Antimicrobial Activity of Natural Herbal Products against Dandruff Causing Microorganisms

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Abstract-
Dandruff is a common scalp disorder faced by the people of all age groups. There are any anti-fungal shampoos present in the market all over the world. The present study deals with the efficacy of different herbal extraction dandruff causing isolates *Malassezia furfur*, *Staphylococcus aureus*, *Staphylococcus captitis*, *Escherichia coli* and *Bacillus* species. Isolation of *Malassezia* was carried out by using Sabouraud dextrose agar, *Staphylococcus* by using Mannitol Salt Agar, *Escherichia coli* on MacConkey or EMB Agar and *Bacillus* species on Mineral Salt medium. Different herbal extracts of Neem, Papaya, Lemon, Tea and Mehandi were taken to check the efficacy against the isolates using Agar Cup Diffusion method. Among all plant extracts tested, Lemon showed highest zone of inhibition followed by Neem extract. The present study reveals that herbal products are more effective because herbal plants have some natural Antimicrobial properties.

Keywords: **Dandruff, Natural herbal extracts, *Staphylococcus, Malassezia furfur*.**

INTRODUCTION:

Dandruff is a common scalp disorder that has occurred for centuries(Sommer B., *et al*., 2015). It is common scalp disorder faced by the people of all age groups. Dandruff can be caused by number of things including dry skin, oily skin, too much and too little hair washing, diet and stress. However, the real cause of dandruff is actually mould like fungus, *Malassezia* furfur which lives on your scalp. Malassezia is a genus of fungi (Shuster S., 1984). *Malassezia* convert the sebum lipid into fatty acids and triglycerides, which accelerate hyperproliferation of kertinoytes.

Currently available dandruff treatment include therapeutic use of zinc pyrithione (Potluri A., *et al.*,2013), salicylic acid, glycolic acid, steroids and sulphur and coal tar derivative. The anti-dandruff shampoo have their own disadvantage like loss of hair, increased scoping, itching, nausea, headache, vomiting. There are natural effective remidies to control dandruff in Ayurveda but presently women are depending upon commerical shampoos that contains some antifungal compounds that fight dandruff.

Natural herbal products like lemon extract, Papaya extract, onion, Neem extract and curd are natural antimicrobial agents which inhibits the growth of microorganisms found in scalp. Lemon is the trusted ingredient to fight against dandruff microorganisms which is rich in vitamin C and helps to restore the pH balance of the skin (Potluri A., *et al.*, 2013). Onion juice has antimicrobial (Dorsch, 1996; Arunchalam 1980) and antifungal effects (Conner and Beuchat 1984). It is rich in protein, carbohydrate, sodium, potassium and phosphorus (Lampe J., 1999). Leaves of papaya helps to remove the dandruff from the scalp. Curd contains vitamin B2 and B12, proteins etc. which is beneficial for hair. It helps to moisturise hair including dandruff treatment (Milind P., and Malik J., 2014) and makes it silky and shiny.

MATERIAL AND METHODS:

Cultivation of fungal isolate:

Dandruff sample were inoculated on Potato Dextrose Agar and plates were incubated for 4 – 5 days at room temperature for Cultivation of dandruff causing microorganisms.

Direct Microscopy of fungal isolate:

Fungal culture was taken on the slide and some drops of Lactophenol Cotton Blue stain added on that culture. Covered the surface of slide with cover slip. The slide was then slightly heated over flame to remove air bubble if present. Observe the slide under 10X and 45X Objective lenses of microscope.

Enzyme test:

Malassezia furfur showed Catalase test positive while other Amylase and Urease test negative. Cottany growth added into a test tube containing 3 ml of hydrogen peroxide solution. Formation of bubbles proves release of oxygen from hydrogen peroxide was observed predicts positive test.

Isolation of Bacterial isolates:

The culture of microorganism such as *Staphylococcus aureus* and *Staphylococcus captitis* were isolated and inoculated on selective media such as Mannitol Salt Agar, *Escherichia coli* on MacConkey or EMB Agar and *Bacillus species* on Mineral Salt medium.

Confirmatory test:

Dandruff causing microorganisms were confirm on the basis of their Morphological characteristics and Biochemical Characteristics like Enzyme Test, IMViC classification and Sugar Fermentation Test.

Antimicrobial activity:

Antimicrobial Activity of Neem extract, Papaya extract, Tea extract, Lemon extract and Mehandi extract were tested against dandruff causing microorganisms using Muller Hingtone Agar (MHA) by well diffusion method. Bacterial lawning of each of Bacterial and fungal culture were made on solidified MHA plates. A wells were made with the help of sterilised borer, 0.5 ml of each of plant extracts was poured in the wells separately. All the fungal culture plates were kept at room temperature for 2-3 days whereas bacterial culture plates were kept in incubator at 37° C for 24 hours. After incubation period the plates were observed for zone of inhibition.

RESULTS AND DISCUSSION:-

The samples were collected from scalp by scraping method. Total 30 samples were taken out of which 20 samples were positive. The positive samples were inoculated first on Nutrient media and then on selective media. The obtained isolates were confirm on the basis of Morphology and their Biochemical characteristics. The present study reveals that herbal products are more effective than chemical containing shampoos. Each natural agent was found more effective to a certain level in inhibiting the growth of dandruff.

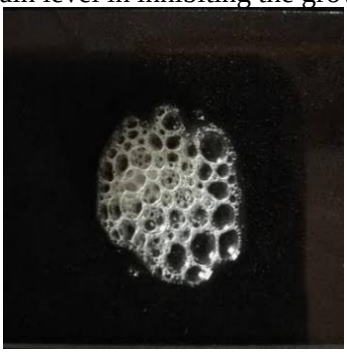


Fig 1: Catalase test positive

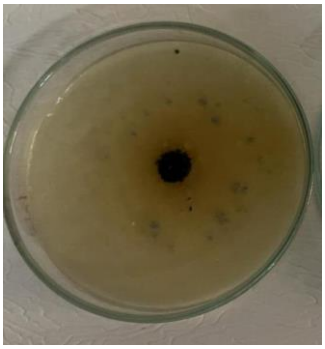


Fig 2: Antifungal activity of Papaya extract against *Malassezia fufur*

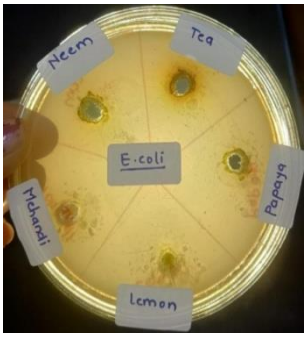
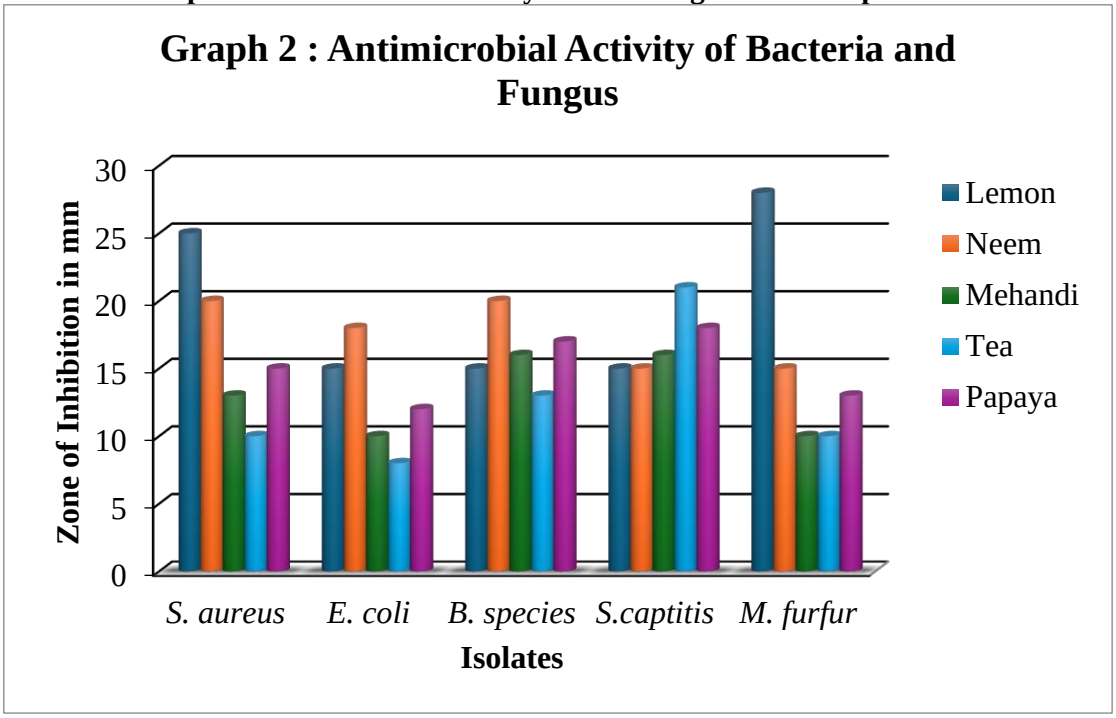


Fig 3: Antimicrobial Activity of various extracts against *E coli*

Table 1: Antimicrobial Activity Of Herbal extracts against various isolates.

Sr. No.	Isolates	Zone of inhibition in mm				
		Lemon	Neem	Mehandi	Tea	Papaya
1	*Escherichia coli*	15.0	18.0	10.0	8.0	12.0
2	*Bacillus species*	15.0	20.0	16.0	13.0	17.0
3	*Staphylococcus captitis*	15.0	15.0	16.0	21.0	18.0
4	*Staphylococcus aureus*	25.0	20.0	13.0	10.0	15.0
5	*Malassezia furfur*	28.0	15.0	10.0	10.0	13.0

Graph 1: Antimicrobial Activity of isolates against herbal products.



In antimicrobial activity, antimicrobial agents were acts as effectors. In above table activity was done against dandruff causing microorganisms. The herbal extracts such as Neem, Tea, Mehandi , Papaya and Lemon showed zone of inhibition against dandruff causing microorganisms.

For *Staphylococcus aureus*, highest zone was showed by Neem and lemon i.e. 25 mm and 20 mm respectively. Mehandi showed 13 mm, Tea 10 mm and Papaya showed 15 mm zone of inhibition.

Neem extract showed highest zone of inhibition against *Escheriachia coli*, i.e. 18 mm followed by Lemon 15 mm and Papaya extract gives 12 mm zone of inhibition. The low to moderate zone of inhibition was observed in Mehandi and Tea extract against *Escheriachia coli*.

In case of *Bacillus subtilis* highest zone was observed against Neem 20 mm followed by Papaya extract showed 17 mm. Other extract extracts showed moderate to good zone of inhibition against *B. subtilis* i.e. for Mehandi 16 mm, Lemon 15 mm and Tea 13 mm respectively.

Staphylococcus captitis highest zone of inhibition was observed against Tea 21 mm followed by Papaya 18 mm, Mehandi 16 mm while Lemon and Neem extract showed same zone of inhibition i.e. 15 mm.

Fungus species *Malassezia furfur* was more effective against herbal products. Highest zone of inhibition was shown by Lemon extract against *Malassezia furfur* i.e. 28 mm, followed by Neem 15 mm, Papaya gave 13mm, Mehandi and Tea gave 10 mm zone of inhibition.

It is observed that Lemon showed highest activity followed with Neem against the isolates.

DISCUSSION:

Dandruff is caused by some fungal and bacterial species.The result of antimicrobial activity of herbal products proved to be more effective against the obtained isolates. According to the study, Lemon extract showed 28 mm zone of inhibition followed by Neem extract 15 mm similarly (Dr. Anita Chandak *et al.*, 2018)

From the above study it is conclude that herbal products are more effective than chemical containing shampoos because they are safe and effective. Neem leaves are natural cure for scalp infection and dandruff. Lemon leaves have antimicrobial properties that it can treat dryness and dandruff effectively. This study will have a great help in the field of cosmetics as it is cost effective and do not have any adverse effects.

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