Survey of bacteriologic flora of conjunctiva and cornea in healthy psittacine birds

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SUMMARY

A total of 151 eyes from healthy psittacine birds were examined by bacteriologic cultural methods. Bacterial growth was not found in 41% of eyes cultured, *Staphylococcus epidermidis* was found in 25%, α-hemolytic streptococci in 25%, *Corynebacterium* spp in 7%, and *Staphylococcus aureus* in 5%. Each of the following organisms were found in 1% of the eyes; *Pasteurella* spp, *Actinobacillus* spp, *Escherichia coli*, *Klebsiella* spp, *Enterobacter* spp, *Pseudomonas* spp, *Proteus* spp, and *Bacillus* spp. More than one bacterial species was found in numerous eyes. Psittacines from an import station had a greater occurrence of ocular bacterial growth than did birds from private owners. The frequency of ocular bacterial growth and types of bacteria isolated were similar to studies from dogs and cats.

Several studies of the bacterial population from healthy eyes in dogs[1-5] and cats[5,6] have been reported. They have shown that the conjunctiva of these animals often contain bacteria, some of which are potential pathogens. Similar studies of flora of eyes from healthy psittacines are not available. Psittacines have primary eye disease (trauma, pox virus) and secondary bacterial disease, usually extending from bacterial sinusitis. A study was undertaken to determine the ocular flora from healthy psittacine birds.

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Materials and Methods

The eyes of psittacine birds were obtained from 3 sources. Forty-four eye samples were obtained from birds raised or housed at a local aviary in Iowa. Thirty-nine eye samples from birds from a private import station in Florida and 68 eye samples were from birds presented to Iowa State University Veterinary Teaching Hospital for other than eye or respiratory tract problems. The eyes were free of any abnormalities. Birds were excluded from the survey if any signs of respiratory tract disease were present.

A small cotton swab was moistened with sterile saline solution, and the cornea, conjunctiva, and nictating membrane were swabbed. Inoculation onto blood agar plates (5% bovine blood) was performed within 1 hour. Plates were incubated in 5% CO_2 (capnic incubator) in air at 37 C for 24 hours. Cultures were examined and subcultured if necessary. Identification of organisms was accomplished by standard bacteriologic methods and the API 20E system.*

Results

When all psittacine eyes are combined and tabulated, the following results were found (Table 1). Bacterial growth was not found in 41%, *Staphylococcus epidermidis* was found in 25%, α-hemolytic streptococci in 25%, *Corynebacterium* spp in 7%, and *S aureus* in 5%. The following organisms were found in 1% of the eyes: *Pasteurella* spp, *Actinobacillus* spp, *Escherichia coli*, *Klebsiella* spp, *Enterobacter* spp, *Pseudomonas* spp, *Proteus* spp, and *Bacillus* spp. The total is greater than 100% because numerous eyes had more than 1 bacterial species isolated.

* Analytab Products, Plainview, NY.

The organisms identified and species of bird involved are tabulated in Table 1. There are variations in the types of organisms identified from the different species. However, the number of individual eyes from each species group is too small to determine species variation.

The frequency of bacterial organisms identified was classified based on the environment of the bird (Table 2). Bacterial growth was not found in 44% of the bird eyes obtained from private owners, 73% of bird eyes from a private aviary, and 0% of bird eyes from an import station.

The number of different organisms isolated from each eye is tabulated in Table 3. Bacteria were not found in 41% of the eyes, 1 type of organism was found in 44% of the eyes, 2 different organisms were found in 13% of eyes, and 3 different organisms were isolated from 2% of the eyes.

Discussion

Bacterial flora of eyes from normal dogs and cats contain a mixture of organisms, including potential pathogens. A similar pattern of organisms was found in normal eyes of healthy psittacine birds. Bacteria were not found in 41% of the eyes. Gram-positive organisms were found in 94 birds and gram-negative organisms were found in 10 birds (several birds had more than 1 organism isolated). Gram-negative bacteria are infrequently found in the gastrointestinal tract of healthy psittacines[7]; a similar situation apparently occurs in the eye. A small number of gram-negative bacteria can be harbored without producing disease in the eyes of healthy psittacines.

There was a marked variation in

TABLE 1—Ocular flora of healthy psittacine birds

Bacteriologic cultural isolate	Amazons (*Amazona* sp) (n = 85 eyes)	African Greys (*Psittacus erithacus erithacus P.e. timneh*) (n = 28 eyes)	Senegals (*Poicephalus senegalus*) (n = 18 eyes)	Cockatoos (*Cacatua* sp) (n = 6 eyes)	Miscellaneous (n = 14 eyes)	Total (n = 151 eyes)
No growth	31 (36)	18 (64)	10 (55)	0	3 (2)	62 (41)
S aureus	6 (7)	0	1 (6)	0	1 (1)	8 (5)
S epidermidis	30 (35)	3 (11)	0	4 (67)	0	37 (25)
α-Hemolytic streptococci	8 (9)	8 (29)	8 (44)	6 (100)	7 (50)	37 (25)
Corynebacterium spp	4 (5)	0	0	2 (33)	4 (29)	10 (7)
Pasteurella spp	0	0	0	0	1 (1)	1 (1)
Actinobacillus spp	6 (7)	0	0	0	1 (1)	7 (5)
E coli	2 (2)	0	0	0	0	2 (1)
Klebsiella spp	0	0	0	0	1 (1)	1 (1)
Enterobacter spp	1 (1)	0	0	0	0	1 (1)
Pseudomonas spp	1 (1)	1 (4)	0	0	0	2 (1)
Proteus spp	0	2 (7)	0	0	0	2 (1)
Bacillus spp	0	2 (7)	0	0	0	2 (1)

Data are expressed as No. of eyes (% of total No.).

TABLE 2—Influence of environment on microbial flora of eyes from healthy psittacine birds

Bacteriologic cultural isolate	Eyes of birds from private owners in Iowa (n = 68)	Eyes of birds housed at Florida import station (n = 39)	Eyes of private aviary in Iowa (n = 44)
No growth	30 (44)	0	32 (73)
S aureus	7 (10)	1 (3)	0
S epidermidis	6 (9)	26 (67)	5 (11)
α-Hemolytic streptococci	22 (31)	5 (13)	10 (23)
Corynebacterium spp	9 (13)	1 (3)	0
Pasteurella spp	1 (1)	0	0
Actinobacillus spp	2 (3)	4 (10)	0
E coli	1 (1)	0	1 (2)
Klebsiella spp	1 (1)	0	0
Enterobacter spp	0	1 (3)	0
Pseudomonas spp	0	1 (3)	1 (2)
Proteus spp	0	0	2 (6)
Bacillus spp	0	0	2 (6)

Data are expressed as No. of eyes (%). The percentage (%) is greater than 100% because of eyes with multiple isolates.

TABLE 3—Number of different organisms isolated from normal eyes of healthy psittacine birds

No. of bacterial organisms isolated from 1 eye	No. of eyes (%)
None	62 (41)
One organism isolated	66 (44)
Two organisms isolated	20 (13)
Three organisms isolated	3 (2)

organisms found based on the environment and husbandry of the bird. All eyes from healthy psittacines from an import station had bacterial growth. Of the bird eyes obtained from private owners, 44% showed no bacterial growth. There was no bacterial growth in 73% of the bird eyes from an aviary in Iowa. The bird density and activity in the import station were great compared with those of a private owner and an aviary. The high percentage of bacteria from the import station may have been a reflection of bird population density.

References

1. Bistner SI, Roberts SR, Anderson RP: Conjunctival bacteria: Clinical appearance can be deceiving. *Mod Vet Pract* 50:45–47, 1969.

2. Urban M, Wyman M, Rheins M, et al: Conjunctival flora of clinically normal dogs. *J Am Vet Med Assoc* 161:201–207, 1972.

3. McDonald PJ, Watson ADJ: Microbial flora of normal canine conjunctivae. *J Small Anim Pract* 17:809–812, 1976.

4. Murphy JM, Lavach JD, Severin GA: Survey of conjunctival flora in dogs with clinical signs of external eye disease. *J Am Vet Med Assoc* 172:66–68, 1978.

5. Gaskin JM: Microbiology of the canine and feline eye. *Vet Clin North Am* 10:303–316, 1980.

6. Campbell LH, Fox JG, Synder SB: Ocular bacteria and mycoplasma of the clinically normal cat. *Feline Pract* 3:10–12, 1973.

7. Graham CL, Graham DL: Occurrence of *Escherichia coli* in feces of psittacine birds. *Avian Dis* 22:717–720, 1978.