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Prevalence of Dermatophytosis in Animal and Human Population with Special Reference to Its Zoonotic Significance

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ABSTRACT

Dermatophytes are a group of closely related keratinophilic fungi that can invade keratinized humans and animals tissues such as skin, hair and nails causing dermatophytosis. They are an important cause of superficial fungal infection. In present study, 128 samples of skin scrapings/hairs/nail lesions from affected animals and human beings were screened by standard techniques for prevalence of Dermatophytosis. Analysis of 128 samples, comprising of 52 from cattle, 22 from buffaloes, 18 from dogs and 36 from human beings. The prevalence of dermatophytes in human and animals were recorded 33.33 % (12/36) and 32.61% (30/92), respectively. Among the Dermatophytes the maximum isolates were Trichophyton verrucosum 16.41% (21/128) followed by Trichophyton rubrum 6.25% (8/128), Trichophyton mentagrophytes 5.47% (7/128) and Microsporum canis 4.69% (6/128). Isolation rate for Sabouraud's Dextrose Agar (SDA) and Dermatophyte Test Medium (DTM) was 27.34 % (35/128) and, 32.81% (42/128), respectively. The efficiency of DTM was found better than SDA.

Key words: *Dermatophytes, Zoonotic infection, Ringworm, SDA, DTM*

INTRODUCTION

The dermatophytosis/ ringworms of animals (cattle, buffaloes, dogs, sheep and goats) could be a potential source of zoonotic infections causing a serious public health problem. The farmers/ pet owners are more susceptible to get this infection from their Animals/ pets, because of the close contact with them[13]. Skin infections are common diseases in developing countries, of which dermatophytosis are of particular concern in the tropics. Most fungal infections are located on the skin's outermost layer (epidermis). Fungal infections in the lower layers of skin, internal organs and blood are rarely seen. Dermatophyte infections are one of the earliest known fungal infections of mans and are very common throughout the world. Dermatophytosis consists of a group of superficial fungal infections of the hair, nails and epidermis. Dermatophytosis has been reported in hot and humid conditions and poor hygienic condition and occurs throughout tropical and temperate regions of the world.

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Dermatophytes are pathogenic fungi and have a high affinity for keratinized structures like hair, nail and skin causing superficial infections known as dermatophytosis in human as well as animals[15]. Dermatophytes mainly have three genera, Trichophyton, Epidermophyton and Microsporum. This organism may be grouped into 3 categories based on host preference and natural habitat: Anthropophilic, Geophilic and Zoophilic. Anthropophilic species infect humans, geophilic species are soil based and may infect both humans and animals, and Zoophilic infect animals[2]. Trichophyton verrucosum, Trichophyton rubrum, Trichophyton mentagrophytes, Microsporum canis, Microsporum gypsum and Epidermophyton floccosum are main dermatophytes which infect humans and animals[9].

Dermatophytosis is an integumentary, cosmopolitan mycotic disease is important from public point of view as well as economic point of view and it is prevalent in sporadic and epidemic forms over 145 countries of the world and also in India. It plays important role in occupational mycozoonosis of dairymen, animal handlers, livestock farmers, pet owners, veterinarians etc. Almost 20 – 50% human skin infections were from zoonotic dermatophytes[10]. Dermatophytosis requires long-term therapy with antifungal drugs that have potential side effects; hence, the correct diagnosis is very important. Typically diagnosis is based on microscopy of the clinical specimens followed by *in vitro* culture and morphological identification of fungus[8].

Dermatophytosis is commonly manifested by alopecia, pruritus, dermatitis, nodular crusty, scaly or scabby lesions depending up underlying cause. Skin disease causes heavy economic loss to the livestock industry due to direct effects on the quality of hide, skin, wool and fur of animals[12]. Present study focused on isolation and identification of Dermatophytosis on Sabouraud's dextrose agar (SDA) and Dermatophyte test medium (DTM) for knowing the prevalence of Dermatophytosis in animal and human population.

MATERIAL AND METHODS

A total of 128 samples of skin scrapings/ hairs/ nail lesions from affected animals and human beings comprising of 52 from cattle, 22 from buffaloes, 18 from Dogs and 36 from human. Samples (Skin scrapings/ Hairs/ Nail lesions) were collected from affected animals and human beings of Livestock Research Station (L.R.S.), Veterinary Clinics, Panjarapols, Primary Health Centres, Community Health Centres and hospitals of Anand, Gujarat.

KOH test

All the samples were subjected to direct microscopic examination with potassium hydroxide (KOH). The specimen was placed in a few drops of 10 to 20% KOH and incubated for 5 to 10 minutes and gently heated on flame. KOH could be used on clinical specimens to clear cellular material and better visualization of fungal elements. A cover slip is placed over the KOH digested sample and the slide was examined microscopically without staining. This method is used most often for the presence of hyphae and arthroconidia in suspected dermatophytes infection. [10]

Isolation of dermatophytes on Sabouraud's Dextrose Agar (SDA) and Dermatophyte Test Medium (DTM):

Each scraping / sample was cultured onto Sabouraud's Dextrose agar (SDA) and Dermatophyte Test Medium (DTM) with Cycloheximide and Chloramphenicol. The plates were incubated at 28°C for up to 4 weeks and examined at 2 to 3 day intervals for fungal growth[11].

Microscopic identification of Dermatophytes with Lacto phenol Cotton Blue (LPCB) Staining:

The obtained dermatophytes were identified by their cultural morphology and microscopic characteristics. Microscopic identification of positive fungal cultures was carried out using lactophenol cotton blue stain[3]. A drop of lactophenol cotton blue stain was placed on a clean glass slide. A portion of mycelium was transferred into the lactophenol cotton blue stain and teased with a 22 gauge nichrome needle to separate the filaments. Cover slip

was placed on the preparation and examined under low and high power magnification using a much reduced light for identification.

RESULT AND DISCUSSION

On clinical examination small, discrete, circumscribed, raised, grayish-white crusty, alopecic lesions were seen at the time of sample collection. The direct examination of clinical specimens in KOH under light microscope revealed hyaline, thin, slender, branched hyphae, and arthrospores morphologically to dermatophytes.

Out of 128 samples collected 42 samples were found positive for Dermatophyte infection. Overall prevalence of dermatophytosis among human and animals were 32.81%. Prevalence of dermatophytosis in Cattle, Buffalo, Dogs and Human were 32.69%, 31.82%, 33.33% and 33.33% respectively. Cultural growth of dermatophytes was more on DTM than SDA. Out of 128 samples 42 samples were grow on DTM and 35 samples were grow on SDA. Isolation rate of SDA and DTM was 27.34% and 32.81% respectively. Therefore DTM is more reliable and specific media for dermatophytes growth (Table 1). Prevalence of *Trichophyton verrucosum* was higher in both the population. *Trichophyton verrucosum* was isolated from cattle, buffalo and Human. Dogs were negative for it. *Microsporum canis* (06) was only isolated from dog sample. *Trichophyton mentagrophytes* (07) isolated from cattle and buffalo. *Trichophyton rubrum* (8) was isolated from human samples. Four samples were positive for Trichophyton verrucossum in human population which is indicative of zoonotic significance.

Dermatophytosis is considered as one of the major public health problems in the world and is the most commonly diagnosed skin disease in India. The prevalence and characteristics of Dermatophyte infections vary with climatic conditions, age, and lifestyle and population migration patterns[6]. Islam and co-worker studied the prevalence of Dermatophyte specimen (Nail and skin) collected from the hospital patients. Out of 80 samples 31 (38.75%) were found positive by culture and 21 (26.25%) were found positive by microscopic method which were also found positive by culture method. Terefe *et al.*[16] studied prevalence of dermatophytosis, skin scabs were collected directly into petridish plates from the clinical lesions of the animals by using gloves and scalpel blade from the total of 384 animals (Holstein Frisian) selected. Out of that 167 (43.39%) animals were positive for dermatophytosis by KOH test as well as by cultural method on SDA. In India Jayanthi *et al.*[7], studied the incidence rate and cultural characteristics of Dermatophytes from human sample. Study involved 60 patients, fungal elements were seen in 20 cases by KOH mount examination test and dermatophytes grew in 17out of 20 samples. The overall positivity rate was 33% Murmu *et al.* [10] collected 362 Dermatophyte suspected samples from cat (202), dog (123) and human beings (37). A total of 285 (78.7%) samples were found to be positively infected with different dermatophytes. Prevalence of infection was the highest in cats (158, 55.5%) than dogs (108, 37.8%) and human beings (19, 6.7%). The incidence of *Microsporum canis* (60.0%) was the highest from affecting dogs, cats, and human beings in comparison to *Microsporum gypseum* (22.5%), *Trichophyton mentagrophytes* (15.8%) and *Trichophyton rubrum* (1.7%). Detection of *T. rubrum* was only from human cases where as in present study *Trichophyton verrucosum* also found from human cases. Rushidat bolanle balogan (2015) also found the prevalence of dermatophytes were 15.04% in horses in Kwarastate, Nigeria Nassimuddin *et al*.,[11] studied the comparison between SDA and DTM for the growth of Dermatophyte i.e similar with our study. He found that there was no statistically significant difference between the SDA and DTM in isolation of dermatophytes. He found overall prevalence of 43% and among them 38.75% *Trichophyton mentagrophytes* and 27.13% *Trichophyton rubrum*. Engy Faraht Gomha Faraht El Sady[4] studied the prevalence rate of Dermatophytes in horses. Out of 216 Horses, 30 horses

showed typical Dermatophyte ring worm lesion on skin. 20 samples found positive by direct microscopic examination and 13 samples were found positive by culture within 2 to 3 weeks.

Present study also agree with other workers like Abou-Eisha *et al*.,[1] found the *Trichophyton verrucosum* lesion among cattle, sheep, goats and horses were 75%, 50%, 71.4%, 65% and 25% respectively. Microsporum canis was identified in dog and cats at the rate of 41.7% and 56.7% respectively.

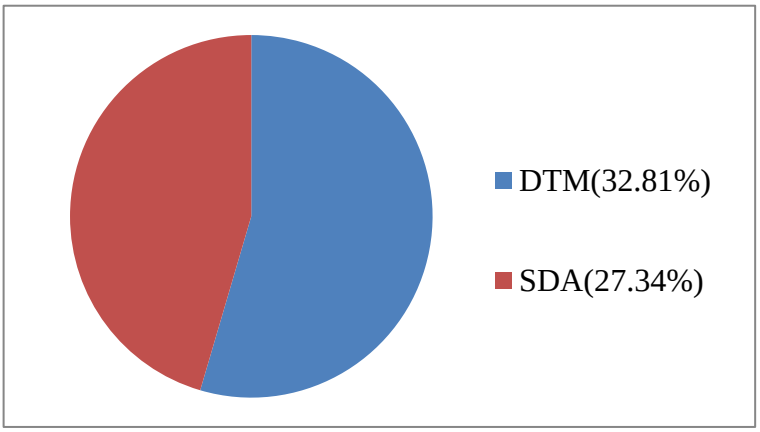
Prevalence of Dermatophytes in Human and Animal Population (Table 1)

Animal spp. and Human	No. of samples examined	No. of samples positive for Dermatophyte	Culture shows growth of Dermatophyte		Overall Prevalence (%)
			DTM	SDA	
Cattle	52	17	17	14	32.69
Buffaloes	22	07	07	05	31.82
Dogs	18	06	06	05	33.33
Human	36	12	12	11	33.33
Total	128	42	42	35	32.81

Overall species wise prevalence of Dermatophytes in animal and human population (Table 2)

Dermatophytes	Cattle	Buffalo	Dog	Human	Total
Microsporum canis	-	--	06	-	06
Trichophyton mentagrophytes	05	02	-	-	07
Trichophyton rubrum	-	-	-	08	08
Trichophyton verrucosum	12	05	-	04	21
Total	42/128				

Comparison of SDA and DTM (Fig. 1)



CONCLUSION

Among all Dermatophytes, maximum isolates were of *Trichophyton verrucosum* from cattle and minimum isolates were of *Microsporum canis* from dogs. *Trichophyton verrucosum* is a cosmopolitan zoophilic species of fungi that causes ringworm in cattle and other farm animals, from which human become infected. In the present work more numbers of isolates were recovered by use of Dermatophyte Test Medium (DTM). Thus, Dermatophyte Test Medium (DTM) is advocated for the regular confirmative diagnosis of dermatophytosis.

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