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Antifungal activity of plant extracts against dandruff causing organism *Malassezia furfur*

Mamatha Pingili*, Sridhar Vanga, Ramakrishna Raparla
Vaageswari institute of pharmaceutical sciences, Besides LMD Police Station, Ramakrishna Colony, Karimnagar, Telangana-505481, India.

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Abstract: In the present study, an attempt was made to know the activity of different plant extracts against the dandruff causing organism *Malassezia furfur*. Various parts of twelve different plants were collected and their crude as well as powered extracts were used for the activity studies. The evaluation was done using cup plate method. Sensitivity of the organism to marketed antidandruff shampoos was also studied. Of all the extracts, antifungal activity was shown by lemon, amla, shikakai, henna (decreasing order of activity). These results were compared with the antifungal activity of three branded shampoos. On comparison, it is inferred that plant extracts showed promising activity against *Malassezia furfur* when compared with the marketed antidandruff shampoos.

Key words: Antidandruff shampoo, Antifungal activity, Dandruff; *Malassezia furfur*

Introduction

Dandruff is a scalp disorder which is characterized by excessive shedding of skin cells from the scalp. It is a common problem faced by people of all age groups. Yeast like lipophilic basidiomyceteous fungus *Malassezia furfur* [*Pytirosporum ovale*] is the causative organism for dandruff [1]. Malassezia converts the sebum lipid into fatty acids and triglycerides, which accelerate hyperproliferation of keratinoytes[2]. The treatment options [ointments, lotions, shampoos] currently available for management of dandruff have zinc pyrithione, salicylic acid, imidazole derivatives, selenium sulphide, tar derivatives, ketocanazole etc. as key ingredients[3]. These synthetic treatment options have certain limitations, which may be due to poor efficacies or due to compliance issues[3]. These are unable to prevent reoccurrence of dandruff with side effects that cannot be neglected. The best approach to treat dandruff is to use plants and herbal formulations which possess antidandruff properties. Studies evaluating antifungal effect of essential oils have been reported [4,6]. Antifungal activity of different plant extracts against *Malassezia furfura* is carried out in this work.

Materials and Methods

15 different plant materials were collected from different areas of Karimnagar district, and their crude as well as powdered extracts were used to evaluate their antifungal activity. Their activity was compared with three branded antidandruff shampoos. The plant parts selected are included in table 1.

Table 1: List of plants and their parts used

S.No	Name of The Plant & Their Parts Used
1	*Aloe babadensis* sheath
2	*Aloe babadensis* gel
3	*Hibiscus rosasinesis* leaves
4	*Lawsonia inermis* leaves
5	*Snake guard* fruit
6	*Wrightia tintoria* leaves
7	*Eucalyptus globules*
8	*Azadirachta indica* leaves
9	*Alium sativum* bulb
10	*Alium sepa* bulb
11	*Citrus lemonis*
12	*Sapindus mukorossi* nuts
13	*Trigonella foenum graecum* seeds
14	*Emblica officinalis* fruit
15	*Acacia concinna*

Collection and maintenance of the culture

Pure culture of *Malassezia furfur* was obtained from IMTECH, Chandigarh, India. The culture was maintained in saborauds agar medium supplemented with 2% olive oil.

Preparation of plant extracts:

Preparation of powdered extracts: Shade dried powders of plant materials were taken in a beaker and boiled with sterile distilled water for 15 mins. Then the extract was filtered and centrifuged for 10 min. The supernatant was used to check the activity.

***Corresponding Author:**
Mamatha Pingili,
Associate Professor,
Department of Biotechnology,
Vaageswari Institute of Pharmaceutical Sciences,
Karimnagar, Telangana-505481, India.
E-mail: mamatharkrao@gmail.com

Preparation of crude extract: Collected plant material was washed with sterile distilled water and titurated individually by using motor and pestle. Then the extract was filtered, centrifuged and the supernatant was used for antidandruff activity.

Antifungal activity of plant extracts

The antifungal activity of different extracts on *Malassezia furfur* was investigated by cup plate method. The media was coated with a drop of olive oil and then the organism was spread uniformly over the agar surface. Wells were punched aseptically with cork borer round the margin of the plates equidistantly (3cm apart). In to each of these wells 50microlitres of extracted solutions were placed carefully. The plates were allowed to diffuse for 30 minutes and incubated at 37^0C for 48 hrs. After incubation zone of inhibitions were measured [7].

Results

The antifungal activity of the various crude and powdered plant extracts against *Malassezia furfur* are tabulated below.

Table 2: Antifungal activity of Crude extracts of various plant parts

S.No	Name of The Crude Extracts	Diameter in Cms
1	*Aloe babadensis* sheath	2
2	*Aloe babadensis* gel	2.4
3	*Hibiscus rosasinesis* leaves	-
4	*Lawsonia inermis* leaves	2.2
5	*Snake guard* fruit	-
6	*Wrightia tintoria* leaves	-
7	*Eucalyptus globules*	2
8	*Azadirachta indica* leaves	-
9	*Alium sativum* bulb	-
10	*Alium sepa* bulb	-
11	*Citrus lemonis* fruit	4.8
12	*Sapindus mukorossi* nuts	2.2
13	*Trigonella foenum graecum* seeds	2.1
14	*Emblica officinalis* fruit	3.4
15	*Acacia concinna*	2.1

Table 3: Antifungal activity of Powdered extracts of various plant parts

S.No	Name of The Powered Extracts	Diameter in Cms
1	*Aloe babadensis* sheath	-
2	*Aloe babadensis* gel	1.3
3	*Hibiscus rosasinesis* leaves	-
4	*Lawsonia inermis* leaves	2.4
5	*Snake guard* fruit	2.2
6	*Wrightia tintoria* leaves	-
7	*Eucalyptus globules* leaves	-
8	*Azadirachta indica* leaves	-
9	*Alium sativum* bulb	-
10	*Alium sepa* bulb	-
11	*Citrus lemonis* fruit	4
12	*Sapindus mukorossi* nuts	-
13	*Trigonella foenum graecum* seeds	2
14	*Emblica officinalis* fruit	3
15	*Acacia concinna*	

Table 4: Antifungal activity of Combined plant extracts

S.No.	Combinations of Crude Extracts	Zone of Inhibition (Cm)
1.	*Citrus lemonis+Lawsonia inermis*	4.5
2.	*Citrus lemonis+Emblica officinalis*	4.5
3.	*Lawsonia inermis+Emblica officinalis*	3.5
4.	*Acacia concinna+Citrus lemonis*	3.5
5.	*Acacia concinna+Emblica officinalis*	3.5
6.	*Acacia concinna+Lawsonia inermis*	3.2

Table 5: Antifungal activity of Branded Shampoos

Sl.No.	Name of The Brands	Diameter In (1-Well) Cms
1	Brand-a	3
2	Brand-b	4
3	Brand-c	5

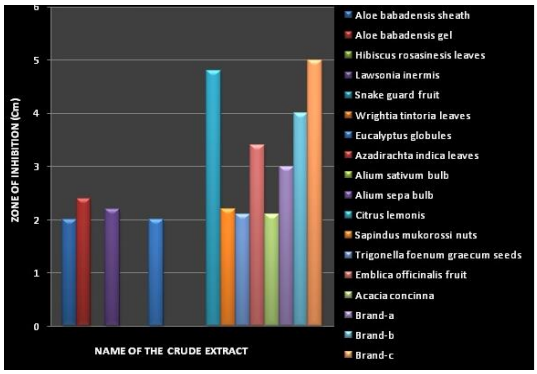

Figure 1: Anti malassezia activity of Crude extracts of various plant parts

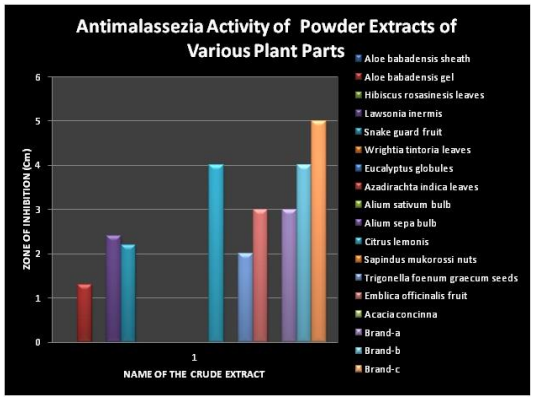

Figure 2: Antimalassezia activity of Powdered extracts of various plant parts

Discussion

Crude herbal drugs have been included in traditional medicine and household remedies for a long time. Not all herbal preparations have been scientifically tested. Many studies are reported on the antifungal activity of plant essential oils against dandruff causing fungi *malassezia furfur*[4,6]. There are measgre studies on the effect of plant extracts on these fungi. In an attempt to determine the benefits of various herbal extracts, effect of different plant extracts against *Malassezia furfur*, an yeast associated with dandruff were evaluated. The most common cause of dandruff is probably the fungus *Malassezia furfur*. The Plants were selected based up on their usage as traditional medicine for

treating dandruff. Both crude and powdered extracts were prepared and tested against *Malassezia furfur* by cup plate method and zone of inhibitions were measured.

Out of the selected plant parts, lemon juice & lemon peel powder showed maximum activity. Next to lemon extracts a good activity was observed with Amla, shikakai, henna, aloevera, fenugreek, & reetha extracts. Lemon, amla, shikakai & henna had good antifungal activity as compared to other plant extracts. Six different combinations from these four extracts were made and checked for their synergistic activity against *Malassezia furfur*. Lemon juice & henna extract and lemon & amla combinations showed best activity as compared to other combinations.

Antidandruff activities of three different branded antidandruff shampoos were also studied and their zone of inhibitions noted. These results were considered as standard reference and compared the results of the extracts with that of the shampoos. On comparison one can say that the plant extracts showed a considerable activity against dandruff causing organism *Malassezia furfur* and can be used to treat dandruff which cause no side effects.

Conclusion

Plant extracts showed good activity against dandruff causing organism *Malassezia furfur*. From the results, we conclude that plant extracts have antifungal activity and could be safely used for treating dandruff. Further studies can be made on the active molecules of plant extracts responsible for antidandruff activity. Toxicity evaluation of these extracts can also be carried out. Synthetic drugs are unable to prevent recurrence [2]. Recurrence of dandruff up on usage of these plant extracts can also be explored.

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