



Prevalence of Dermatophytosis in some animals and Human in Behera Province, Egypt

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Abstract

A total of 150 hair and skin scraping samples were collected from clinically suspected ring worm lesions found on different parts of the body of individually owned animals including; cattle (50), buffaloes (25), sheep (50) and horses (25) of different ages and sex from Abo El Matameer District, Behera Province during the period extended from June 2014 to May 2015 to be investigated for presence of dermatophytes. In addition, 50 samples of hair and skin scrapings were collected from human patients clinically diagnosed as having Tinea of various ages and sex whom their history revealed that there was an animal contact with the examined species. Samples were transported under possible aseptic condition with the minimum of delay to the laboratory of the Department of Animal Hygiene and Zoonoses, Faculty of Veterinary Medicine, Alexandria University where they were subjected to mycological examination. The obtained results revealed that the overall prevalence of dermatophytosis in different animal species was 74 % and the highest prevalence was observed in examined samples of sheep (78%) followed by buffaloes (76%) then cattle and horses (72 and 68%, respectively). Also, it was observed that the prevalence of dermatophytosis was higher in females than in males in examined samples of cattle, buffaloes and sheep while in examined samples of horses, it was noticed that males was higher than females. Also, it was found that the prevalence of dermatophytosis was higher in examined samples of the age group (< 2 years) than in the age group (2- > 2 years). The frequency of isolation of dermatophytes from examined animal species clarified that *T. verrucosum* was isolated with the highest frequency (47.33%) followed by *T. mentagrophytes* (14%) and they were isolated from all animal species under investigation then *T. equinum* (7.34%) that was isolated from examined samples of horses only and finally *M. canis* (5.33%) that was isolated from examined samples of cattle and sheep only. The overall prevalence of dermatophytosis in examined samples of the clinically suspected human patients was 82% and males' prevalence (52%) was higher than females (30%). In addition, the highest prevalence was observed in the age group (15- < 30 years) followed by the age group (< 15 years) and finally the age group (> 30 years). Moreover, It was noticed that *T. corporis* constituted the highest prevalence (40%) followed by *T. pedis* (18%) then *T. capitis* and *T. cruris* (16 and 8%, respectively).

Key words:

Dermatophytosis, Farm animals, Human, Isolation

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1. INTRODUCTION

The term ringworm presumably derives from the characteristic rings that develop with infection, however the term is misleading as worms or parasites are not responsible for the condition and hence the correct term for ringworm is dermatophytosis. Dermatophytosis is an infection of

keratinized tissue (skin, hair, and claws) by one of the three genera *Epidermophyton*, *Microsporum*, and *Trichophyton* that are collectively called dermatophytes. These pathogenic fungi are found worldwide, and all domestic animals are susceptible. The most important animal pathogens worldwide are *M. canis*, *M. gypseum*, *T. mentagrophytes*, *T. equinum*, *T. verrucosum*, and *M. nanum* (Chermette

et al., 2008). Exposure to a dermatophyte does not always result in infection and the possibility of infection depends on fungal species, host age, immunocompetence, condition of exposed skin surfaces, host grooming behavior, and nutritional status (Chermette et al., 2008). Affected animals initially develop characteristically discrete, scaling patches of hair loss with grey- white crust that later become thickly suppurated crust whose location is highly variable (Radostits et al., 2000). *T. verrucosum* is the usual cause of dermatophytosis in cattle, but *T. mentagrophytes*, *T. equinum*, *M. gypseum*, *M. nanum*, *M. canis*, and others have been isolated. Dermatophytosis is most commonly recognized in calves, in which nonpruritic periocular lesions are most characteristic, although generalized skin disease may develop. Cows and heifers are reported to develop lesions on the chest and limbs most often, and bulls in the dewlap and intermaxillary skin. Lesions are characteristically discrete, scaling patches of hair loss with gray-white crust formation, but some become thickly crusted with suppuration. Ringworm as a herd health problem is more common in the winter and is more commonly recognized in temperate climates (Papini et al., 2009). In addition, dermatophytosis is a common, troublesome problem in lambs where the infecting species include *M. canis*, *M. gypseum*, and *T. verrucosum*. Lesions in lambs are most often noticed on the head, but widespread lesions under the wool may be apparent when lambs are sheared for show, or may develop later as a consequence of contamination from clippers at shearing (Francisco, 2000). *T. equinum* and *T. mentagrophytes* are the primary causes of dermatophytosis in horses, although *M. gypseum*, *M. canis*, and *T. verrucosum* have also been isolated. Clinical signs consist of one or more patches of alopecia and erythema, scaling, and crusting, which are present to varying degrees. Early lesions may resemble papular urticaria but progress with crusting and hair loss within a few days (Radostits et al., 2000). Abou Eisha et al., (2008) carried out a survey on dermatophytes among farm and pet animals in Suez Canal Area. They found that *T. verrucosum* was the main etiological agent isolated from clinically diagnosed cattle, buffaloes, sheep, goats and horses with ringworm lesions at rates of 75%, 50%, 71.4%, 65% and 25%, respectively. Also, they noticed that

young aged animals are more susceptible for dermatophytic infection than older ones. Their findings reassured that these animals act as an important source and reservoir of human infections with dermatophytes and reflecting the danger of contact with these animals because these agents are more inflammatory and causing sever disease than the anthropophilic one. So, the aim of the current study is to determine the prevalence of dermatophytosis in some animal species including cattle, buffaloes, sheep and horses and human and study the effect of age and sex on the estimated prevalence.

2. MATERIALS AND METHODS

Clinical examination and collection of samples:

A total 150 animals clinically showing typical circular lesions covered with grayish white crusts were selected from individually owned animals from different farms and veterinary clinics including; cattle (50), buffaloes (25), sheep (50) and horses (25) of different ages and sex from were in Abo El Matameer District, Behera Province during the period extended from June 2014 to May 2015 to be investigated for presence of dermatophytes. In addition, a total of 50 samples of hair and skin scrapings were collected from human patients clinically diagnosed as having Tinea of various ages and sex whom their history revealed that there was an animal contact with the examined species. Hair, wool, scales and skin scraping samples were collected from animal clinically showing ringworm lesions. The affected skin areas were cleaned with 70% alcohol and skin scraping were taken from the edge of the lesion, using blunt scalpel blade until blood was just drawn. The second most useful specimen was plucking of hairs or wool that were pulled out using sterile epilator forceps from the lesion and any damaged-looking hairs were collected (Quinn et al, 1994). The withdrawn scales and hairs or wool were collected in clean labeled envelopes or in clean sterile labeled Petri dishes. Samples were transported with the minimum of delay to the laboratory of the Department of Animal Hygiene and Zoonoses, Faculty of Veterinary Medicine, Alexandria University where they were subjected to mycological examination.

Table (1): Distribution of animal samples

Species	No.	Sex		age groups	
		Females	Males	< 2 years	2 - >2years
Cattle	50	37	13	29	21
Buffaloes	25	19	6	15	10

Sheep	50	39	11	25	25
Horses	25	11	14	8	17
Total	150	106	44	77	73

Table (2): Distribution of human samples (n=50)

Sex		Age groups			Type of Tinea			
Females	Males	< 15 years	15 - < 30 years	> 30 years	T. corporis	T. capitis	T. pedis	T. cruris
20	30	13	27	10	23	10	11	6

Mycological examination:

1. Direct microscopical examination:

The hair, wool, scale and skin scraping specimens from animals were examined microscopically as described by Quinn et al. (1994), using KOH wet preparation method.

2. Isolation of dermatophytes:

Specimens from clinically affected animals and human were cultured, irrespective of the negative or positive direct microscopical examination result as described by Quinn et al. (1994), using duplicate Petri dishes or test tubes; the first one containing Sabouraud Dextrose Agar supplemented with chloramphenicol and cycloheximide, the second containing SDA with chloramphenicol, cycloheximide and thiamine. The Petri dishes or test tubes were labeled with the specimen number and date of inoculation. A light inoculum of each hairs, wool, skin scrapings or scale specimen was picked up with sterile teasing needle or forceps and scattered over the surface of the medium and gently pressed down into the agar. The inoculated plates

were incubated at 28-30°C, while the plates containing SDA with chloramphenicol, cycloheximide and thiamine were incubated at 37°C to enhance growth of *T. verrucosum* and observed daily for any evidence of growth for three to four weeks before being considered as negative. The negative specimens were repeatedly inoculated until a definite finding was established. After the establishment of dermatophyte growth, a subculture was made on SDA without cycloheximide for further identification of unidentified cultures or for preservation of the obtained colonies.

3. Identification of the isolates:

The isolated colonies were identified by macroscopical character, morphology and microscopical examination using Lactophenol cotton blue (LPCB) wet mount (Clayton and Midgley, 1985 and Carter and John, 1990), to demonstrate the presence of hyphae, macroconidia, chlamydospores and other fungal structure.

3. RESULTS AND DISCUSSION

Table (3): Prevalence of dermatophytosis in investigated animal species and human

Species	No. of examined samples	Positive	%
Cattle	50	36	72
Buffaloes	25	19	76
Sheep	50	39	78
Horses	25	17	68
Total	150	111	74

The recorded data in Table (3) clarified that the overall prevalence of dermatophytosis in examined hair and skin scraping samples of different animal species in the current study was 74 % and the

highest prevalence was observed in examined samples of sheep (78%) followed by buffaloes (76%) then cattle and horses (72 and 68%, respectively).

Table (4): Prevalence of dermatophytosis in investigated animal species in relation to sex

Species	Females			Males		
	No	Positive	%	No	Positive	%
Cattle	37	25	50	13	11	22
Buffaloes	19	15	60	6	4	16
Sheep	39	31	62	11	8	16
Horses	11	6	24	14	11	44
Total	106	77	51.33	44	34	22.67

The recorded data in Table (4) showed the prevalence of dermatophytosis in different

investigated species in relation to sex. It was found that the prevalence of dermatophytosis was higher in

females than in males in examined samples of cattle, buffaloes and sheep while in examined samples of horses, it was noticed that males was higher than females.

Table (5): Prevalence of dermatophytosis in different animal species in relation to age groups

Species	< 2 years			2- > 2 years		
	No	Positive	%	No	Positive	%
Cattle	29	21	42	21	15	30
Buffaloes	15	11	44	10	8	32
Sheep	25	23	46	25	16	32
Horses	8	9	36	17	8	32
Total	77	58	38.76	73	53	35.33

The recorded data in Table (5) showed the prevalence of dermatophytosis in different investigated species in relation to age groups. It was found that the prevalence of dermatophytosis was higher in examined samples of the age group (< 2 years) than in the age group (2- > 2 years).

Table (6): Frequency of isolation of Dermatophytes from investigated animal species

Isolate	Cattle		Buffaloes		Sheep		Horses		Total	
	No	%	No	%	No	%	No	%	No	%
<i>T. verrucosum</i>	24	48	11	44	32	64	4	16	71	47.33
<i>T. mentagrophytes</i>	9	18	8	32	2	4	2	8	21	14.00
<i>M. canis</i>	3	6	0	00	5	10	0	00	8	5.33
<i>T. equinum</i>	0	00	0	00	0	00	11	44	11	7.34
Total	36	72	19	76	39	78	17	68	111	74

The tabulated data in Table (6) illustrated the frequency of isolation of dermatophytes from examined animal species. It was found that *T. verrucosum* was isolated with the highest frequency (47.33%) followed by *T. mentagrophytes* (14%) and they were isolated from all animal species under investigation then *T. equinum* (7.34%) that was isolated from examined samples of horses only and finally *M. canis* (5.33%) that was isolated from examined samples of cattle and sheep only.

The overall prevalence of dermatophytosis in examined samples of the clinically suspected human

patients was 82% and males' prevalence (52%) was higher than females (30%) (Table, 7). Data presented in Table (8) clarified the age wise positivity of dermatomycosis in clinically suspected human patients. It was found that the highest prevalence was observed in the age group (15- < 30 years) followed by the age group (< 15 years) and finally the age group (> 30 years).

The prevalence of dermatophytosis in relation to the type of Tinea was tabulated in Table (9). It was noticed that *T. corporis* constituted the highest prevalence (40%) followed by *T. pedis* (18%) then *T. capitis* and *T. cruris* (16 and 8%, respectively).

Table (7): Prevalence of dermatophytosis in investigated human patients in relation to sex

Species	Females			Males			Total	
	No	Positive	%	No	Positive	%	No	%
Human Patients (n =50)	20	15	30	30	26	52	41	82

Table (8): Prevalence of dermatophytosis in human patients in relation to age group

Age groups	No	Positive	%
< 15 years	13	11	22
15 - < 30 years	27	23	46
> 30 years	10	7	14
Total	50	41	82

Table (9): Prevalence of dermatophytosis inhuman patients in relation to the type of Tinea

Type of Tinea	No	Positive	%
<i>T. corporis</i>	23	20	40

T. capitis	10	8	16
T. pedis	11	9	18
T. cruris	6	4	8
Total	50	41	82

Table (10): Frequency of isolation of dermatophytes from human patients (n=50).

Isolate	No	%
<i>T. verrucosum</i>	14	28
<i>T. mentagrophytes</i>	6	12
<i>T. violaceum</i>	6	12
<i>M. canis</i>	7	14
<i>E. floccosum</i>	8	16
Total	41	82

The frequency of isolation of dermatophytes from clinically suspected human patients revealed that *T. verrucosum* was the highest isolated dermatophyte

(28%) followed by *E. floccosum* and *M. canis* (16 and 14%, respectively) and lastly *T. mentagrophytes* and *T. violaceum* (12% of each).



Fig. (1): Ringworm lesions in cattle showing typical circular lesions on the head covered with grayish white crusts.



CFig. (2): Ringworm lesions in buffaloes



Fig. (3): Ringworm lesions in sheep



Fig. (4): Ringworm lesions in buffaloes

Fig. (3): Ringworm lesions in sheep characterized by alopecia and scaling

4. DISCUSSION

Ringworm is a common infection of the skin and nails that is caused by fungus. The infection is called “ringworm” because it can cause an itchy, red, circular rash. Ringworm is also called “tinea” or “dermatophytosis.” Because of the zoonotic importance of dermatophytosis, the current study was conducted to highlight the role that was played by some animal species including cattle, buffaloes, sheep and horses in transmission of infection to human in contact. The recorded data in Table (3) clarified that the overall prevalence of dermatophytosis in examined hair and skin scrapping samples of different animal species in the current study was 74 % and the highest prevalence was observed in examined samples of sheep (78%) followed by buffaloes (76%) then cattle and horses (72 and 68%, respectively). The obtained result was higher than that recorded by Abou-Eisha et al., (2008) who found that the overall prevalence of examined clinically affected animals in Suez Canal area was 66.3% among the all examined animals and the prevalence of dermatophytosis in examined cattle, buffaloes, sheep and horses was 75, 50, 71.4 and 25%, respectively. Also, these results were higher than dermatophyte cultural examination results reported in Egypt by Abou-Eisha and El-Attar, (1994) (69.2% of cattle) and Awad Allah, (2002) (26.7% of different animal species) and Ghazaly, (2006) (15% of cattle). This may be attributed to the type, age and number of the examined animals, location and the environmental conditions (Nassif and Osman, 2003). The recorded data in Table (4) showed the prevalence of dermatophytosis in different investigated species in relation to sex. It was found that the prevalence of dermatophytosis was higher in females than in males in examined samples of cattle, buffaloes and sheep (50, 60, 62 %, respectively) while in examined samples of horses, it was noticed that males (44%) was higher than females (24%). These findings disagreed with that obtained by Abou-Eisha et al., (2008) who found that the dermatophyte infection rates were higher in males (75.9%, 100%, 76% and 100%) than females (24.1%, 0.0%, 24% and 0.0%) in cattle, buffaloes, sheep and horses, respectively. While, El-Assi (1977) mentioned that although female sheep showed higher incidence of infection (59.1%), both sexes were equally susceptible to infection. Occurrence of dermatophytosis in male farm animals could be explained by the fact that most of the examined bovine and ovine ringworm cases were males from intensive beef fattening farms and large collections

of sheep used for fattening. It seems that overpopulation and confinement of these animals may play a role in the spread of the disease among fattened males. Distribution of animal dermatophytosis with regard to age among the examined animals clinically showing ringworm lesions, in this study was recorded in Table (5) and revealed that the prevalence of dermatophytosis was higher in examined samples of the age group (< 2 years) than in the age group (2- > 2 years). These results were in harmony with that obtained by Nassif and Osman, (2003); Silva et al., (2003), Cafarchia et al., (2004) and Abou-Eisha et al., (2008) who found that most cases of bovine and ovine dermatophytosis were observed in young animals specially those aged less than one year except in horses, all cases were recorded in horses aged more than 6 years old. Results of equine dermatophytosis in the current study agreed with Mahmoud (1995) and Awad (1995) who found that most cases of equine ringworm were recorded in young horses, most commonly those aged 2-3 years old. From the mentioned above, it was concluded that young aged animals are more susceptible for dermatophytic infection than older ones. This higher susceptibility of young animals may be related to lack of prior exposure to infection and thus no immunity to protect those animals (Nassif and Osman, 2003 and Cafarchia et al., 2004). Regarding the dermatophyte isolates in the present study, the tabulated data in Table (6) illustrated the frequency of isolation of dermatophytes from examined animal species. It was found that the overall isolation rate of *T. verrucosum* was the highest (47.33%) followed by *T. mentagrophytes* (14%) then *T. equinum* (7.34%) and finally *M. canis* (5.33%) Moreover, *T. verrucosum* was the main isolate of culturally positive cases of cattle (48%), buffaloes (44%), sheep (64%) and horses (16%) that was agreed with Abou-Eisha et al., (2008) who observed that *T. verrucosum* was the main isolate of culturally positive cases of cattle (75%), buffaloes (50%), sheep (71.4%) and horses (25%). also, these findings were in accordance with those reported by Abou-Eisha and El-Attar (1994), Al-Ani et al. (2002), Awad Allah, (2002), Abd-el khalek, (2003) and Ghazaly, (2006). In conclusion, the isolated zoophilic dermatophytes, *T. verrucosum*, *M. canis*, and *T. mentagrophytes* form the examined farm animals reassured that these animals act as important source and reservoir of human infections with dermatophytes and reflecting the danger of contact with these animals because these agents are more inflammatory and causing sever disease than

the anthropophilic one. The overall prevalence of dermatophytosis in examined samples of the clinically suspected human patients was 82% and males' prevalence (52%) was higher than females (30%) (Table, 7). The recorded result was higher than that recorded by Bhatia and Sharma, (2014) who analyzed the epidemiological data regarding the prevalence of different dermatophyte species involved in superficial mycoses in human patients in India and found that 74 samples (36.6%) were found positive for dermatophyte spp. Also, the male to female infection rate obtained in the current study agreed with that noticed by Bhatia and Sharma, (2014) who found that males (85.14%) were higher than females (14.86%). Data presented in Table (8) clarified the age wise positivity of dermatomycosis in clinically suspected human patients. It was found that the highest prevalence was observed in the age group (15- < 30 years) followed by the age group (< 15 years) and finally the age group (> 30 years). These results were in harmony with that obtained by Bhatia and Sharma, (2014) who observed that the most affected age group was 21-50 years (64.9%) followed by 1-20 years (28.4%) and above 50 years (6.8%). The prevalence of dermatophytosis in relation to the type of Tinea was tabulated in Table (9). It was noticed that *T. corporis* constituted the highest prevalence (40%) followed by *T. pedis* (18%) then *T. capitis* and *T. cruris* (16 and 8%, respectively). these results disagreed with Khaled et al., (2015) who examined 112 patients and found

that the *T. capitis* infection had the highest prevalence among the patients (22.3%) while *T. barbae* had the lowest. The frequency of isolation of dermatophytes from clinically suspected human patients was recorded in Table (10) and revealed that *T. verrucosum* was the highest isolated dermatophyte (28%) followed by *E. floccosum* and *M. canis* (16 and 14%, respectively) and lastly *T. mentagrophytes* and *T. violaceum* (12% of each). This result was found coincided with Khaled et al., (2015) who observed that the identified dermatophyte isolates were belonged to nine species as *T. violaceum*, *T. verrucosum*, *T. rubrum*, *T. mentagrophytes*, *T. schoenleinii*, *T. concentricum*, *M. canis*, *M. audouinii* and *E. floccosum* while it disagreed with Bhatia and Sharma, (2014) who noticed that *T. mentagrophyte* was the predominant spp. (63.5%) followed by *T. rubrum* (35.1%). Based on the obtained results, it was clear that farm animals and equine were considered to be potential reservoirs for *Dermatophytes* that might constitute a zoonotic risk for human contacts. Although examined human samples were found to be negative for *T. equinum* infection, the zoonotic hazard must not be neglected and further epidemiological studies should be done to highlight the zoonotic importance. Moreover, the current status of dermatophytosis in the current study condition was revealed and the results may help in prevention and control strategies against dermatophytosis.

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