**Ringworm in Cattle and Man Caused By Microsporum Canis: Transmission From Dog**

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** Abstract

*Dermatohytosis , caused by many dermatophytic fungi, is an important cutaneous mycotic zoonosis of global significance. Microsporum canis, a zoophilic dermatophyte, was identified as the prime cause of ringworm in two cross-bred, female calves which belonged to a private dairy farm in Gujarat, India. The small, discrete, scaly lesions were observed on the skin of the head and neck of the affected young cattle. The direct examination of the skin scrapings under light microscope showed hyaline, branched, septate hyphae and arthrospores by potassium hydroxide technique. The fungus was isolated in pure culture from the skin scrapings on Sabouraud dextrose agar and dermatophyte test medium (DTM). The detailed morphological examination of fungal growth in Narayan stain confirmed the identity as Microsporum canis. The retrospective epidemiology indicated that both the calves contracted the infection from a young male pet dog. In addition, one three-year-old female child in the family also acquired ringworm infection from the diseased dog. The skin scrapings from the calves, dog and child when examined under Wood’s lamp exhibited a bright greenish yellow fluorescence suggesting Microsporum infection. Microsporum canis was also identified in the skin lesions of pet dog and the child by direct microscopy as well cultural isolation on mycological media. Interestingly, the isolates of Microsporum canis from cattle, dog and man did not reveal any difference in their cultural and morphological characteristics. The findings of this investigation indicated that transmission of Microsporum canis from the dog to cattle and man is possible. As animal dermatophytes are communicable to humans, care must be exercised while handling the sick animal or collecting the skin scrapings or applying drug on the skin lesions. It is emphasized that Narayan stain should be widely used in all public health and microbiology laboratories for studying the detailed morphology of fungi which are incriminated in the various clinical disorders of humans as well as animals.**

**Key words:** Cattle, Dog, Microsporum canis, Narayan stain, Public health, Ringworm, Zoonosis

**Introduction**

*Dermatohytosis, commonly referred as “ringworm” or “tinea”, is important from public health and economic point of view and occurs in sporadic as well as in epidemic form* (Pal and Thapa, 1993., Pal, 2007). It is the most frequently occurring cutaneous, infectious and highly contagious mycosis of man and animals (Pal and Boru, 2011). The disease is caused by dermatophytes which grow best in warm and humid environment and therefore, more common in tropical and subtropical region of the world (Pal, 2011). Dermatophytes are strict aerobic fungi which invade the keratinized tissues of the skin, hair, nails and claws of the susceptible hosts. There are three important genera of dermatophytic fungi, viz, Epidermophyton (infests skin and nail), Microsporum (attacks the hair and skin) and
Trichophyton (invades hair, skin and nail) (Cabanes, 2000). In cattle, the ringworm is mainly caused by Trichophyton verrucosum (Pal, 1987). There is rarity of reports on bovine dermatophytosis caused by Microsporum canis. Hence, this prompted the authors to put on record two cases of ringworm in Holstein Friesian cross bred calves due to Microsporum canis from Gujarat, India. In addition, an attempt was also made to establish the source of infection. The public health significance of animal dermatophytes is also discussed.

**Materials and Methods**

The two female Holstein Friesian crossbred calves, aged 36 days and 45 days belonged to a private dairy farm in Bharauch, Gujarat, India. The skin scrapings and hairs collected aseptically from the ringworm suspected lesions of calves, dog and child were submitted to the laboratory of Veterinary Public Health to confirm the diagnosis and suggest the treatment. All the clinical samples were subjected to ultra violet light under Wood’s lamp; and also treated in 10 % potassium hydroxide solution for direct microscopic examination (Pal, 2007). Each specimen was cultured on Sabouraud dextrose agar with chloramphenicol (0.05 mg / ml) and actidione (0.5 mg/ ml) and dermatophyte test medium (DTM) (Pal and Dave, 2006). The inoculated slants were kept at 25 degree centigrade in BOD incubator and examined daily for fungal growth. The detailed morphology of the fungal isolates was done in Narayan stain which was developed by Pal (2004). The stain contained 0.5 ml of methylene blue (3 % aqueous solution), 6.0 ml of dimethyl sulfoxide (DMSO) and 4.0 ml of glycerin. The hair perforation test was conducted in vitro on human hairs collected from a five year old male child (Pal, 2007). The isolates were identified as per the procedure recommended by Rebell and Taplin (1974). The treatment prescribed to calves, dog and child included topical application of 2 % solution of tincture iodine, 2 % miconazole ointment and 1 % terbinafine cream, respectively. The owner was advised to remove the scales carefully in a container with disinfectant (5% phenol) and apply the drugs with a clean wooden spatula on each lesion daily for about three weeks. All the patients were daily observed to see the response of the drugs as well as any signs of the skin toxicity.

**Results**

Discrete, scaly, circular lesions were found on the skin of head and neck region of both the calves. The dog has one lesion on the shoulder and other on the back. The dermatologist diagnosed tinea faciei as the child had one ringworm type lesion on her right cheek. The examination of the skin scrapings and hairs under Wood’s lamp exhibited a bright greenish yellow fluorescence suggesting Microsporum infection. The direct microscopic examination of the skin scrapings and hairs in 10 % potassium hydroxide (KOH) revealed the presence of thin, long, branched, hyaline hyphae and arthrospores morphologically resembling dermatophytes. There was no evidence of ectoparasite in the skin lesions. On Sabouraud
medium, the colony appeared as white at the centre with yellow periphery and the reverse side showed bright yellow or orange pigment. The growth of dermatophytes on DTM changed the colour from yellow to pink or red. The isolates of dermatophytes from calves, dog and child in “Narayan” stain spindle shaped macroconidia and thereby identified as Microsporum canis. The human hair exposed to M.canis isolates when examined in” Narayan “stain showed a wedged shaped perforation. Interestingly, we did not observe any cultural or morphological difference in the bovine, canine and human isolates of M.canis. There was no facility of molecular typing of fungal strains in the laboratory of Veterinary Public Health. As narrated by the owner, the topical drugs prescribed to calves, dog and child were effective to treat ringworm lesions. There was no signs of erythema or pruritis indicating that all the drugs were safe to the animal and human patients.

**Discussion**

Dermatophytosis is a highly contagious cutaneous mycotic disease of humans and animals. The disease is reported from over 145 countries of the world including India (Pal, 2007). It is presumed that about 20% of the world population is affected with dermatophytosis (Pal, 2005). Many species of dermatophytes are involved in the etiology of dermatophytosis. However, Microsporum canis is recognized as a global dermatophyte (Pal, 2011). In the present investigation, M.canis was identified in the skin lesions by direct microscopy and cultural isolation as the sole dermatophyte responsible for causing dermatophytosis in cattle, dog and man. The transmission of zoophilic dermatophytes occurs when a susceptible subject comes in contact with a diseased animal. Similar findings were reported by Pal and Dave (2005) and Pal and Dave (2006) who described ringworm case in animal handlers who contracted infection from zoophilic dermatophytes from diseased animals. Our observations clearly indicated that the calves and child acquired M.canis infection from the diseased dog having ringworm lesions.

Bovine ringworm is mainly caused by Trichophyton verrucosum and rarely by other dermatophytes (Pal, 1987; Pal and Dave, 2006; Pal and Boru, 2011). The isolation and identification of M.canis from the skin lesions of two calves is an interesting observation. It is emphasized that the growing role of M.canis, an emerging zoophilic dermatophyte, should be investigated in the skin lesions of humans, domestic, pet, farm, laboratory and wild animals. The animals which carry the fungal spores without any lesions may serve as source of infection to others (Pal, 2007). It is, therefore, important to mention that hair brush technique should be employed to screen the healthy animals for dermatophytes as well other keratinophilic fungi. As zoophilic dermatophytes are highly communicable to human beings, proper care must be taken when dealing with animals (Pal, and Dave, 2005; Pal, 2011). The early diagnosis and prompt therapy is mandatory to prevent the spread of infection.
The macroconidia of M. canis isolates recovered from cattle, dog and man were properly stained in Narayan stain. We, therefore, recommend the wider application of Narayan stain in microbiology and public health laboratories to study the morphology of fungi which are implicated in many clinical disorders of humans as well as animals. Moreover, potassium hydroxide technique can be used to diagnose ringworm infection in veterinary clinics/hospitals in remote /field areas where mycological facilities for cultural isolation of dermatophytes are not easily available or do not exist.

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References