ZOONOTIC ASPECT OF TRICHOPHYTON MENTAGROPHYTES IN RABBIT FARMS

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ABSTRACT

Epidemio-mycological studies were carried out for isolation of T.mentagrophytes in 4 rabbit farms of low hygienic condition in Kaliobia Governorate. For this purpose samples were collected from rabbits, rodents, human workers and soil. Investigation revealed that T.mentagrophytes recovered from 75 (44.11%) of rabbits complaint of skin lesions and 58 (20.71%) out of 280 apparently healthy rabbits. A total of 40 rats were trapped from the above mentioned farms and implicated in trichophyton infeetion in 5 (21.73%) and 4 (23.52%) in Rattus rattus and Rattus norvegicus respectively. Zoophilic dermatophyte T.mentagrophytes recorded in 5 (19.23%) of human workers in rabbit farms, 3 (13.63%) and 2 (50%) from apparently healthy and skin lesion respectively. Out of 40 soil samples T.mentagrophytes found in 6 (15%) soil samples. Experimental infection of Guinea pigs with the isolated T. mentagrophytes indicates the zoonotic importance of dermatophytosis caused by these isolates.

INTRODUCTION

Trichophyton mentagrophytes is a zoophilic dermatophyte of worldwide distribution (**Ajello, 1974**). Intensive mass-producting and private rabbit breeding started in recent years and at the sametime the possibility of mycotic infections spreading from animal onto man expanded, the infeeted animals constitute a constant source of zoonotic infection to farm attendants and the members of their families (**Van Custem *et al.*, 1985**). Rodents live in very close association with man and rabbit act as carrier to T. mentagrophytes infection (**Sarkisov and Nikiforov, 1981**). Polluted soil play an important role in the epidemiology of dermatophytes and other fungi to man and animals (**Haggag *et al.*, 1999**). So for the study of the epidemiology of T. mentagrophytes in rabbit farms in Kaliobia Governorate, it is essential to know their distribution in rabbits, infested rodents, human contacts and soil surrounding these farms.

MATERIAL AND METHODS

Sampling:

Four Rabbit farms of low hygienic condition, harbouring 450 New Zealand white rabbits were selected for the experiment from different localities in Kaliobia Governorate. These animals were housed in galvanized wire mesh cages in batteries on flat-deck. 170 rabbits presented with the complaint that they have lost hair on the upper lip, nose, ears and near the extremities of both fore and hind limbs. There are signs of severe itching. Collection of samples were carried out according to (**Szilli and Kohalmi, 1981**). The lesions were cleaned with 70% ethyl alcohol, and the active border of the lesion were scrapped with sterile scalpel and the scales were collected. Also stumps of broken hairs were plucked by means of sterile forceps. The collected samples were brought to the laboratory in a clean sterile folded paper.

A total of 40 apparently healthy rodents infested rabbit farms were trapped by ordinary wire cage trap and transferred to the laboratory where they anaesthetised and identified according to (**Meehan, 1984**). Tuft of hair from the face, neck, dorsal and ventral surfaces of the body and tail of the rodents were removed with sterile forceps or scissors and collected in paper wrappers as described by **Gugnani *et al.*, (1972)**.

A total of 26 human workers in rabbit farms, 22 apparently healthy and 4 persons complain of skin lesion in forearm and fingers of the hand were investigated for isolation of fungi. Skin scrapping, clippings of hair and nail were collected and analysed for dermatophytes as cited by **Sundaram *et al.*, (1986)**.

Laboratory Examination of the Collected Samples:

Direct microscopic examination by potassium hydroxide wet mount:

Hairs, nails and skin scrapping were placed in a drop of 20% potassium hydroxide on a clean slide, then covered with a cover slip, heated gently and left in humid chamber for overnight, then examined for the presence of fungal hyphae and arthrospores as described by **Quinn *et al.*, (1994)**.

Isolation of the fungi:

According to (**Emmons *et al.*, 1974**) each sample was inoculated onto slopes of sabouraud dextrose agar (SDA) containing chloramphenicol (0.05 mg/ml) and cycloheximide (0.05 mg/ml), the inoculated SDA slopes were incubated at 25°C and observed up to 4 weeks for fungal growth. The final identification of the isolates was made on the basis of macroscopic appearance of colonies of T. mentagrophytes and microscopic staining by lactophenol cotton blue as described by **Ajello *et al.*, (1976)**.

Soil Samples:

A number of 40 soil samples were collected from variety of sites of rural areas around the previous mentioned rabbit farms of different districts in Kaliobia Governorate. The samples were collected according to

(**Deshmukh and Agrawal, 1983**) from superficial layer depth not exceeding 10 cm . with plastic spoon in sterilized polythene bags and brought to the laboratory and stored at room temperature.

Hairbaiting technique for isolation of T. mentagrophytes from soil samples:

Hairbaiting technique were carried out after (**Bendek, 1962**) using human hair as keratin bait, hairs were sterilized by autoclaving at 121°C for 15 minutes and scattered on the surface of each soil sample and incubated at room temperature (22°C – 25°C) for four weeks. When the substrate become covered with growth of fungus, the latter was subcultured on sabouraud dextrose agar medium containing 0.5 gm chloramphenicol and 0.5 mg cyclohexamide, the inoculated plates were incubated at room temperature for two weeks. Growth of colonies was examined macroscopically and microscopically as previously described.

Experimental Infection:

The investigation was carried out on 25 guinea pigs free from mycosis.

Procedure:

Carried out as cited by (**Krystina and Grazyna, 1979**) suspension was prepared from T.mentagrophytes cultivated on the solid sabouraud medium in the physiological salt solution containing 5 x 10^5 living germs in 1 ml 20 experimental animals 400 – 500 gm each were infected with the germ by rubbing it on the skin partly deprived of hair in the back area for three successive days. 5 animals were kept separately in cages and used as control. The infected animals were observed for 2 months and clinical symptoms of mycosis were noted. Samples were collected from developed lesions and examined mycologically.

RESULTS AND DISCUSSION

Table (1) shows the results of isolated T. mentagrophytes from 450 New Zealand white rabbits. T. mentagrophytes investigated from 77 (44.11%) hairs and skin scrapping of 170 rabbit, with complaint of loss hair and skin lesion.

The obtained results were higher than those investigated in rabbits by (**Bohn and Lotiger, 1969**) and (**Weiss and Weber, 1983**).

From the available literature dermatophytosis in rabbit farms Belgium caused mainly by Microsporum canis (**Van Custem *et al.*, 1985**) In another study **Sarkisov and Nikiforov, (1981)** mainly isolated T. mentagrophytes from rabbits in Russian Eastern countries and concluded that in most cases the infection is introduced via carrier such as cats, dog rodents or even man. The lesion appears mostly on the head, ears and paw

There is complete or partial alopecia and the skin appears dry and scaly; slight itching is typical. The lesions may be secondarily invaded by Streptococcus pneumonia of human origin and this causes more severe and purulent infections (**Okerman, 1989**).

Trichophyton mentagrophytes isolated from 58 (20.71%) out of 280 apparently healthy rabbits. A finding in accordance with (**Szilli and Kohalmi, 1981**) who demonstrated T. mentagrophytes on the hair in 15-20% of healthy rabbits, a state called subclinical infection, in case of predisposing factors e.g. overcrowding, wet or warm climate, the subclinical infection can be the starting point of an extended endemies and fast spreading in mass-productive breeding of rabbits. Prevention of trichophytosis in rabbit in Belgium with disinfection of environment by using enilconazole spray, gave good result and no side – effect were observed (**Van Custem *et al.*, 1985**).

A total of 40 rodents trapped from the infested rabbit farms and identified as Rattus rattus and Rattus norvegicus Table (2). Mycological examination revealed that T. mentagrophytes demonstrated in 5 (21.73%) and 4 (23.52%) from R.rattus and R.norvegicus respectively. A finding substantiates those isolated from rodent in India and Nigeria by (**Gugnani *et al.*, 1972**) and (**Josephine and Gugnani, 1981**) respectively. Rodents live in very close association with man and animal so act as a carrier for dermatophytes infection on skin coat, infection due to T. mentagrophytes is transmits indirectly by rodents to man by means of residues of shed epithelium in the environment (**Acha and Szyfres, 1989**).

Regarding mycological studying of hair, nails and skin scrapping from 26 animal attendants, 22 apparently healthy and 4 with skin lesion, Table (3). T. mentagrophytes isolated from 3 (13.63%) and 2 (50%) from apparently healthy and persons with skin lesion respectively. An observation in accordance with that observed by (**Szilli and Kohalmi, 1981**).

The Zoophilic dematophyte infection caused by T. mentagrophytes implicated in tineal infection in human in Denmark (Foged and Nielsen, 1981) and in school children in Rome, Italy (**Polonelli *et al.*, 1982**). The percent of zoophilic species responsible for human dermatomycoses varies, was 21% in Peru (**Gomez Pando and Matoz Diaz, 1982**). In India found T. mentagrophytes in 56 (38.5%) from man (**Chatterjee *et al.*, 1980**), while in Nigeria T. mentagrophytes responsible for 17.1% of human dermatophytosis (**Egere and Gugnani, 1981**). **Pesterev, (1983)** for epidemiological studying of infection with T. mentagrophytes, investigated pet animals and mice in the home of 271 patients with trichophytic infection and concluded that wild mice, rats, cats and dogs are important sources of infection for the human especially children. Transmission to man occurs by direct contact with an infected animals (sick or carriers) or indirectly by means of spores on hair, and dermal scales shed by the animal, dermatophytes remain viable in shed epithelium for many months and even years (**Acha and Szyfres, 1989**).

Dermatophytosis is an annular scaling patch with raised margin showing a variable degree of inflammation, the center being usually less inflammed than the edge (**Mandell *et al.*, 1995**).

Soil samples were collected from soil of rabbit farms for demonstration of Trichophyton mentagrophytes, Table (4). Out of 40 soil samples, T. mentagrophytes found in 6 (15%).

A finding was similar to those found in soil in Madhya Pradesh, India (**Deshmukh and Agrawal, 1983**) and in Behera Province, Egypt (**Haggag *et al.*, 1999**) who concluded that the existence of T. mentagrophytes in the soil is influenced by the presence of organic matter particularly tissue debris, scales, hair, feather and feces.

The pathogenicity of the recovered T. mentagrophytes were experimentally tested using Guinea pigs. Scarification of heavy suspension of Trichophyton species produced a light traumatic lesion 2-3 days after rubbing it in the skin, followed by formation of erythmatosquamous patches. There is alopecia with scaly and dry skin. A notice agree with that noticed by (**Krystina and Grazyna, 1979**).

A successful experimental infection indicates the zoonotic importance of cutaneous mycosis caused by T. mentagrophytes.

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Table (1): T. mentagrophytes isolated from rabbits.

Rabbit	Number of examined rabbits	Positive isolates	
		Number	Percent
Apparently healthy	280	58	20.71
Skin lesion	170	75	44.11
Total	450	133	29.55

Table (2): T. mentagrophytes isolated from rodent infested rabbit farms.

Species	Number of examined rodents	Positive isolates	
		Number	Percent
Rattus rattus	23	5	21.73
Rattus norvegicus	17	4	23.52
Total	40	9	22.5

Table (3): T. mentagrophytes isolated from human workers in rabbit farms.

Human	Number of examined persons	Positive isolates	
		Number	Percent
Apparently healthy	22	3	13.63
Skin lesion	4	2	50
Total	26	5	19.23

Table (4): T. mentagrophytes isolated from soil samples.

Samples	Number of examined samples	Positive isolates	
		Number	Percent
Soil	40	6	15
Total	40	6	15

الملخص العربي

الأهمية المشتركة لفطر التريكوفيتون مينتاجروفيت في مزارع الأرانب

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أجريت دراسة وبائية لعزل فطر التريكوفيتون في أربع مزارع أرانب نيوزيلاندى أبيض بمحافظة القليوبية تشكو من سوء الحالة الصحية . اشتملت الدراسة على تجميع عينات من الأرانب ، الفئران ، العمال والتربة المحيطة . كانت نسبة فطر التريكوفيتون ٧٥ (٤٤,١١%) في الأرانب المصابة بمرض جلدي وكانت ٥٨ (٢٠,٧١%) في الأرانب السليمة أسفر فحص عينات الشعر من الفئران في هذه المزارع عن عزل الفطر بنسبة ٢١,٧٣% ، ٢٣,٥٢% في كلاً من الفأر المنزلي والفأر الزويجى على التوالي بينما كانت نسبة الفطر الجلدي في العاملين الآدميين بهذه المزارع (١٩,٢٣%) . تم تجميع ٤٠ عينة تربة حول هذه المزارع وكانت نسبة الفطر بها ١٥% من عينات التربة. كذلك تمت العدوى المعملية لخنازير غينيا عن طريق حك الجلد بالعترات المعزولة وأسفرت النتائج الإيجابية عن أهمية هذا الفطر كمرض جلدي مشترك.