

STUDY ON EFFECTIVENESS OF SYNTHETIC ACTIVES VS HERBAL ACTIVES IN ANTI DANDRUFF SHAMPOOS AGAINST *MALASSEZIA FURFUR*

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Article Received on
11 March 2022,

Revised on 01 April 2022,
Accepted on 22 April 2022

DOI: 10.20959/wjpr20225-23964

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ABSTRACT

Dandruff is caused by *Malassezia furfur*. This study was carried to evaluate the efficacy of Anti dandruff Shampoo against *Malassezia furfur*. Ten Popular Anti dandruff Shampoo samples (Synthetic & Herbal) were collected from market and evaluated. Test results were encouraging and demonstrated efficacy against the test organism in detail.

KEYWORDS: Dandruff, *Malassezia furfur*, Anti dandruff Shampoo, MIC, Synthetic, Herbal, Skin.

INTRODUCTION

Dandruff is a common persistent, relapsing inflammatory condition affecting the areas rich in sebaceous glands.^[1] Dandruff is medically known as Pityriasis capitis is a condition, characterized by small white flakes of skin scales that separate and fall from the scalp. It is a condition that causes social or self-esteem problems to those affected.^[2]

Dandruff affects more than 50% of the adult population and represents 25% of all scalp disorders.^[3,4]

Dandruff begins in young-adulthood and continues through middle age. It is commonly aggravated by changes in humidity, trauma, seasonal changes, and emotional stress. The severity of dandruff may fluctuate with season, as it often worsens in winter.

The dominant species on human scalp are *Malassezia furfur*, *Malassezia globosa* and *Malassezia restricta*. *Malassezia furfur* is the causative organism for dandruff. *Malassezia furfur* has lipolytic activity which induces hydrolysis of human sebum triglycerides into free fatty acids that cause both hair loss and scalp.

Males are affected more than females. Rates decrease after the age of 50.

Cosmetic companies have developed anti-dandruff shampoos for this problem. Two types of anti dandruff Shampoos are commercially available, Synthetic anti dandruff shampoos (based on ingredients of chemical origin) and Herbal Anti dandruff Shampoos (based on plant ingredients).

Synthetic anti dandruff Shampoos contain fungicides such as Ketaconazole, Zinc pyrithione, Piroctone olamine and Selenium di sulfide. Synthetic anti dandruff shampoos are harmful especially during regular usage. This causes severe dryness of hair and shaft leading to hair fall and destroys budding hair shaft.

Herbal anti dandruff shampoos are available for people who wish to avoid synthetic fungicides. Such shampoos often use essential oils or herbal extracts.^[5]

Herbal anti dandruff Shampoos contain plant ingredients and essential oil. It is used to remove dandruff, dust, to impart softness and smoothness to hair shaft, to prevent hair falling. They are safe and free from side effects.^[6]

In this study synthetic and herbal anti dandruff shampoos were procured from the market and evaluated for its anti microbial efficacy.

MATERIALS AND METHODS

Ten popular anti dandruff shampoos (Herbal & Synthetic) were selected for this study and evaluated for antimicrobial efficacy. The Study products are categorized based upon the speciality ingredient present in it as per the label claim.

- Brand I contain *Melaleuca alternifolia*, *Aloe barbadensis miller*
- Brand II contains Piractone Olamine
- Brand III contains Zinc pyrithione.
- Brand IV contains *Azadiracta indica* and *Rosaminus officinalis*
- Brand V contains *Allium cepa*, *Oryza sativa*

- Brand VI contains *Melaleuca alternifolia*, *Zingiber officinale*
- Brand VII contains *Melaleuca alternifolia*, *Azadirachta indica*, *Ocimum sanctum*
- Brand VIII contains *Zingiber cassumunar*, *Azadirachta indica*, *Citrus limon*, *Emblica officinalis*, *Psoralea corlifolia*, *Thymus vulgaris* and *Rosaminus officinalis*
- Brand IX contains *Cedrus deodara*, *Melaleuca alternifolia*
- Brand X contains *Aloe barbadensis miller*, *Phyllanthus emblica* & *Bacopa monnieri*

Malassezia furfur (MTCC 1374) was procured from IMTECH, Chandigarh and was sub cultured and stored in refrigerator.

Twenty-four hours broth culture of the test organism was used for the study. The culture in the SDA broth with Olive oil was incubated at $23 \pm 2^\circ\text{C}$ for 24 hrs. After 24 hrs from the broth a loop full of culture was streaked on a SDA agar plate overlaid with olive oil to know the presence or absence of growth of *Malassezia furfur*.

Different concentrations viz, 0.5, 1, 2, 3, 4, 5, 6, 7.5, 10, 12 mg/ml of anti dandruff shampoos were prepared and transferred into the petriplates. Then the molten SDA was poured and mixed thoroughly. After solidification 20 µl of culture was spread over the agar. The plates were incubated at $23 \pm 2^\circ\text{C}$ for 3 - 5 days. Experiments were done in triplicates with suitable control.

RESULT

The study results revealed a marked positive result of Anti dandruff shampoo samples by *Malassezia furfur*.

Table 1: Anti microbial efficacy of Commercially available Anti dandruff Shampoos with Synthetic and Herbal Active ingredients.

S.No.	Sample Details	Active ingredients	MIC (mg/ml)
1.	Brand I	<i>Melaleuca alternifolia</i> , <i>Aloe barbadensis miller</i>	4 - 5mg/ml
2.	Brand II	Piractone Olamine	0.5 - 1 mg/ml
3.	Brand III	Zinc pyrithione	1 - 2 mg/ml
4.	Brand IV	<i>Azadirachta indica</i> , <i>Rosaminus officinalis</i>	7.5 - 10 mg/ml
5.	Brand V	<i>Allium cepa</i> , <i>Oryza sativa</i>	2 - 3 mg/ml
6.	Brand VI	<i>Melaleuca alternifolia</i> , <i>Zingiber officinale</i>	4 - 5 mg/ml
7.	Brand VII	<i>Melaleuca alternifolia</i> , <i>Azadirachta indica</i> , <i>Ocimum sanctum</i>	5 - 7.5 mg/ml
8.	Brand VIII	<i>Zingiber zerumbet</i> , <i>Azadirachta indica</i> , <i>Citrus limon</i> , <i>Emblica officinalis</i> , <i>Psoralea corlifolia</i> , <i>Thymus vulgaris</i>	3 - 4 mg/ml

		and <i>Rosaminus officinalis</i>	
9.	Brand IX	<i>Cedrus deodara</i> , <i>Melaleuca alternifolia</i>	4 - 5 mg/ml
10.	Brand X	<i>Aloe barbadensis miller</i> , <i>Phyllanthus emblica</i> and <i>Bacopa monnieri</i>	10 -12 mg/ml

DISCUSSION

Dandruff and seborrheic dermatitis are common afflictions of the human scalp^[7] and considered the same base condition differing only in magnitude.^[8] Dandruff is a condition, which causes small white flakes of the skin that separate and fall from the scalp.^[9] *Malassezia furfur* is a lipolytic fungus affects the hair and causes diseases called dandruff and also called pityriasis vesicular, seborrheic dermatitis.^[10] There are Natural control remedies in Ayurveda. Synthetic anti-dandruff shampoo contains some anti-fungal compounds like miconazole, ketocanazole, selenium sulphide etc. Plant products contain various compounds like alkaloids, flavonoids, tannins which have sufficient anti-fungal activity.

All anti dandruff shampoo samples had good anti-fungal activity but there is a considerable variation in the potency of their anti-fungal activity depending on the active compound and its concentration.

The current study clearly demonstrates that Brand II and III has highest anti fungal activity compared to other samples.

In Brand II Piractone olamine is a pyridine derivative, as ciclopirox olamine. It is a component of any cosmetic product such as fungicidal effect. It penetrates the cell membrane and forms complexes with iron ions, inhibiting energy metabolism in mitochondria. Piractone olamine is often used in anti-dandruff shampoo as a replacement for the commonly used compound Zinc pyrithione.^[11] It is slightly more effective than Zinc pyrithione.

In Brand III Zinc pyrithione is an antimicrobial compound that has been used since the 1960's in the anti-dandruff shampoo.^[12]

Allium cepa has antimicrobial activity in Brand V.^[13]

Brand VIII has inhibition level of (3-4mg/ml), *Azadirachta indica* produces anti-fungal, anti-bacterial activity.^[14] *Thymus vulgaris* and *Rosaminus officinalis* protects and prevents scalp irritation and dandruff.

Brand I, VI and Brand IX shows same MIC value, having *Melaleuca alternifolia*. *Melaleuca alternifolia* contains several hydrocarbons and terpenes. Terpen 4 ol is believed to have antimicrobial activity and could possibly effective against *Malassezia furfur*.^[15]

Brand IV and Brand X shows higher inhibition level.

CONCLUSION

The study clearly demonstrates that the anti-dandruff shampoos with Piractone Olamine and Zinc pyrithione found to be very effective than other samples. Synthetic anti-dandruff shampoos are harmful compared to herbal anti-dandruff shampoos. These shampoos create burning of scalp, skin irritation, skin peeling and cause temporary hair loss. Zinc pyrithione anti dandruff shampoo causes burning of eyes, mouth, nose. Other side effects may include burning or redness and in rare case blistering. Piractone olamine causes irritation and wrinkling of skin.

However herbal shampoos have been found to be not only safer than the chemical shampoo but also highly reduce the hair loss. Herbal ingredients like *Rosaminus officinalis*, *Azadirachta indica*, *Melaleuca alternifolia*, *Zingiber cassumunar* also recorded good anti-pityrosporum activity, but slightly higher than anti dandruff shampoos with synthetic ingredients in MIC. The awareness and need for cosmetics with herbs in on the rise, as it is strongly believed that these products are safe and free from side effects. For dandruff treatment, we have both synthetic and herbal shampoos. Comparatively herbal shampoos are safe and effective to use than synthetic anti - dandruff shampoos.

ACKNOWLEDGEMENT

The authors are thankful to Mr. Pradeep Choleyil and Mrs. Jayadevi Pradeep, Directors, Choleyil Private Limited, Chennai, India for their support and encouragement in carrying out this work.

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