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STUDY ON CLINICO-DERMATOPHYTIC INFECTION AMONG CANCER PATIENTS

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ABSTRACT

Dermatophytic fungal infections have become an important cause for sickness among cancer patients. The immunocompromised patients are high risk for infection with dermatophytes, namely *Trichophyton* Species, *Microsporum* species, *Epidermophyton* species and other molds also. To study incidence, clinical types, pattern of dermatophytic species and more predominant species responsible for dermatophytic infection among cancer patients. This study was conducted in the Department of Microbiology, Yubraja College, Mysore, India over a period of two years from January 2010 to January 2012. Total number of 200 samples from conformed cancer patients samples were collected and processed by the investigator and patient data recorded as per proforma, from K R Hospital, Mysore, India. In this study maximum numbers of cases with dermatophytosis were observed between May to September, where (41.0%) cases were from farmers 51.5%. Dermatophytosis was common in male (43.3%), youngest patient was 2 months and oldest patient was 77 years old and few 40.5% were between 26-30 years of age. Direct (10.0%) KOH mount of the samples was 71.5% positive for fungal element in wet mount preparations. Most common clinical type was tinea corporis (47.0%) followed by tinea capitis (12.5%) tinea cruris (12.0%) tinea pedis (6.5%) tinea unguium (6.0%) and tinea manum 3%. Over all culture positive was 62% and predominant species of dermatophyte isolated was *T. rubrum* (30.6%) followed by *Trichophyton verrucosum* (25.0%) *T. tonsurans* (25.0%) and *T. mentagrophytes* (8.8%). Poverty and fungal disease goes side by side. Fungal species identification is mandatory, when prolonged course of antifungal treatment is required and treatment may be prescribed with precision rather than empirical.

Key words: Cancer, Dermatophyte, Clinical types, *T. rubrum*.

INTRODUCTION

Dermatophytic fungal infections have become an important cause for sickness in immunosupressed patients **[1]**. The incidence of invasive fungal infections is increasing day by day and new species of dermatophyte are emerging as important pathogens. In cancer patients the main risk factor for the development of superficial and systemic fungal disease is severe due to prolong neutropenia **[2, 3]**. Other factors such as muscles damage, presence of central venous line, immunosuppressive therapy and broad-spectrum antibiotics are also major contributory factor for dermatophytic infection among cancer patients **[4]**.

These immunocompromised patients are at high risk for fungal infections, may be with opportunistic and dermatophytic infections namely *Trichophyton, Microsporum* and *Epidermophyton* species. There are other different other species of dermatophyte, which is also responsible for dermatophytic infections called as emerging dermatophytes. Infectivity, duration of treatment and health care costs for dermatophyte fungal infection is high. Addressing the emergence of fungal disease will require increased surveillance coupled with the availability of rapid, noninvasive diagnostic tests, monitoring the development of resistance to the antifungal agents and research focused on understanding preventions and control of fungal infections **[5]**.

Fungal infections began to emerge, as a significant problem among cancer patients; once effective antifungal agents became available then it is easier to survive immunocompromised patients for longer time. Initially only zoophilic dermatophyte accounted for the vast majority of fungal infection but now a day's geophiles and anthropophiles dermatophyte also responsible for the continued increased frequency. Most of the fungal infections occur in patients with hematological neoplasm **[6, 7]**. At present 40-50% of contagious infections are due to dermatophytes. A disturbing observation in recent years is the increasing frequency of spreading fungal infections among out patients undergoing multiple drug therapy by quack. In the past such infection occurred predominantly among out patients with far-advanced neoplasm, who were no longer responding to chemotherapy.

Fungal infections occurring in cancer patients can be divided into two major categories namely the opportunistic fungi and the pathogenic fungi. The pathogenic funguses cause infections in the general population, but are more likely to cause disseminated infection in cancer patients. Opportunistic fungi usually cause only

superficial infection in immunocompromised patient, but are most likely to cause disseminated infection in cancer patients and are the most common cause of fungal infection in patients with impaired host defense mechanisms **[8, 9]**.

MATERIALS AND METHODS

Clinically conformed 200 cases of dermatophyte infected cancer patients were included in our study from January 2010 to January 2012, a total of 200 in patients from K R Hospital and who were only clinically diagnosed and conformed cases of cancer patients selected for our study. Suspected lesions like skin scraping, nail clipping and hair plucking samples were collected after disinfecting the site with 70% of ethyl alcohol. Samples were collected in a sterile thick black envelope, folded, labeled and brought to the laboratory for further processing.

For direct microscopy the sample collected was screened for the presence of fungal elements by the methods called as 10% of KOH with 40% of Dimethyle sulphoxide (DMSO) mount. Two to three drop of KOH+DMSO mixture was kept on a clean, grease free glass slide. The sample like skin scraping, nail clipping and hair plucking were kept in the KOH+DMSO drop and cover with a sterile cover slip on the sample and press gently, so that all air bubbles trapped inside will remove from our wet mount, then observe within 5-8 minutes time.

Each slide thoroughly examined for the presence of filamentous, septate, branched hyphae with or without arthrospore is crossing the margin of the sqamous epithelial cells of the skin. In case of hair, arrangement of the spore was noticed to name it as ectothrix and endothrix infection.

Samples for culture were collected in a sterile paper, folded, labeled and transported to the department, same day for culture and identification. All samples were inoculated on selective and common Sabourauds Dextrose Agar with antibiotic (Sabourauds cyclohexamide, cloramphenicol Dextrose Agar), HiMedia laboratories Pvt. Ltd. Mumbai, India was used in this study following standard microbiology protocol. Data were analyzed with SPSS vertion-16 **[10, 11]**.

All the samples were incubated in a preheated incubator at 26^{o}C. The culture was examined daily for a period of 4-6 days. The obverse and reverse of the petridish were examined daily for growth, colony morphology, color, texture and pigment production. If no growth was observed at the end of 3 weeks, culture was labeled as negative. From culture positive slide culture was done to demonstrate macroconidia and microconidia and its filament morphology by lactophenol cotton blue mount (LPCB).

Lectophenol cotton blue mount were prepared for the identification of the structure and the morphology of the spores **[1]**.

RESULTS

Current observational prospective study was carried out in the department of Microbiology, K R Hospital, Mysore, India. Total numbers of 200 patients with malignant disease were examined for dermatophyte infection; with their consent we fill the proforma. Table-1 that shows, out of 200 cancer confirmed patient samples were examined, 143 (71.0%) showed the evidence of fungal elements on direct microscopy. Among all these, only 124 (62.0%) turned out to be positive on culture, but 8 samples, which were culture positive for culture, were negative on microscopical examination, making a total of 132 (66.0%) sample culture were positive Table-2. Those among 200 samples studied 68 (34.0%) did not show any evidence of fungal growth, either on direct microscopy or on culture.

Most common clinical type in our study was tinea corporis 47.0% followed by tinea capitis 12.5%, tinea cruris 12.0%, tinea pedis 6.5%, tinea unguium 6% and tinea manum 3.0%. Genus and species of dermatophyte isolated based on morphology and physiological characters 132 (66.0%) positive for culture. One hundred and thirty two dermatophytes comprising seven species belong to the only two genera: *Trichophyton* 131/132 (99.0%) and *Epidermophyton* 1/132 (0.0%) were isolated which is depicted in Table-3 there was 10 cases of mix dermatophyte infection. Most commonly isolated was *T. rubrum* and *T. verrucosum*. *T. rubrum* was the most predominantly isolated species (30.6%) followed by *T. verrucosum* (25.0%), *T. tonsurans* (25.0%) and *T. mantegrophyte* (8.8%). *T. tonsurans* (48.0%) was found to be predominant species in tinea capitis cases. *T. rubrum* was predominant in cruris (41.6%) and (8.3%) in tinea ungium respectively.

Table-1: Factors Associated With Dermatophytic Infection Among Cancer Patients

Factors	Number of cases	Number of Positive cases	Percentage %	P-value
1. Age				
< 1	**2**	**2**	**100**	**P < 0.05**
1- 5	**5**	**3**	**60**	
6- 10	**19**	**10**	**52**	
11- 15	**16**	**7**	**43**	
16- 20	**17**	**9**	**52**	
21- 25	**30**	**19**	**63**	
26- 30	**81**	**56**	**69**	
31- 35	**11**	**8**	**72**	
36-40	**10**	**6**	**60**	

> 40	**9**	**4**	**44**	
2. Sex				
Male	**113**	**73**	**64**	**P < 0.001**
Female	**87**	**51**	**58**	
3. Occupation				
Farmers	**83**	**61**	**73**	
Students	**49**	**28**	**57**	
House wife	**39**	**19**	**48**	**P < 0.001**
Others	**29**	**16**	**55**	
4. Living rooms in house				
1- 2	**162**	**99**	**61**	
3- 4	**30**	**19**	**63**	**P < 0.001**
> 4	**8**	**6**	**75**	
5. Sharing of beddings				
Sharing	**174**	**101**	**58**	**P < 0.001**
Nat sharing	**26**	**23**	**88**	
6. Bathing frequency				
Once daily	**44**	**32**	**72**	
Twice daily	**20**	**18**	**90**	**P < 0.001**
Occasionally	**136**	**74**	**54**	
7. Sharing of combs				
Family sharing	**148**	**95**	**64**	
Not shoring	**52**	**29**	**55**	**P < 0.001**
8. Keeping animals				
Dog	**146**	**90**	**61**	
Cat	**28**	**11**	**61**	**P < 0.001**
Other	**36**	**23**	**63**	

Table 2: Conditions Associated With the Occurrence of the Dermatophyte Direct Microscopy and Culture

Clinical type	Number and %	Microscopy positive and %	Culture positive and %
1. Leukemic lymphoma.			
Acute leukemia	**65(33.0)**	**44(30.0)**	**42(31.0)**
Chronic leukemia	**10(5.0)**	**7(4.0)**	**6(4.0)**
Hodkins disease	**30(15.0)**	**24(16.0)**	**23(17.0)**
2. Female genital organ.			
Carcinoma of cervix	**25(12.0)**	**20(13.0)**	**15(14.0)**
Carcinoma of endometrium	**5(2.0)**	**4(2.0)**	**4(3.0)**
Carcinoma of vagina	**5(3.0)**	**3(1.0)**	**3(2.0)**
Carcinoma of breast	**6(3.0)**	**5(2.0)**	**4(3.0)**
3. Gastro Intestinal Tract.			
Carcinoma of esophagus	**3(1.0)**	**2(1.0)**	**2(1.0)**
Carcinoma of colon	**4(2.0)**	**3(2.0)**	**2(1.0)**
4. Respiratory Tract.			
Carcinoma of bronchus	**16(8.0)**	**12(8.0)**	**10(7.0)**
Carcinoma of lungs	**4(2.0)**	**3(2.0)**	**3(2.0)**
5. Miscellaneous			
Carcinoma of prostate	**10(5.0)**	**7(4.0)**	**6(4.0)**
Malignant melanoma	**2(1.0)**	**2(1.0)**	**2(1.0)**
Carcinoma of maxillary sinuses	**3(1.0)**	**1(0.0)**	**1(0.0)**
Carcinoma of thyroid	**11(5.0)**	**6(4.0)**	**5(3.0)**
Total	**200**	**143(71.0)**	**132(66.0)**

Table 3: Distribution of Cases According to Clinical Type of Disease in Relation to Species of Dermatophytes

Dermatophytes	*T .corporis*	*T. capitis*	*T. cruris*	*T. unguium*	*T. pedis*	*T. manum*	*T. faciale*	*T. mixed*
***T.rubrum* (38)**	**28(22.6)**	**1(0.8)**	**3(2.4)**	**0**	**0**	**0**	**0**	**6(4.8)**
***T.verrucosm*(31)**	**6(4.8)**	**0**	**10(8.1)**	**1(0.8)**	**5(4.0)**	**3(2.4)**	**1(0.8)**	**5(4.0)**
***T.tonsurans*(31)**	**17(13.7)**	**12(9.7)**	**0**	**0**	**0**	**0**	**0**	**2(1.6)**
***T.mentag.* (11)**	**1(0.8)**	**0**	**0**	**6(4.8)**	**1(0.8)**	**1(0.8)**	**2(1.6)**	**0**
***T.violaceum*(9)**	**1(0.8)**	**5(4.0)**	**0**	**1(0.8)**	**2(1.6)**	**0**	**0**	**0**
***E.floccosum* (3)**	**1(0.8)**	**0**	**2(1.6)**	**0**	**0**	**0**	**0**	**0**
***T.schoenleii* (1)**	**0**	**1(0.8)**	**0**	**0**	**0**	**0**	**0**	**0**
Total (124)	**54(43.5)**	**19(15.3)**	**15(12.0)**	**8(6.4)**	**8(6.4)**	**4(3.2)**	**3(2.4)**	**13(10.5)**

DISCUSSION

There is no doubt that there is increase in incidence of mycotic infection among cancer patients. Conditions associated with the dermatophytic infections among patients with debilitating diseases are high, as seen in cases such as cancer or diabetes, or in whom the physiological state has been upset by immunosuppressive drugs, steroids, X-ray, and broad spectrum antibiotics **[12]**. Other workers have noted this high incidence of mycotic infection among patients with leukemia and lymphoma **[13]**. In this study farmers were predominantly getting infection with common isolate was *T. verrucosum,* which are normally zoophiles. Our studies showed male 56.5% with cancer acquired disease but female only 43.3% mostly leukemic lymphoma type acquire dermatophyte infection when we compare another cancer clinical type.

In one research **[14]** also reported male predominant with female ratio (2:1). It may be due to high work load (physical labor) and wearing unhygienic dirty clothing's [**15]** on from western state of India **[16]** also reported approximate but similar type of report. **[1**7**]** noted the commonest age group of tinea infection between 11-20 years of age and similar result was also observed by [**14]** But in our report, infection in age group between 26-30 years (40.5%) fallowed by 15% in 21 to 25 years of age. However in this study youngest patient was 2 month and oldest was 77 years. When we will see the clinical type tinea corporis, which were higher in female as compared to male fallowed by tinea capitis in which it is conststant with other studies shows tinea corporis as the most common infection among various clinical types. This study observed 10% of the patients had two clinical types.

Tinea corporis with cruris 7.5% eases, where as t. corporis with t. barbae, t. capitis with corporis, tinea pedis with corporis and tinea unguium, Tinea corporis with cruris were 0.5%, 1.0%, and 0.5% respectively. *T. rubrum* is the predominate species reported would wide whereas shahindokhi from Tehran noted *Epidermophyton* as a dominant species followed by *T. rubrum.* In

contrast with their fin finger, present study showed *T. verrucosum* (30.6%) as predominant specters identifieal fallowed by *T. rubrum* (25%) *T. tonsurans* (25%) and *T. mentagrophytes* (8.8%). This report shows constant with **[18]** who also documented *T. verrucosum* as a predominant species in various tinea infections (14 out of 27 cases). Study done at eastern Nepal **[19]** obtained *T. mantegrophyte* as a predominant species. In present study *T. verrucosum* (29.78%) was found to be commonest causative agent of tinea corporis, which is in concordance with the study of Iran **[16]**. In our present study, *T. tonsurans* (48%) was found to be predominant species followed by *T. violacium* (20.0%) in cases of tinea capitis. However, **[19]** reported *T. violacium* main causative agent of tinea capitis. S. **[20]** found equal number of *T. rubrum* and *T. mentagrophytes* species in tinea pedis, however in present study *T. rubrum* was isolated, which is in accordance to the various reports in litratures **[18, 21]**. In cases of tinea faciae present study found *T. mantegrophyte* followed by *T. rubrum*. This suggests infection with anthropophilic fungal infection from household contact. In-patient with extensive tinea infection (tinea corporis, cruris, manum, ungium and pedis) *T. verrucosum* was isolated from all different sites of patients.

CONCLUSIONS

The predominant occupation of patient under study was agriculture-based farmer. In spite of that easy availability of medical person, there was delayed in seeking treatment. This may be due to over the counter medication and use of indigenous household remedies, which is a common practice. This delay in treatment may be responsible for spread of disease and partial treatment for shorter period of time, which is solely responsible for drug resistance. Most common clinical type was tinea corporis. Majority of children was from boarding schools, where chances of infection are high. In spite of agriculture-based occupation in Nepal, there was no increase in prevalence of tinea manum and ungium infection.

Fungal species identified is mandatory, when prolonged course of antifungal treatment is required and treatment may be prescribed with precision rather than empirical. Furthermore culture of specimen should be performed specially in cases of tinea pedis and tinea ungium to improve diagnosis when prolong antifungal treatment is required.

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