

# Mycotic Skin Infections: Study of Clinico-Etiological Pattern and Socio-Economic Profile in Garhwal Region of Uttarakhand.

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## ABSTRACT

**Background:** The prevalence of cutaneous mycoses has been increasing with constantly changing pattern. The likelihood of fungal infections in the population of Garhwal region might be increased due to their poor personal hygiene, agriculture work and close contact with soil and animals. **Aim:** To find out the prevalence of various mycotic skin infections in Garhwal region of Uttarakhand and compare and correlate it with site, gender, age group, occupation, socio economic status and health status of residents of Garhwal region of Uttarakhand. **Methods:** The patients with superficial fungal infection reported were studied in relation to name, age, address, occupation, socio - economic status and sites involved. Skin scrapings were collected in a sterile black paper and divided into two parts. Part I was used for KOH mount and Part II was used for culture. Cultures were read after 5 days of incubation for colony morphology and pigment production and every five days till 4 weeks. Fungi were identified on the basis of their colony morphology, pigmentation, microscopic characteristics and biochemical tests. **Results:** Out of total 136 patients, 98(72.05%) had fungal infection. Maximum patients were in the age group of 20 – 50 years (60.20%). Farmers, dairy and poultry workers (36.73%) were most affected. Affected patients were mostly from low and very low socioeconomic status (59.1%). Among Dermatophytes (69.82%), *T. mentagrophyte* and *T. rubrum* were most common. **Conclusion:** Dermatophytes are most common cause of mycotic skin infection.

**Keywords:** Dermatophyte, Mycotic skin infection, Culture, Morphology.

## INTRODUCTION

Cutaneous mycosis is one of the most common infectious diseases worldwide and affects around 20 – 25% of world's population and the prevalence of cutaneous mycoses is still increasing with constantly changing pattern.<sup>[1-3]</sup> Dermatophytes, yeasts and non dermatophytic molds can involve skin, hair and nails and are important microorganisms of soil. The infection is generally restricted to non – living cornified layers of skin. Various clinical manifestations are seen varying from mere pruritis to favus. In majority of cases however the infection presents as scaly lesion, spots or blisters. Apart from temperature, humidity, rainfall, environmental light, climate, chemical composition and pH; other factors like human and/or animal presence in the vicinity are also of importance in amount and diversity of fungal flora growing there.<sup>[4-8]</sup> In Garhwal region of Uttarakhand alpine conditions predominate with mild summers, humid monsoon and cold winters but the city of Srinagar being a valley has warm summers and humid monsoons. The major part of population is engaged in agriculture, livestock rearing and manual labour and is in close contact with soil and animals. Less frequent bathing, poor

personal hygiene and poor environmental sanitation increases the risk of contracting fungal infection.<sup>[9,10]</sup> Though the infections are not serious in terms of mortality but lesions are not self - curative and may harbour secondary bacterial infections. Disfigurement caused due to infection affects the self – esteem of patient and decreases the quality of life. The infected individual acts as reservoir of disease and can transfer it by direct or indirect contact.<sup>[11]</sup> Veer Chander Singh Garhwali Government Medical Science and Research Institute, Srikot, Srinagar is one of the referral centers for Garhwal region. There are seven districts under Garhwal division: Dehradun, Uttarkashi, Haridwar, Chamoli, Pauri, Tehri and Rudraprayag. VCSGMS&RI, Srinagar is closest referral center from Chamoli, Tehri, Rudraprayag and Pauri districts. This study was undertaken to study the prevalence and pattern of fungal skin infections in Garhwal region of Uttarakhand.

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## MATERIALS AND METHODS

This study was carried out in department of Microbiology, Veer Chander Singh Garhwali (VCSG) Government Medical Science and Research Institute, Srinagar, Garhwal. A total of 136 clinically diagnosed randomly selected cases of superficial fungal infection of all age groups and both sexes coming to out – patient departments of VCSG Government Medical Science and Research Institute were studied. History was taken in relation to name, age, address, occupation, socio - economic status and sites involved. Patients under antifungal treatment were excluded from the study group. The affected area was cleansed with 70% ethyl alcohol and skin scraping was taken from inflamed border of active lesion using surgical blade (No. 23). Skin scrapings were collected in a sterile black paper and divided into two parts. First Part was used for KOH mount and second Part was used for culture. 10% KOH was used for skin scrapings, 20% for scrapings from palm and sole and 40% for nail clippings. Cultures were done on Sabouraud's Dextrose agar and Sabouraud's Dextrose agar with chloramphenicol and cyclohexidine and were incubated at 28°C. Cultures were read after every five days of incubation for colony morphology and pigment production till 4 weeks. If no growth was seen after 4 weeks culture was regarded negative. Lactophenol cotton blue mount was made by teasing a small part of colony on slide to study microscopic morphology. Fungi were identified on the basis of colony morphology, pigmentation, microscopic characteristics and biochemical tests (Urease test).

**RESULTS**

A total of 136 patients with clinical suspicion of fungal infection were included in the study. 163 samples were collected from different sites. Out of total 163 samples 150 (92.02%) samples were found positive either by direct microscopy and/or culture [Figure 1]. Ninety one (55.828%) samples were positive by both culture and microscopy whereas twelve (7.36%) were positive by microscopy but negative by culture and forty seven (28.83%) samples were found positive by culture but negative by microscopy [Figure 2].



Figure 1: Culture showing Trichophyton rubrum.

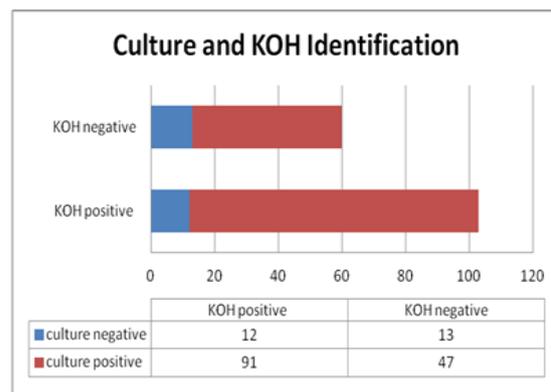


Figure 2: Culture and KOH Identification

Twenty two out of 138 (15.94%) culture positive samples were found bacterial contaminants. Out of these 22 samples, ten (7.24%) samples were negative by microscopy while 12 (8.69%) were observed both microscopy and culture positive. Thirteen (7.97%) samples were negative by both microscopy and culture. Fungi were isolated from 116 samples (71.16%) out of total 163 samples [Figure 2].

Out of total 136 suspected patients, 98 (72.05%) had fungal infection at one or more sites. Fungi were isolated from more than one site in 13 patients whereas two different fungi were isolated from six patients. Male: Female ratio of patients suffering from fungal infection was 3.3:1. Maximum of patients with fungal infection were in the age group of 20 – 50 years (60.20%) [Figure 3].

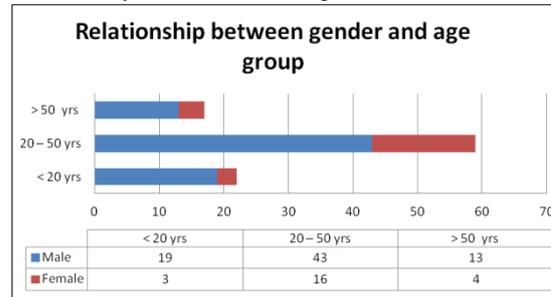


Figure 3: Relationship between gender and age group of infected patients.

Maximum number of patients with fungal infection were farmers, dairy or poultry workers (36.734%) followed by students (28.571%). [Figure 4].

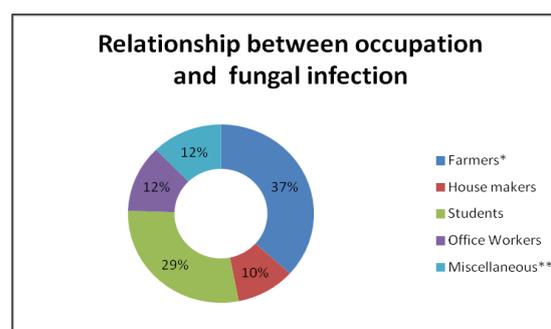


Figure 4: Relationship between occupation and infected patients

Most common site involved was Groin, Buttock and Thigh in 35 (30.17%) cases followed by nails in 24 (20.69%) cases. 18 (81.81%) out of 22 bacterial contaminants grew in samples from groin, Thigh and Buttock region [Table 1] [Figure 5 & 6].



Figure 5: Fungal lesion on nail.



Figure 6: Fungal lesion on neck.

Table 1: Sites involved: Fungus and Bacterial contaminants.

Site	Fungi	Percentage	Bacterial contaminant	Percentage
Hand	12	10.34%	2	9.09%
Trunk	10	8.62%	0	0.00%
Head & Neck	17	14.66%	0	0.00%
Nails	24	20.69%	2	9.09%
Groin, Thigh, Buttocks	35	30.17%	18	81.82%
Foot	18	15.52%	0	0.00%
	116		22	

Out of 116 culture isolates 81 (69.82%) were dermatophytes, 20 (17.24%) were non dermatophytic molds and 15 (12.93%) were yeasts. *T. mentagrophyte* and *T. rubrum* were commonest isolated fungi 34 (29.31%) each, followed by 11 (9.48%) *Candida albicans* [Figure 7& 8, Table 2].

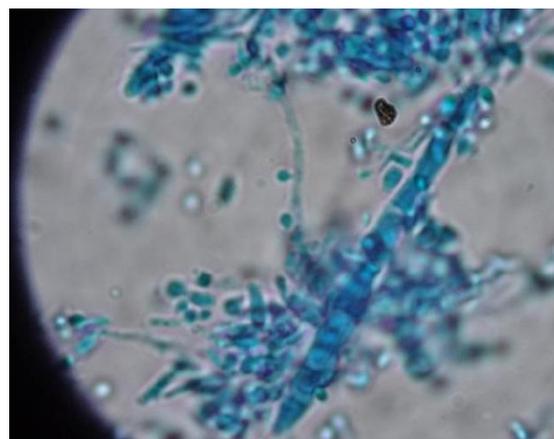


Figure 7: Macroconidia of *T. rubrum*.

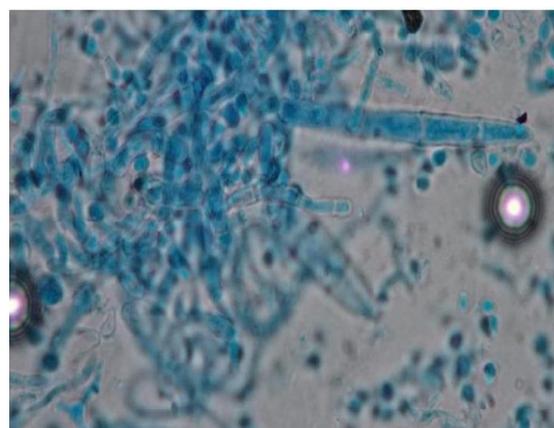


Figure 8: Macroconidia of *T. mentagrophyte*.

Table 2: Prevalence of various etiological agents.

Causative Agent	Frequency	Percentage
<b>Dermatophytes</b>		
<i>T. rubrum</i>	34	29.31%
<i>T. mentagrophyte</i>	34	29.31%
<i>T. tonsurans</i>	1	0.86%
<i>T. concentricum</i>	1	0.86%
<i>T. nanum</i>	1	0.86%
<i>T. schoenleinii</i>	1	0.86%
<i>T. violaceum</i>	3	2.59%
<i>E. floccosum</i>	1	0.86%
<i>M. audouinii</i>	2	1.72%
<i>M. gypseum</i>	3	2.59%
<b>Yeasts</b>		
<i>C. albicans</i>	11	9.48%
<i>C. tropicalis</i>	4	3.45%
<b>Non-dermatophytes</b>		
<i>Penicillium</i>	3	2.59%
<i>Scytalidium</i>	2	1.72%
<i>A. flavus</i>	2	1.72%
<i>A. fumigates</i>	3	2.59%
<i>A. niger</i>	6	5.17%
<i>Fusarium</i>	1	0.86%
Unidentified	3	2.59%

Most of the patients belonged to low socio economic class (34.69%) followed by middle and very low socio economic classes with 26.53% and 24.49% respectively [Figure 9].

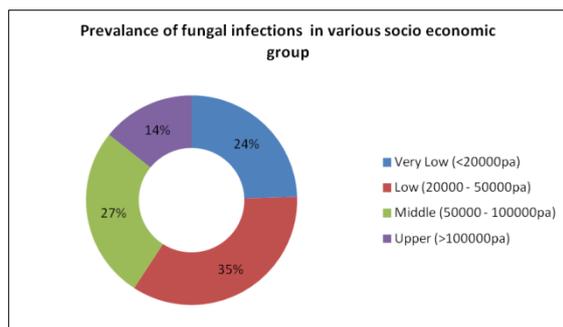


Figure 9: Prevalence in various socio economic status.

Most of the affected patients were from Srinagar (37.76%) followed by Srikot (17.35%) and Rudraprayag (13.27%). [Table 3].

Out of 13 cases in which fungi was isolated from more than one site 6 (46.15%) were diabetics, three (23.07%) were smokers and two (15.38%) were hypertensive. Out of 6 cases in which different species were isolated, three were diabetics (50%) and one each (16.66%) were smoker and hypertensive. Five (22.72%) out of 22 bacterial contaminants were isolated from diabetic patients [Table 4].

Table 3: Area wise prevalence of fungal infections.

Address	Frequency	Percentage	District	Percentage
Pauri	5	5.10%	Pauri: 59	60.20%
Srikot	17	17.35%		
Srinagar	37	37.76%		
Rudraprayag	13	13.27%	Rudraprayag: 15	15.31%
Augustimuni	1	1.02%		
Guptkashi	1	1.02%		
Chamoli	9	9.18%	Chamoli: 9	9.18%
Tehri	7	7.14%	Tehri: 15	15.31%
Devprayag	1	1.02%		
Chauras	7	7.14%		

Table 4: Gender V/s Health Status and Age group V/s Health Status.

	Males	Females	Total	<20 Years	20-50 Years	>50 Years	Fungi from > 1 Site	Bacterial Contaminant
Smoking	18	3	21	0	11	10	3	2
Hypertension	5	1	6	0	3	3	2	0
Diabetes	13	0	13	0	5	8	6	5

## DISCUSSION

In this study 136 clinically suspected cases of fungal skin infection attending Dermatology and Venereal disease out - patient department of VCSG Government Medical Science and Research Institute, Srikot, Srinagar were studied. Male predominance is seen but Male: Female ratio of 3.26:1 [Figure 3] is greater than most other studies but is comparable to studies carried in Shimla,<sup>[9,11-17]</sup> Central India and Rajasthan.<sup>[18-22]</sup> This high Male: Female ratio may be because females in rural area avoid visiting health facilities until their condition begins affecting their work and home made remedies have failed to provide relief. Age range of patients varied from 3 months to 81 years. Maximum numbers of patients were in the age group of 20 – 50 years [Figure 3] which is also seen in most of the researches.<sup>[17,18,20,21]</sup> The reason of high prevalence in this group may be their more active life style and involvement in outdoor activities. Farmers, dairy or poultry workers [Figure 4] were most affected which may be due to their close contact with soil and animals. Students were second most affected group which may be due to their active involvement in physical activity and wearing of occlusive clothing.<sup>[22, 23]</sup> Groin, Thigh and Buttocks and surrounding area were most common sites [Table 1] followed by nails and foot. Less frequent changing of undergarments

and poor personal hygiene along with involvement in physically strenuous work leading to heavy sweating may be responsible for more frequent involvement of groin and surrounding area. Highest bacterial contamination was also seen in samples isolated from this site which may be due to present of large number of bacterial commensals around this area.

Dermatophytes were most common culture isolates followed by non dermatophytic molds and yeasts [Table 2]. Among the Dermatophytes, Trichophyton spp. was most common isolates. While most studies have reported T. rubrum as most common specie isolated followed by T. mentagrophyte or vice versa.<sup>[12,13,15-17,21,24,25]</sup> In this study T. rubrum and T. mentagrophyte were equally responsible for the infection (29.31%) which is similar to a study carried in Aurangabad where these two species were isolated in almost equal percentage.<sup>[14]</sup> Yeast C. albicans was next most isolated (9.48%). among non-dermatophytic molds Aspergillus niger was most common followed by A.fumigatus and Penicillium.

Most of the patients in the study were from low and very low socio economic [Figure 9] classes together comprised of around 60% of total patients which is in accord with other studies.<sup>[15]</sup> In this study low socio economic class comprised of most patients and not very low. This may be because people of very

low socio economic status usually do not visit hospital as their earning is mostly on a daily basis. Maximum numbers of patients were from Srinagar followed by Srikot and Rudraprayag [Table 4] which may be due to closer approach to the hospital. Total 46.15% of cases were found diabetics in which fungi were isolated from more than one site whereas 50% were found diabetics in which more than one fungi were isolated [Table 4]. This can be due to greater risk of development of infections in diabetics. Only 40.81% of infected patients gave history of diabetes, hypertension or smoking [Table 4]. Interestingly none of the patient gave history of both smoking and hypertension or smoking and diabetes or diabetes and hypertension or all three. This may be due to patient bias or undiagnosed case.

### CONCLUSION

Superficial mycotic infections are very common in Garhwal region of Uttarakhand despite the relatively cold climate conditions. This may be due to warm and humid days despite cold nights due to proximity with river. In this region, poor hygiene, occlusive clothing and involvement in agriculture and related activities increase risk of fungal infection. Dermatophytes are found to be the most common cause of fungal infection but yeasts like *C. albicans* are also quite common cause so there is need of accurate diagnosis as treatment differs for different groups.

Further research on pattern of fungi found in soil at different sites, therapeutic efficacy of different drugs in treatment of different groups of infection, presence of fungal infection in students and farmers and people not visiting OPD will help make the results more applicable to general population. Research on hygiene habits of general population and different age groups and occupation in relation to fungal infection will help better direct awareness programmes.

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