

## IN VITRO STUDY OF AYURVEDIC CONDITIONER W.S.R. TO ANTIDANDRUFF ACTIVITY

Jain Vatsala<sup>1</sup>, Rao K. Shankar<sup>2</sup>

<sup>1</sup>Assistant Professor, Dept. of *Rasa Shastra & Bhaishajya Kalpana*, Prabuddh Ayurvedic Medical College Hospital and Research Centre, Lucknow, Uttar Pradesh, India

<sup>2</sup>Professor and HOD Department of *Rasshastra and Bhaishajya Kalpana*, National Institute of Ayurveda., Jaipur, Rajasthan, India

Corresponding Author: [drvatsalajain@gmail.com](mailto:drvatsalajain@gmail.com)

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## ABSTRACT

**Objective:** Dandruff is the unusually high shedding of dead skin cells from the scalp. It is a common scalp disorder affecting almost half of the post pubertal population. In the market many treatment options are available but herbal preparation is the best option to treat dandruff. Thus, in the present research work *Ayurvedic* conditioner prepared with plant extract (decoction) was studied to evaluate antidandruff activity against *Staphylococcus aureus* & *Candida albicans*. **Method** In vitro study was conducted to evaluate the antidandruff effect of *Ayurvedic* conditioner against *S. aureus* & *C. albicans*. The evaluation done by adopting Kirby-Bauer Agar Well diffusion method. Antibacterial activity was compared with the standard references. **Result** Study revealed that *Ayurvedic* conditioner was susceptible for the same microbes in less concentration. **Conclusion** *Ayurvedic* conditioner was found to be the most effective formulation against dandruff causing factors; *s.aureus* and *c.albicans*.

**Keywords:** Antidandruff, Ayurvedic conditioner, *C.albicans*, *S. aureus*.

## INTRODUCTION

Dandruff is the unusually high shedding of dead skin cells from the scalp.<sup>1</sup> Dandruff starts at puberty, reaches peak incidence and severity at the age of about 20 years, and becomes less prevalent among people over 50. Dandruff is a common scalp disorder affecting almost half of the post pubertal population regardless of ethnicity and gender and has several putative causes including non-microbial and microbial factors.<sup>2</sup> Microbial factors responsible for the pathogenesis of dandruff are *Malassezia* species, *Staphylococcus aureus*, *Candida albicans* may play a role.<sup>3,4</sup> 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.<sup>5</sup> These synthetic treatment options have certain limitations, which may be due to poor efficacies or due to compliance issues.<sup>6</sup> These are not capable to prevent reoccurrence of dandruff without side effects that cannot be neglected. The best approach to treat dandruff is to use plants and herbal formulations which possess antidandruff properties.<sup>7,8</sup> Thus in the present research work Ayurvedic conditioner was prepared with plant extract (decoction) and studied to evaluate antidandruff activity against *Staphylococcus aureus* & *Candida albicans*. Plant materials *Nagakeshar*, *Musta*, *Ushira*, *Hareetaki* selected from *Kamaratnama*.<sup>9</sup> Other supporting ingredients like *Aloevera*, Cucumber, Olive oil selected due to their proved conditioning and antidandruff properties to increase the potency of formulation.

### Material & Methods

#### Plant materials & Base ingredients collection

The plant material *Nagakeshar*, *Musta*, *Hareetaki* and *Ushir* were procured in the dry form, from the pharmacy of National Institute of Ayurveda, Jaipur. Fresh *Aloevera* phylloids were collected from herbal garden of National Institute of Ayurveda, Jaipur. Fresh Cucumber fruits and olive oil were collected from local market. Base ingredients were collected from the Drug testing Laboratory (DTL) of *Rasa*

*Shastra* & *Bhaishajya Kalpana* Department, NIA, Jaipur.

#### Preparation of Ayurvedic Conditioner

For the preparation of *Ayurvedic* Conditioner, *Kwatha* was prepared by cleaned and coarse powder of *Nagkesara*, *Musta*, *Hareetaki* and *Ushira* (each 187.5g.) by adding 16 times of water & reduced to 1/4<sup>th</sup> part and filtered through the double layered cloth. During the preparation of *Ayurvedic* Conditioner Phase I & II were prepared then mixed both phases. In the preparation of Phase I prepared *Kwatha* 60%, prepared *Aloevera* juice 3%, prepared Cucumber juice 2%, SLES 5%, Glycerine 2% and PG 2% were added gradually in Water Phase at maintained temperature of 75°C – 85°C until they get mixed properly. In the preparation of Phase II Silicone 4.5%, olive oil 2%, cetyl alcohol 2%, cetosteryl alcohol 3.5%, IPM 1.5% , LLP 2%, and Emulsifying wax 2% added one by one in a wide mouthed glass beaker and was heated to maintain temperature at 75°C – 85°C with continuous stirrer until they get mixed properly. Then oil phase was mixed in water phase at reducing temperature (80°C - 50°C) with continuous slow stirring, using electrical stirrer until it becomes lukewarm and thick. After cooling dimethicone 2% added in it and mixed well by stirrer. Then Fragrance was added in it and mixed well.

#### Antimicrobial study

Anti microbial study was done by 2 samples of *Ayurvedic* conditioner against 2 selected microbes. One was bacteria *Staphylococcus aureus* and one was fungi *Candida albicans*. The anti microbial study was done at SR labs, Jaipur. In Antimicrobial susceptibility test (adopting Kirby-Bauer Agar Well diffusion method), samples *Ayurvedic* Conditioner were tested against one bacteria *Staphylococcus aureus* and one fungus *Candida alibicans*. Antibacterial activity was compared with as the standard reference of Gentamycin Sulphate (5µg/ml) and Antifungal activity was compared with as the standard reference of Ketoconazole which is used as for control. Antibacterial and antifungal activity tests were carried out at SR labs, Jaipur.

**Table 1:** Showing bacterial strain with their MTCC No

S. No.	Microbes	Species	MTCC No.	Diseases
1.	Gram positive	Staphylococcus aureus	737	Superficial infections.
5.	Fungi	Candida albicans	227	Affects mucous membrane, skin and nails.

**Microorganisms used:** The organisms used were one bacteria *Staphylococcus aureus* and one fungus *Candida albicans*. (Table 1)

**Antimicrobial Activity<sup>10</sup>** Agar- Well Diffusion Method: The antimicrobials present in the plant extract are allowed to diffuse out into the medium and interact in a plate freshly seeded with the test organisms. The resulting zones of inhibition will be uniformly circular as there will be a confluent lawn of growth. The diameter of zone of inhibition can be measured in millimetres.

**Procedure**

In vitro antibacterial activity of formulations was carried out by using the Kirby-Bauer Agar Well diffusion method. This classic method yields a zone of inhibition in mm result for the amount of antibacterial that is needed to inhibit growth of specific microorganisms. Sample prepared as each purified formulation (2 & 10 %) were dissolved in DMSO. For the determination of zone of inhibition (ZOI),

bacterial strain was taken and as a standard antibiotic and control DMSO for comparison of the results. The dilution (2 & 10 %) of formulation in DMSO and Gentamycin (5µg/ml) as antibacterial and Ketoconazole (1 %) as antifungal positive as positive reference standards /antibiotics were prepared in double distilled water. Muller Hinton agar plates for bacteria were seeded with liquid culture of bacterial strains and allowed to stay at 37°C for 24 hours. The zones of growth inhibition around the wells were measured after 18 to 24 hours of incubation at 37°C for bacterial. The sensitivity of the microorganism species to formulation were determined by measuring the sizes of inhibitory zones (including the diameter of well) on the agar surface with comparison to the standard antibiotic zones.

Diameter of Well- 8 mm, Vol. applied in each well- 100 µl. (Figure 1 & 2)

**Result:** Result depicted in Table 2.

**Table 2:** Showing Antimicrobial Sensitivity

Sr. No.	Strains	Ayurvedic Conditioner (AC)		
		Std.	2%	10%
1.	S. aureus, ZOI in mm	22*	13	15
2.	C. albicans, ZOI in mm	40*	14	19
Control is DMSO Blank for all study				
ZOI is Zone of Inhibition				



**Figure 1:** Inhibition of c. albicans at 2% & 10% Solution of the AC Figure 2: Inhibition of s.aureous at 2% & 10% Solution of the AC

## Activity index

### Zone of Inhibition by sample / Zone of Inhibition by standard

Antimicrobial susceptibility may be interpreted through the results of Activity index. Activity index of Ayurvedic Conditioner for *Staphylococcus aureus* was 0.59, 0.68 in 2%, 10% solution respectively and for *Candida albicans* was 0.35, 0.47 in 2%, 10% solution respectively.

## DISCUSSION

There are so many studies available on the effect of plant extracts on these microbes. But here an attempt has been made to evaluate the antidandruff effect of formulation against *Staphylococcus aureus* & *Candida albicans*. When comparison done with standard it can be said that Ayurvedic Conditioner was susceptible for *Staphylococcus aureus* in 2% and strongly susceptible in 10% solution. It was also susceptible for *Candida albicans* in 10% and 2% solution. Study revealed that Ayurvedic conditioner was susceptible for the same microbes in less concentration. But conditioner applied directly on wet hair shaft without addition of water or any agent. Thus, when the present formulation will be applied on wet hair, it will act strongly against microbes and will show considerable activity against dandruff.

## CONCLUSION

Ayurvedic conditioner was found to be the most effective formulation against dandruff causing factors *s.aureus* and *c.albicans* with conditioning properties.

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