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Cyanthillium cinereum Plant Extract Incorporated Body Lotion and Its Effect on Skin Microflora

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Abstract: ***Medicinal plants play a vital role in treating various ailments. Scientific studies on the antimicrobial properties of plant components began in the late 19th century. Cyanthillium cinereum, an indigenous plant, is traditionally known for its medicinal properties. Its extract exhibits strong antibacterial activity, making it a promising agent with potential applications in the cosmetic industry. The local name for the plant is Poovamkurunnila (Malayalam), and it is one of the ten sacred flowers or 'Dasapushpam' with cultural and traditional significance in Kerala. The antibacterial activity was tested against skin microflora, which includes resident and transient microbes that may be harmless or pathogenic. Lotions are low-viscosity topical preparations intended for external skin application. Plant-based lotions are used for both cosmetic and medical purposes. The skin microflora, including Staphylococcus aureus and Micrococcus spp., was isolated and identified. Phytochemical analysis of the methanol extract revealed the presence of alkaloids, tannins, saponins, flavones, volatile oils, phenols, and steroids. This study aimed to evaluate the efficacy of Cyanthillium cinereum extract and a body lotion containing it, compared to a lotion without the extract, against the isolated skin flora. The plant extract showed antibacterial activity, producing a zone of inhibition of 21 mm against Staphylococcus aureus and 19 mm against Micrococcus spp. The lotion with the plant extract created zones of 20 mm and 17 mm for Staphylococcus aureus and Micrococcus spp., respectively. These results indicate that the body lotion containing Cyanthillium cinereum extract has greater antibacterial activity against skin flora than the control lotion.***

Keywords: Cyanthillium cinereum, Skin microflora, Antimicrobial activity, Plant extract, Body lotion

I. INTRODUCTION

India, a land of vibrant colours and rich traditions, has always celebrated the beauty of nature in various forms. Among the myriad of natural wonders, flowers hold a special place in the hearts of millions. From prayers to weddings, and every joyous occasion in between, flowers grace these moments with their enchanting presence. Let's delve into the captivating significance of flowers in Indian culture and how they add an aromatic touch to life's rich tapestry. Different flowers are used in various occasions like weddings, decorations, birthdays, sad occasions, in South India, it is a tradition to adorn the hair with flowers like jasmine, rose etc. Dasapushpam (10 flowers in Malayalam) is the group of ten plants. In Kerala, Dasapushpam is used in many traditional occasions. Women used to wear Dasapushpam garland on the hair at the time of playing Thiruvathira (Thiruvathira is the traditional dance in Kerala). In the time of Malayalam month Karkadakam, the ten sacred plants of Dasapushpam were displayed in a gleaming brass plate in front of the praying room.

There are many uses of ten sacred plants of Dasapushpam in Ayurveda. The 10 sacred plants are Slender dwarf morning-glory, Indian doab or Bahama grass, Lilac tassel flower, Morning glory, Mountain knot grass, Golden eye grass, False daisy, Little iron weed, *Biophytum sensitivum* and Balloon plant. Little iron weed is one of the best medicinal plants in Dasapushpam. Its botanical name is *Cyanthillium cinereum*. *Cyanthillium cinereum* (also known as little ironweed and poovamkurunnal, in Malayalam, Poovam kurunnila. *Cyanthillium cinereum* is a species of perennial plant in the sunflower family. Poultice made from the plant is used to treat cuts, wounds, burns, skin diseases and headaches. Also used in treating swelling, inflammation, stomach pain, and kidney disorders, diabetes, leprosy, worm infection and cough. Every part of the plant can be used medicinally.

The bacterial species that naturally inhabit the human skin are referred to as the normal flora of the skin. When this protective layer is compromised due to injury or surgical procedures, an individual becomes more vulnerable to skin infections. Most of the microorganisms present on the skin are harmless, and some even provide beneficial effects. However, it is essential to understand that every organism has the potential to become pathogenic, as even the most harmless microbe can cause infection when the skin is damaged or infected. Common bacterial members of the normal skin flora include *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Streptococcus* pyogenes (not *Streptococcus aureus*, which is a different species), *Candida albicans*, and *Mycobacterium* species.

The leaf and stem extracts of *Cyanthillium cinereum* showed strong antimicrobial activity against *Staphylococcus aureus* and *Micrococcus luteus*. An increase in the concentration of the crude extract led to a corresponding rise in anti-staphylococcal activity, as indicated by larger zones of inhibition.

In recent years, the widespread and indiscriminate use of existing antimicrobial drugs for treating infectious diseases has contributed to the emergence of multiple drug resistance (*Service, 1995*). Moreover, certain antibiotics are known to cause adverse side effects. Hence, there is an urgent need to explore alternative antimicrobial agents from natural sources such as plants (*Cordell, 2000*). Natural products derived from higher plants may serve as promising sources of antimicrobial compounds, potentially possessing novel mechanisms of action (*Barbour et al., 2004*).

II. MATERIAL AND METHODS

A. Isolation Of Predominant Bacteria From Skin

Normal bacteria from skin were isolated using a sterile cotton swab. The samples were taken from the neck and underarms of 5 male and 5 female students aged 18 to 24. The sample was collected in the afternoon. Samples were immediately transferred to the laboratory for further processing and inoculated on nutrient agar.

B. Identification Of Bacteria From Skin

The predominant bacteria present in the skin were identified based on colony morphology, staining, motility, and biochemical tests. (Cappuccino *et al.*, 2020).

C. Collection Of Cyanthillium Cinereum Plant

The plant of our study, *Cyanthillium cinereum*, is an herb. The plant was collected from Malappuram, Kerala. Shadow dried and finely powdered the whole plant, excluding the root, using a blender. The powder was stored.

D. Solvent Extraction Of Plant

To prepare the methanol extract of the plant material, 50g of each powdered leaf material was soaked in 500ml of methanol for 72hrs with constant rocking at room temperature. The samples were then sieved over Whatmann No.1 filter paper. The filtrates were vaporized to dryness using a rotatory evaporator.

E. Phytochemical Analysis Of Cyanthillium Cinereum

These phytochemical analyses were carried out to detect the presence of alkaloids, tannins (catecholic-green), saponins, flavones (orange), volatile oils, phenols, and steroids in *Cyanthillium cinereum* extract by the appropriate tests.

F. Antibacterial Activity Of Plant Extract

The antibacterial activity of *Cyanthillium cinereum* plant extract against the isolated organism were evaluated by agar well diffusion method. The test organism (McFarland) were seeded on to Muller Hinton Agar (MHA). The samples were loaded (50µl) in wells using sterile micropipette and the plates were kept in incubator at 37°C for 24 hours. Zone of inhibition was measured.

G. Preparation of Body Lotion

1) Normal Body Lotion

2 gm of beeswax, 2 gm of olive oil and 4 gm of coconut oil were measured and mixed by the double-boiling method in a sterile beaker. After the mixing, allow it to cool.

2) Body Lotion With Plant Extract

2 gm of beeswax, 2 gm of olive oil and 4 gm of coconut oil. And the mixtures with 2 gm of *Cyanthillium cinereum* plant extract were measured and mixed by the double boiling method in a sterile beaker. After the mixing, allow it to cool.

H. Antimicrobial Activity Of Normal Body Lotion And Body Lotion With Cyanthillium Cinereum Plant

The antibacterial activity of body lotion with *Cyanthillium cinereum* plant extract and normal body lotion against the isolated organism was evaluated by the agar well diffusion method. The test organisms were seeded onto Muller-Hinton Agar (MHA). The samples were loaded (50µl) in wells using a sterile micropipette, and the plates were kept in an incubator at 37 °C for 24 hours. The zone of inhibition was measured.

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III. RESULT

Several organisms were isolated from the skin by the swabbing method from different students in the age group between 18 –24. The samples were swabbed onto nutrient agar plates and exhibited different colony morphologies. The isolates with an observable difference in colony were cultured by quadrant streaking on nutrient agar and MSA. Colony morphologies are tabulated. Out of 5 different strains from 10 plates, 2 predominant bacteria were selected. The selected bacterial species were identified as *Staphylococcus aureus* and *Micrococcus* sp. Based on the results of staining techniques, motility, biochemical tests and colony morphology on Nutrient agar and Mannitol salt agar. (Table 1) *Cyanthillium cinereum* is an annual herb up to 120 cm (4 feet) tall. It produces flat-topped arrays of numerous flower heads, each with pinkish or purplish disc florets but no ray florets. It has small green leaves (Fig. 1). When it becomes dry, the leaves maintain the green colour. It can be seen that the *Cyanthillium cinereum* extract of the methanol showed positive for all the phytochemicals tested (alkaloids, tannins, catecholic-green, saponins, flavones (orange), volatile oils, phenols, steroids) (Table 2). Antibacterial activity of *Cyanthillium cinereum* plant extract against the isolated bacteria was observed. The antibacterial activity of body lotion with *Cyanthillium cinereum* and normal body lotion against the isolated bacteria was observed by the agar well diffusion method. The zone of inhibition of the selected plant extract against *Staphylococcus aureus* was observed with a diameter of 21 mm, and that of the body lotion with plant extract was recorded to be 20 mm. The zone of inhibition of the selected plant extract against *Micrococcus sp* was observed with a diameter of 19 mm, and that of the body lotion with plant extract was recorded to be 17 mm.

Table 1: Identification of Predominant Bacteria - Colony Morphology, Staining, Motility and Biochemical characterization

Sl no	Organism	Nutrient agar	MSA	Gram stain	Motility	Spore stain	Biochemical Characterization									
							Indole	MR	VP	Citrate	Urease	Catalase	Oxidase	TSI	Coagulase	Nitrate
2.	*Micrococcus sp*	Circular, smooth, convex, yellow colour colonies.	Pink colonies without halo zone.	+	-	-	-	-	+	-	+	+	+	-	-	+

Table 2: Phytochemical analysis of *Cyanthillium Cinereum*

Phytochemical test	*Cyanthillium cinereum* Methanol Extract
Alkaloids	Present
Tannins (Catecholic-green)	Present
Saponins	Present
Flavones (Orange)	Present
Volatile oils	Present
Phenols	Present
Steroids	Present



Figure 1: *Cyanthillium cinereum* plant



Figure 2: Methanol extraction of *Cyanthillium cinereum*

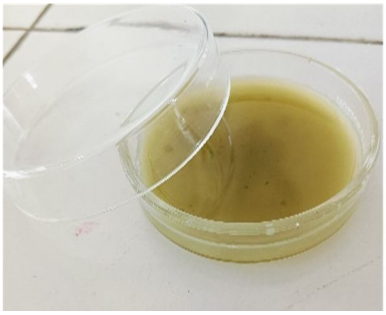


Figure 3: *Cyanthillium cinereum* plant extract incorporated body lotion



Figure 4: Colony Morphology of *Micrococcus* spp. on Nutrient Agar



Figure 5: Colony Morphology of *Staphylococcus aureus* on Mannitol Salt Agar



Figure 6: Antibacterial activity of *Cyanthillium cinereum* plant extract against *Staphylococcus aureus*



Figure 7: Antibacterial activity of *Cyanthillium cinereum* plant extract against *Micrococcus* spp.

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IV. DISCUSSION

There are several indigenous species that are present in various parts of India which have different roles in our culture, traditions, and are also used as medicine for various diseases. The medicinal significances of several varieties of these plants are still left unexplored. Several plants contain different types of phytochemicals such as rennin, saponin, flavonin, phenol contains various antibacterial, antifungal, antioxidant, and anticancerous properties.

The selected plant for study - *Cyanthillium cinereum* is one among the 10 sacred flowers or Dasapushpam that is found in the Western Ghats of Kerala, India. This group of flowers contain the earlier mentioned properties and can be used in preparing plant based medicine.

Skin inhibits both resident and transient flora. The transient micro flora mainly constitutes the potentially pathogenic microorganisms. The important organism as pathogenic include *Staphylococcus* sp, *Micrococcus* sp. These microorganisms only become pathogenic when immune system of the individual on which the microorganisms resides becomes weak or the individual gets immunocompromised by any medical complications.

In the present study, an attempt was made to assay the efficacy of *Cyanthillium cinereum* plant extract and body lotion mixed with the selected plant extract against the isolated skin flora *Staphylococcus aureus* and *Micrococcus* sp. This study was also done to compare the antimicrobial effect of the plant extract itself, the body lotion mixed with plant extract and the body lotion without plant extract. The antibacterial efficacy is interpreted based on the zone of inhibition. *Cyanthillium cinereum* plant extract showed the highest activity, followed by the body lotion mixed with plant extract.

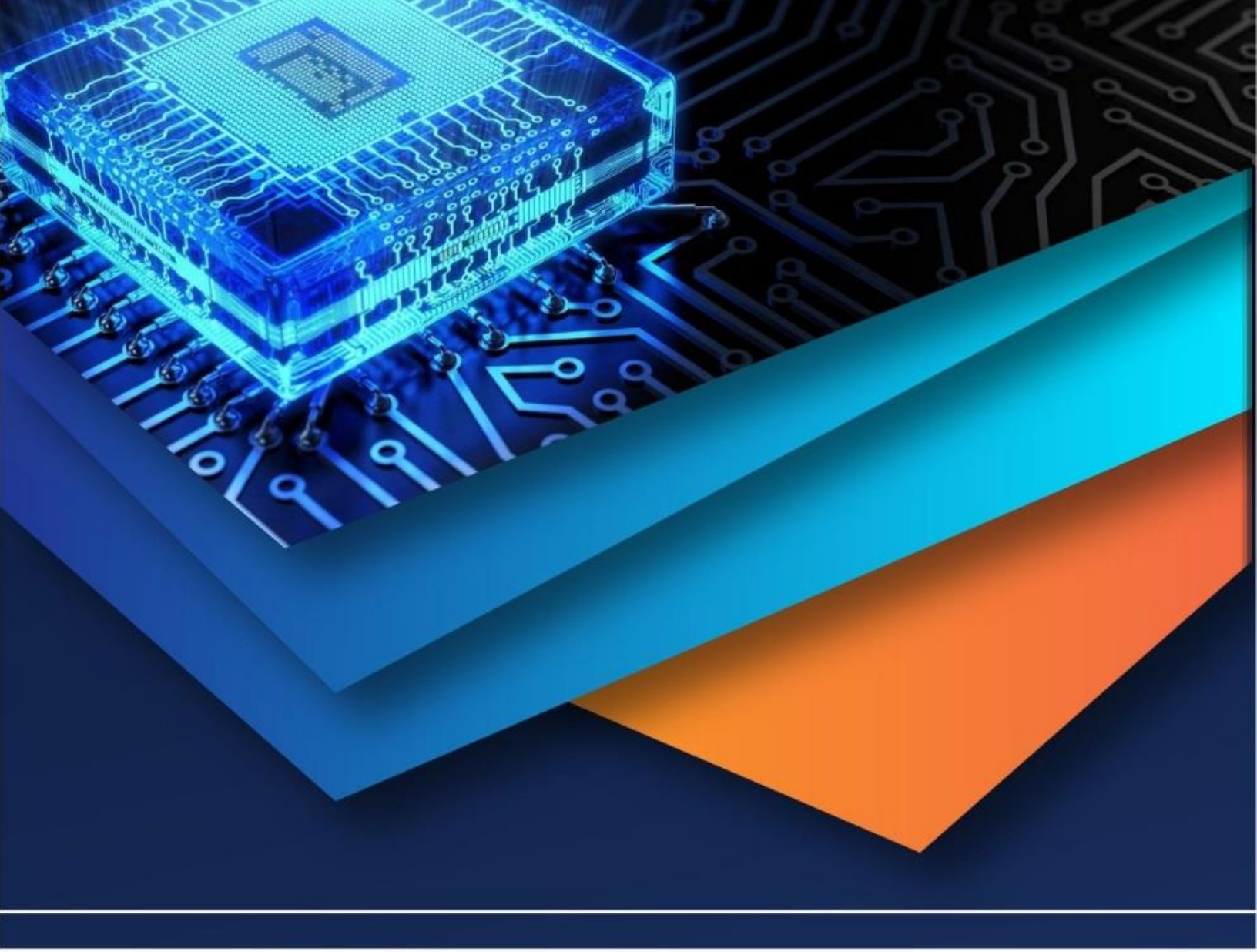
V. CONCLUSION

Transient flora from surface of skin was collected by swabbing method and was identified as *Staphylococcus aureus* and *Micrococcus* sp by suitable morphological and biochemical characterization. These organisms was subjected to an antibacterial study by exposing to *Cyanthilliam cinereum* plant extract and the body lotion made with this plant extract. The antibacterial results showed that body lotion made with plant extract had significant antibacterial property against skin flora.

Thus the study that body lotion with *Cyanthilliam cinereum* plant extract be recommended to daily usage and can be used without any side effects.

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