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EVALUATION OF ANTIBACTERIAL AND ANTIFUNGAL ACTIVITIES OF MARKETED ANTI-DANDRUFF SHAMPOOS

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ARTICLE INFO	ABSTRACT
Article history Received 30/09/2013 Available online 30/10/2013 Keywords Anti-dandruff shampoos, Cup plate method, Antibacterial activity, Antifungal activity	The aim of the study was to investigate <i>in vitro</i> antibacterial and antifungal activities of anti-dandruff shampoos by cup plate (well diffusion) method against seven bacterial and two fungal pathogenic cultures. Two different concentrations were used to screen the antibacterial and antifungal activities of shampoos. Results showed that anti-dandruff shampoos have remarkable antibacterial and antifungal activities due to synergistic action of its ingredients such as zinc pyrithione, ketoconazole and selenium sulfide.

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INTRODUCTION

Despite remarkable progress in human medicines, infectious diseases caused by bacteria, fungi, viruses and parasites are still a major cause of morbidity and mortality particularly in developing countries [1]. Shampoo is a hair care product used for the removal of oils, dirt, dead skin particles, dandruff, environmental pollutants and other contaminant particles that gradually build up in hair [2]. Shampoos are generally composed of cleansing agents (surfactants), conditioning agents, special care ingredients and additives [3]. Anti dandruff shampoos may contain active substances like Zinc Pyrithione, Ketoconazole and Selenium Sulfide which are responsible for antibacterial and antifungal activities. In addition to the type and concentration of active ingredients, the efficacy of a shampoo is also influenced by the formulation [4-7]. The present work deals with the comparative evaluation of the antibacterial and antifungal activities of marketed shampoo preparations.

MATERIAL AND METHODS

The shampoos with antidandruff activity available in the market were screened and five well known brands were selected and procured from retail pharmacy.

Preparation of Test solution

0.5 ml and 1 ml from each shampoo was diluted to 100 ml using sterile distilled water in sterile area. These dilutions of antidandruff shampoo were subjected to antibacterial and antifungal screening.

Test Organisms

The bacterial cultures such as *Bacillus subtilis*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Escherichia coli*, *Salmonella typhi*; fungal cultures such as *Aspergillus niger* and *Candida albicans* were procured from National Chemical Laboratory, Pune- 411 008 and Department of Microbiology, Karmaveer Bhaurao Patil College, Vashi, Navi Mumbai- 400 703. Using Morphology and staining technique the microbial cultures were characterized and used in the screening.

Culture media

The media used for antibacterial and antifungal testing was nutrient agar and sabouraud's chloramphenicol agar, respectively of HiMedia Pvt. Ltd., Mumbai – 400 086.

Inoculum preparation

Bacterial and fungal cultures were maintained on slants of nutrient agar and sabouraud's chloramphenicol agar, respectively, in refrigerator. The cultures were prepared by inoculating loopful of suspension from 24 to 48 hours old slant to nutrient broth (for bacteria) and sabouraud's chloramphenicol broth (for fungi) and incubated at 37°C for 24 hours.

Particular volume of enriched broth was diluted with sterile saline such that turbidity of resulting suspension of organism matches with 0.5 Mcfarland Standard which corresponds to 1.5×10^8 CFU per ml[8].

Antimicrobial sensitivity test (AST)

Antibacterial sensitivity test was conducted against standard antibiotic such as chloramphenicol 1000 µg/ml and antifungal sensitivity test was carried out using standard antifungal agent miconazol 1000 µg/ml. Stock solution of standards were prepared in sterile water.

Antibacterial and antifungal screening

Shampoos were tested for antibacterial and antifungal activities by the cup plate method using 7 bacterial cultures.[9] 20 ml of sterile molten nutrient agar was poured in presterilized petri plate and was allowed to solidify. 0.1 ml of bacterial/fungal suspension spread on plate, uniformly, using glass spreader or glass slide. After solidification the wells/cups were bored in agar plates over layered with test organism, using sterile cork borer in order to make 4 wells (10 mm diameter) at a spaced out position in petri plate. All the wells were filled with 0.1 ml of each dilution of shampoo, 0.1 ml of standard and 0.1 ml of sterile water as solvent control using micropipette with sterile tips. These agar plates were set aside at room temperature for 15 to 30 minutes for diffusion and then incubated at 37°C for 24 hours. After incubation diameter of zone of inhibition was measured in mm. Diameter of borer was subtracted from each reading and mean value of three readings was recorded [9,10].

RESULTS AND DISCUSSION

Table 1: Antibacterial and antifungal activities of antidandruff shampoos

Sr. no.	Name of organism	0.5 Mcclafarnand Standard	Zone of Inhibition (mm)														
			Shampoo 1			Shampoo 2			Shampoo 3			Shampoo 4			Shampoo 5		
			Std	0.5	1	Std	0.5	1	Std	0.5	1	Std	0.5	1	Std	0.5	1
1	<i>Pseudomonas aeruginosa</i>	1.5 ml	24	8	14	25	10	13	21	12	13	19	-	-	21	-	-
2	<i>Bacillus subtilis</i>	1.0 ml	27	9	17	29	10	14	24	10	17	16	10	11	24	9	15
3	<i>Proteus vulgaris</i>	1.0 ml	16	-	-	17	-	-	17	-	-	12	6	9	14	-	-
4	<i>Klebsiella pneumoniae</i>	1 ml	20	8	17	24	7	12	24	9	10	20	6	10	21	-	-
5	<i>Escherichia coli</i>	0.5 ml	24	6	9	24	7	10	24	8	10	20	5	6	20	-	-
6	<i>Staphylococcus aureus</i>	1.0 ml	24	7	14	24	8	11	24	8	11	15	6	7	15	7	11
7	<i>Salmonella typhi</i>	1.0 ml	19	5	7	19	-	-	19	-	-	14	-	4	22	-	-
8	<i>Aspergillus niger</i>	-	-	13	19	-	1	10	-	14	22	-	-	-	-	5	10
9	<i>Candida albicans</i>	-	6	15	18	5	18	28	5	27	32	5	18	20	-	24	30

The values are mean of three results.

(-): Not applicable

Diameter of borer (10 mm) is subtracted from readings.

All the shampoos were tested for antibacterial and antifungal activities in terms of zone of inhibition. From table 1 it is clear that all the marketed antidandruff shampoos which are used to treat scalp, itching and irritation have significant inhibitory activities against bacteria and fungi. Direct comparative studies have been done to compare results with different brands of shampoos. It is observed that all the shampoos have nearly equal efficacy.

CONCLUSION

It is concluded that excellent action of antidandruff shampoos is due to synergistic effect of its ingredients such as zinc pyrithione, ketoconazole and selenium sulfide. Since these shampoos have substantivity for the human scalp, they may be useful as adjunctive therapy to drugs which are used in the treatment of scalp infections.

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