Dept. of Hygiene, Nutrition and Animal Ethology
Fac. of Vet. Med., Suez Canal Univ.
Head of Dept. Prof. Dr. M. Sobeih.

DERMATOPHYTOZOONOSES IN ISMAILIA CITY

(With 2 Tables & 2 Fig.)

By

A.M. ABOU-EISHA & A.A. EL-ATTAR*

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الفطريات الجلديه / التينيا) كمرض مشترك بين الانسان والحيوان بمدينة الاسماعيليه

عبد الكريم أبو غيشه ، عرفه العطار

تم فحص ١٦٠ من القطط وحيوانات المزرعه المختلفه (١١٦ حيوان سليم من الناحيه الظاهريه و ٤٤ حيوان مشتبه أصابتهم بالفطريات الجلديه) وذلك لمعرفة مدى الاصابه بالفطريات الجلديه .

وكانت نتائج الفحص الميكولوجى كالتالى :

فى الحيوانات السليمه ظاهريا وجد أن ١٠ حيوانات ايجابية الفحص (٦ ر٨ ٪) للفطريات الجلديه ثم عزل منهم ميكروسبورم كانيز والتريكوفيتون فيركوزم . وأتضح ان نسبة عزل فطر الميكروسبورم كانيز كانت ٣٠ ٪ فى القطط . أما نسبة عزل فطر التريكوفيتون فيركوزم كانت ٥ ر٦ ٪ فى الابقار و ٧ ر٦ ٪ فى الاغنام ، ٣ ر٨ ٪ فى الماعز مع ملاحظة عدم ظهور أعراض واضحه ومميزه للفطريات الجلديه فى هذه الحيوانات . كما أوضحت النتائج سلبية العينات التى أخذت من الجاموس والجمال السليمه ظاهريا .

وفى الحيوانات المشتبه أصابتها بالفطريات الجلديه . وجد أن فطر ميكروسبورم كانيز يمثل ٨٠ ٪ من الاصابه فى القطط وأن فطر التريكوفيتون فيوليشيم تم عزله من قطه واحده مصابه . أما نسبة عزل فطر التريكوفيتون فيركوزم كانت ٢ ر٦٩ ٪ فى الابقار ، ٣٠ ٪ فى الاغنام ، ٥٠ ٪ فى الماعز ، ٣ ر٣٣ ٪ فى الجاموس والجمال . ولوحظ أن التلامس المباشر بالابقار المصابه يؤدى الى اصابة العديد من حيوانات المزرعه الاخرى .

وأيضا تم فحص ٤٤ شخص مريض مشتبه أصابتهم بالفطريات الجلديه وكانوا مخالطين للحيوانات المختلفه ، ونسبة الاصابه بالفطريات الجلديه بين هؤلاء كانت ٢ ر ٧٣ ٪ وتم عزل منهم فطر الميكروسبورم كانيز (٢٤ عتره) وفطر التريكوفيتون فيكوزوم (٤ عتره) واتضح أن الاطفال أكثر قابليه للاصابه بتينيا الرأس والجسم المسببه بميكروسبورم كانيز عن الكبار . واختلاف الجنس لم يكن له تأثير معنوى على نسبة أصابة الانسان بالفطريات الجلديه .

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*: Dept. of Microbiology, Fac. Vet. Med., Suez Canal Univ.

SUMMARY

A total of 160 animals of various species, apparently healthy (116) and animals showing characteristic lesions of ringworm (44) were examined mycologically. In the apparently healthy animals, 10 (8.6%) out of 116 animals were had dermatophytes, Microsporum canis and Trichophyton verrucosum. Fungal elements of Microsporum canis were recorded in 30% of cats and Trichophyton verrucosum in 6.5% of cattle, 6.7% of sheep and 8.3% in goats without showing any sings of ringworm. There was no dermatophytic fungi in apparently healthy buffaloes and camels. Among the animal showing ringworm lesions, Microsporum canis infections were found in 80% of cats and the anthropophilic Trichophyton violaceum was isolated from a case of ringworm in cat. The zoophilic Trichophyton verrucosum isolated of 69.2% of cattle, 30% of sheep, 50% of goats and 33.3% of buffaloes and camels. Contact with infected cattle and fomites contaminates by the cattle are believed to have caused the infection in the other farm animals. In human patients showing characteristic lesions of dermatophytosis and had a history of animal contact; 30 (73.2%) of 44 humans had dermatophytes; Microsporum canis (24 strains) and Trichophyton verrucosum (4 strains). Children were more affected with Tinea capitis and Tinea corporis caused by the zoophilic Microsporum canis than adults. There was no evidence to support sex predisposition.

INTRODUCTION

Dermatophytes are the most frequently encountered among fungi parasitizing man, various mammals and birds. These fungi represent relatively the best known group of pathogenic fungi which invade only the skin in its superficial layers (*JACOBS, 1988 and MULLER, et al. 1989*). Zoophilic dermatophytes primarily infect animals but they may be transmitted from animals to humans *(RADENTZ, 1991)*. In humans the clinical manifestations of zoophilic dermatophyte infections are usually more inflammatory than those seen in anthropophilic fungai infections *(AHMED, 1982)*. The occurrence of ringworm lesion on people in contact with cats infected by *Microsporum canis* was recorded *(PEPIN and OXENHAM, 1986)*. In farm animals dermatophytosis may be of economic importance due to costs of

treatment, decreased skin value and weight gain *(AAMODT, et al. 1982)*. Many domestic and wild animals could carry dermatophyte spores on their coats without any signs of disease *(EL-BAHAY and REFAI, 1973)*. Despite the significance of the asymptomatic animal which has not been fully assessed in terms of their potential danger to man, many cases of human ringworm accounted for the zoophilic dermatophytes have been reported *(STEHLICH, et al. 1989)*. The frequency and extension of the infection with the aetiological agents of human and animal ringworm is of prime importance in understanding the epidemiological cycles of these fungi. The purpose of the present study was undertaken to determine the dermatophyte infections in animals and persons who have a history of animal contact in order to give a futher light on the role of animals as a reservoir for human dermatophytosis.

MATERIAL AND METHODS

Between the period from June, 1993 to April, 1994, a total of 160 animals of various species were selected from different areas at Ismailia city, 20 and 5 of cats, 31 and 13 of cattle, 30 and 9 of buffaloes, 15 and 10 of sheep, 12 and 4 of goats, 8 and 3 of camels apparently healthy and showing characteristic ringworm lesions respectively. The age of animals were estimated by examination of their teeth and also by its phenotype especially in cats.

Forty one human patients with a skin lesions and had a history of animal contact were selected from patients who were presented to Dermatology Medical Center, Ismailia City.

Sampling:

1- Apparently healthy and clinically affected animals:

The back, shoulder and hindquarter of the apparently healthy animals were brushed with sterile plastic brushes *(MACKENZIE, 1963)*.

Hairs, wool and skin scrapings were collected with a sterile forceps and scalpels from the border of the lesions of the clinically infected animals after cleaning the infected areas with 70% alcohol.

2- Infected individuals: Hair and skin scrapings were collected in sterile test tubes. Each sample was labelled with questionnaire such as name, age, sex type of skin lesions, occupation and history of the animal contact.

Microscopical and cultural examination:

Each sample was divided into two parts, one part was placed in a few drops of 10% potassium hydroxide solution on a slide covered with coverslip, left for 30-60 minutes, and

examined microscopically for the presence of characteristic fungal elements. The other part of each sample was inoculated on the surface of Sabouraud's dextrose agar to which chloramphenicol (250mg/liter) and cyclohexamide (Actidione) (500mg/liter) were added. The inoculated plates were incubated at 30°C for up to four weeks. When culture yielded colonies suggestive of dermatophytes, the species were identified by the morphology of thallus and by direct microscopic examination of hyphae macroconidia and microconidia (*REBELL and TAPLIN, 1970*). The data were analyxed by using the X^2 test.

RESULTS

The results of microscopical and cultural examination of animals for dermatophytes are summarized in table (1). Forty-three (26.9) out of 160 animals were positive for dermatophytic fungi. All isolates were identified as: *Microsporum canis* (5.6%), *Trichophyton violaceum* (0.6%) and *Trichophyton verrucosum* (13.8%) as shown in Fig(1).

In the apparently healthy animals, 15 (12.9%) and 10 (8.6%) out of 116 animals were positive for dermatophytic fungi as identified by direct microscopical and cultural examination respectively. Cats were the most highly carrier for *Microsporum canis* (30%). Fungal fragments of *Trichophyton verrucosum* were recorded in cattle (6.5%), sheep (6.7%) and goats (8.3%). There was no dermatophytic fungi in apparently healthy buffaloes and camels.

Twenty-six (59.1%) and 22 (50%) out of 44 clinically infected animals were positive for dermatophytes as identified by the previously both tests respectively. The high dermatophyte-positive rates were recorded among cats (80%) followed by cattle (69.2%), goats (50%), sheep (30%) and lastly buffaloes and camels (33.3).

Thirty-two strains of zoophilic dermatophytes species were recovered from animals. Of these, 10 strains were isolated from the apparently healthy animals including *Microsporum canis* (6) and *Trichophyton verrucosum* (4). The other 22 isolates were isolated from animals showing characteristic ringworm lesion; 3 strains of *Microsporum canis* from cats, one strain of *Trichophyton violaceum* from one case of ringworm in cat (Fig. 2) and 18 strains of *Trichophyton verrucosum* from the farm animals.

In human patients: In table (2) 30 (73.2%) of 41 human patients suffering from skin lesions were positive for dermatophytes as identified by direct microscopical and

cultural examinations. All isolates of the affected humans were 28 strains of dermatophytes identified as *Microsporum canis (24) and Trichophyton verrucosum (4). Microsporum canis* infection was recorded in patients, aging 15 years and suffered from Tinea capitis and Tinea corporis. *Trichophyton verrucosum* was isolated from patients aged 13-48 years and had skin lesions on their arms. Males (80%) showed a high prevalence of infection than females (62.3%). However, statistically, there was no significant results (P> 0.05). Generally, the human and animal specimens that yielded positive cultures for dermatophytes species were positive on direct microscopic examination.

DISCUSSION

Many domestic animals could carry dermatophyte spores on their coats without showing any signs of disease *(EL-BAHAY and REFAI, 1973).* In the present study, the apparently healthy cats were the most significant carrier of *Microsporum canis* (30%), a result which is nearly similar to that obtained by *ABDEL-HALIM, et al. (1991).* The apparently healthy cattle, sheep and goats, showed fungal elements of *Trichophyton verrucosum* (6.9%). However, there was no dermatophytic fungi in the apparently healthy buffaloes and camels. This findings indicated that cats and farm animals could carry and tolerate *Microsporum canis* and *Trichophyton verrucosum* respectively on their coats, without showing any signs of ringworm and seemed to be a major reservoir of these zoophilic dermatophytes *(SMITH et al., 1969; EL-BAHAY and REFAI, 1973 and ABD EL HALIM et al., 1991).*

Among the animals showing characteristic lesions of ringworm, our results indicated that the highest rate of *Micrsporum canis* infections was recorded in cats (80%). *JUNGERMAN and SCHWORTZMAN (1972)* reported that the *Microsporum canis* is the etiological agents of roughly 98% of the cases of feline ringworm in North America.

The anthropophilic *Trichophyton violaceum* was isolated only from one case of ringworm in cats. This result is in accordance with that reported by *REBELL and TAPLIN (1970) and AINSWORTH and AUSTWICK (1973).*

The data obtained strongly suggest that the most common cause of ringworm in the farm animals is *Trichophyton verrucosum (NASSER, 1969; REFAI et al., 1976; FOUAD et al., 1977; EL-SAYED, 1980; ABDEL-HALIM et al., 1988 and GHANEM, 1991).* Young animals are predisposed to the development of dermatophytosis, with the prevalence of infection in animals less than one year old *(SPARKES et al., 1993).* Farthermore,

contact with infected cattle and fomites contaminated by the cattle are beliveved to have caused the infection in the other farm animals *(POWER and MALONE, 1987).*

Zoophilic dermatophytes including *Microsporum canis* and *Trichophyton verrucosum,* were isolated from 68.3% of human patients with skin lesions. *Microsporum canis* was the most common zoophilic dermatophyte that infect humans *(RIPPON, 1982).* A result which coincide with that recorded by *WARNER (1984)* who observed that most cases of dermatophytosis were caused by *Microsporum canis* and cats were considered to be the important source in 77% of the 106 human cases in USA. On the other hand *Trichophyton verrucosum* infections were less common and seen most often in persons who were in contact with farm animals *(EMMON, et al. 1977).* The most frequently affected parts of the human body were located in the scalp, neck, and forearm. This may be attributed to the frequent contact of carrier animals with the exposed uncovered skin of persons *(ABDEL-HALIM, et al., 1991).*

Children were more affected with Tinea capitis and Tinea corporis caused by the zoophilic *Microsporum canis* than adults *(KEEP, 1963 and ABDEL-HALIM, et al., 1991)* In two previous studies, *GREGOR (1965) and BAXTER (1973)* have been suggested that males are more likely to develop dermatophytosis but statistically in this study and in accordance with *SPARKES, et al. (1993),* there was no evidence to support any sex predisposition. The identification of arthrospores in or around hair shaft provides conclusive proof of dermatophytosis. It is suggested that the microscopic examination of both the collected samples and the culture form an important and vital step for diagnosis and identification of suspected dermatophytosis *(SPARKES, et al., 1993).*

It was concluded that *Microsporum canis* is the most frequent agent of feline dermatophytosis in cats which are considered as one of the most important animal reservoir of ringworm in both man and animal *(REBELL and TAPLIN, 1970 and MULLER, et al., 1989).* Close contact between human suffering from anthropophilic dermatophyte *Trichophyton violaceum* infections and pets may be constituted a potential health hazard for the animal involved *(KAPLAN, 1967).* On the other hand, *Trichophyton verrucosum* is possibly the most common cause of ringworm in farm animals and it is mostly seen in persons who are contact with these animals *(JACOBS, 1988).*

REFERENCES

Aamodt, O.; Naess, B. and Sandvik, O., (1982): Vaccination of norwegian cattle against ringworm. Zentralbl Veterinarmed. (B) 29: 451-456.

Abdel-Halim, M. Youssef, H.M.; Ramadan, A.A. and Refai, M. (1988): Dermatophytosis in Egyptian sheep and goats Vet. Med. J. 36 (2), 199-206.

Abdel-Halim, M.; Itman, R.H.; Reda, W. and Nadia, S. (1991): Cats as a potential reservoir for the Zoophilic Microsporum canis and its zoonotic importance. J. Egypt. Vet.Med. Ass. 51, No. and 2, 299-307.

Ahmed, A.R. (1982): Immunology of human dermatophyte infections. Arch. Dermatol. 118; 521-525.

Ainsworth, G.C. and Austwick, P.K.C. (1973): Fungal diseases of animals, 2nd ed. weybridge, commonwealth Agricultural Bureau. PP 10.

Baxter, (1973): Ringworm due to *Microsporum canis* in cats and dogs in New zealand. N.Z. Vet. J. 21, 33-37.

El-Bahay, G.M. and Refai, M. (1973): Cats and dogs as potential carrier of *M. canis.* J. Egypt. Vet. Med. Ass. 28: 63-69.

El-sayed, M.E. (1980): Dermatophytes in domestic animals. Fac. of Vet. Med., Alexandria Univ, M.D. Thesis.

Emmons, C.W.; Binford, C.H.; Utz, J.P.; and Kwonchung, K.J. (1977): Medical mycology, 3rd ed. Philadelphia, Lea and Febiger.

Fouad, M.S.; El-Assi, J. and Refai, M. (1977): Ringworm in sheep and goats in Egypt special refernces to expermintal infection and immunization in sheep. Castellania, 5: 165-167.

Ghanem, F.M. (1991): Studies on Ringworm in buffalo-calves Ben Suef. Vet. Med. Res. Vol. No. 1: 145-149.

Gregor, W.W. (1965): Comparative physiology and pathology of the Skin. Eds A.J. Rook, G.S. Walton. Oxford, Blackwell Scientific publications p. 303.

Jacobs, P.H. (1988): Dermatophytes that infect animals and humans, Cutis, 42: 330-331.

Jungerman, P.F. and Schwartzman, R.M. (1972): Veterinary Medical Mycology. Philadelphia, Lea and Febiger.

Kaplan, W. (1967): Epidemiology and public health significance of ringworm in animals Arch. Dermatol., 96, p. 404.

Keep, J.M. (1963): A survey of *Microsporum canis* infection of cats in sydney, Aust. Vet. J. 39: 330-332.

Mackenzie, D.W.R. (1963): "Hair brush diagnosis" in detection and eradication of non-fluorescent scalp ringworm. brit. Med. J. 11: 363-365.

Muller, G.H.; Kirk, R.W. and Scott, D.W. (1989): Small Animal Dermatology, 4th ed. Philadelphia, W.B. Sannders P: 295.

Nasser, M. (1969): The zoonotic importance of dermatophytes in U.A.R. Fac. of Vet. Med., Cairo Univ. M.D. thesis.

Pepin, G.A. and Oxenham, M. (1986): Zoonotic dermatophytosis (Ringworm). Vet. Rec. 4: 110-111.

Power, S.B. and Malone, A. (1987): An outbreak of ringworm in sheep in Ireland caused by *Trichophyton verrucosum* Vet. Rec. 121: 218-220.

Radentz, W. (1991): Fungal skin infections associated with animal contact, AFP. Vol. 43, No. 4, 1253-1256.

Rebell, G. and Taplin, D. (1970): Dermatophytes, their recognition and identification 2nd ed coral Gables, Florida, University of Miami Press. 30.

Refai, M.; Ibrahim, M.S. and El-Saifi, A. (1976): Uberdas vorkommen von *Trichophyton verrucosum.* Infektionen in Agypten mit Hinweis auf die Behandlung mit Griseofulvin. Deutsch Tierarztliche woochenschrift 83 (2). 62-64.

Rippon, J.W. (1982): Medical mycology; the pathogenic fungi and the pathogenic actinomycetes. Philadelphia; saunders, 203-208.

Sparkes, A.H.; Gruffydd-Jones, T.J; Shaw, S.E.; Wright. A. I. and Stokes, C.R. (1993): Epidemiological and diagnostic features of canine and feline dermatophytosis in the united kingdom from to 1991, Vet. Rec. 17, p. 57-61

Smith, J.M.B.; Rush-Munro, F.M. and Mccarthy, M. (1969): Animals as a reservoir for human ringworm in new zealand. Aust J. Derm 10: 169-182.

Stehlich, G; Katalin G. and Ibolya, T. (1989): Tinea capitis caused by *Microsporum canis* in an adult. Mycoses, 32: 97-98.

Warner, R.D. (1984): Amer J. of Public Health, 74, 1239: cited by pepin, G.M. and Oxenham, M. (1986) zoonotic dermatophytosis (ringworm). Vet. Rec. 4: 110-111.

Table (1): Prevalence of dermatophytes among apparently healthy and clinically affected animals.

Animal species	No. of examined animals	Age	No. of positive cases for dermatophytic fungi/total No. of examined animals					Isolated strains (No.)
			Overall	Apparently healthy animals		Animals with skin lesions		
			(%)	M.E (%)	C.E (%)	M.E (%)	(C.E) %	
Cats	25	≥2 months	13/25 (52)	8/20 (40)	6/20 (30)	5/5 (100)	4/5 (80)	M.canis (9) T.violaceum (1)
Cattle	44	≤3 years	14/44 (31.8)	4/31 (12.9)	2/31 (6.5)	10/13 (76.9)	9/13 (69.2)	T.Verrucosum (11)
Buffaloes	39	≤3 years	5/39 (12.8)	0/30 (0)	0/30 (0)	3/9 (33.3)	3/9 (33.3)	T.Verrucosum (3)
Sheep	25	≤3 years	6/25 (24)	2/15 (13.3)	1/15 (6.7)	4/10 (40)	3/10 (30)	T.Verrucosum (4)
Goats	16	≤3 years	4/16 (25)	1/12 (8.3)	1/12 (8.3)	3/4 (75)	2/4 (50)	T.Verrucosum (3)
Camels	11	4-7 years	1/11 (1)	0/8 (0)	(0/8) 0	1/3 (33.3)	1/3 (33.3)	T.Verrucosum (1)
Total	160		43/160 (26.9)	15/116 (12.9)	10/116 (8.6)	26/44 (59.1)	2/44 (50)	M.canis. (9) T.Verrucosum (22) T.violaceum (1)

M.E = microscopical examination
C.E = cultural examinations
M. canis = *Microsporum canis*
T. violaceum = *Trichophyton violaceum*
T. Verrucosum = *Trichophyton verrucosum*

Table (2): The prevalence of dermatophytes among clinically affected patients.

Sex	No. of examined patients	No. of positive cases for dermatophytic fungi/total No. of examined patients			Isolated strains (No.)
		Overall (%)	M.E. (%)	C.E. (%)	
Male	25	20/25 (80)	20/25 (80)	18/25 (72)	M. Canis (15), T.Verrucosum (3)
Female	16	10/16 (62.5)	10/16 (62.3)	10/16 (62.3)	M. canis (9), T.Verrucosum (1)
Total	41	30/41 (73.2)	30/41 (73.2)	28/41 (68.3)	M. Canis (24), T.Verrucosum (4)

* $X^2 = 1.5$ ($P > 0.05$)

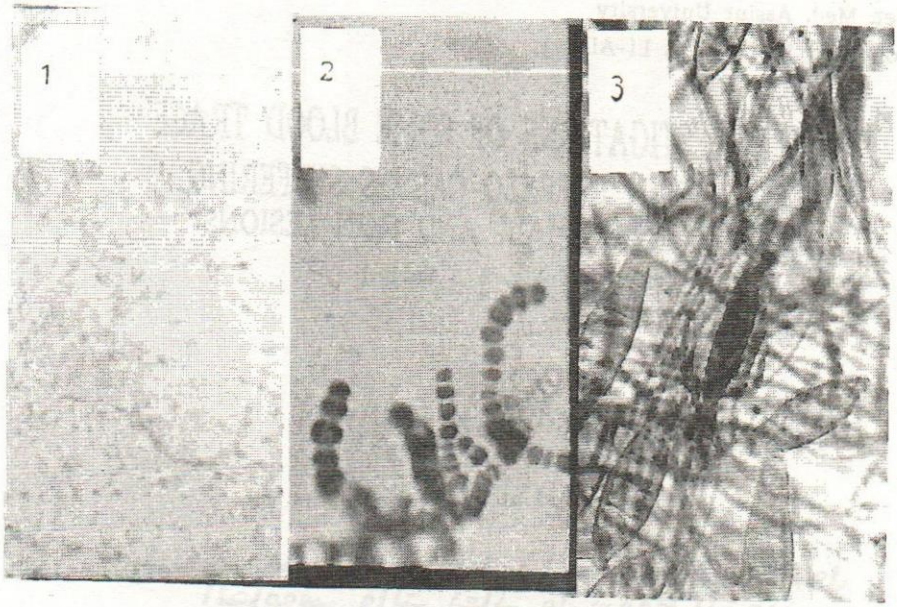

Fig (1) Photomicrographs of *Trichophyton violaceum*(1); *Trichophyton verrucosum*(2) and *Microsporum canis*(3) on Sabouraud's dextrose agar.

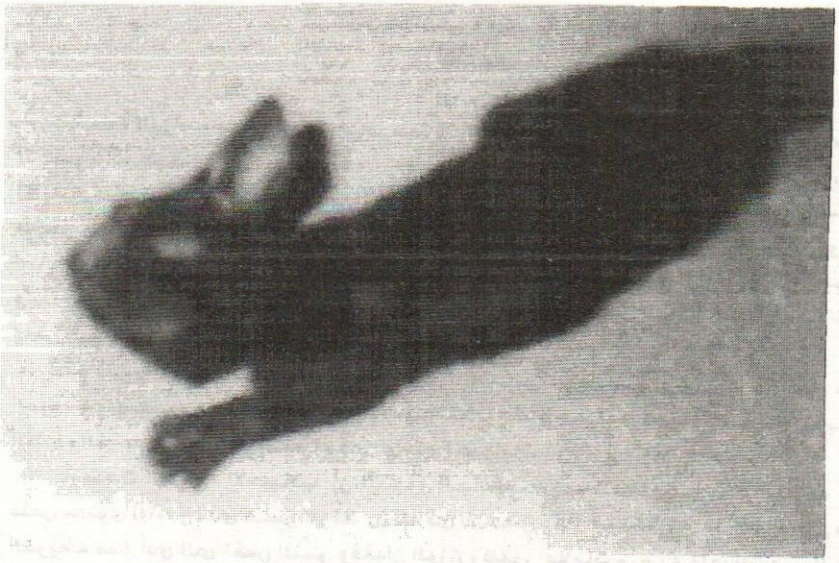

Fig (2) Ringworm lesions are noninflammatory scaly patches with hairless on the head and fore - extremitis of cat caused by *Trichophyton violaceum*.