

## Prevalence of Fungi in the Conjunctival Sac of Clinically Normal Sheep

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KVFD-2014-12550 Received: 03.11.2014 Accepted: 01.12.2014 Published Online: 09.12.2014

### Abstract

Conjunctival swabs were obtained from both eyes of 50 healthy sheep to identify the fungal flora. Data were analyzed for effect of age and sex. Out of 100 samples cultured, 18 (18%) showed fungal growth with predominance of the genus *Cladosporium* (38.89%). Other isolated fungal genera were *Penicillium* (16.67%), *Rhodotorula* (16.67%), *Aspergillus* (16.67%) and *Curvularia* (11.10%). There was no significant effect of sex and age on frequency of fungal isolation. Results showed that fungi are not prevalent on the ocular surface of healthy sheep.

**Keywords:** Fungal flora, Eye, Sheep, *Cladosporium* spp.

## Klinik Olarak Normal Koyunların Konjunktival Kesesinde Mantarların Yaygınlığı

### Özet

Elli adet koyunda yapılan bu çalışmada hayvanların gözlerindeki konjunktival keselerden alınan sıvap örnekleme ile normal fungal floranın belirlenmesi amaçlandı. Çalışmada yaş ve cinsiyetin etkisi analiz edildi. Kültürü yapılan 100 örneğin 18 (%18)'inde fungal üreme görüldü. *Cladosporium* cinsi (%38.89) en çok üreyen mantar idi. Diğer üreyen mantarlar; *Penicillium* (%16.67), *Rhodotorula* (%16.67), *Aspergillus* (%16.67) ve *Curvularia* (%11.10) idi. Cinsiyet ve yaşın fungal izolasyon üzerine etkisi saptanmadı. Sonuçlar sağlıklı koyunların göz yüzeyinde mantarların yaygın olarak bulunmadığını gösterdi.

**Anahtar sözcükler:** Mantar florası, Göz, Koyun, *Cladosporium* spp.

### INTRODUCTION

In many animal species fungi are considered as a part of the normal ocular flora, but their existence can turn to pathogenic state when defense mechanisms of the outer eye are damaged. Knowledge on the fungal species which are most likely encountered in the conjunctival sac is important to select an antifungal drug as initial empirical treatment of corneal mycoses <sup>[1,2]</sup>. There is a paucity of information on the ocular fungal flora of ruminants <sup>[3-5]</sup>, especially sheep <sup>[6]</sup>. Reportedly, *Cladosporium* spp, *Penicillium* spp and *Mucor* spp. are the predominant species. In order to increase knowledge of the ovine ocular fungal flora and to determine the effect of sex and age on the prevalence of isolates, we conducted present study on healthy sheep.

### MATERIAL and METHODS

Fifty clinically healthy fat-tailed sheep presented at the

Urmia abattoir (Iran) from May to July 2011 were swabbed. Animals were from both sexes (26 males and 24 females) and divided into two age groups based on dental formula; A: Under 2 years old (34.68%) and B: above 2 years old (16.32%).

Samples were taken from the lower conjunctival sac of both eyes (n=100) using dry sterile swabs per eye, avoiding the eyelid margins and eyelashes. Swabs were placed into sterile tubes containing 2 ml normal saline and immediately transferred to the laboratory in a chilled box. Samples were plated onto Sabouraud dextrose agar (Merck, Darmstadt, Germany) and malt extract agar (Quelab, Montreal, Canada) and incubated at 25°C for 3 weeks. Identification of isolates was achieved to the genus level on the basis of macroscopic and microscopic features <sup>[7]</sup>.

The effect of age and sex on the frequency of fungal isolation was determined using Fischer's exact test. Significance was set at P<0.05.



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## RESULTS

Five genera of fungi were cultured from a total of 13 sheep (26%) and 18 eyes. The fungi isolated and the isolation rates are listed in Table 1. *Cladosporium* spp (38.89%) was the most frequent isolate. Single fungi were isolated from each eye.

According to statistical analysis (Table 2, Table 3), the prevalence of fungal isolates did not show significant differences between sexes and age groups ( $P > 0.05$ ).

**Table 1.** Fungal genera, frequency of species isolated and number of positive culture eyes and sheep

**Tablo 1.** Mantar türleri, izole edilen türlerin bulunma sıklığı ile göz ve koyunlarda pozitif kültür sayıları

Fungi	No. of Positive Sheep (%)	No. of Positive Eyes (%)	No. of Isolates (%)
<i>Cladosporium</i> spp.	6 (12)	7 (7)	7 (38.89)
<i>Penicillium</i> spp.	3 (6)	3 (3)	3 (16.67)
<i>Rhodotorula</i> spp.	3 (6)	3 (3)	3 (16.67)
<i>Aspergillus</i> spp.	3 (6)	3 (3)	3 (16.67)
<i>Curvularia</i> spp.	2 (4)	2 (2)	2 (11.10)

**Table 2.** Frequency analysis of the conjunctival fungal isolates in relation to sex of sheep

**Tablo 2.** Koyunların cinsiyet ile ilişkili olarak konjuktival mantar izolatlarının sıklık analizi

Fungi	No. of Isolates (%)		P-value
	Males n=26	Females n=24	
<i>Cladosporium</i> spp.	2	5	0.239
<i>Penicillium</i> spp.	2	1	0.999
<i>Rhodotorula</i> spp.	1	2	0.602
<i>Aspergillus</i> spp.	1	2	0.602
<i>Curvularia</i> spp.	2	-	0.491
Total	8	10	0.557

## DISCUSSION

To our knowledge, this is the second published report of the ocular fungal flora in healthy sheep. In the current study, 26% of the sheep demonstrated positive cultures for fungi. This finding was consistent with those reported for goats (37.14%)<sup>[5]</sup>, dogs (22%) and cats (40%)<sup>[3]</sup>. In the large animals this amount were reported to be 100% for cattle, 95% for horses<sup>[3]</sup>, and 79.04% for donkeys<sup>[8]</sup>. It seems that results of the ocular fungal culture could be influenced by size of eye and its surface area exposed to the environmental fungi.

**Table 3.** Frequency analysis of the conjunctival fungal isolates in relation to age of sheep

**Tablo 3.** Koyunların yaş ile ilişkili olarak konjuktival mantar izolatlarının sıklık analizi

Fungi	No. of Isolates (%)		P-value
	<2 years old n=34	>2 years old n=16	
<i>Cladosporium</i> spp.	3	4	0.190
<i>Penicillium</i> spp.	2	1	0.999
<i>Rhodotorula</i> spp.	2	1	0.999
<i>Aspergillus</i> spp.	1	2	0.236
<i>Curvularia</i> spp.	1	1	0.542
Total	9	9	0.060

In the majority of studies on equine species *Aspergillus* spp is the most common isolate of the normal conjunctiva<sup>[2,8-10]</sup>, but in domestic carnivores<sup>[3]</sup> and ruminants including cattle<sup>[3,4]</sup> and goats<sup>[5]</sup> generally *Cladosporium* spp and *Penicillium* spp were reported to be predominant. In our study, genus *Cladosporium* (38.89%) also reported as the most frequent isolates of conjunctiva. This finding was not similar to that reported for sheep in Italy<sup>[6]</sup>, in which *Mucor* spp predominated (49%). It has been suggested that fungi are transitory inhabitants of the eye surface, and their prevalence can thus be influenced by geographic conditions<sup>[1,11]</sup>.

In the present study there was no significant difference in isolation rates of fungi between sexes and age groups. In various studies have been showed that prevalence of the normal eye flora could be affected by these two host factors, as in male horses<sup>[1]</sup>, male goats<sup>[5]</sup>, female pigs<sup>[12]</sup> and younger horses<sup>[11]</sup> frequency of isolates were significantly higher.

Fungi are not prevalent on the ocular surface of healthy sheep. This could be considered as a reason for paucity of keratomycosis in this species.

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