

An outbreak of atypical dermatophilosis mixed by *Pseudomonas aeruginosa* in a sheep herd after dipping

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Abstract:

Dermatophilosis is a bacterial skin infection and wet conditions like, raining and dipping predispose sheep to it. A great economic loss can be caused by this disease because of its effect on the quality of wool. In Iran (near Saveh), there was an outbreak of the disease in a herd and the clinical manifestation was different from that of typical dermatophilosis. Diffuse wide alopecic area accompanied by large amount of purulent discharges were seen. The main lesions were located at the thoracic area. Secondary infection caused by *Pseudomonas aeruginosa* and bacteremia caused by staphylococcus was diagnosed and is considered to be the cause of 0.16% mortality. For diagnosis blood samples were obtained for CBC, and bacteriological culture and direct smear were taken from skin lesions. Biopsy was also prepared from skin lesions for histopathologic study and bacteriologic culture. Direct microscopic examination was made on Giemsa-stained smear prepared from crusts and their underlying tissue. Gram stained smear was also prepared from underlying crusts of skin. After bacteriological and histopathological evaluation, Dermatophilus was determined. A typical railroad track of Gram positive bacteria was seen in Gram and Giemsa stained smear. Filamentous bacteria in the epidermis were seen in histopathological samples. Infection was controlled by treating herd intramuscularly with 70,000 mg/kg BW procaine penicillin G, twice daily for 5 consecutive days.

Introduction

A herd, which consisted of 5000 sheep, had been kept out of shelter by the time of disease occurrence. One hundred and twenty (120) out of the 5000 sheep were infected (2.4% morbidity) and 8 died (0.16% mortality).

It was discovered that one month before

being referred to the hospital (October), the animals were dipped. Dipping was followed by moderate rain which delayed drying of the skin.

Clinical Presentation

Clinical examination revealed asymmetrical

complete loss of wool, especially at the thoracic, lumbar and neck regions. In some cases, the alopecic area had purulent discharge with putrefaction odor. The alopecic area was not pruritic, some areas had thick scabs which moved easily. The underlying skin was reddened (Fig. 1). In affected animals, 5 sheep had toxemic signs including hypothermia, recumbency, dehydration and lethargy.

Diagnostic Tests

After clinical examination, blood samples were taken for CBC and bacteriological culture and direct smears were taken from skin lesions, while biopsy was prepared from the skin lesions for histopathological study and bacteriological culture.

Tissue specimens were fixed in 10% neutral buffered formalin, embedded in paraffin and sectioned at 5 micron thickness by microtome LEICA RM 21 35 model and stained by the H&E method.

Direct microscopic examination was carried out on Giemsa-stained slides into smears prepared from crusts and their underlying tissue. Gram stained slides were also prepared from underlying crusts of skin. Bacteriological cultures were made from 5 samples and *Dermatophilus* was identified. The organism *Dermatophilus* was confirmed from Giemsa and Gram stained slides.

Blood culture from toxemic sheep showed bacteremia by *Staphylococcus*, mixed bacterial infection was the cause of mortality. Bacteriologic culture from purulent discharge showed a mix of *Pseudomonas aeruginosa* and *Dermatophilus*.

Pseudomonas acts as an opportunistic pathogen and can grow very quickly on skin lesions. In fact, the purulent discharge from some cases was mixed with *Pseudomonas* but the primary pathogen was *Dermatophilus*.

In Gram and Giemsa stained slides, a typical "railroad track" cocci was seen and zoospores

could be seen in some slides (Figs. 2 and 3).

At clinical examination, the prominent finding was a thick crust in the non-pruritic alopecic area; wool easily separated by pulling from skin and crusts moved easily, with a reddened underlying surface.

Histopathology findings were parakeratosis and mild hyperkeratosis with degenerated neutrophils, followed by degenerative changes in the stratum spinosum. The epidermis contained filamentous bacteria. Figure 4 shows the basophilic bacterial colonies on the surface of the epidermis

The herd was moved to a dry and warm shelter. The herd was treated by administering 70,000 mg/kg BW Procaine Penicillin G intramuscularly, twice daily for 5 consecutive days. The initiation of improvement appeared after 48 h, infection was controlled and incidence of new patients stopped.

Assessments

Dermatophilosis is a contagious bacterial disease of the skin caused by *Dermatophilus congolensis*. *Dermatophilus* is a Gram-positive, aerobic bacterium which produces motile zoospores. The organism is considered as an obligate parasite of ruminant skin and was not thought to survive for a very long time in the soil. Studies have shown that it may survive for several months, especially within cast-off crusts (Roberts, 1963; Martinez, 1991). Latently infected animals may serve as the major reservoir of infection (Stewart, 1972). The organism persists in dry scabs and crusts, and can survive in the environment for long periods (up to 42 months) (Martinez, 1991). Some risk factors predispose the host to infections, the most important environmental risk factors are heavy rainfall and dipping of sheep for external parasite. Wetting of skin and wool leads to dilution of a sebaceous layer of skin and losing the protective effect of this layer. Dermatophilosis is epizootic in tropical and



Figure 1. Alopecic area with purulent discharge (arrow).

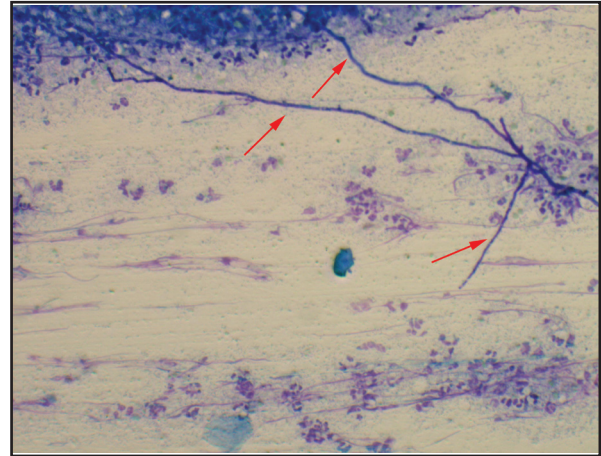


Figure 2. Direct smear (Giemsa stained), branching bacterial filamentous composed of cocci (arrow).

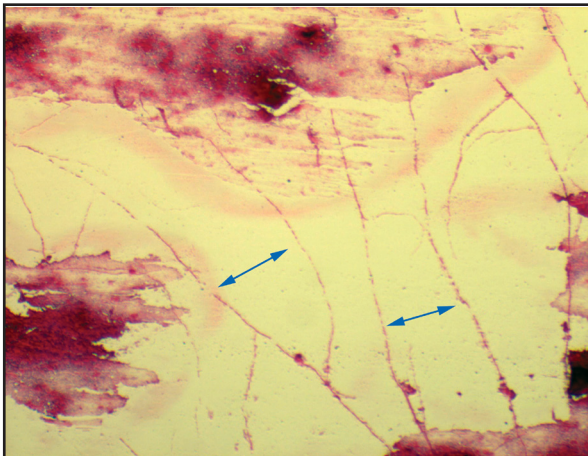


Figure 3. Direct smear (Gram stained), typical railroad track of gram positive cocci (arrow).

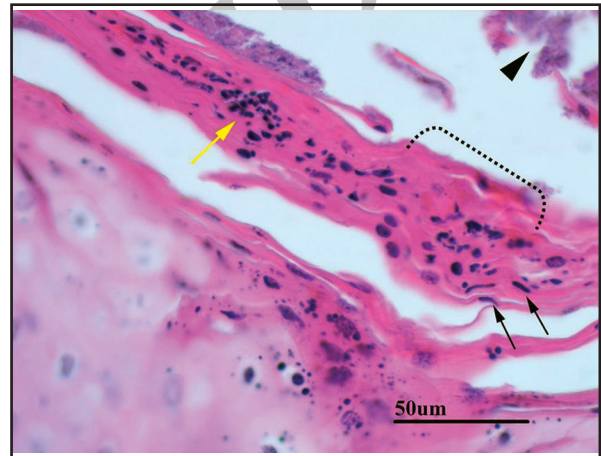


Figure 4. Note the bacterial filament (black arrow) and bacterial colony on the surface (arrow head). Neutrophil filtration has been shown by arrow (yellow arrow). Region of hyperkeratosis has shown by dashed line. (H&E satined).

subtropical areas of the world and can lead to considerable economic loss (Radostis, 2007).

The dependence of the release of zoospores on wetting, and the effects of heat on survival and bacterial competition, suggests that transmission would be favored by cold wet weather (Roberts, 1963). Raining and dipping in autumn are predisposing factors, if wool remains wet (Amabrose, 1996). Long-term survival of this organism in soils mixed with water suggests that ponds and dipping tanks may constitute sources of infection (Martinez, 1991). Outbreaks are rare but have been reported (Larsen, 1987). In adults, lesions tend to be on the muzzle, in the dorsal midline, or on the scrotum or distal legs (Yeruham, 2003). Lesions have been reported in the ears of kids at 5 days of

age (Mullowney, 1984). In a report of outbreak in sheep flock, lesions were most prominent on the lips (Wabacha, 2007). Although the condition is relatively rare, it may be fatal in livestock debilitated by other diseases and poor nutrition. In this study, case fatality was 0.16% and mix infections by *Pseudomonas aeruginosa* and bacteremia by *Staphylococcus* was found in dead animal. The findings which differentiate this report from similar study are clinical manifestations. Typical findings in Dermatophilosis are crust with exudative secretion with consequent matting of groups of hairs 'lumpy skin' (Scott, 2007). From the observation of this study, considerable findings were: Remarkable alopecia in all cases and

wool loss, wool could be pulled easily from skin, there was no pain or itching at lesions, and some lesions were seriously infected (Figure 1) causing *Pseudomonas aeruginosa* to become isolated from purulent secretions.

Dermatophilosis is a zoonotic disease (Hyslop, 1979) but from the outbreak discussed in this study, no one in contact with the infected sheep suffered from skin lesions.

Control programs should be a priority since this disease can cause economic loss. In conclusion, control strategies need to reduce the risk of transmission, minimize exposure of animals to stressors that enhance the risk of infection, and enhance resistance through genetics or vaccines (Norris, 2008).

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References

1. Amabrose, N.C. (1996) The pathogenesis of dermatophilosis. *Trop Anim Health Prod.* 28: 29-37.
2. Hyslop, N.S. (1979) Dermatophilosis (streptothricosis) in animals and man. *Comp Immunol Microbiol Infec Dis.* 2: 389-404.
3. Larsen, J.W.A. (1987) An outbreak of mycotic dermatitis in goat kids. *Aust Vet J.* 64: 160.
4. Martinez, D., Prior, P. (1991) Survival of dermatophilosis congolensis in tropical clay soils submitted to different water potentials. *Vet Microbiol.* 29: 135-145.
5. Mallowney, P.C., Baldwin, E.W. (1984) Skin diseases of goats. *Vet Clin North Am Large Anim Pract.* 6: 143.
6. Norris, B.J., Colditz, I.G., Dixon, T.J. (2008) Fleece rot and dermatophilosis in sheep. *Vet Microbiol.* 128: 217-230.
7. Radostis, O.M., Gay, C.C., Hinchcliff, K.W., Constable, P.D. (2007) Diseases associated

with bacteria – IV. In: *Veterinary Medicine: A text book of the Diseases of Cattle, Sheep, Pigs, Goats and Horses.* (10th ed). W.B Saunders. London, UK. p. 1048-1051.

8. Roberts, D.S. (1963) Release and survival of dermatophilus dermatonomus zoospores. *Aust J Agric Res.* 14: 386-399.
9. Scott, D.W. (2007) *Ovine.* In: *Color Atlas of Farm Animal Dermatology.* (1st ed). Blackwell Publishing, Iowa, USA. p. 152-53.
10. Stewart, G.H. (1972) Dermatophilosis. A skin disease of animals and man. Part 1. *Vet Rec.* 91: 537-544.
11. Wabacha, J.K., Mulei, C.M., Gitonga, N.P., Njenga, M.J., Thaiyah, A.G., Nduhiu, J. (2007) Atypical dermatophilosis of sheep in Kenya. *Tydskr S Afr Vet Ver.* 78: 178-81.
12. Yeruham, I., Elad, D., Perl, S. (2003) Dermatophilus in goats in the judean foothills. *Rev Med Vet.* 154: 785-788.

شیوع درماتوفیلوزیس آتیپیک همراه با سودوموناس آئروجینوسا در یک گله گوسفند بعد از حمام ضد کنه

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چکیده

درماتوفیلوز بیماری باکتریایی پوست است. شرایط محیطی مثل بارش باران و حمام دادن گوسفندان را به بروز بیماری مستعد می‌سازند. بیماری با ضررهای اقتصادی به علت آسیب وسیع به پشم همراه است. در یک گله در مرکز ایران در پاییز ۹۲ بیماری به صورت همه گیری مشاهده شد که علایم بالینی آن از درماتوفیلوزیس آتیپیک متفاوت بود. آلوپسی وسیع به همراه ترشحات چرکی از جراحات کاملاً برجسته بود. بیشترین جراحات در ناحیه سینه‌ای دیده می‌شد. در بررسی‌های تکمیلی عفونت ثانویه با سودوموناس آئروجینوزا و باکتری می با منشأ استافیلوکوکوس تأیید گردید که عامل ۱۶/۰٪ مرگ و میر در گله بودند. برای تأیید تشخیص نمونه خون جهت انجام CBC، و کشت خون اخذ گردید. از جراحات لام مستقیم تهیه شد و نمونه بیوپسی نیز برای ارزیابی‌های هیستوپاتولوژیک و کشت باکتریولوژیک اخذ گردید. لام مستقیم تهیه شده از جراحات پوستی با رنگ گیمسا و گرم رنگ آمیزی شدند. در بررسی‌های میکروسکوپی درماتوفیلوزیس تأیید گردید. در نمونه‌های آماده شده گرم و گیمسا رشته‌های باکتری گرم مثبت با ظاهر تیپیک ریل آهن دیده شدند. در هیستوپاتولوژی هم فیلامان‌های باکتری در اپیدرم دیده شدند. گله با پنی سیلین پروکائین ۷۰/۰۰۰mg/kg به صورت عضلانی دو بار در روز به مدت پنج روز درمان شد و بیماری تحت کنترل درآمد و تلفات متوقف گردید.

واژه‌های کلیدی: درماتوفیلوزیس، حمام، باران، گوسفند، پوست

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