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Research Article

Natural Ovine Dermatophilosis: Clinical Aspects and Efficacy of Penicillin/Streptomycin Treatment

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Abstract: This is the first report about natural *Dermatophilus congolensis* infection in Turkey. Presumptive and confirmatory diagnoses were made based on clinical signs and the demonstration of the bacteria frorn scab material by direct microscopic examination and by culturing the organism on bacteriological media and identifying it by conventional methods such as biochemical reactions.

The study was carried out using two groups of animals. Seventy sheep and 20 goats, 8-11 months old were included in group 1 and 155, 1-4 weeks old lambs in group 2. Ten sheep and five goats in the first group and 10 lambs in the second group were allocated as control groups. In group 1, the animals were treated daily with 20.000 IU Benzilpenicillin procaine and 20 mg Dihydrostreptomycin mixture per kg body weight for 5 days. Antibiotic sprays were applied locally. In the second group, lambs were treated daily with intramuscuIer injection of the same antibiotic for 3 days at the same dose.

Differences between treated and untreated sheep in terms of recovery were highly significant ($p < 0.01$) in week 5 and ($p < 0.001$) in weeks 6, 7 and 8. Compared to untreated lambs, a statistically significant difference ($p < 0.001$) was found in treated lambs in weeks 2 and 3 after treatment.

Key Words: Sheep, Lambs, *Dermatophilus congolensis*, penicillin/streptomycin, treatment

Doğal Koyun Dermatofilozisi: Klinik Görünüm ve Penisilin/Streptomisin Tedavisinin Etkinliği

Özet: Bu araştırma, Türkiye'deki doğal *Dermatophilus congolensis* hakkındaki ilk rapordur.

Ön tanı ve kesin tanı; klinik bulgular, lezyonlu bölgelerden alınan materyalin direkt mikroskobik muayenesi, besi yerinde organizmanın kültürünün yapılması ve geleneksel biyokimyasal metotlarla bakterinin türünün saptanmasıyla yapıldı.

Çalışma 2 hayvan grubunda yürütüldü. 8-11 aylık 70 koyun ve 20 keçi (1. grup) ve 1-4 haftalık 155 kuzu (2. grup). 1. grupta 10 koyun ve 5 keçi ve 2. grupta 10 kuzu kontrol grubunu oluşturdu. 1. gruptaki hayvanlar 5 gün boyunca kilogram vücut ağırlığına 20000 IU benzil penisilin prokain ve 20 mg dihdrostreptomisin kombinasyonu ile günlük olarak tedavi edildi. Lokal olarak antibiyotikli sprey kullanıldı. 2. gruptaki kuzulara 3 gün boyunca aynı dozda aynı antibiyotik kasiçi enjeksiyonu şeklinde günlük olarak tedavi edildi.

Tedavi edilen ve edilmeyen koyunlar arasında iyileşme yönünden 5. haftada ($p < 0.01$), 6, 7 ve 8. haftalarda ($p < 0.001$) oldukça önemli farklar saptandı. Tedavi edilmeyen kuzularla karşılaştırıldığında tedaviden sonraki 2. ve 3. haftalarda tedavi edilen kuzularda iyileşme yönünden oldukça önemli ($p < 0.001$) fark gözlendi.

Anahtar Sözcükler: Koyun, Kuzu, *Dermatophilus congolensis*, Penisilin/Streptomisin, Tedavi

Introduction

Ovine dermatophilosis is a contagious zoonotic skin infection of sheep, goats and lambs caused by the bacterium *Dermatophilus congolensis*. This disease causes an acute and chronic skin disease resulting in hard masses of scabs on the skin and wool of sheep (1,2). The disease has a world wide distribution and a wide range of hosts including man (3,4). It causes significant economic losses such as restriction of movement, reduced wool production, treatment costs, loss of condition or even death in ruminants. (5-7).

Dermatophilosis occurs frequently in severely malnourished and poor-condition animals. The other epidemiological factors that have been implicated in the

cause, spread and resolution of the disease are rainfall, humidity, high ambient temperature, ectoparasites and carrier animals. The disease has been reported to be transmitted by direct contact with infected animals. (4,5,8-10).

In dermatophilosis, clinical prevalence depends closely on environmental conditions. In some affected sheep widespread severe chronic lesions develop, while others develop less severe signs and even recover spontaneously (11-13). The lesions mainly affect the epidermis and may occur widely over the body and result in a marked buildup of exudate causing extensive matting of the fleece. Patches of wool are easily detachable by hand. There are scabs and many areas of wool are covered by a crust. In the most extreme cases, the whole skin of a sheep can be covered by scabs. In typical dermatophilosis lesions, the local lesion appears as an area of matted hair or fleece which may sometimes be detached together with a moist crust. The detached hair and crust usually resembles a camelhair paint brush. In sheep, the most noticeable features are scab lesions on the ears and muzzle area, particularly in lambs (14-16). Intense pruritis may be observed on occasion (2,4).

The diagnosis of dermatophilosis is primarily based on the clinical signs and the demonstration of the micro-organism in a direct microscopic examination of Giemsa-stained smears prepared from scab lesions. Confirmatory diagnosis of the disease may be achieved by culturing the microorganism on bacteriological media and identifying the bacteria by conventional methods such as biochemical reactions. In differential diagnosis, fungal infection (particularly with the trichophyton species) and infestation with skin parasites (such as the demodex and psoroptes species) have been stressed. The disease may also be confused with orf, lumpy skin or foot and mouth disease (1,4,17-19).

In the treatment of Dermatophilus congolensis, antibiotics are preferred and the animals can be successfully treated after parenteral administration (6,7,20,21). The causing bacterium is highly sensitive in vitro to a wide range of antibiotics. Erythromycin, spiramycin, penicillin G, ampicillin, chloramphenicol, the streptomycines, amoxicillin, the tetracyclines and novobiocin were shown to have potential use for the treatment of dermatophilosis (4,21). However, sometimes a second antibiotic treatment is necessary (11). Some researchers used local preparations such as Hibitane (11) and 0.2% organic iodine (1) for the resolution of skin lesions with parenteral antibiotic applications. Usually, a combination of penicillin / streptomycin are preferred and have been suggested in various doses (1,9).

The present trial describes the clinical signs of dermatophilosis that were first reported in sheep, goats and lambs in Turkey and therapeutic efficacy of penicillin / streptomycin combination on this infection.

Materials and Methods

Observations were carried out on two animal groups. Animals clinically suspected of dermatophilosis were examined and their lesions were classified as active if they were visually and palpably attached to the skin. The distribution of lesions on affected animals was recorded. The affected areas of the body on each animal were scored on a scale from 1 to 4: size 1-lesions on all parts of the body; size 2-neck, back, flank and tail affected; size 3-lesions on head, ear, muzzle, face and near mouth; or size 4- limbs, legs and feet affected.

In group 1, 70 Akkaraman sheep and 20 goats which were 8-11 months old with naturally infected *Dermatophilus congolensis* were identified from a flock consisting of about 350 animals (300 sheep and 50 goats) in October 1999. These animals were affected severely by a chronic form of the disease. Group 2 was made up of 155 Akkaraman lambs which were 1-4 weeks old and affected with dermatophilosis. These animals were identitied from a flock consisting of 325 in March 2000. The lambs were affected less severely than group 1 and had an acute form of the disease. All these animals with dermatophilosis were found in Ekinciler village near Diyarbakır.

The first presumptive diagnosis of dermatophilosis was made on the basis of clinical signs and the demonstration of the bacteria in a direct microscopic examination of Giemsa-stained smears. For these, each lesion on the animals was recorded and scab material was collected from the internal surface of the scabs. Then confirmatory diagnosis was made by culturing the organism on bacteriological media (blood agar) and the identification of the bacteria was performed by conventional methods such as biochemical (*Dermatophilus congolensis* was fully identified by catalase +, gelatin hydrolysis +, nitrate reduction +, urease production +,

glucose +, mannitol +, and indole -, arabionose -, dulsitol -, lactose -, sorbitol -) reactions (22-24). Sheep were then weighed, marked by ear tags and ranked in order of body weight.

In group 1, the animals were treated daily with deep intramuscular injection into the semitendinous muscle of 20.000 IU Benzilpenicillin procaine and 20 mg Dihydrostreptomycin (Reptopen-S; Sanofi Doğu İlaç A.Ş.) per kg body weight for 5 days. Antibiotic sprays containing chloramphenicol and gentian violet (Piyedif; Sanofi Doğu İlaç AŞ.) were applied locally. Because of lesions unresolved and bacteria found in scab material, four sheep and six goats were retreated in the third week. In group 2, the lambs were treated daily with an intramuscular injection of the same antibiotic for 3 days at the same dose.

Fifteen animals in group 1 (10 sheep and five goats) and 10 lambs in group 2 were allocated as untreated groups.

After treatment, the animals were clinically re-examined weekly for 8 weeks. In this period untreated animals were also checked. The animals in the two treated groups were classified as completely cured if all the identified lesions were resolved.

Fisher's Exact Test (25) was used to assess the statistical significance of the results.

Results

The clinical observations throughout the study are outlined for the two groups in Tables 1 and 2 and for group 1 in Figures 1-6. In this trial mild-severe degrees of chronic dermatophilosis lesions were obtained in group 1 while mild degrees of acute dermatophilosis signs were found in group 2. In addition the goats had severer lesions than the sheep in group 1.

Details of treatment allocation are provided in Table 3. The lesions were beginning to heal and the scabs had started to detach from the skin 2-3 weeks after treatment on some sites of the animals in group 1. Complete recovery was achieved about 4-8 weeks later, depending on the severity of the lesions in this group. The retreated four sheep and six goats in group 1 also completely recovered in the fifth week after the second

Table 1. The localisation of the lesions on the affected areas of the body in treated and untreated animals.

	Treated animals			Untreated animals		
	group 1		group 2	group 1		group 2
	sheep	goats	lambs	sheep	goats	lambs
Size 1	17	15	0	2	2	0
Size 2	26	4	5	4	1	2
Size 3	15	0	119	3	2	5
Size 4	12	1	31	1	0	3

Table 2. Number of each observed active lesion type on the body of affected animals before treatment.

	Treated animals			Untreated animals		
	group 1		group 2	group 1		group 2
	sheep	goats	lambs	sheep	goats	lambs
Thick/hard multiple scabs	63	20	125	10	5	7
Erythema/papule formation			30			3
Wool/hair loss or matted area	60	17	15	10	5	2
Thick/fold skin area	25	15	0	2	3	0
Dandruff	35	15	25	3	4	6
Pruritis	10	2	18	2	2	2

Figure 1-6.

application. In group 2, resolution of the lesions started in the first week and complete recovery was obtained in the third week after treatment.

In group 1, the differences between treated and untreated sheep were significant ($p < 0.001$) by week 5 and ($p < 0.001$) in the seventh and eight weeks. Statistically significant results ($p < 0.05$ and $p < 0.001$) were obtained between treated and untreated goats in weeks 7 and 8, respectively. Compared to untreated lambs, statistical significance ($p < 0.001$) was found in

Table 3. Number of completely cured animals in two treated groups after treatment.

Week	1	2	3	4	5	6	7	8
Sheep				4	28**	53***	63***	70***
Goats				1	2	5	13*	20**
Lambs	13	130**	155**					

*: $p < 0.05$ **: $p < 0.01$ ***: $p < 0.001$

treated lambs in weeks 2 and 3. No pruritis was observed in all treated animals of the groups, while some of the control group animals showed pruritis.

Discussion

In this study we diagnosed dermatophilosis primarily based on clinical signs and the demonstration (isolation and identification) of the microorganism from scab material (2,5,17,18,20).

This trial confirms previous reports (8,10,12,13) about the causes and predisposing factors of dermatophilosis in sheep, goats and lambs. All animals with dermatophilosis were malnourished, while some of them also had ectoparasites such as mites, lice, fleas and ticks. In addition, some stress factors such as overcrowding, high temperatures and rainy weather were present.

We observed in both treated and untreated groups (Tables 1,2 and Figures 1-6) similar lesions to those reported by other authors (1,2,5,20) previously for infected sheep, goats and lambs with Dermatophilus congolensis. In this study, the clinical symptoms observed in the group 1 treated and untreated sheep and goats were thicker and harder multiple scabs, variable degrees of wool or hair loss, matted hair or fleece area, thickening and folding skin area and heavy dandruff. In this trial, we observed that goats were more severely affected than sheep, with lesions covering all parts of the body in many goats. In treated and untreated lambs (group 2) the lesions were the foci of erythema and/or papule formation, varying degrees of scabs and matted hair area.

Pruritis was observed in a few animals in both the treated (10 sheep, two goats and 18 lambs) and untreated (two sheep and two lambs) groups, thus supporting Linklater and Smith (2) and Zaria (4) who reported pruritis in dermatophilosis.

In the treatment of dermatophilosis, a number of antibiotics are known to be effective against *Dermatophilus congolensis* (7,20,21). Apparent success has been reported after parenteral treatment with a mixture of penicillin and streptomycin (1,11,15). On the other hand, some researchers reported that clear benefits were not observed in the treatment of ovine dermatophilosis with antibiotics (6).

The results of the treatment in this study are shown in Table 3. The lesions were beginning to heal and scabs had started to detach from the skin 2-3 weeks after treatment on some sites of sheep and goats in group 1. In group 2, resolution of the lesions started in week 1. These results support the findings of previous studies (11,15) that resolution of the lesions were observed on some sites of animal a few weeks after treatment.

Complete recovery was achieved in about 4-8 weeks according to the severity of the lesions in group 1 treated sheep and goats. In this group, four sheep and six goats with residual dermatophilosis were treated again and these also comptetely recovered on the week 5 after a second application. In the group 2, the lambs completely recovered on week 3 after treatment.

In group 1, the differences between treated and untreated sheep were significant ($p < 0.01$) on week 5 and ($p < 0.001$) on weeks 6, 7 and 8. Statistical significance ($p < 0.05$ and $p < 0.001$) were obtained between the treated and untreated goats in weeks 7 and 8, respectively. Although some differences between treated sheep and goats were identified in recovery time because of lesions severity, complete recovery was obtained in all in week 8. Compared to untreated lambs, statistical significance ($p < 0.001$) was found in treated lambs on weeks 2 and 3. No pruritis was observed in all treated animals in both groups after treatment while some animals in the control groups had pruritis.

According to these findings, we obtained significantly better results in the two groups of treated animals

compared with untreated animals. These benefits were observed despite the fact that the animals had been exposed to the same predisposing factors. This work confirms previous reports (1, 11) indicating that complete recovery was seen after parenteral treatment with a mixture of penicillin and streptomycin.

In conclusion, *Dermatophilus congolensis* infection was diagnosed for the first time in Turkey. This trial demonstrated that sheep, goats and lambs were successfully treated with a penicillin/streptomycin mixture. Antibiotic sprays have to be applied locally on more severely affected animals. However, a second application may be necessary in severely affected sheep and goats on which healing of lesion had not started by the third week.

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