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Antifungal Activity of Mineral Group of Homoeopathic Medicines - An Experimental Study

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ABSTRACT

Dermatophytosis is the commonest superficial skin infection caused by the human pathogenetic dermatophytes namely, *Trichophyton rubrum*, causing tinea corporis, tinea pedis and onychomycosis and *Malassezia furfur* causing pityriasis versicolor, *Malassezia folliculitis* and seborrheic dermatitis with a prevalence of 20-25% globally. This in-vitro study was undertaken to determine the antifungal activity of homoeopathic medicines, Kali sulphuricum, Natrum muriaticum, Sanicula aqua and Tellurium metallic in 30 CH potencies against the dermatophytes, *Trichophyton rubrum* and *Malassezia furfur* using Disc diffusion method or Kirby-Bauer testing method. On completion of this study, it was inferred that Kali sulphuricum 30 CH showed antifungal activity equal to Econazole and ethanol and greater than other homoeopathic medicines. Thus, the antifungal property of the homoeopathic medicines was scientifically witnessed. Further in vitro studies focusing on gene expression analysis is put forwarded in the scientific community for more scientific evidences on related topic.

Keywords: Dermatophytosis, Kali sulphuricum, *Malassezia furfur*, Natrum muriaticum, Sanicula aqua, Tellurium metallicum and *Trichophyton rubrum*

Introduction

Dermatophytes are highly specialized filamentous fungi which cause the majority of superficial mycoses in humans and animals¹. Among the human pathogenic dermatophytes, the most clinically observed are *Trichophyton rubrum* and *Malassezia furfur*². *Trichophyton rubrum* primarily causes tinea corporis, tinea pedis and onychomycosis^{3,4}. *Malassezia furfur* is associated with pityriasis versicolor, *Malassezia folliculitis* and seborrheic dermatitis^{5,6}. The patients suffering from superficial fungal skin infections present with severe itching,

scratching, scaly or patchy eruptions and significant redness or blackish discoloration of skin. With the increasing severity of the disease, the mental state of the patients gets affected⁷. This in-vitro was conducted to establish the antifungal activity of the homoeopathic medicines, Kali sulphuricum, Natrum muriaticum, Sanicula aqua and Tellurium metallicum in 30 CH potencies against *Trichophyton rubrum* and *Malassezia furfur* using Disc diffusion method or Kirby- Bauer testing method.

Materials and Methods

Dilutions of Kali sulphuricum, Natrum muriaticum,

Sanicula aqua and Tellurium metallicum in 30 CH potencies were procured from a renowned homoeopathic pharmacy. Pure cultures of *Trichophyton rubrum* (MTCC 7859) and *Malassezia furfur* (MTCC 1374) were collected from Microbial Type Culture and Gene Bank, Chandigarh. The culture medium was purchased from high media and sensitivity discs of 6 mm diameter of Whatman Filter Paper no.1 were used. The study was conducted at Microbiology lab, Research Facilitation Centre, Sarada Krishna Homoeopathic Medical College Research Lab, Kulasekharam, Kanyakumari. Disc diffusion method or Kirby-Bauer testing method was used for conducting the study or obtaining data.

Methodology of antifungal assay - Kirby-Bauer method

Trichophyton rubrum and *Malassezia furfur* were purchased as slants. The cultures obtained were suspended in 100 ml of Sabouraud Dextrose Agar broth and incubated in a shaking incubator at 25°C for 72 hours. In Mueller Hinton agar (MHA) plates, the inoculum was swabbed evenly in an aseptic environment. Then, Kali sulphuricum 30 CH was suspended in a 6 mm plain disc and carefully placed in the MHA plates without disturbing the fungal lawn. The same technique was repeated for other medicines and were repeated in duplicates. The plates were incubated in an upright position at 25°C for 72 hours to observe the zones of inhibition (Figure 1). The zones of inhibition in the plates with different medicines were compared with that of positive and negative control (Figure 2). If the medicine had antifungal activity, the fungus growth would have been inhibited in that plate⁸.

Results



Figure 1: Zone of Inhibition against *T. rubrum*.



Figure 2: Zone of Inhibition against *M. furfur*.

Antifungal activity of selected samples against Trichophyton rubrum

As shown in Figure 1, (Table 1 and Figure 3), the maximum zone of inhibition was shown by Ethanol. Kali sulphuricum 30 CH and Natrum muriaticum 30 CH had equal measurements

of zone of inhibition in comparison with Econazole and less than Ethanol. Thus, it could be inferred that the homoeopathic medicines taken for study have significant antifungal effect against *T. rubrum*.

Table 1: Measurement values of Zone of Inhibition against *T. rubrum*.

Sl. No.	Sample codes	Samples	Zone of Inhibition
1.	GG 1	Positive control (Econazole)	5 mm
2.	GG 2	Negative control (Ethanol)	7 mm
3.	GG 3	Kali sulphuricum 30 CH	5 mm
4.	GG 4	Natrum muriaticum 30 CH	5 mm
5.	GG 5	Sanicula aqua 30 CH	4 mm
6.	GG 6	Tellurium metallicum 30 CH	4 mm

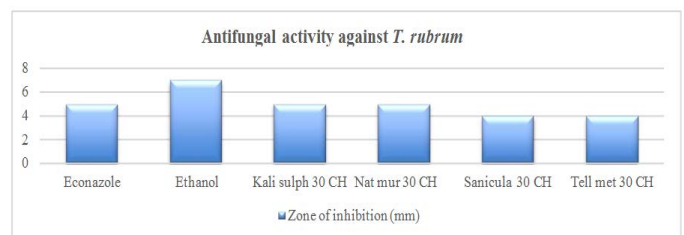


Figure 3: Comparison of values of Zone of inhibition of all the samples against *T. rubrum*.

Antifungal activity of selected samples against Malassezia furfur

As shown in Figure 2, (Table 2 and Figure 4), the maximum zone of inhibition was shown by Ethanol and Kali sulphuricum 30 CH in comparison with other samples and all medicines showed either equal or larger zone of inhibition than Econazole. Thus, it could be inferred that the homoeopathic medicines taken for study have mild antifungal effect against *M. furfur*.

Table 2: Measurement values of Zone of Inhibition against *M. furfur*.

Sl. No.	Sample codes	Samples	Zone of Inhibition
1.	GG 1	Positive control (Econazole)	1 mm
2.	GG 2	Negative control (Ethanol)	3 mm
3.	GG 3	Kali sulphuricum 30 CH	3 mm
4.	GG 4	Natrum muriaticum 30 CH	1 mm
5.	GG 5	Sanicula aqua 30 CH	2 mm
6.	GG 6	Tellurium metallicum 30 CH	1 mm

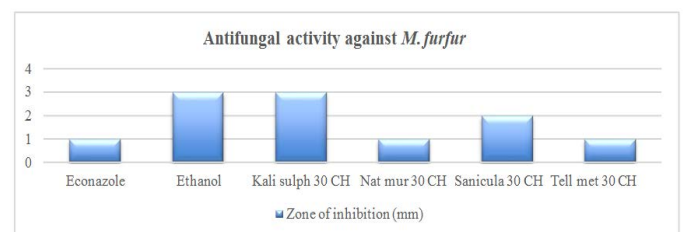


Figure 4: Comparison of values of Zone of inhibition of all the samples against *M. furfur*.

Discussion

In an in – vitro study, the *Valeriana officinalis* mother tincture had antifungal activity against *T. rubrum* in comparison with *Valeriana* herbal extract⁹. In another in-vitro study, *Acidum*

sulphuricum, Acidum benzoicum, Azadirachta indica, Cinchona officinalis, Iodum, Phosphorus, Selenium, Sulphur, Zincum metallicum and Zingiber officinale in various potencies showed good values of zone of inhibition on *Pityrosporum ovale*¹⁰. In this study, based on zones of inhibition formed, it was evident that Kali sulphuricum, Natrum muriaticum, Sanicula aqua and Tellurium metallicum in 30 CH potency have moderate action against *Trichophyton rubrum* and mild action against *Malassezia furfur*.

Conclusion

From this study, it could be inferred that Kali sulphuricum 30 CH has antifungal activity equal to the Econazole and ethanol and greater than other chosen homeopathic medicines. Thus, the antifungal property of the homeopathic medicines was scientifically witnessed.

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