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A Small Outbreak of Dermatophytosis due to *Trichophyton Verrucosum* in the Family of a Dairy Farmer

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Abstract

Dermatophytosis is a highly infectious fungal disease of humans and animals. We describe a small outbreak of dermatophytosis due to *Trichophyton verrucosum*, a zoophilic fungus, in the family of a dairy farmer from a nearby village of Bharuch, Gujarat, India. The diagnosis was confirmed on direct microscopical demonstration of fungal elements in the skin scrapings of 3 children followed by in- vitro culture of clinical specimens on mycological medium. Detailed morphological identification of fungal isolates was attempted in Narayan stain. All the patients treated with topical application of 1% terbinafine cream showed good clinical response. Epidemiological investigation revealed that all the children who were in close contact with a ringworm infected cow-calf contracted the infection. Direct microscopy of the skin scrapping and its cultural isolation established the diagnosis of ringworm in a cow- calf due to *Trichophyton verrucosum*. The cow- calf was treated with 2 solution of tincture iodine. There was no difference in the macroscopic and microscopic morphology of T. *verrucosum* isolated from humans and animals. Since zoophilic dermatophytes have public health significance, the persons who are handling animals should take required precautions to check the spread of infection..

Keywords: Animal; Children; Cow Calf; Dairy Farmer; Dermatophytes; *Trichophyton Verrucosum*; Zoonosis

Introduction

Dermatophytosis commonly known as ringworm, tinea, is the most frequently encountered superficial cutaneous mycosis in human and animal clinical practice both in developing as well as developed nations of the world [1]. The disease is caused by dermatophytes, which are the filamentous fungi and have the ability to affect the skin, hair and nail [2]. There are three genera of dermatophytes, such Trichophyton, Microsporum, and Epidemophyton, which can cause infection in both sexes and all age groups [3]. Disease is widely prevalent in tropical and sub-tropical regions because of high relative humidity and temperature [2,4].

Humans can acquire the infection by direct contact with affected humans and animals and also by indirect contact with fomites [5-7]. Dermatophytosis due to zoophilic dermatophytes is an occupational mycosis of animal handlers, pet owners, veterinarians, butchers, and abattoir workers [8,5-7,3]. Trichophyton verrucosum, a zoophilic

dermatophyte, is implicated in the etiology of tinea tinea faceci, tinea capitis, tinea mannum, tinea corporis and tinea of nails [9,4,7]. Ringworm infection due *T. verrucosum* has been described in many species of animals, such as cattle, buffaloes, goats, camels, sheep, horses, mule, pigs, dogs, cats, deer etc [2,8,10-12]. Direct microscopy and isolation still remain a gold standard of diagnosis [2]. Treatment regime includes topical as well as systemic medications depending on the severity of infection [3]. The patient with one or two lesions can be easily treated with topical drugs. The present investigation records a small outbreak of ringworm due to Trichopyton verrucoum in a family of dairy farmer from a nearby village of Bharuch, Gujarat, India.

Materials and Methods

Three children with skin lesions attended a Skin Clinic at Bharuch for the diagnosis and treatment. The Wood lamp was used for preliminary examination of the lesions. The skin scrapings were collected aseptically after sterilizing the skin with 70 % alcohol by the Laboratory Technician for direct microscopy and cultural isolation. Direct examination of the clinical specimen was attempted in a mounting solution that contained 4 ml of 20 % potassium hydroxide (KOH) solution, 4 ml of Parker blue black ink and 2 ml of glycerol [2]. The specimens from three patients were cultured on the slants of Sabouraud dextrose agar with chloramphenicol (0.1 mg/ml), cycloheximide (0.mg/ml) and incubated at 37°C [2]. The suspected colonies were examined for detailed microscopic morphology in 'Narayan' stain (0.5 ml of methylene blue (3% aqueous solution), 4.0 ml of glycerine, and 6.0 ml of dimethyl sulfoxide [13]. The isolates were identified as per the procedure recommended by Baxter M, et al. [14], and Pal M, et al. [2]. The treatment prescribed by the Dermatologist included the topical application of 1% terbinafine cream two times daily for 2-3 weeks. The laboratory has no facility for molecular characterization of dermatophytes.

The owner narrated that one cow-calf was having skin lesions. In order to confirm the source of infection, specimen of skin scrapings with hairs was obtained from a 4-month-old cow- calf with ringworm lesions on the face through the courtesy of an animal technician. The clinical specimen was examined by direct microscopy and isolation. The calf was treated with local application of 2% tincture iodine solution. The animal owner was asked to apply drug with cotton swab daily for 2 to 3 weeks on the lesions after the removal of crust with disposable wooden spatula. In order to prevent the spread of infection, it is imperative that crusted material and wooden spatula must be burnt.

Results

The examination of all the patients under Wood's lamp examination did not reveal any fluorescence. The age and sex of all the children is presented in Table 1. All three children had only one ringworm type lesion on the skin of face, hand, and neck. The typical ringworm type lesion was present on the face and neck of two male children, and the female child had one ringworm like lesion on the hand (Table 1).The direct microscopical examination of clinical specimens in wet mount solution (mixture of KOH, Parker blue black ink and glycerol) revealed thin, hyaline, branched hyphae morphologically simulating to dermatophytes. The growth was slow in the medium. Small, compact, heaped, white or grey colonies grew on Sabouraud medium after 14 to 17 days of incubation at 37°C. All the isolates in 'Narayan' stain showed tear shaped microconidia, rat tail like macroconidia, and antler type branched hyphae, and were identified as *T. verrucosum* [14,2]. Good clinical response with topical application of 1% terbinafine ointment was observed in all our patients. Furthermore, none of the patients gave a history of any side effects like redness, pruritis etc. There was no mycological follow up as the patients did not visit the Skin Clinic. On clinical examination, the calf showed two discrete, raised, greyish-white crusted lesions on the skin of the face. The laboratory investigation confirmed that cow-calf was suffering with Trichophyton verrucosum infection. The ringworm affected calf was treated with 2% tincture iodine solution.

S.No	Age	Sex	Location of Lesion	Animal Contact	Laboratory Diagnosis	
					DM*	Isolation
1	5 y	M	Face	Cattle	+ **	+
2	9 y	F	Hand	Cattle	+	+
3	11 y	M	Neck	Cattle	+	+

*DM: Direct Microscopy
**Positive

Table 1: Clinical and mycological observations in three Trichophyton verrucosum affected children.

Discussion

Dermatophytosis caused by anthropophilic (man), zoophilic (animal) and geophilic (soil) is most commonly reported from tropical and subtropical regions of the world [2-4]. Disease can occur in sporadic and epidemic form, and is important from public health point of view [15,16,6,7]. Trichophyton verrucosum is a zoophilic dermatophyte that has been reported from humans [7] and also from a wide variety of animals [2]. The laboratory investigation of the clinical specimens from the patients irrefutably proved that *T.verrucosum* was the prime etiological agent implicated in this small outbreak of ringworm in the family of a dairy farmer. Our observations are in conformity with the earlier findings of Ming and co-workers [16] who recorded an outbreak of dermatophytosis in humans due to *T. verrucosum*, and the source of infection was cattle. Likewise, Pal M, et al. [5] described ringworm due to *T. verrucosum* in a 30-year-old male patient who acquired infection from a 2-month-old cow- calf having ringworm on the head and neck region. Similarly, Zienicke H, et al. [17] from Germany described an intra-familial transmission of *T. verrucosum* infection to a new born baby due to occupational exposure. Transmission of zoophilic dermatophytes usually occurs through direct close contact with the animals [2,6,7]. Ringworm infection due to T.verrucosum in a veterinarian who was occupationally exposed to the livestock was diagnosed by Dave P, et al. [6]. These findings clearly suggested that direct contact with animals serve as the chief source of zoophilic infections to humans and therefore, care must be taken when dealing with animals to avoid the infections. The early diagnosis and prompt treatment with antifungal drug is necessary to check the spread of infection [2]. The efficacy of terbinafine skin cream for the treatment of ringworm infection in humans has been reported by earlier workers [2,7].

As animals serve an important source of zoophilic dermatophytes, the treatment of the affected animal should be attempted with antifungal drugs in order to prevent the transmission of infection to susceptible subjects. In this context, Pal M, et al. [5] and Pal M, et al. [12] has described the efficacy of 2 % solution of tincture iodine for the treatment of ringworm in cattle.

Conclusion

The clinical, mycological and therapeutical observations conclusively established that Trichophyton verrucosum was the sole causative agent responsible for a small outbreak of ringworm that affected 3 children (2 males and 1 female) in the family of dairy farmer in a village of Bharuch District of Gujarat, India. The diseased cow calf in the family was considered the source of infection as all the three children were in direct close contact of the calf. There was no difference in the morphology of the dermatophytes isolated from children as well as calf. It is emphasized that mounting solution should be commonly used for making a quick presumptive diagnosis of ringworm infection particularly in the rural areas where laboratory facility for fungal isolation is hardly available. It is recommended that ringworm in humans with a history of occupational exposure with animals should be prudently examined for the zoophilic dermatophytes. As 'Narayan' stain is cheaper, and easy to prepare than other mounting fluid, its routine application in all the microbiology and public health laboratories dealing with fungi is highly emphasized.

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Contribution of Authors

All the authors worked for the manuscript.

Conflict of Interest

There was no conflict of interest among the authors.

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