

The leaves, stems, and roots of various medicinal plants have been utilized as a natural remedy for a wide range of illnesses and ailments. Despite the fact that synthetic alternatives have mostly replaced plant-based medicines, ayurvedic products are nevertheless highly valued for their safety and efficacy. Because natural products are readily available, affordable, and have a high medicinal value, they can be used to treat almost any type of ailment or skin condition. Isolated active ingredients that give these plants their medicinal properties are applied topically in lotions, soaps, oils, and ointments to treat wounds, ringworms, eczema, acne, and other skin disorders. They are also used for cosmetic and antimicrobial purposes. Many formulations for both medicinal and cosmetic uses make use of plants' therapeutic qualities. ^[6]

According to a WHO research, skin diseases account for an astounding 34% of all occupational disorders. Data from 2020 showed that the number of skin disease-related deaths in India was 17,857, or 0.21% of all deaths. Therefore, the best course of action to address the situation is to include herbal potentials in the formulation, that have fewer effects and provide effective treatment alternatives that are safer and have fewer side effects. Thus, the current study focuses on creating medicated herbal soap that incorporates the active properties of several herbs to create an antibacterial and antioxidant soap that could be used as a standard bath soap. ^[7]

PRESENT SCENARIO HERBAL SOAP

The market for herbal soap was valued at USD 181.31 million in 2021–2022, and it is expected to increase at a compound annual growth rate (CAGR) of 5.9% to reach USD 255.7 million by 2030 (figure 3).



Figure 3: market scenario for herbal soap

Because of its skin-friendly composition, it won't irritate or cause allergic responses on the skin. Herbal soaps also have a pleasant aroma that helps to promote both physical and mental calm. Because it has so many advantages, herbal soap is widely used in homes all over the world. Over time, there has been a growth in consumer desire for natural and organic products.^[8]

COVID-19's IMPACT ON THE BEAUTY INDUSTRY

China's February sales suffered a significant fall, of up to 80%, when compared to the sales of 2019. In spite of the prevailing circumstances, there was a noteworthy recovery in March, with a year-over-year reduction of 20%, suggesting a quick recovery.

Although many sales of beauty products are being made online, beauty retailers still stand to lose. Spending by consumers on online shopping platforms has skyrocketed globally. It is necessary to speed the product delivery process to the client in order to improve customer satisfaction.

The epidemic has altered the structure of the market. The middle class is growing worldwide thanks to internet buying platforms.^[9]

USES OF NEEM TULSI HERBAL SOAP

- Neem and tulsi are natural plant ingredients in this research article's herbal soap, which has antibacterial, antifungal, and anti-inflammatory properties.
- The primary ingredient in this soap is neem, which has therapeutic qualities. Quercetin and beta-sitosterol are the primary compounds extracted from neem leaves, along with several other limonoids and several antimicrobial components (figure 4). Because neem has antibacterial and antifungal qualities, it is an excellent herb to treat skin problems.

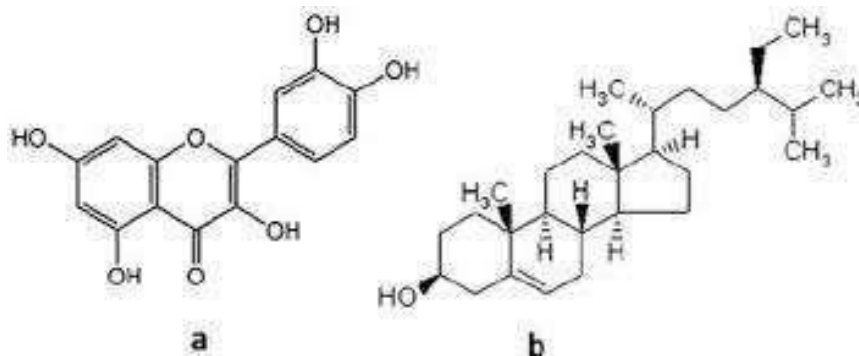


Figure 4: (a) Quercetin and (b) beta-sitosterol

- Tulsi is the key ingredient in this herbal soap because it has antifungal properties, boosts stamina, reduces inflammation, and reduces stress. Tulsi's primary antifungal action is advantageous when used in soap making. ^[10]

MATERIALS AND METHODS

Chemicals

These involve peppermint oil, ethanol, soft paraffin, and stearic acid.

Collection of plant material

Neem and Tulsi leaves were taken from various fully grown plants. For the investigations, the leaves were ground, dried in a hot air oven, and kept in airtight vials. Peppermint oil, ethanol, soft paraffin, and stearic acid was purchased from the neighbourhood market.

Extraction

The powdered neem and tulsi was extracted using a decoction method with water. Ten grams of the above mentioned powder were added to a conical flask and allowed to extract with water for four hours, stirring occasionally and after that, filtered it.

Decoction Method

This method involves boiling the crude medication in a given amount of water for a predetermined amount of time, cooling it, and then straining or filtering it (figure 5). This process works well for extracting components that are heat- and water-stable. Usually, this procedure is employed to prepare "quath" or "kawath," which are Ayurvedic extracts. During the extraction process, the volume is boiled to one-fourth of its initial volume once the crude drug to water ratio is determined, such as 1:4 or 1:16. After filtering, the concentrated extract is either utilized unaltered or undergoes additional processing (figure 6).



Figure 5: Decoction method

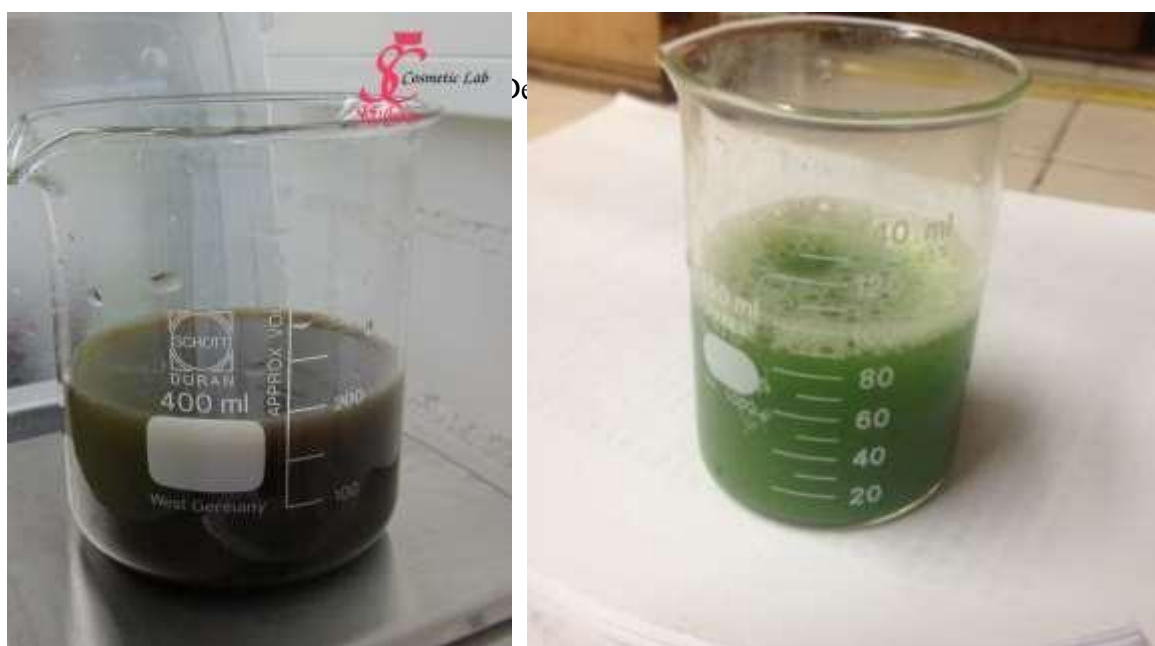


Figure 6:(a) neem extract (b) tulsi extract



Figure 7: Neem ^[11]

MATERIALS AND ITS DESCRIPTION

1 Azadirachta indica: Synonyms: margosa, neem

Family: Meliaceae

Biological Source : Nearly every element of the Azadirachta indica plant that is utilized as a medicine is included in neem (figure 7).

Geographical source:

Azadirachta is indigenous to India, shri lanka

Macroscopic properties:

- Apex : Ovate – Lanceolate
- Base : Unequal
- Colour : Smooth and dark green
- Odour : Typical
- Taste : Bitter

Microscopic Characteristics of leaf:

- Leaf Dorsiventral
- Covering, and on both surfaces, glandular trichomes
- Short, unicellular stalks and bicellular or unicellular heads make up glandular trichomes.
- Anomocytic Spots ^[12]

Table 1: Microscopic Parameters of Neem^[13]

Parameters	Range
Vein islet Number	9.86
Palisade ratio	2.5 - 3
Stomatal Index	7 – 8.5

Chemical constituents:

Because different types of chemicals are present in different areas of the plant, different parts of the plant are employed for different commercial and medicinal purposes. Among them are neem leaf contains the following: flavonoids, alkaloids, Azadirone, Nimbin, Nimbidin, Terpenoids, Steroids, Margosicacid, Vanilic acid, glycosides, B-sitosterol, Nimbectin, Kaempeerol, and Quercursertin.

Pharmacopoeial Standards :

Table 2 illustrated the Pharmacopoeial Standards of Neem

Foreign Matter	Nil
Total Ash	8.9%
Acid Insoluble Ash	1.6%
Water soluble Ash	7.8%
Alcohol soluble extractive	7.98%
Water soluble extractive	12.6%

Description:

Compound alternating, rachis 15–25 cm long, 0.1 cm thick, leaflet with oblique, serrate, 7–8.5 cm long, 1–1.7 cm wide, slightly greenish yellow colour.

Uses:

- The neem tree is utilized as a sedative, contraceptive, antifungal, antibacterial, antiviral, and anthelmintic in all sections of the plant.

2 Ocimum tenuiflorum

Synonyms: Tulsi, Holy basil

Biological Source:

Holy basil consists of fresh and dried leaves of *Ocimum sanctum* Linn., belongs to family Labiatae (figure 8).

Geographical Source:

It is an annual herbaceous plant with many branches that grows all over India; Hindus revere it. The plant is typically grown in gardens and in close proximity to temples. Seeds are used to spread it. These days, tulsi is grown for its volatile oil on a commercial basis. ^[14,15]



Figure 8: Tulsi ^[16]

Chemical Constituents:

Bright, yellow-colored, and delightful volatile oil (0.1 to 0.9%) is present in tulsi leaves. The kind of drug, where it is cultivated, and when it is harvested all affect how much oil is in it. The steam distillation method is used to extract the oil from the blooming tops and leaves. About 70% of it is made up of eugenol, 3% is carvacrol, and 20% is eugenol-methyl ether. It has caryophyllin as well. Fixed oil with strong drying qualities is found in seeds. Alkaloids, glycosides, saponin, tannins, a significant amount of vitamin C, and trace amounts of maleic, citric, and tartaric acid are also said to be present in the plant.

Uses:

There are several uses for the young leaves, their juice, and their volatile oil. It is an insecticidal and antibacterial oil. The leaves have diaphoretic, fragrant, spasmolytic, and stimulating properties. The juice is used to treat earaches, as an antiperiodic, and as a component of several skin disease remedies. The leaves are infused and used as a stomachic. The medication works well as an immunomodulatory.

FORMULATION OF HERBAL SOAP

The decoction process was used to formulate herbal soap with chemical and active herbal plant materials (Table 3, 4). After the homogenous semisolid mixture was created, it was put into a mould and let to solidify at room temperature. Any changes in its characteristics were then physically observed.

Table 3: Chemicals used in formulation of herbal soap

S. No.	Chemicals
1	Stearic acid
2	Ethanol
3	Soft Paraffin
4	Peppermint oil
5	Distilled Water

Table 4: Herbal Plant Materials

S. No.	Herbal Plant Material
1	Azadirachta indica
2	Ocimum tenuiflorum

Formulation:

The most suitable combination for making herbal soaps is the one listed in table no.5

Table 5: Formulation of Herbal soap

S. No.	Ingredients	Quantity (%)	Uses
1	Azadirachta indica leaf Powder	5 gm	Antibacterial, Anti inflammatory
2	Ocimum tenuiflorum leaf Powder	2 gm	Antifungal , Antiviral
3	Stearic acid	1.5 gm	Hardening
4	Ethanol	5 ml	Solvent
5	Soft Parrafin	0.80	Soothing agent
6	Peppermint oil	q. s.	Perfumery
7	Distilled water	q. s.	Vehicle

EVALUATION OF HERBAL SOAP

The following criteria were used to evaluate the herbal soap formulation:

1 Organoleptic Criteria: The following criteria were used to evaluate organoleptic properties

- Odour
- Colour
- Appearance
- Clarity

2 Physical criteria:

The following qualities of the herbal soap formulation were evaluated:

- **pH:** A digital pH meter was used to measure the soap's pH after it was made. Following two hours, the produced formulation was diluted in 100 millilitres of distilled water. The solution's pH was measured using a pH meter that had previously been calibrated. The pH was found to be naturally basic.
- **Foamability:** Two grams of soap sample were added to 50 millilitres of distilled water and thoroughly mixed to dissolve it. After that, it was put into a 250 ml measuring cylinder with some washings. Distilled water was added to get the volume up to 200 millilitres. The combination was given 25 equal strokes and allowed to stand motionless for a while until the water volume reached 200 ml. From above the water volume, the foam height was measured.

- **Foam stability:** In addition to the foamability test, the mixture was left undisturbed for 30 minutes while using the same quantity of soap sample and distilled water. Thirty minutes later, the foam height was measured above the water volume.
- **Alcohol insoluble matter:** 50 ml of warm ethanol was used to dissolve a 5-gram sample of soap that was placed inside a conical flask. The liquid was dried at 1050 degrees Celsius for an hour after passing through 20 millilitres of warm ethanol and tarred filter paper. The weighted filter paper had been replaced.
- **Moisture content:** Weighing a 10-gram sample of soap right away allowed us to record the "wet weight of the sample." Using the appropriate drying equipment, this wet sample was dried to a constant weight at a temperature not to exceed 115 °C. The material was weighed again after cooling to ascertain its "dry weight." Using the moisture content formula, the moisture content was determined.

3 Biological Criteria:

- **Antibacterial assay:** The antibacterial experiment was conducted against two strains of bacteria, Gram-positive (*B. subtilis*) and Gram-negative (*S. Typhi*), using the disc diffusion method. In order to carry out this technique, 100 ml of suspension containing 100–150 CFU/ml of each microbe were seeded into nutritional agar medium plates. After being dried and sanitized, filter paper discs (6 mm in diameter) soaked in 400 g of test solution were carefully placed on the agar plates. The extracts' antibacterial activity was assessed by measuring the diameter of the zone of inhibition in millimetres following a 24-hour incubation period at 37 °C.

RESULT AND DISCUSSION

The data collected for the organoleptic, physical and biological assessment are compiled in the tables 6, 7, 8 below.



Figure 9: Prepared Herbal Soap

Table 6: Organoleptic properties of formulation

S. No.	Parameters	Herbal Soap Organoleptic properties
1	Odour	Good
2	Colour	Greenish brown
3	Appearance	Green
4	Clarity	Turbid

Table 7: Physical properties of formulation

S. No.	Parameters	Herbal Soap Physical properties
1	pH	9.8
2	Foamability	13 cm
3	Foam stability	11.5 cm
4	Alcohol insoluble matter	15.5
5	Moisture content	4.2

Table 8: Biological properties of formulation

Prepared Herbal soap	Dose (µg/ml)	Zone of inhibition GM–ve bacteria (<i>S. typhi</i>) (mean of 3)	Zone of inhibition GM+ve bacteria (<i>B. subtilis</i>) (mean of 3)
Data obtained	400	0.79	0.87

CONCLUSION:

Following their extraction via the decoction procedure, the plants *Azadiracta indica* and *Ocimum tenuiflorum* underwent a battery of evaluation tests. The prepared herbal soap's physical, biological, and organoleptic characteristics were examined. The composition had a pleasing colour and scent, and it looked good. It was discovered that the pH was within the designated range of 8 to 10. Other factors that represented the standard values for soap were found, including moisture content, alcohol insoluble matter, and the percentage of foamability and foam stability. According to biological characteristics, such as an antibacterial study that was done, the produced soap has a strong antibacterial effect. Based on the findings of this research study, it is possible to formulate herbal soap using the decoction method while taking into account a variety of factors, including skin condition and the potential and activity of the herbs. When examined for various tests, the created mixture produced positive findings. It is demonstrated that soap does not irritate skin by the fact that a small group of volunteers who used these soaps found that it does not.

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