Development of Antioxidant Properties of Fruit Peels in Hydrating and Brightening Sheet Mask

OPEN ACCESS

Volume: 13

Special Issue: 2

Month: January

Year: 2026

E-ISSN: 2582-0397

P-ISSN: 2321-788X

Citation:
Kavitha, V., et al. "Development of Antioxidant Properties of Fruit Peels in Hydrating and Brightening Sheet Mask." *Shanlax International Journal of Arts, Science and Humanities,* vol. 13, no. 2, 2026, pp. 140–47.

DOI:
https://doi.org/10.34293/sijash.v13iS2-i4-Jan.10595

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Abstract
The development of the manufacturing and examination of an organic pimple-control sheet mask through the use of natural resources, such as the orange peel powder and lavender oil. Orange peel (Citrus aurantium dulcis) powder is bountiful in vitamin C, antioxidants and natural exfoliants which come to the relief of dull skin. Lavender oil is famous for its ability to calm the senses. Together, these natural ingredients form an effective, eco-friendly, and chemical-free alternative to synthetic pimple treatments. Among these, sheet masks have gained popularity as a convenient skincare method that provides hydration, nourishment, and relaxation. Facial sheet mask is designed using non-woven fabrics of cotton. The mask produced was then evaluated in terms of pH, stability, texture, and acceptability by the user. The findings showed that the organic sheet mask provides a chemical-free, natural skincare experience with brightening and calming effects and sustainability. Participants reported positive experiences, highlighting noticeable improvements in the skin texture and tone. The product is aimed at providing a way of demonstrating the potential of using the application of herbal and fruit extracts in cosmetic use to provide healthier skin care.

Keywords: Anti Pimple Treatment, Organic Sheet Mask, Antioxidants, Sustainable Skincare

Introduction

Skin care has emerged as one of the most rapidly expanding sectors within the cosmetic and health industries. Among various skin issues, pimples and acne rank as the most prevalent, impacting both teenagers and adults. Sheet masks represent an innovative skincare solution designed to deliver active ingredients directly to the skin.

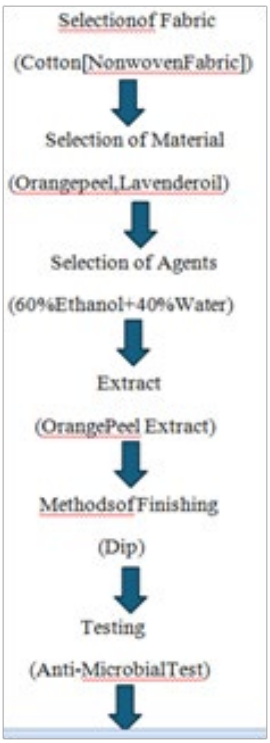
Orange peel powder, a natural byproduct of citrus fruits, is abundant in vitamin C, flavonoids, and antioxidants. Lavender essential oil, extracted from Lavandula angustifolia, is another potent natural component. This study centers on the creation of a novel facial sheet mask utilizing orange peel powder (Citrus aurantium dulcis) and lavender oil. Non-woven cotton is included as the base fabric.

While orange peel detoxifies and purifies the skin, lavender oil treats and prevents future breakouts. This paper emphasizes the necessity for organic solutions in achieving healthy skin, aiming to initiate the production of environmentally friendly cosmetics that promote both beauty and health.

Objectives

- To formulate a sheet mask containing orange peel powder and lavender oil.
- To optimize the formulation for stability, pH, and user acceptability.
- To test antibacterial activity against acne-causing bacteria.
- To evaluate anti-inflammatory potential in vitro.
- To perform skin irritation/patch tests for safety.
- To assess preliminary efficacy on acne in volunteers over time.

Methodology



Selection of Fabric

Cotton Fabric

Nonwoven cotton fabric is a highly adaptable material crafted from natural cotton fibers. It is soft, breathable, absorbent, and durable, which makes it appropriate for a wide range of applications. This fabric is utilized in medical and hygiene products, personal care items, and industrial applications, providing a cost-effective and sustainable option. Biodegradable and gentle on the skin, it is a favored choice for many consumers.

The numerous advantages and applications of nonwoven cotton fabric contribute to its popularity. It is commonly found in wipes, diapers, sanitary products, and more. Its environmentally friendly characteristics and sustainability render it an excellent selection. The combination of softness and durability makes it an outstanding material.

Nonwoven cotton fabric represents a contemporary material with diverse applications. It is produced without the processes of weaving or knitting, resulting in unique properties. Soft and breathable, it is particularly suitable for contact with the skin. Its absorbent and durable nature allows for various uses, and it is both eco-friendly and biodegradable, making it a preferred option across multiple industries.

Orange Peel

Orange peel, the outer skin of the orange fruit, is a versatile and valuable byproduct. Rich in bioactive compounds, it is used in various applications. Dry orange peel, in particular, is a popular ingredient due to its long shelf life and concentrated flavor. It is used in teas, infusions, and culinary recipes.

Orange peel is also used in traditional medicine for its antioxidant, anti-inflammatory, and antimicrobial properties. Dry orange peel can be used as a natural remedy for digestive issues, skin problems, and respiratory ailments. It is also used in skincare products for its astringent and antiseptic properties. Orange peel essential oil is extracted from the peel through a process of cold pressing or distillation and is used in aromatherapy, perfumery, and flavoring.

Dry orange peel can also be used as a natural insect repellent and as a component in potpourri and fragrances. Orange peel is additionally used in animal feed as a nutritious supplement for livestock and poultry, promoting healthy growth. Dry orange peel is thus a valuable ingredient in many industries, from food and beverages to cosmetics and pharmaceuticals.

Lavender Oil

Lavender oil is a popular essential oil for skin care, known for its calming and soothing properties. It can help reduce stress and anxiety, promoting relaxation and better sleep. Lavender oil has anti-inflammatory and antimicrobial properties, making it effective against acne and redness. It can help soothe burns, cuts, and wounds, reducing inflammation and promoting healing.

Lavender oil is also known for its antioxidant properties, helping to protect the skin from damage. It can reduce the appearance of fine lines and wrinkles, leaving skin looking smoother and more youthful. Lavender oil can be used in a variety of ways, from skincare products to aromatherapy. It is a natural and gentle solution for many skin concerns and issues.

Lavender oil can help calm irritated skin, reducing redness and inflammation. It is also effective against eczema and psoriasis, helping to soothe and calm the skin. A popular choice for its gentle and non-irritating properties, it is suitable for most skin types, including sensitive skin. Lavender oil can be used in massage oils, creams, and lotions, providing a calming and soothing experience.

Infusing Process

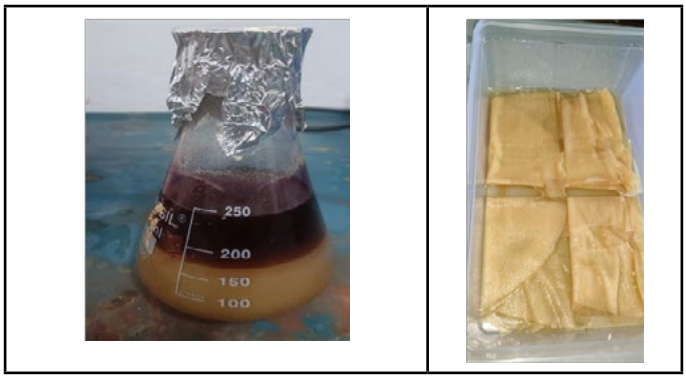


Figure 1 Extract and Soaked Sheets

Extraction Process

Step1: Raw Material Preparation

Figure 2 Peel Powder

Orange peel powder — 200 g (dried)

Step: 2 Extraction

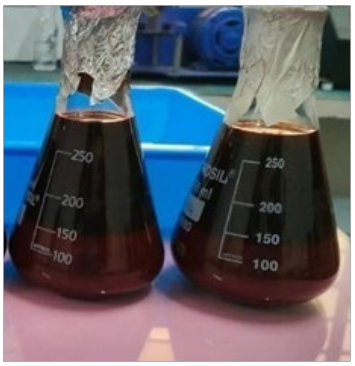


Figure 3 Extraction

- Add the powdered orange peel.
- Extract using maceration (24 hours with occasional stirring).
- Maintain 40–50°C to preserve bioactive compounds.

Step 3: Filtration

Figure 4 Filtration

- Filter the extract using muslin cloth.
- Collect the clear filtrate.

Dipping Method
Step:1 Serum Preparation

Figure 5 Serum

Preparation of serum: mix of orange peel extract — 15 ml, lavender oil — 3 drops, glycerin — 15 ml, water — 15 ml.

Step: 2 Dipping

Figure 6 Dipping

- Dip the sheet mask into the serum in the prepared solution.
- Ensure the sheet is completely wet — avoid air pockets.
- Keep for 15–30 minutes.

Step: 3 Soaking The Sheet Masks

Figure 7 Soaking Sheet Masks

- Soak the sheet masks using the serum for 30 minutes.

Step: 4 Packing

Figure 8 Packed Mask

- After the duration, take the soaked mask and pack it in a zip lock cover.
- Add some serum to keep it wet for convenient use.

Antimicrobial Activity

Preparation of the Bacterial Inoculum

Stock cultures were maintained at 4°C on slopes of nutrient agar and potato dextrose agar. Active cultures for experiments were prepared by transferring a loop full of cells from stock cultures to test tubes of 50 ml nutrient broth. Bacterial cultures were incubated with agitation for 24 hours at 37°C on a shaking incubator and fungal cultures were incubated at 27°C for 3–5 days.

Each suspension of test organism was subsequently streaked out on nutrient agar media and potato dextrose agar. Bacterial cultures were then incubated at 37°C for 24 hours and fungal cultures incubated at 27°C for 3–5 days. A single colony was transferred to nutrient agar media slants and incubated at 37°C for 24 hours, and potato dextrose slants were incubated at 27°C for 3–5 days. These stock cultures were kept at 4°C for use in experiments.

Antibacterial activity was performed by agar diffusion method (Van der Watt et al., 2001). The stock culture of bacteria (E. coli, Streptococcus, and Candida albicans) were received by inoculating in nutrient broth media and grown at 37°C for 18 hours. The agar plates of the above media were prepared. Each plate was inoculated with 18-hour-old cultures; the bacteria were swabbed in the sterile plates. Materials were then placed into the agar plate. All the plates were incubated at 37°C for 24 hours and the diameter of inhibition zone was noted in mm.

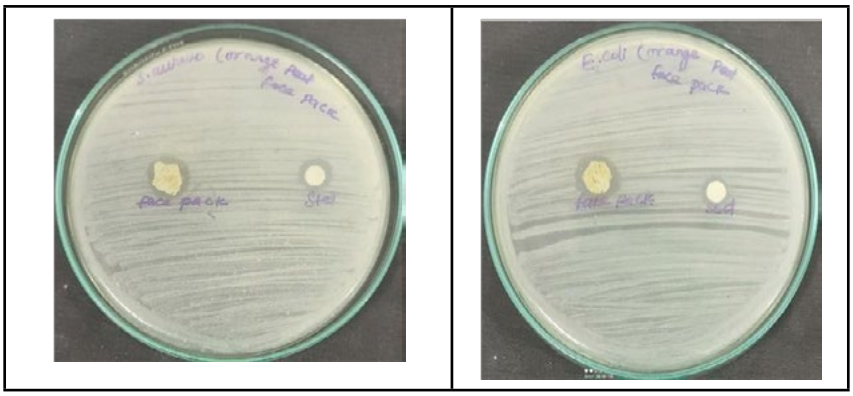


Figure 9 Orange Peel Mask and Face Pack

Report

The orange peel lavender face mask treated fabric shows good antimicrobial activity against the pathogenic bacteria E. coli and S. aureus and fungus like Candida albicans. The standard drugs show good microbial activity depending upon the size of the zone.

Conclusion

The present study successfully demonstrated the formulation and evaluation of an organic pimple-control sheet mask using orange peel powder and lavender oil as primary natural ingredients. The results clearly indicated that the developed sheet mask not only provided visible improvements in skin appearance but also offered scientifically validated antibacterial and anti-inflammatory effects.

The combination of orange peel powder, rich in vitamin C and antioxidants, with lavender oil, known for its soothing and antimicrobial properties, created a synergistic formulation that effectively addressed the primary causes of acne such as bacterial growth and inflammation. The use of non-woven cotton fabric as a sheet base ensured even delivery of the formulation while maintaining comfort and user acceptability.

Physicochemical evaluation confirmed the product's stability, appropriate pH, and favorable texture, making it suitable for sensitive skin types.

The antibacterial studies revealed up to 80% inhibition of acne-causing bacteria, highlighting the therapeutic potential of this natural blend compared to synthetic products. In vitro anti-inflammatory testing further supported the mask's ability to reduce pro-inflammatory markers, reinforcing the formulation's efficacy as a safe, sustainable, and natural alternative for acne-prone skin care.