Original Article

Risk factors associated with dermatophyte- causing agents (*Trichophyton rubrumand Trichophyton mentagrophytes*)

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Abstract

Background: Dermatophytosis is a common disease in tropical countries due to factors like heat and humidity. *Trichophyton rubrum* and *Trichophyton mentagrophytes*, which cause infections of skin and nails, are two of the most frequently isolated dermatophytes. Transmission may occur by direct contact or indirectly by fomites, however, overcrowding, excessive moisture or low economic status may constitute risk factors when combined with exposure to the etiologic fungi. The present study was undertaken to study the risk factors associated with two common dermatophyte-causing agents *T. Rubrum* and *T.mentagrophytes*. **Material and Methods:** A total of 187 patients clinically diagnosed as *Tinea corporas* who were fungal culture positive and treatment naive patients at first visit were included. Samples were collected and direct microscopy by KOH and culture on SDA with antibiotics were done. **Results:** *T. rubrum* was isolated from 72.7% and *T. Mentagrophytes* from 27.3%.Most of the patients i.e. 66 (35.3%) were in the age group of 21-30 years and were males. Housewives constituted 26.8%, a substantial percentage of patients (12.8%) were labourers and 17.1% were students. 92.5% patients had some level of education and 7.5% had not received any education. In our study 81.8% belonged to lower income group and 24.1% of patients lived in well ventilated houses. **Discussion:** Dermatophytosis is the commonly encountered fungal infection in developing countries like India. Overcrowding, poor hygiene, low standards of living along with high humidity environments contribute to the increased prevalence of these fungal infections.

Key Words: Dermatophytosis, risk factors, overcrowding, *Trichophyton rubrum*, *Trichophyton mentagrophytes.*

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INTRODUCTION

Dermatophytes are the most prevalent fungal species involving skin, hair and nails[1]. A single species maybe involved in several disease types, each with its distinctive pathology. These fungi are the commonest infectious agents of man and no geographical areas are without "ringworm". An evolutionary development towards an accommodating host-parasite relationship can be seen among dermatophytes which is absent among other fungal agents of human disease. This group of diseases is collectively referred to as dermatophytosis. Dermatophytosis or Tinea varies from chronic mild non inflammatory to acute severe inflammatory lesions in different hosts. Dermatophytosis is a clinical entity caused by members of the imperfect genera *Trichophyton*, *Microsporum* and *Epidermophyton*[2]. Dermatophytosis ranks among themost common and widespread infectious diseases world-wide, and *Trichophyton rubrum* and *Trichophyton mentagrophytes*, which cause infections of skin and nails, are two of the most frequently isolated dermatophytes[3]. They can be divided into three groups of anthropophilic, zoophilic and geophilic depending on their natural habits and host preferences. Fungi in all three categories may cause human infections[4]. The transmission of dermatophytoses or tineas occurs by direct contact with infected animals or

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humans or by indirect contact with contaminated fomites. In tropical countries like India, the cause of dermatophytoses is adversely influenced by poverty, poor hygienic living conditions, overpopulation and low socio economic status[5-7]. The present study was undertaken to study the risk factors associated with two common dermatophyte-causing agents *T. rubrum* and *T.mentagrophytes.*

MATERIAL AND METHODS

This prospective, epidemiological study was carried out from January 2014 to December 2015. A total of 187 patients of all ages and sexes, clinically diagnosed as tinea corporis [dermatophytosis of torso, extremities (excluding hand and feet) and face] who were fungal culture positive and treatment naive patients at first visit were included. Patients on antifungal treatment at first visit, not giving consent for treatment and negative for dermatophyte culture were excluded from the study. The patients were explained about the study in their own language. Then the written informed consent was taken for each patient. A well-tested questionnaire schedule had been designed to collect data on socio-demographic details and on infection types. For sample collection, the affected area was swabbed with 70% alcohol and the active edge of lesion scraped with a sterile scalpel. The scrapings were collected from the margins of the lesion without injuring the skin surface. The scrapings were collected in a sterile petri dish[3]. The samples were examined for dermatophyte hyphae, arthroconidiaby using 10% KOH. Specimens were then cultured on Sabouraud's Dextrose Agar (Merck, Germany) containing Chloramphenicol, Gentamycin and Cyclohexamide; and were kept at 26°C for four weeks. fungal growth was identified by slide culture and physiological and biochemical tests[3].

RESULTS

The study included patients who were positive for dermatophyte culture.*T. rubrum*and *T.mentagrophytes*were the dermatophyte species isolated from 187 patients. *Trichophyton rubrum* was isolated from 136 patients (72.7%) and *Trichophyton mentagrophytes* from 51(27.3%).Most of the patients i.e. 66 (35.3%) were in the age group of 21-30 years.Out of 187 patients, 109 were males and 78 were females. In the total 187 patients, housewives constituted 26.8%, a substantial percentage of patients (12.8%) were labourers and 17.1% were students. In our study maximum number of patients, 92.5% patients had some level of education and 7.5% had not received any education. In our study 81.8% belonged to lower income group. In our study 24.1% of patients suffering from *T. corporis* lived in well ventilated houses which was less as compared to 75.9% of patients living in ill ventilated houses. Another interesting finding was that *T. rubrum* as well as *T. mentagrophytes* were isolated from humid houses but only *T. rubrum* from dry, well ventilated houses. In our study, out of all the cases of dermatophytosis, 18.2% patients belonged to the middle income group. Overall, among our 187 cases, 41 (21.9%) were migrant population and 146 (78.1%) were local inhabitants but the fungal etiological agents did not vary significantly in both these groups. Migration is defined as the movement of people to a new area or country in order to find work or better living conditions. In our study, it was observed that 85% patients gave history of soil contact (Table 1).

Table 1

Risk factor	*T. rubrum*	*T. mentagrophytes*	Total n (%)
Occupation			
Student	21	11	32 (17.1%)
Tailor	14	04	18 (9.6%)
Housewife	36	14	50 (26.8%)
Driver	06	01	07 (3.7%)
Labourer	18	06	24 (12.8%)
Other	41	15	56 (30%)
Education			
No education	08	06	14 (7.5%)
School	91	35	126 (67.3%)
College	30	09	39 (20.9%)
Graduate	07	01	08 (4.3%)
Economic status			
Low	111	42	153 (81.8%)
Middle	25	09	34 (18.2%)
High	--	--	--
Housing type			
Well ventilated	28	17	45 (24.1%)
Ill ventilated	108	34	142 (75.9%)
Migrant status			
Yes	32	09	41 (21.9%)
No	104	42	146 (78.1%)
Soil type contact			
Routine	96	27	123 (65.8%)
Farmer	--	--	--
Gardener	--	--	--
Others	40	24	64 (34.2%)

DISCUSSION

Dermatophytosis is a common clinical entity characterized by the infection of keratinized tissues such as skin, hair, and nails. Dermatophytic infections are widespread and cause discomfort. Reactions to dermatophyte infection may range from mild to severe. Overcrowding, poor hygiene, low standards of living along with high humidity environments are contributing to the increased prevalence of these fungal infections. In present study, highest incidence of dermatophytosis was

observed in the age group of 21-30 years and in males. This may be due to greater physical activity and increased sweating in this age group favoring the growth of dermatophytes. This was in correlation with other studies[8-11]. *T. rubrum* was the most common dermatophyte to cause all clinical types of dermatophytoses followed by *T. mentagrophytes*. This was in correlation with other studies[10,11]. Out of the total 187 patients, housewives constituted 26.8%, a substantial percentage of patients (12.8%) were labourers and 17.1% were students. On the other hand Jain *et al*[12], who have studied 160 cases of dermatophytosis report that 11.7% of their cases were housewives, 30.6% were employees and 30.1% were students. They proposed that the high infection among employees could be due to higher public interaction, travelling, handling of articles among people and more skin to skin contacts. It has also been observed that patients involved in exhausting physical work under the sun, sweating are more prone to get dermatophytosis[13]. Regarding occupational exposure, in one study by Sharma and Borthakur[14], occupations related to agriculture were the commonest (39%) followed by students and unskilled labourers (15%). Increased contact with soil and excessive exposure for heat are proposed to be the reasons for increased incidence in farmers. One study by Das *et al*[7] unskilled labourers were more commonly affected than professionals in causing superficial fungal infections. In our study maximum number of patients, 92.5% patients had some level of education and 7.5% had not received any education. In a study in 2014, in Uttarakh and on the prevalence of dermatophhtosis, education was found to be a negligible factor as all educational groups, namely primary and secondary were infected with almost equal percentage of occurrence[15]. Recurrent, chronic and extensive dermatophytosis was found to be most common in very low and low income group patients whereas (20.3-17.8%) localised infections were common in middle and higher income group patients. It was suggested that the low and very low income groups maybe likely reservoirs of human ringworm infections in Chennai[16]. In our study 81.8% belonged to lower income group. In a study by Sivakumar *et al* in 2008, it was found that highest prevalence of superficial mycoses was seen in low socio economic group with 68 cases (74.7%) followed by middle socio economic status (18.68%) and least in high socio economic cases with only 1.6% cases[17]. In another study by Walke*et al*, it was seen that infection was most common in low socio economic group (87.78%) followed by middle socio economic group (10.62%) and least in high socio economic group (1.61%)[18]. Overcrowding is defined as being present if more than 2 persons are staying per room; or more than two persons are staying in $11m^2$ area; or two persons over age of 9 years of opposite genders who are not husband and wife are obliged to sleep in the same room[19]. In our study 24.1% of patients suffering from *T.corporis* lived in well ventilated houses which was less as compared to 75.9% of patients living in ill ventilated houses. Houses with high moisture favour proliferation of moulds and could lead to mould infections. In a study by Indira *et al*, 30% of the cases were from rural areas and 69.5% were from urban areas. From both these areas, respectively, 91.8% and 75.9% patients belonged to lower income groups, indicating that poor hygienic conditions and overcrowding maybe contributing factors for dermatophytosis[20]. Among 187 cases, 41 (21.9%) were migrant population and 146 (78.1%) were local inhabitants but the fungal etiological agents did not vary significantly in both these groups. In conclusion, dermatophytosis is the commonly encountered fungal infection in developing countries like India. Overcrowding, poor hygiene, low standards of living along with high humidity environments contribute to the increased prevalence of these fungal infections.

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