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Minimum inhibitory and antimicrobial detection in Vellore aesthetic plants

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Abstract: The aim of the study was to investigate antimicrobial activity, minimal inhibitory concentration of samples such as tulsi, turmeric, olive oil, aloevera gel and peel, neem, saffron, green camphor, amla, rose petals, sandals, bengal gram coconut oil was collected from various places for biocosmetics preparation. Dimethyl sulfoxide were used to screen antimicrobial activity by agar diffusion method. The higher antibacterial activities were observed in ethanolic extract followed by and di-Methyl sulfoxide. Aqueous ethanolic extract of four medicinal plants were subjected to antibacterial assay against human pathogenic *Staphylococcus aureus*, determination of minimal inhibitory concentration [MIC] for every chemical agent through the dilution method. Immobilization technique is used for preservation of enzymes using different colors of natural dyes for the importance would be to create beads of different colors. Results of antimicrobial activity was seen maximum in coconut oil and MIC of various samples will be discussed.
Key Words: Antimicrobial activity, Minimal inhibitory concentration, di-methyl sulfoxide, *Staphylococcus aureus.*

Introduction

Older cultures derived their cosmetic products from natural compounds such as fruit's, milks, vegetables, flowers, stems, and seeds and also including mineral compounds such ashes and clays. Medicinal plants have been used for treatment of diseases since the early civilizations of the Middle East India, China and the New World In recent years, there has been a revival in the use of traditional medicinal plants[1]. Therefore, pharmaceutical companies are investigating a lot of money in developing natural products extracted from plants[2]. Most of the herbal plants are considered as one of the world's most popular ornamental plants because of their beauty and fragrance[3]. Biocosmetics was produced by using various medicinal plants such as tulsi is found in hot and the temperate regions of India is an aromatic plant, nearly glabrous branching herb[4,5]. Reveals that the antimicrobial property of Tulsi against a variety of microorganisms like *Staphyloccus aureus, Candida albicans* , enteric pathogens, *Klebisella, Escherichia coli and Proteus* [6]. Sandal [Santalum album] medicinally to remedy many ailments[7]. The S. album mainly used to treat skin restricted the growth of *Staphylococcus aureus*. coconutoil [Cocos nucifera] The coconut shell has equal chemical composition compared to wood and it is suited for the extraction of phenolic compounds[8]. Which are responsible for the antimicrobial, antiulcerogenic, antiinflammatory and antineoplastic activities[9,10]. Olive oil [*Olea europaea*] Phenolic compounds have been shown to inhibit the growth of *Klebsiella pneumonia*, Escherichia coli, and Staphylococcus aureus[11,12]. *Aleo vera* [*Aloe barbadensis*] The Aloe Vera gel is extensively used in gastrointestinal disorders including peptic ulcer and promote wound healing[13]. Aloe leaves are used as laxative preceeding rectal surgery and as a hemorrhoid treatment[14].Saffron (*Crocus Sativus*). Saffron carotenoids with ethanol-extractable mostly contain safranal as an antibacterial was used in traditional medicine to treat some skin disorders[15] .Rose [Rosa damascene] is considered one of the most important Rosa species for its beauty, flavor and fragrance industry' turmeric (Curcuma longa) soothing portion of the herb turmeric and posses the properties like anti-platelet, antioxidant, anti-inflammatory, cholesterol which lowers anti-fungal and anti-

bacterial effects [16]. It increases the red blood cell count and helps to promote good health n that amla fruit possess antioxidant, hepatoprotective, hypocholesterolemic and antiinflammatory activities[17,18,19,20]. Neem *[Azadirachta indica*] Different parts of neem have been shown to exhibit wide pharmacological activities including; antioxidant, antimalarial, antimutagenic, anticarcinogenic, antiinflammatory, antihyperglycaemic, antiulcer and antidiabetic properties[21]. Chickpea (*Cicer arietinum*) is a good source of dietary fibre, vitamins and minerals[22]. Green Camphor[*Cinnamomum camphora]* is frequently used as a home remedy for oily skin [23]. In previous study, medicinal properties of tulasi plant shows hypoglycemic, anabolic, smooth muscle relaxant, cardiac depressant, anti fertility,immunomodulatory properties were estabilished [24]. Immobilization is a very efficient technique in which enzyme is attached to an insoluble, inert material in which the enzyme activity can be preserved for certain period of time [25].

Materials and Methods

SAMPLES COLLECTION

Different types of herbs such as tulsi, turmeric, olive oil, aloevera gel and peel, neem, saffron, green camphor, amla, rose petals, sandals, bengal gram coconut oil was collected and dried in sunlight. It was blended using electrical grinder.

Test Microorganism

Staphylococcus aureus used as a test organism was inoculated in nutrient broth for further studies.

Antimicrobial activity

7.6 grams of Muller Hinton agar and 3.5 grams of agar was weighed and dissolved in 200ml of distilled water and petri plates were kept it for sterilization. Then sterile media was poured in sterile petri plates what man's no.1 paper was cut as disc using bunching machine. *Staphylococcus aureus* was inoculated in 100ml of nutrient broth and swab it in petri plates and then 1ml of sample was marinated in ethanol and add 0.2mg of dimethyl sulfoxide. Sterile disc was soaked in sample containing beaker using sterile forceps disc was placed in petri plate and kept in the incubator at 37° for 1day. Remaining samples also prepared in same manner [26].

Minimal inhibitory concentration determination

1.3 grams of nutrient broth was weighed and dissolved in 100ml of distilled water in sterile conical flask kept for sterilization. Then take 10 test tubes and add 2ml of nutrient broth followed by 1ml of Staphylococcus aureus.0.5mg of dimethyl sulfoxide was added and then all samples were mixed well in beaker in that small amount taken and put in test tubes in 5 minutes intervals and mL of tested sanitizing agent was added and filtered using muslin cloth kept in incubator for 1 day for turbidity formation. Then take O.D at 600nm.

Synthesis of immobilization beads by natural dyes

Extraction of dyes

Here beat root, rose, carrot and mint are used. First all these things are washed and then cut into small pieces. All these small pieces are kept separately in different bowls. After then electronic grinder is used for grinding the small pieces. By doing this four different colors of dyes from all the materials are extracted. Then dyes are collected in four different test tubes differently.

Preparation of bead formation

4grams of calcium chloride was weighed and dissolved in 100ml of distilled water and kept in 4°cfor 2 hours. To prepare 0.1N Nacl sodium alginate for that weighed 0.685grams of sodium chloride and 3.5 grams sodium alginate was dissolved in 100ml of distilled water. In four separate beakers, 20 ml of Sodium Alginate is taken in each. Four different coloured dyes prepared earlier are now added separately to four beakers containing Sodium Alginate. Hence four different coloured Sodium Alginate solutions are prepared. Now $CaCl_2$ is taken into four different beakers. Then using dropper Sodium Alginate solution of different colour is added drop by drop into different beakers containing CaCl2 so that there are four different colours of beads formation. When different colored Sodium Alginate solutions is added drop by drop into different beakers

containing CaCl2 then four different colors of beads are formed. Beads are dissolved in phosphate buffer and take O.D at 24 hours interval for 5 days at 600nm.

Biocosmetic preparation

0.1gram of samples and 0.1miligram of Kcl and Nacl was weighed in sterile breaker contianing 2ml of 20% ethanol .

Results and Discusssion

Samples was collected from various places and dried in sunlight and stored in container

Fig:1 sample collection

Table:1 Antimicrobial activity of different medicinal plants

Medicinal plants	Zone of inhibition
Neem	80mm
coconut oil	100mm
Termeric	50mm
Saffron	70mm
Amla	50mm
Champak	30mm
Rose	60mm
Green campor	10mm
Olive oil	20mm
Bengalgram powder	No activity
Aleo vera gel	50mm

Ethanolic extract of Coconut oil have higher microbial activity when compare to other medicinal plants about 100mm zone of inhibition has been formed against *Staphylococcus aureus*

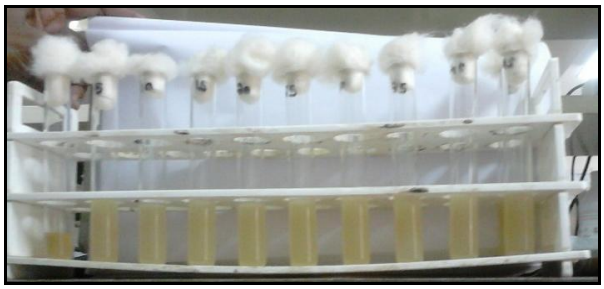

Fig:2 Minimal inhibitory concentration of different medicinal plants

Minimal inhibitory concentration was determined by dilution method .10mg dimethyl sulfoxide has more antimicrobial activity compare to other antibiotics.

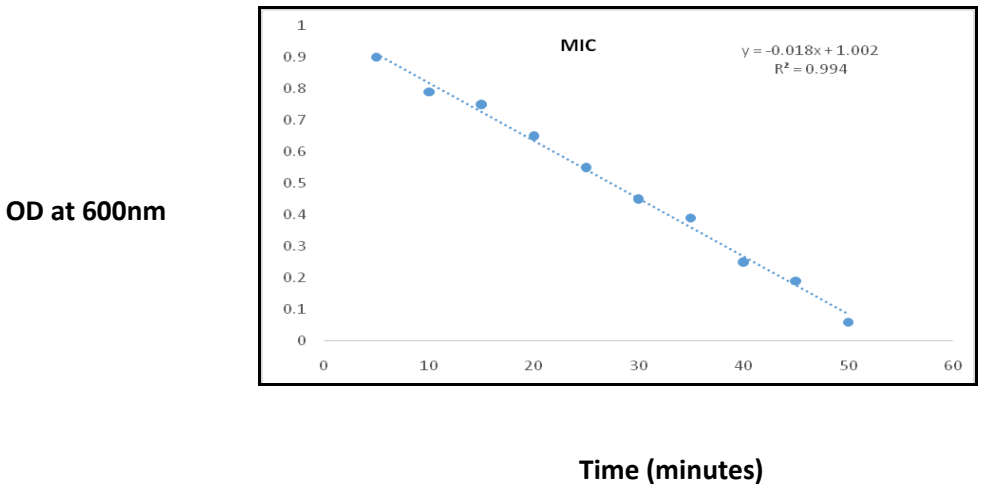

Fig 3: Shows results of Minimum Inhibitory Concentration (MIC)

Table: 2 Enzyme activity of samples

Time of interval	Optical density
Control	0.00
5minutes	0.90
10 minutes	0.79
15 minutes	0.75
20 minutes	065
25 minutes	0.55
30 minutes	0.45
35 minutes	0.39
40minutes	0.25
45 minutes	0.19
50minutes	0.06

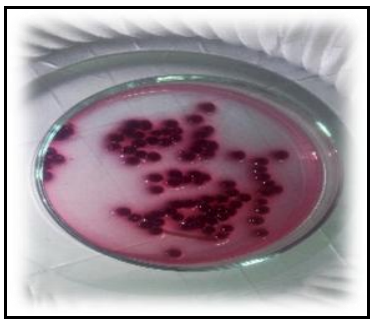

Fig: 3.1 Immobilization of beetroot

Fig: 3.2 Immobilization of mint

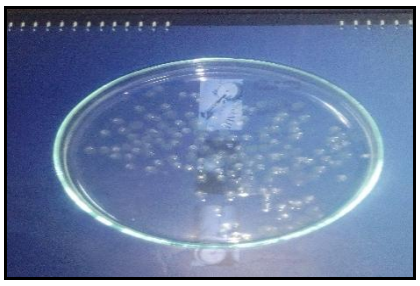

Fig:3.3 Immobilisation of rose extract

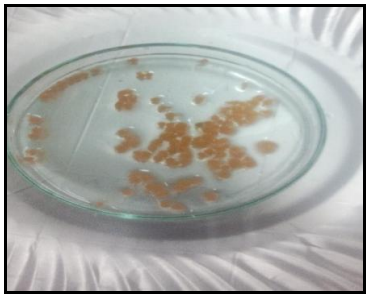

Fig:3.4 Immobilisation of carrot extract

Formation of beads using rose, mint, carrot, and beet root by immobilization technique used to preserve enzyme activity and it was analysed for its activity for 4 days.

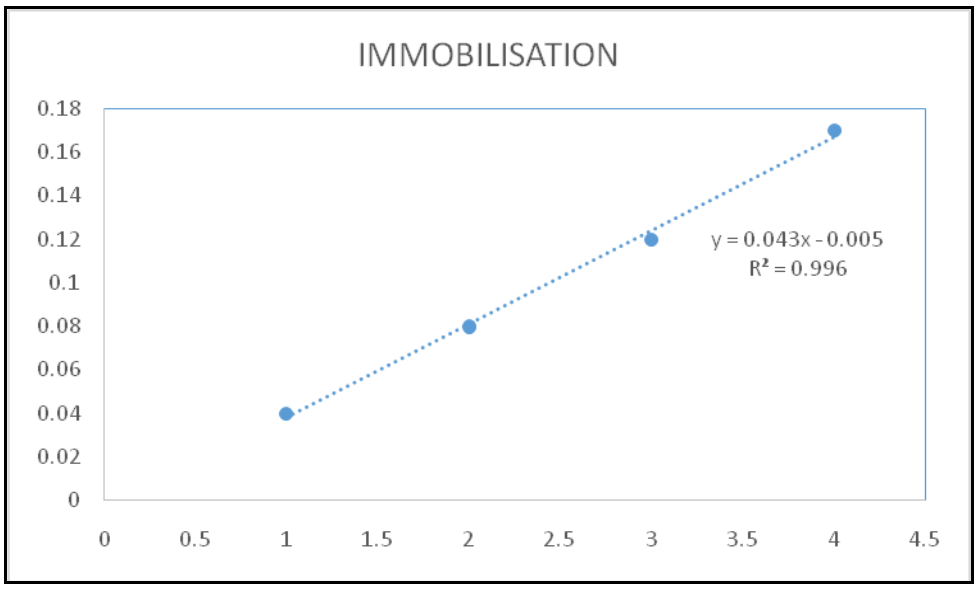

Fig 4: Shows result of antimicrobial activity using immobilization technique

In this study, we used various medicinal plants were evaluated antimicrobial activity against gram positive bacteria *Staphylococcus aureus.* The test samples exerted broad spectrum of antimicrobial activity against *Staphylococcus aureus.* Coconut oil have shown 100mm zone of inhibition it has more effect against *Staphylococcus aureus*and least activity was seen in green champor.Minimal inhibitory concentration study revealed that 10mg of dimethyl sulfoxide shows more resistances against *Staphylococcus aureus.* Then, Immobilisation technique was carried out using sodium alginate to retain its antimicrobial activity until 72 hrs. Herewith, we concluded that ethonalic extraction of medicinal plants such as as tulsi, turmeric, olive oil, aloevera gel and peel, neem, saffron, green camphor, amla, rose petals, sandals, bengal gram coconut oil.In that coconut oil have potent of antimicrobial activity against *Staphylococcus aureus* . It can be used in the treatment of skin disease caused by *Staphylococcus aureus* and it will be more promising approach for the production of biocosmetics without any adverse side effects in mere future.

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