



ISSN Print: 2394-7500
ISSN Online: 2394-5869
Impact Factor (RJIF): 8.4
IJAR 2023; 9(12): 189-192
www.allresearchjournal.com
Received: 25-09-2023
Accepted: 28-10-2023

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Evaluation of antimicrobial effectiveness of herbal anti-dandruff hair oil

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Abstract

Hair is a primary epidermal protective barrier which is one of the vital parts increasing the overall elegance of the body. Dandruff is a problem that possesses serious concern in common people including almost all age groups. The major culprit of dandruff is the yeast-like lipophilic fungus called *Malassezia* spp. and sometimes by some gram-positive skin flora like *Staphylococcus epidermidis*. The present work is undertaken to study the effectiveness of herbal hair oil formulations against dandruff causing organisms. In the study a fixed volume of samples was applied into the well at the middle of the solid agar surface after spreading with the challenge organisms. After the completion of incubation period, evaluation was done based on the appearance of zone of inhibition around the well. It was observed that the effectiveness of tested herbal formulation is satisfactory in comparison with the market sample as well as other control sample used under the test.

Keywords: Dandruff, *Malassezia*, *staphylococcus epidermidis*, herbal oil

Introduction

The scalp is the anatomical area bordered by the face at the front and by the neck at the sides and back. It is characterized by a usually high density of terminal hair growth with numerous sebaceous glands that contribute to a specific microenvironment with significant differences from the rest of the skin. The scalp is a rich environment for microbes. Ecologically, sebaceous areas have greater species richness than dry ones, with implications both for skin physiology and pathologic conditions [1]. To maintain healthy-looking hair, scalp health is of utmost importance. The focus on scalp health is limited, however, the disorders such as dandruff and seborrheic dermatitis have been much studied and many treatments are emerging in research and development concerning effective scalp care, which is ultimately the root of healthy hair.

The word dandruff (Dandruff, Dandruffe) is of Anglo-Saxon origin, a combination of 'tan' meaning 'tetter' and 'drof' meaning 'dirty'. Dandruff affects aesthetic value and often causes itching. The severity of dandruff may fluctuate with season as it often worsens in winter [2]. It was found that the lipophilic yeast of the genus *Malassezia* which feeds on scalp oils and contributed to dandruff. Some people's bodies view this oil breakdown as an irritant, so the scalp responds by speeding up skin cell renewal, which results in dandruff [3, 4]. The scalp form as biocenose for various organisms such as *Staphylococci* spp., *Propionibacterium* spp., and *Malassezia* spp [5, 6].

Hair plays an important role in human life, In India the traditional process is the preparation of hair oils put together with various hair growth promoting natural products. The daily hair oiling was recommended with appropriate herbs filled to suit others constituents and this practice also continuous until today. The hair oil preparations are included to treat various dandruff, hair fall process, split ends etc. The hair oil preparations are mainly used to cool the scalp for luxurious growth of hair in both men and women [9]. Herbal oils are a choice for hair care cosmetics as they have proven efficacy against the fungi *Malassezia* and they avoid the use of synthetic drugs. Moreover, herbal actives act as hair growth promoters, improve hair smoothness and reduce hair fall [10].

The present study deals with assessment of anti-dandruff activity of herbal hair oil vis-à-vis marketed hair oil by virtue of zone inhibiting effects against *Malassezia furfura* and *Staphylococcus epidermidis*, the main culprits for the development of dandruff.

Materials and Methods

a) Samples

1. Sample 1 (Anti- dandruff Herbal Hair Oil).
2. Sample 2 (Market sample: Anti- dandruff Herbal Hair Oil).
3. Positive Control: Amoxicillin and Ketoconazole were used as positive controls for antibacterial and anti-fungal activity assays respectively.
4. Coconut Oil as traditional hair oil.
5. Sterile water as Blank

Challenge organisms

Freshly grown culture of-

1. *Malassezia furfura*
2. *Staphylococcus epidermidis*
- 3.

Both the strains were obtained from ATCC.

C. Method of evaluation

Comparison of zone inhibition on solid agar plate by using in-house developed method.

- d) Media - SCDA & SDA
- e) Product concentration under test and control- 1:2 diluted sample in Polysorbate 20.
- f) Zone of Inhibition Studies: Brief procedure
 - The tested organisms were inoculated uniformly on the surface of the solid media (SCDA for bacteria & SDA for fungus).
 - Sufficient wells were made in the center of the medium.
 - 200-250 μ l of tested samples were loaded in the well in duplicates along with positive and negative controls.
 - The plates were incubated at 37 °C for 2-3 days for bacteria and at 25 °C for 3-5 days for fungi.
 - Zones of inhibition were measured and compared with controls.

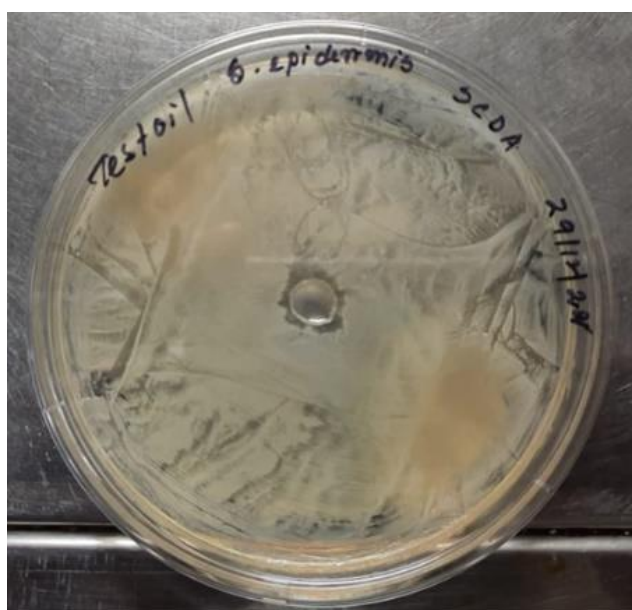
Results

Zone inhibition against *Staphylococcus epidermidis*: In the zone inhibition study against *Staphylococcus epidermidis*, it was observed that test sample was 1.2 and 1.5 times superior to that of market sample and coconut oil respectively. The results were incorporated in Table 1 and Figure 1.

Zone inhibition against *Malassezia furfura*: In the zone inhibition study against *Malassezia furfura*, it was observed that test sample comparable to that of market sample and 1.2 times better than coconut oil. The results were incorporated in Table 2 and Figure 2.

Table 1: Zone Inhibition against *Staphylococcus epidermidis*

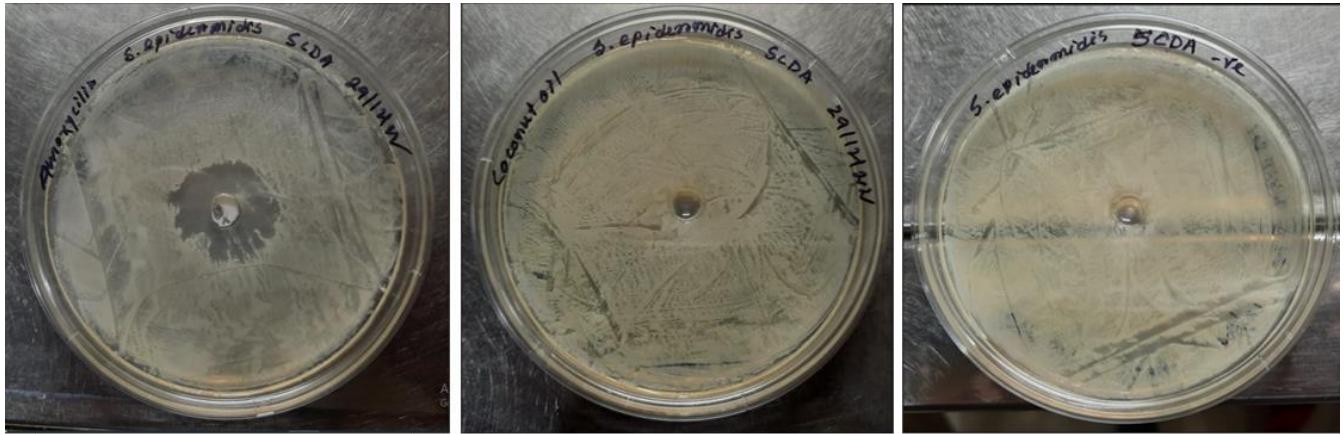
Growth Media used: SCDA			
Incubation condition: 37 °C			
Sl No.	Product under test	Diameter of zone (mm)	Inhibition Factor
01	Sample 1 (tested anti-dandruff oil)	12	0.5 X w.r.t. Positive Control; 1.2 X w.r.t. Market sample; 1.5 X w.r.t. Coconut oil
02	Himalaya anti-dandruff oil (Market sample)	10	0.4 X
03	Coconut oil	8	0.3 X
04	Blank	No zone	0 X
05	Amoxicillin as Positive control	25	Consider the zone inhibition as X



Sample 1



Market Sample



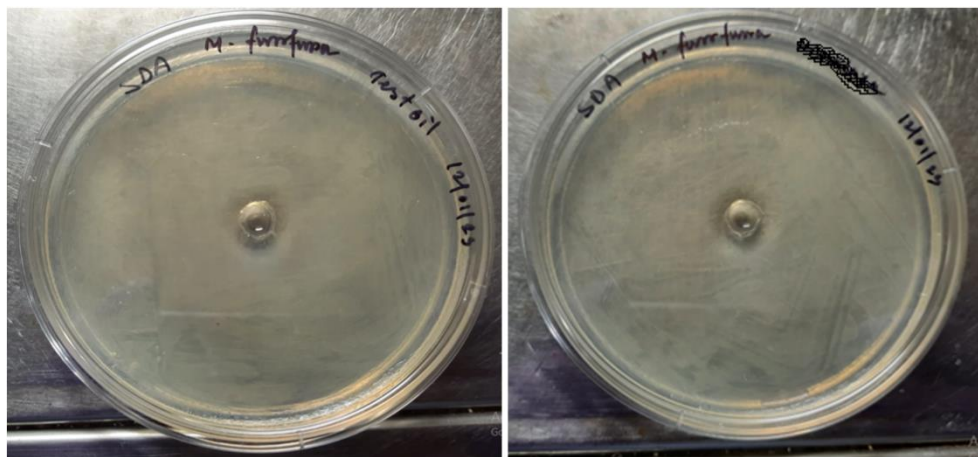
Anti-fungal antibiotic
(as Positive control)

Coconut oil

Blank

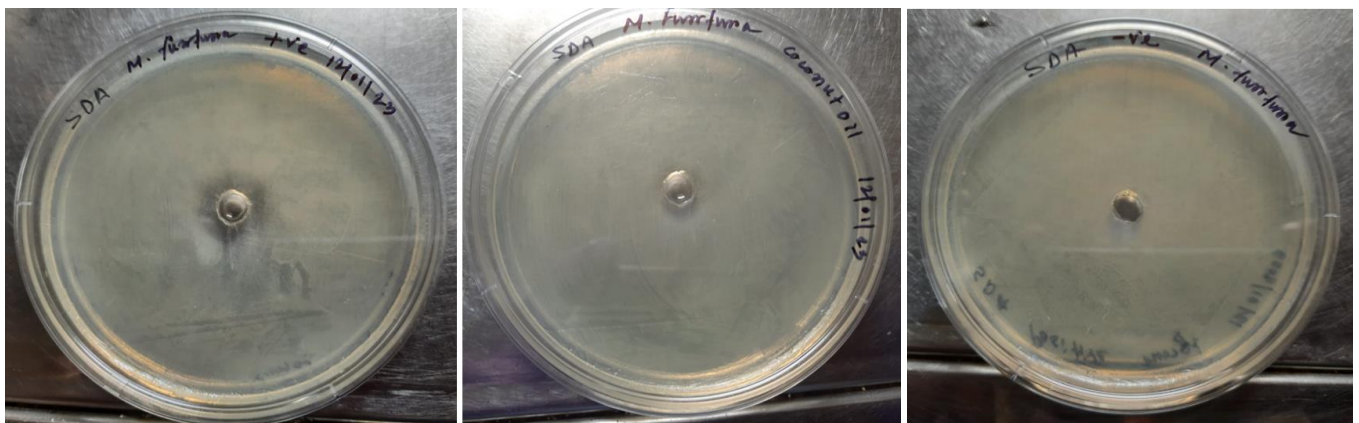
Table 2: Zone Inhibition against *Malassezia furfura*

Growth Media used: SDA			
Incubation condition: 25 °C			
Sl No.	Product under test	Diameter of zone (mm)	Inhibition Factor w.r.t. Positive Control
01	Sample 1 (tested anti-dandruff oil)	13	0.8 X w.r.t. Positive Control; 1 X w.r.t. Market sample; 1.2 X w.r.t Coconut oil
02	Market Sample	13	0.8 X
03	Coconut oil	11	0.65 X
04	Blank	No zone	0 X
05	Ketoconazole as Positive control	17	Consider the zone inhibition as X



Sample 1 (tested anti-dandruff oil)

Market sample



Positive control

Coconut oil

Blank

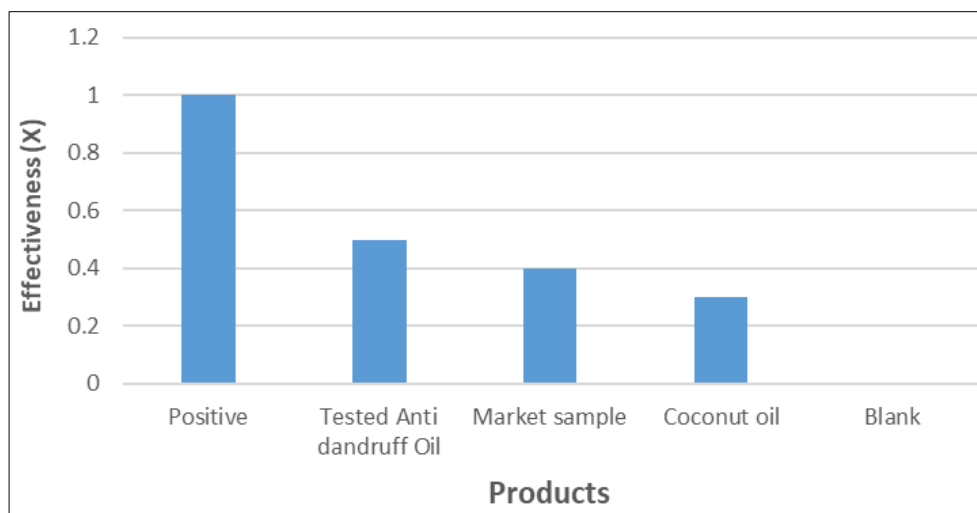


Fig 1: Effectiveness against *Staphylococcus epidermidis*

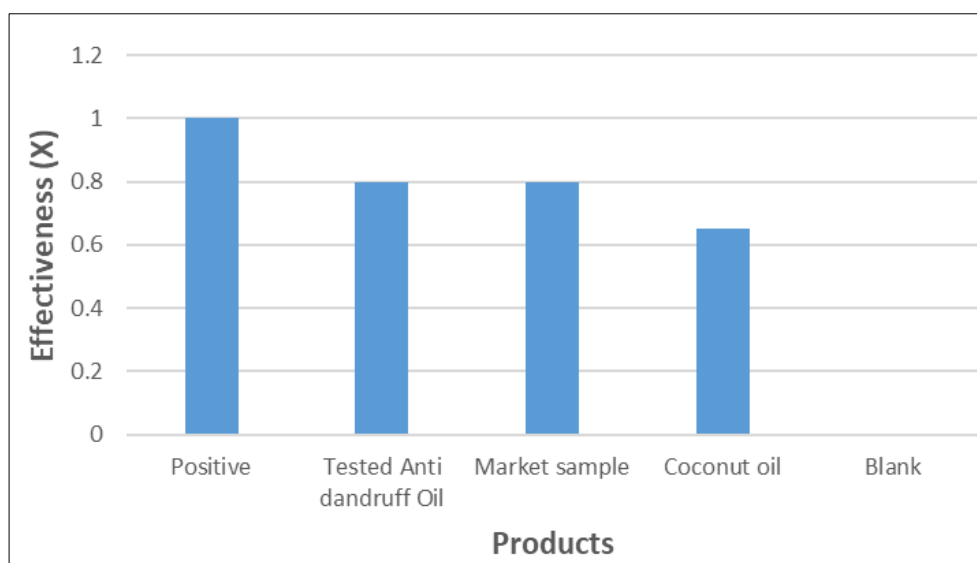


Fig 2: Effectiveness against *Malassezia furfura*

Conclusion

From the above study, it can be concluded that the tested anti-dandruff oil is exhibiting more or comparable antimicrobial effect against dandruff causing microorganisms such as *Staphylococcus epidermidis* and *Malassezia furfura* in comparison with the competitive anti-dandruff oil available in the market.

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