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**DERMATOPHYTOSIS IN CATTLE:  
CLINICAL, HISTOPATHOLOGICAL  
AND THERAPEUTIC STUDIES**  
(With 4 Tables and 6 Figures)

By

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(Received at 25/6/2002)

دراسات إكلينيكية وباثولوجية وعلاجية عن القراع في الأبقار

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تم إجراء هذه الدراسة للتعرف على بعض الجوانب الوبائية والمناعية والتشخيصية والعلاجية لمرض القراع في الأبقار. بالفحص المعلمي تم الكشف عن فطر التريكوفايتون بنسبة 22.01% في الحيوانات التي تم فحصها. كانت الإصابة عبارة عن دوائر خالية من الشعر في مناطق مختلفة من الجلد خاصة في منطقة الرأس وحول العينين ومنطقة الأذن والرقبة. كانت نسبة الإصابة عالية في فصلي الشتاء والربيع خاصة في العجول الصغيرة في المرحلة العمرية ما بين 3 أشهر وعام. أظهرت النتائج المعملية أيضاً وجود ارتفاع معنوي في مستوى الجاما جلوبيولين وكذلك مستوى الأجسام المضادة IgG في الحيوانات السليمة عنها في الحيوانات المصابة. تم أيضاً تقييم كفاءة غسول يستخدم في العلاج بمقارنته بمحلول صبغة اليود المركز 5% حيث أعطى الغسول كفاءة عالية في العلاج.

**SUMMARY**

Out of 486 cattle examined for ringworm, 107(22.01%) cases proved to be infected with Trichophyton spp. by direct microscopy and culture methods. Histopathological studies of skin biopsies before treatment revealed marked hyperkeratosis, parakeratosis, acanthosis, acantholysis and leukocytic infiltration. Higher incidence of the disease was recorded



only rarely useful (Stervenson and Hughes, 1988; Scott et al., 1995; Carlotti and Bensignor, 1999 and Markus et al., 2001).

In Egypt, dermatophytosis was studied by many authors (Abu-Gabal et al., 1976; Abdel-Halim et al., 1988; Rafaa, 1992; Seddik et al., 1994; Awad, 1995; Abou-Zaid, 1996 and Ammar et al., 1998) with incidence varied from 10.42% to 98.3%. The aim of the present work was directed to study some epidemiological, clinical and histopathological aspects as well as sero-biochemical responses associated with dermatophytosis in cattle. Also the efficacy of Tr. Iodine and other anti fungal preparation was studied.

## **MATERIALS and METHODS**

### **1) Animals:**

For estimating the yearly incidence of dermatophytosis in Sakha farm during 2001, 486 animals of different ages were monitored for the occurrence of the disease (longitudinal study).

### **2) Mycological examination:**

#### **a- Skin scraping:**

It was done according to Kely (1984).

#### **b- Direct microscopic examination:**

The scraping and hair were placed in a 20% potassium hydroxide solution on a clean slide, then covered with a cover slip and gently warmed. After appropriate amount of time for clearing the debris, the slides were examined under microscope with reduced lighting for the presence of hyphae and arthrospores as described by Koneman and Roberts (1985).

#### **c- Culture:**

Skin scraping and hair were inoculated on Sabouraud Dextrose Agar media with chloramphenicol and cyclohexidone (actidione) and Kept at 27°C for at least 3 weeks. The resultant colonies were identified according to (St-Germain and Summerbell, 1996).

### **3) Histopathological examination:**

Skin biopsies of entire skin were taken from the affected parts as well as 10 days after treatment. The biopsies were immediately fixed in 10% neutral buffered formalin for 24 hours, stained with H&E covered, dried and examined microscopically (Carleton et al., 1967).

### **4) Biochemical analysis:**

Blood samples were collected from jugular vein of the examined animals and left for serum separation. Total serum protein were



abscess (Fig. 4). The hair structure never seen above the surface of epidermis. The remaining intra-epidermal part showing invasion with round refractile eosinophilic arthrospores of the causative fungal agent. The underlying dermis was more or less mildly affected with mild focal leukocytic infiltration (Fig. 5).

Concerning the distribution of infection among animals, it was observed that animals of age group from 3 months to 1 year appeared to be more susceptible, followed by animals of age group from 1 year to 2 years and lastly animals of age group from 1 day to 3 months old (Table 1).

Table 1: Incidence of ringworm in relation to age

Age	No. of animals examined	No. of animals infected	Incidence
3 days – 3 M	52	10	19.23
3 M – 1 year	110	46	41.82
1 year – 2 year	124	36	29.3
Animals > 2 year	200	15	7.5
Total	486	107	22.01

Table 2: Incidence of ringworm in relation to season

Age	No. of animals examined	No. of infected animals	Incidence
Winter	486	53	10.9
Spring	486	36	7.4
Summer	486	12	2.46
Autumn	486	6	1.23

Regarding the seasonality, ringworm was most common in winter (10.9%), followed by spring (7.4%) then summer (2.46%) and lastly Autumn (1.23%).

Electrophoretic pattern of the obtained sera showed variation in the levels of total protein, globulin, Albumin: globulin ratio and between different fraction of the globulins as shown in Table (3).

Table 3: Mean  $\pm$  SE of total protein and electrophoretic pattern in examined calves.

Animal Status	Total Protein G/dl	Albumin G/dl	Globulin G/dl	Albumin/Globulin Ratio	$\alpha$ Globulin G/dl	$\beta$ Globulin G/dl	$\gamma$ Globulin G/dl
Healthy N= 10	7.51 $\pm$ 0.64	2.61 $\pm$ 0.27	4.9 $\pm$ 0.51	0.53 $\pm$ 0.022	0.81 $\pm$ 0.40	0.65 $\pm$ 0.08	3.44 $\pm$ 0.236
Infected N=10	6.57 $\pm$ 0.64	2.60 $\pm$ 0.24	3.97 $\pm$ 0.50	0.65 $\pm$ 0.027	0.81 $\pm$ 0.13	0.63 $\pm$ 0.16	2.53 $\pm$ 0.35

\*: Significant at P<0.05

To results of ELISA from measuring serum total immunoglobulins IgG and IgM as shown in Table (4) showed high levels of the total IgG in healthy calves than infected ones.

**Table 4:** Results of ELISA (mean  $\pm$  SE of O.D.) for measuring immunoglobulin titers in examined animals.

Animals status	IgG	IgM
Healthy	0.92 $\pm$ 0.04	1.6 $\pm$ 0.24
Infected	0.7 $\pm$ 0.03**	0.91 $\pm$ 0.13

\*\* : Sugbucab at P<0.001

Treatment of infected animals using tincture iodine 5% needs more time and more application whereas treatment using preparation containing benzoic acid, salicylic acid, and lactic acid in absolute ethanol gave rapid and good clinical and mycological response after only 4 applications one day interval. Moreover, histopathological examination of skin biopsies collected 10 days after application of medicament revealed complete resolution of hyperkeratosis and crusts, the acanthosis previously described have disappeared. The hair started to grow normally. The skin completely returned to normal histological structure (Fig. 6).

#### DISCUSSION

The hazard of zoonotic infection and reduction of animal price gave ringworm in cattle a major attention.

Incidence of ringworm was recorded in 22.01% of the examined animals. Nearly similar results were recorded by Arslan et al. (1993). Higher incidence was recorded by (Perez-Ruano et al., 1997 and Gyllensvaan, 1999). On the other hand lower incidence was recorded by (Dai et al., 1990; Rashid et al., 1996 and Ammar et al., 1998). The differences in the incidence among studies may be attributed to the degree of environmental contamination in each locality, housing system, hygiene, intensity of animal population and animal susceptibility.

*Trichophyton verrucosum* was the only dermatophyte detected in this study, in accordance to the results recorded previously by Ammar et al. (1998) and Rhaymah (1999). Records from the farm under study revealed endemic nature and annual occurrence of dermatophytosis especially *Trichophyton verrucosum*. This observation may be attributed to the survival of dermatophytes spores viable in shed epithelium for many months and even years (Acha and Szyfres, 1989).

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recorded in winter and spring. This finding agrees to that reported previously by (Fadlelmula et al., 1994 and Ammar et al., 1998) who recorded a high prevalence in July and a minimum prevalence in March.

Serum biochemical analysis revealed non significant alteration in total serum protein, albumin, alpha and beta fractions of globulin between the infected and clinically healthy animals. In contrast gamma globulin fraction showed a significant increase in clinically healthy ones. In addition, the total serum immunoglobulins (Ig) G were significantly higher in healthy animals than in infected ones whereas the total immunoglobulins (Ig) M showed non significant differences. The significant decrease in gammaglobulin in infected animals than normal one indicated that the immune response against ringworm are mainly occurred via cell mediated immune response (Koed, 1997 and Lund et al., 2001).

The preparation containing 2.5%, Benzoic 2.5 % Salicylic acid and 2% lactic acid in absolute ethanol offer efficient result in eliminating the infection with 100 recovery rate after only 4 application one day interval. The efficacy of the preparation is due to the acidity as well as the antifungal activity of its components (Perscott et al., 2000 and Maddison et al., 2002). In addition examination of skin biopsies taken 10 days after treatment confirm the efficacy of the medicament in returning the skin to its normal histological structure.

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Fig.1. Lesions of ringworm in Friesian calves.

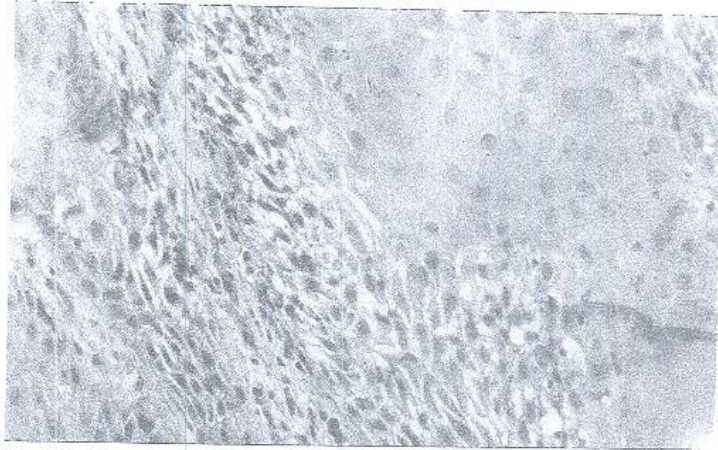


Fig.2.Epidermis showing swelling of spines of brickle cell layers with marked acanthosis. H&E (X400).

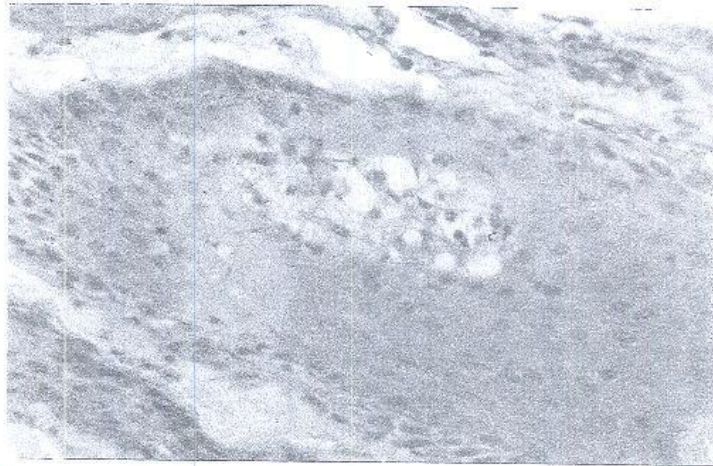


Fig. Epidermis of calf infected with *T. verrucosum* showing intra epidermal vesicles formations. H&E (X400).

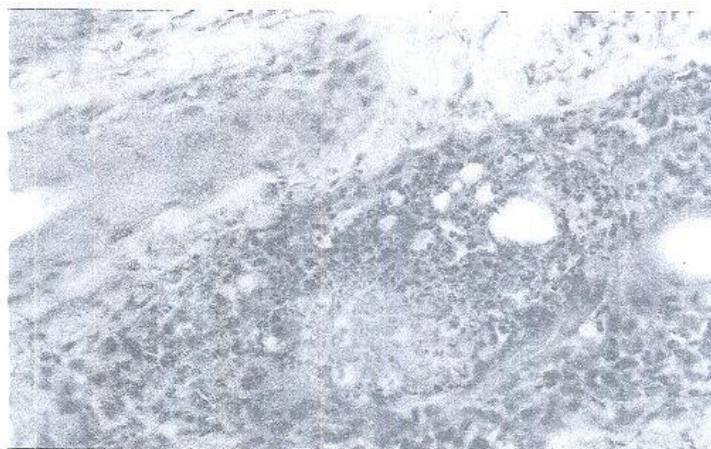


Fig.4. Epidermis of calf infected with *T. verrucosum* showing intra epidermal abscess formation and focal infiltration of inflammatory cells in dermal papillae. H&E (X400).

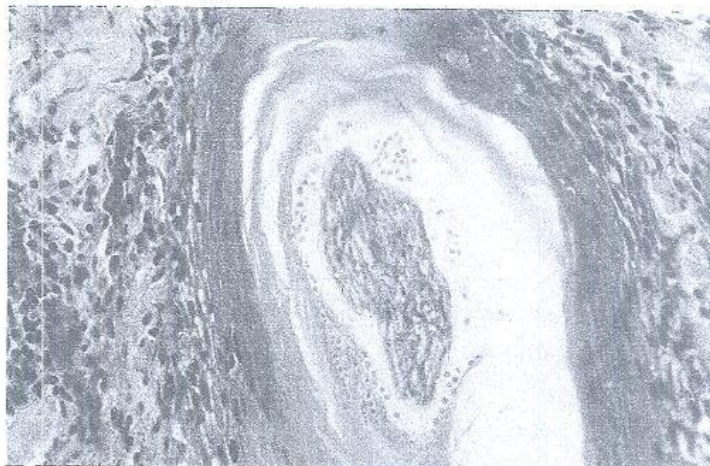


Fig.5. Epidermis of calf infected with *T. verrucosum* showing presence of arthrospores within destroyed hair with focal leukocytic infiltration in dermis. H&E (X400).



Fig.6. Normal histological structure of skin biopsies after treatment. H & E (X400).