Prevalence in India of *Dermatophilus congolensis* infection in clinical specimens from animals and humans

M. PAL *

**Summary:** A total of 257 samples (from 51 cattle, 43 buffalo, 32 goats, 25 dogs, 23 horses, 14 fowl, 9 camels, 7 rabbits, 5 donkeys, 4 antelopes, 3 pigs, 2 monkeys, 1 bear and 38 humans, all with cutaneous disorders) were examined for the presence of *Dermatophilus congolensis* using standard microbiological techniques. *Dermatophilus* was identified in 14 specimens (5.45%) both by direct microscopy and by cultural isolation of the pathogen from cutaneous specimens. The infection was recorded in 2 humans, 6 cattle, 3 buffalo, 1 goat, 1 horse and 1 antelope. A history of trauma to the skin was evident in 6 of these cases; ticks were present in 5 cases. The organism could not be isolated from 12 soil samples collected from the immediate environment of the diseased animals. This appears to be the first report of *D. congolensis* as a cause of dermatitis in humans, horse and antelope in India.

**KEYWORDS:** Antelope – Dermatitis – Dermatophilus congolensis – Horse – Man – Skin.

**INTRODUCTION**

*Dermatophilus congolensis*, the aetiological agent of dermatophilosis (lumpy wool, mycotic dermatitis, streptotrichosis, streptothricosis), is a pleomorphic, Gram-positive actinomycete which primarily infects the epidermis of many species of animals, and humans (1, 3, 4, 6, 11, 13, 16). The disease, which occurs in sporadic and epidemic form, is world-wide in distribution; its incidence and severity vary in different geographical regions and in different species of animals, but the disease is recognised to be of greatest severity in the humid tropics (13, 14, 18, 19). Dermatophilosis results in considerable financial losses to the livestock industry through its effects on the production of hides, skins and wool, and the mortality or culling of affected animals (1, 4, 13, 14). There is a paucity of information on *Dermatophilus* infection in animals from the Indian sub-continent (12, 14, 16, 18, 19). The present communication describes the prevalence of dermatophilosis in cutaneous specimens collected in India from farm, pet and zoo animals, and from humans.

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MATERIAL AND METHODS

Clinical specimens

Between July 1991 and June 1994, a total of 257 samples of scabs and crusts collected from active cutaneous lesions on different parts of the bodies of 219 animals (51 cattle, 43 buffalo, 32 goats, 25 dogs, 23 horses, 14 fowl, 9 camels, 7 rabbits, 5 donkeys, 4 antelopes, 3 pigs, 2 monkeys and 1 bear) and 38 humans were investigated for the presence of *Dermatophilus*. Six smears prepared from pustules and exudates from 2 humans, 2 cattle, 1 goat and 1 horse were also examined. All samples were submitted to the Laboratory of Veterinary Public Health in Anand, and were processed microbiologically. In every case, the age, sex, affected sites, duration of lesions, occupation (in humans), evidence of injury, presence of ticks and source of the specimen were recorded.

Direct microscopy

Each sample was suspended in 15% potassium hydroxide (KOH) and examined for the presence of dermatophytes and ectoparasites. Smears prepared from the scabs, crusts, exudates and pustules were stained with Giemsa or methylene blue (17) and examined for the presence of *D. congolensis*.

Isolation in culture

Specimens of crusts and scabs were first ground with 0.5 ml of sterile distilled water in a sterilised glass pestle and mortar, and were then transferred to a sterile glass bottle containing 1 ml of sterile water and maintained at 20°C for 3-4 h. A heavy loopful of the material was then cultured on plates of tryptose agar and brain-heart infusion (BHI) agar. The plates were incubated micro-aerophilically in a candle jar at 37°C and examined for microbial growth. Suspect colonies were subcultured on BHI, and purified isolates with the morphology of *Dermatophilus* were subjected to a number of different biochemical tests to confirm their identity (9). Cultures were examined in a recently-developed stain, 'PHOL' (15), which contained 0.3 ml of 3% aqueous solution of methylene blue, 5 ml of 4% aqueous solution of 35% formaldehyde and 3 ml of glycerol.

Examination of soil

Twelve soil samples were collected in polythene bags from the immediate environments of 6 animals (3 cattle, 1 buffalo, 1 goat and 1 horse) from which *Dermatophilus* had been isolated. Suspensions of each samples were cultured using a dilution technique on the two agar media.

RESULTS

Of the 219 animal and 38 human samples examined, *D. congolensis* was demonstrated (both in smears and cultures) in only 12 animals and 2 humans (Table I). Lesions were present on various parts of the body, while generalised lesions were observed in only 2 animals (1 buffalo and 1 bovine). Lesions included vesicles, pustules, thick crusts (cream to brown in colour) and dirty yellow-coloured scabs. Removal of hard crusts left a pinkish, moist surface. Lameness was noted in 4 animals (antelope, buffalo, bovine and horse) with lesions affecting the limbs. A history of trauma was
available in 4 animals and 2 humans. In 5 animals, ticks were observed on the body. *Dermatophilus* was not demonstrated in specimens from bear, camel, dog, donkey, fowl, monkey or pig. Distribution of *Dermatophilus*-positive samples is given in Table II.

In smears stained with Giemsa or methylene blue, *D. congolensis* was observed as characteristic thin, branched, septate filaments with parallel rows of coccoid bodies. KOH preparations failed to demonstrate the presence of dermatophytes, yeasts or ectoparasites under direct microscopy.

Examination of growth from the cultures of *D. congolensis* on BHI, after 3 days at 37°C in 'PHOL' stain, showed typical fine, branched, septate hyphae and coccoid bodies arranged in parallel chains. All isolates hydrolysed casein, starch and urea, and fermented fructose, galactose, glucose and maltose with production of acid but not gas. Methyl red, nitrate reduction and Voges-Proskauer tests were negative, but production of catalase and liquefaction of gelatine were demonstrated. In serum broth, the organism showed a thin pellicle and a cotton-like growth on the base after incubation for 48-72 h at 30°C. On tryptose agar and BHI, *D. congolensis* appeared as minute, small, raised, greyish-white colonies with a fringe-like margin after incubation for 48-72 h at 37°C. No difference was apparent between the cultural and microscopic characteristics of the isolates from animals and humans.

### Table I

**Clinical and laboratory findings in fourteen cases of *Dermatophilus* infection**

<table>
<thead>
<tr>
<th>Source</th>
<th>Age</th>
<th>Sex</th>
<th>Site of infection</th>
<th>Possible predisposing factor</th>
<th>Laboratory diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Human</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult</td>
<td>23 years</td>
<td>M</td>
<td>Left leg</td>
<td>Trauma</td>
<td></td>
</tr>
<tr>
<td>Child</td>
<td>11 years</td>
<td>M</td>
<td>Right forearm</td>
<td>Trauma</td>
<td></td>
</tr>
<tr>
<td>Animal</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antelope</td>
<td>2 years</td>
<td>M</td>
<td>Lower limbs</td>
<td>ND</td>
<td>+</td>
</tr>
<tr>
<td>Buffalo</td>
<td>5 years</td>
<td>F</td>
<td>Tail, udder, hind legs</td>
<td>Tick</td>
<td>+</td>
</tr>
<tr>
<td>Buffalo</td>
<td>8 years</td>
<td>F</td>
<td>Generalised</td>
<td>Tick</td>
<td>+</td>
</tr>
<tr>
<td>Buffalo calf</td>
<td>7 months</td>
<td>M</td>
<td>Muzzle, head</td>
<td>Trauma</td>
<td>+</td>
</tr>
<tr>
<td>Bovine</td>
<td>6 years</td>
<td>F</td>
<td>Back of udder, tail</td>
<td>ND</td>
<td>+</td>
</tr>
<tr>
<td>Bovine</td>
<td>4 years</td>
<td>F</td>
<td>Limbs</td>
<td>Tick</td>
<td>+</td>
</tr>
<tr>
<td>Bovine</td>
<td>3 years</td>
<td>F</td>
<td>Generalised</td>
<td>Tick</td>
<td>+</td>
</tr>
<tr>
<td>Bovine calf</td>
<td>10 months</td>
<td>M</td>
<td>Head, neck, rump, back</td>
<td>Trauma</td>
<td>+</td>
</tr>
<tr>
<td>Bovine calf</td>
<td>9 months</td>
<td>M</td>
<td>Head, neck</td>
<td>Tick</td>
<td>+</td>
</tr>
<tr>
<td>Bovine calf</td>
<td>5 months</td>
<td>F</td>
<td>Muzzle, face</td>
<td>Trauma</td>
<td>+</td>
</tr>
<tr>
<td>Goat</td>
<td>1 year</td>
<td>M</td>
<td>Scrotum, thigh</td>
<td>Trauma</td>
<td>+</td>
</tr>
<tr>
<td>Horse</td>
<td>2.5 years</td>
<td>M</td>
<td>Back, lower limbs</td>
<td>ND</td>
<td>+</td>
</tr>
</tbody>
</table>

* *pathogen demonstrated in the cutaneous lesion by direct microscopy*

**organism isolated from clinical specimen**

ND: no data
### TABLE II

**Origin and prevalence of Dermatophilus infection in samples from humans and animals with cutaneous disorders**

<table>
<thead>
<tr>
<th>Origin</th>
<th>Number examined</th>
<th>Number (%) positive</th>
<th>Origin of positive specimen(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gujarat</td>
<td>91</td>
<td>4 (4.39)</td>
<td>Human child, antelope, bovine, bovine calf</td>
</tr>
<tr>
<td>Delhi</td>
<td>86</td>
<td>5 (5.81)</td>
<td>Human adult, buffalo, bovine cow, goat, horse</td>
</tr>
<tr>
<td>Rajasthan</td>
<td>29</td>
<td>2 (6.89)</td>
<td>Bovine calf, bovine calf</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>27</td>
<td>2 (7.40)</td>
<td>Buffalo calf, bovine</td>
</tr>
<tr>
<td>Haryana</td>
<td>13</td>
<td>1 (9.09)</td>
<td>Buffalo</td>
</tr>
<tr>
<td>Karnataka</td>
<td>11</td>
<td>0 (0.00)</td>
<td>–</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>257</strong></td>
<td><strong>14 (5.45)</strong></td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

Dermatophilosis was reported for the first time in 1915, by Van Saceghem, in cattle in the Belgian Congo (20). The disease has since been recorded world-wide in a diverse range of hosts including antelope, buffalo, camel, cat, fallow and white-tailed deer, dog, donkey, eland, giraffe, goat, horse, lizard, monkey, pig, rabbit, racoon, squirrel and zebra (1, 3, 4, 6, 8, 16, 18). The present report shows that in India the disease also affects a wider range of species than previously indicated. Only cutaneous specimens were examined and thus no indication has been obtained regarding infection of other tissues. Oral infection has previously been described in a buffalo in India (12) and in cattle imported into Nigeria (10). Lymph node involvement has been reported in the goat (19), and subcutaneous infection has been described in a cat which had a superficial injury caused by another cat (5).

Human infection with *Dermatophilus* has been reported on a few occasions, particularly following exposure to infected animals (2, 6, 7, 11). In the present report, there was a history of trauma in both affected individuals, and both had handled diseased animals. Healthy animal attendants without possible predisposing factors (e.g. injury to the skin) failed to contract the infection (14). Trauma and tick infestation have commonly been associated with infection in animals (1, 13), and one or other of these factors was recorded in all the case histories of the affected animals studied here, but it is uncertain whether these factors were directly related to the infections which occurred. Other predisposing factors — including high humidity, heavy rainfall, and the activity of biting flies and other arthropods — have also been incriminated in the development of dermatophilosis (1, 4, 13, 21).

The two most common sources of infection in cases of dermatophilosis are scabs retained in the coat following previous infection, and transmission from other infected animals. Attempts to recover the organism from natural substrates have been unsuccessful (6, 14). The present findings support the hypothesis that soil does not provide a favourable environment for the survival of *D. congolensis*. 
Dermatophilosis should be differentiated clinically from a wide variety of other exudative and crusting dermatoses. Diagnosis should be confirmed by microbiological techniques which are capable of specifically identifying the pathogen (5, 13, 14, 17, 18), including examination of stained smears and isolation in culture, as employed in this study. Due to the characteristic appearance of the organism in smears, smear examination is a very effective, low-cost method of diagnosis which can be employed even in field laboratories with minimal facilities. Culture of *D. congolensis* is sometimes difficult, especially from contaminated lesions, and other techniques employing fluorescent antibody tests (4) or enzyme-linked immunosorbent assay (8) have been developed to facilitate diagnosis. However, these methods were not available in this study.

**ACKNOWLEDGEMENTS**

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**PRÉVALENCE EN INDE DE L'INFECTION PAR *DERMATOPHILUS CONGOLENSIS* DANS DES PRÉLÈVEMENTS CLINIQUES EFFECTUÉS SUR DES ANIMAUX ET DES HOMMES. – M. Pal.**

**Résumé**: Des techniques microbiologiques standard ont été appliquées à la recherche de *Dermatophilus congolensis* dans 257 prélèvements effectués sur 51 bovins, 43 buffles, 32 chèvres, 25 chiens, 23 chevaux, 14 volailles, 9 dromadaires, 7 lapins, 5 ânes, 4 antilopes, 3 porcs, 2 singes, 1 ours et 38 hommes qui tous présentaient des lésions cutanées. Cette bactérie a été reconnue dans 14 cas (5,45 %) par microscopie directe et par isolement en culture de l'agent pathogène à partir de prélèvements de peau. L'infection a été constatée chez deux hommes, six bovins, trois buffles, une chèvre, un cheval et une antilope. Dans six de ces cas, la peau présentait des lésions anciennes et on a observé la présence de tiques dans cinq cas. L'agent responsable n'a pas été isolé dans les douze prélèvements de sol effectués dans l'environnement immédiat des animaux atteints. C'est la première fois, semble-t-il, que des cas de dermatite chez l'homme, le cheval et l'antilope sont attribués à *D. congolensis* en Inde.


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FRECUENCIA EN LA INDIA DE INFECCIONES POR *DERMATOPHILUS CONGOLENSIS* EN MUESTRAS CLÍNICAS TOMADAS DE ANIMALES Y SERES HUMANOS. - M. Pal.

**Resumen:** Un total de 257 muestras (procedentes de 51 bovinos, 43 búfalos, 32 cabras, 25 perros, 23 caballos, 14 aves de corral, 9 camellos, 7 conejos, 5 asnos, 4 antílopes, 3 cerdos, 2 monos, 1 oso y 38 humanos, todos afectados de dolencias cutáneas) fueron sometidas a técnicas microbiológicas estándar con el fin de identificar en ellas la presencia de *Dermatophilus congolensis*. Este patógeno fue detectado en 14 de los casos (5,45%), tanto por microscopía directa como por aislamiento en cultivo a partir de las muestras cutáneas. La infección afectaba a dos humanos, seis bovinos, tres búfalos, una cabra, un caballo y un antílope. En seis de aquellos casos el sujeto presentaba señales evidentes de un traumatismo antiguo en la piel; en cinco de los casos se observó la presencia de garrapatas. El microorganismo no pudo aislarse en ninguna de las 12 muestras de suelo recogidas en el entorno inmediato de los animales enfermos. Este parece ser el primer caso registrado en la India en el que se identifica a *D. congolensis* como agente causante de dermatitis en el hombre, el caballo y el antílope.

**PALABRAS CLAVE:** Antílope – Caballo – Dermatitis – *Dermatophilus congolensis* – Hombre – Piel.

**REFERENCES**


