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CONJUNCTIVITIS IN PIGEONS (*COLUMBA LIVIA DOMESTICA*) : CAUSES, DIAGNOSIS AND TREATMENT

Ammar T. Naser[1], Muthana Mohammed Ibrahim[2], Ghassan H. Jameel[3]*, Waleed Ibrahim Jalil[1], Zahid I. Mohammed[1], Elaph Khalid Ibrahim[1] and Salah Noori Ibrahim[1]

[1]College of Veterinary Medicine, Diyala University, Iraq.
[2]College of Education for Pure Sciences, Diyala University, Iraq.
*e-mail : ghassan_immune@yahoo.com

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ABSTRACT : Conjunctivitis, also known as pink eye is inflammation of the outermost layer of the white part of the eye and the inner surface of the eyelid. It makes the eye appear pink or reddish. Pain, burning, scratchiness, or itchiness may occur. The affected eye may have increased tears or be "stuck shut" in the morning.Swelling of the white part of the eye may also occur. Itching is more common in cases due to allergies. Conjunctivitis can affect one or both eyes. Forty pigeons included in this study were suffered from infection of conjunctiva. Eye swabs have been taken from infected pigeons were cultured on nutrient, specific medias and Sabouraud dextrose agar. Plates were incubated in aerobic conditions at 37°C for 24-48 hours. After presumptive identification based on colony morphology and microscopic morphology. *Staphylococcus aureus* bacteria were represent 19 isolates out of 40 samples. Gram negative *Bacilli* were represent 10 isolate from 40 samples. Eleven isolates were negative to bacterial isolation. *Staphylococcus aureus* has been revealed high resistant to all concentrations of Acacia extract (*Senegalia greggii*). Doxytetracycline is more effective to inhibit the growth of *S. aureus* fallowed by Ciprofloxacin and Rifampicin and with no efficacy of amoxicillin.

Key words : Avian conjunctivitis, pigeons diseases, *S. aureus*.

INTRODUCTION

Avian conjunctivitis is an eye infection can affect any kind of bird, including house finches, cockatiels, parakeets, cockatoos, mynahs, songbirds, wild birds, and many others. The broad range of possible causes can make a diagnosis difficult. While a piece of feed lodged near the conjunctiva can cause the irritation and discharge often seen, more serious causes, such as a viral or bacterial infection, can further compromise the health of your bird. Recognizing the symptoms and getting medical help promptly can save not only your bird's eyesight, but also his life. Birds can contract a bacterial infection in the conjunctiva, or the membrane that surrounds the eyes. This tissue will become swollen and irritated, and the infection can spread to other parts of the eye and upper respiratory system (Abrams *et al*, 2002). Pigeons (*Columba livia domestica*) belong to order Columbiformes and family Columbidae (Fig. 1). Pigeons are used in racing or pigeon sport, as ornamental birds, laboratory specimens, companion animals and they are also raised for meat production (Magnino *et al*, 2009).

Conjunctivitis is most often a symptom of another health problem. Symptoms of conjunctivitis in birds due to the many causes of conjunctivitis, relaying all the symptoms you see to your veterinarian can help point to the reason your bird's eyes are infected, as some symptoms are indicative of certain conditions. Most signs are related to the eyes, sinuses and upper respiratory tract, and can include: Swollen, red and irritated eyes, crusty eyes, watery eyes, cloudy or glassy eyes, upper respiratory infection, sinusitis, eye or nostril discharge, facial swelling, tearing, sneezing, swollen sinuses, inflammation in the eyelids, sensitivity to light, weakness in eyelid, deposits on cornea, blindness, starvation, listlessness, sit fluffed up, reduced jaw tone, crusty nodules on legs or face. Through physical examination and diagnostic testing are necessary to determine a treatment plan (Griggs, 2019; Azari and Barney, 2013). Infected birds may have red, swollen, runny or crusty eyes. In severe cases, the eyes become swollen shut and the bird becomes blind and unable to fend for itself. You might observe an infected bird sitting quietly in your yard, clumsily scratching an eye against its foot or a perch. While some infected birds recover, many die from starvation, exposure, or predation. Additional symptoms may be respiratory distress (open

Fig. 1 : Affected pigeon with conjunctivitis.

beak) and tail-bobbing. Infected birds typically show various degrees of crusty thickened growths around the eyes. In extreme cases, these growths can completely cover the eye. Eyes are often swollen, reddish as well as watery. Birds with conjunctivitis may also suffer from associated respiratory problems, which can result in death. Conjunctivitis can be caused by a number of factors, to including injuries, bacteria, fungi, nematodes, and protozoa. Diagnostic testing is necessary to determine exactly what causes each case of conjunctivitis (Abrams *et al*, 2002; Richards and Guzman-Cottrill, 2010).

If it is mycoplasma, a vet would typically prescribe Tylosine or Doxycycline (antibiotics) - both of which can usually be purchased at a pigeon or chicken supply store (Guay, 2001).

The objective which be selected in this study is Acacia (*Senegalia greggii*) seeds (Fig. 2), Kingdom Plantae, Phylum Angiosperms, Order Fabales, Family Fabaceae, Genus *Senegalia*. Seed extract used as a treatment for eye conjunctivitis in pigeons in comparison with other common drugs. *Acacia* spp. is used for chemical products, forage, domestic uses, environmental management, fiber, food, drink and wood. The tough wood is white to slightly yellowish in color, rarely producing dark brown heartwood. It is widely cultivated in Asia, Australia, the Mediterranean region, India and the Indian Ocean area. As is common in *Acacia* spp., edible gum seeps from cracks in the tree's bark, and is an important part of the bushbaby's winter diet. The gum can be used to manufacture candy and used to have economic importance as "Cape Gum". In dry areas, the tree's presence is a sign of water, both above and underground (Joffe, 2007).

MATERIALS AND METHODS

Collection of samples

Forty pigeons in different ages clinically diagnosed with eye conjunctivitis infection had been conducted in this study then, evaluation of the general state of the animals as weight, appetite and morbidityrate were recorded. The severity, position and time of the appearance of lesions as well as the age of the animals were also recorded (Abrams *et al*, 2002).

Preparation of the extract

Acacia seeds had been collected from Baqubah city-Diyala province, then cleaned, washed, dried and grinded with electrical grinder, then loaded to suitable thimble in order to extract with soxhlet apparatus by using of 70% of ethanol for 72 hours. The extract was dried with rotary evaporator and resultant powder was kept in special bottles till use (Evans *et al*, 2009). From dried extract (0.25gm,0.5 gm, 1 gm and 2gm) were dissolved with 100 ml of sterile Distill water to prepare (0.25%, 0.5%,1% and 2%) solution for *in vitro* treatment, respectively.

Bacteriological examination

Eye swabs have been taken from infected pigeons were cultured on nutrient, specific medias and Sabouraud dextrose agar. Plates were incubated in aerobic conditions at 37°C for 24-48 hours. After presumptive identification based on colony morphology and microscopic morphology (Koneman *et al*, 1998). Antibiogram test was performed with the bacteria isolated from conjunctival samples. Antibiogram test : Antibiotic susceptibilities of isolates were determined by disk diffusion method on Mueller Hinton agarplate (Bauer *et al*,1966). The following commerical antibiotic disks were used in this procedure : doxycycline, amoxicillin, oxytetracycline, ciprofloxacin. 0.2 ml of pure culture of the isolate incubated at 37°C for 24 hours. Finally, growth inhibition zone diameter of each antibiotic disk was measured. The decision about whether the test isolate was resistant or susceptible to the antibiotic was made by the measured zone diameters (in millimeters) in comparison between the drugs and Acacia extract.

Statistical analysis

The differences are compared by using F-Test at $p<0.05$ (Zar, 1984).

RESULTS AND DISCUSSION

The Fig. 1 revealed infected pigeon with conjunctivitis.

Birds can suffer from many different eye disorders. They can be due to an eye injury, or possibly an infection to the area. Occasionally, eye disorders are symptoms of another underlying medical problem. Therefore, if your bird has an eye problem, it should be considered serious and you should consult a veterinarian to rule out any major internal disease (Sahinduran, 2004).

Forty pigeons included in this study were suffered

Fig. 2 : represent the Acacia plant (*Senegalia greggii*) with seeds.

Fig. 3 : Represent the shape of the colony of *Staphylococcus aureus*.

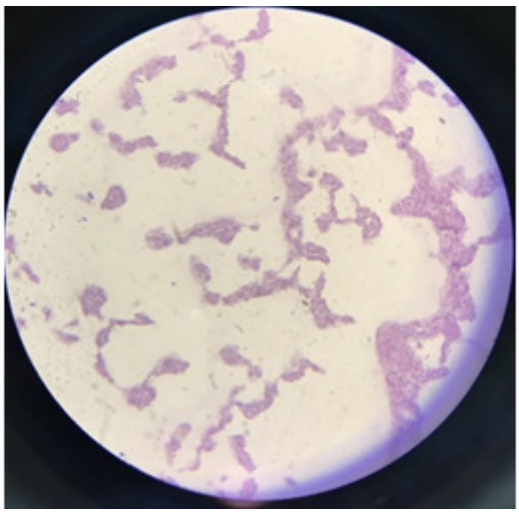

Fig. 4 : Represent the aggregation of *Staphylococcus aureus* bacteria after staining.

Fig. 5 : Represent the catalase test reaction and display the air bubbles produced by *Staphylococcus aureus*.

from infection of conjunctiva. The results in Table 1 are revealed the number of the pigeons and the types of bacterial isolates.

Figs. 3 and 4 were revealed the colony and the aggregations of *Staphylococcus aureus* bacteria stained with Gram stain and supported with positive catalase test (Fig. 5).

Statistical analysis was revealed significant elevation at ($P<0.05$) in total number of *S. aureus* isolates when compared with other.

Staphylococcus aureus is a Gram-positive, round-shaped bacterium that is a member of the firmicutes and it is a usual member of the microbiota of the body, frequently found in the upper respiratory tract and on the skin. It is often positive for catalase and nitrate reduction and is a facultative anaerobe that can grow without the need for oxygen. Although, *S. aureus* usually acts as a commensal of the human microbiota, it can also become an opportunistic pathogen, being a common cause of skin infections including abscesses, respiratory infections such as sinusitis and food poisoning. Pathogenic strains often promote infections by producing virulence factors such as potent protein toxins and the expression of a cell-surface protein that binds and inactivates antibodies. The emergence of antibiotic-resistant strains of *S. aureus* such as methicillin-resistant *S. aureus* (MRSA) is a worldwide problem in clinical medicine. Despite much research and development, no vaccine for *S. aureus* has been approved (Mashalla *et al*, 2001).

Staphylococcus aureus has been revealed high resistant to all concentrations of Acacia extract (*Senegalia greggii*) (Fig. 6).

The chemical analysis of the *Senegalia greggii* plant which done by other researchers in previous studies was revealed the presence of different types of chemical materials as catechin and phenethylamine (Kríz *et al*, 2003; Smith, 1977). These materials haven't any therapeutical effect on the bacteria. *S. aureus* may be acquired its resistant by horizontal gene transfer of mobile

Table 1 : Revealed the number of pigeons and the type of analysis of samples.

The number of the pigeons	The positive result	The cause
Forty	19	*S. aureus* infection
	10	*Gram negative bacilli* infection
	11	Unknown cause

genetic elements, for example from organisms in soil (Nesme and Simonet, 2015).

Fig. 7 was revealed the effect of two drugs on *S. aureus* bacteria, the first is Doxycycline so, the zone of inhibition reach to 1.7 cm. in diameter and the second is Ciprofloxacin in 1.3 cm. in diameter. High resistance to the extract (0.5 and 2%).

Fig. 8 was revealed the less effect of different drugs on *S. aureus* bacteria,as Rifampicin, Tetracycline, Doxycycline and Ciprofloxacin so, the zone of inhibition reach to 1.4, 1.1, 1 and 1.3 mm. in diameter and with no efficacy of amoxicillin.

Few studies were perform about the conjunctivitis in birds and sensitivity test to diagnose the causative agent and the drug of choice has been used. These results are in agreement with the other study was done by Sahinduran (2004), who isolate *S. aureus* from conjunctiva of Ostriches in Turkey. OÑCallaghan (2018) refer to that *S. aureus* is among the most common causes of ocular infection. Siqueira *et al* (1997) refer to that *S. aureus* cause severe inflammatory reaction in a rabbit eye model.

The eyelid, tear duct and conjunctiva are in contact with the tear film that contains multiple soluble factors able to protect against bacterial infection, but *S. aureus* infections of these sites are commonly encountered among the general population. Such infections are not sight-threatening unless the cornea becomes involved. Corneal infections can be challenging because the combination of the immune response and the action of bacterial toxins can cause considerable tissue damage resulting in scarring that reduces visual acuity. Likewise, infections of the inner eye involve a potent host response that together with bacterial toxins can damage tissues critical to vision, especially the retina (OÑCallaghan, 2018).

Treatment of conjunctivitis will aim to treat the infection while addressing the underlying cause. The main treatment consists of saline flushes, accompanied by topical antibiotics, such as antibiotic ophthalmic ointments, or a spray containing tylosin, lincomycin, or spectinomycin. These topical antibiotics can relieve

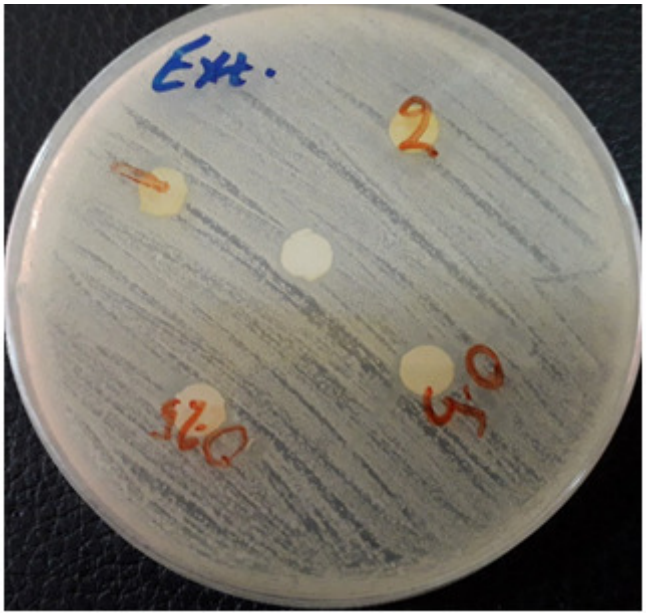

Fig. 6 : Different concentrations of Acacia plant and its effect on *S.aureus*.

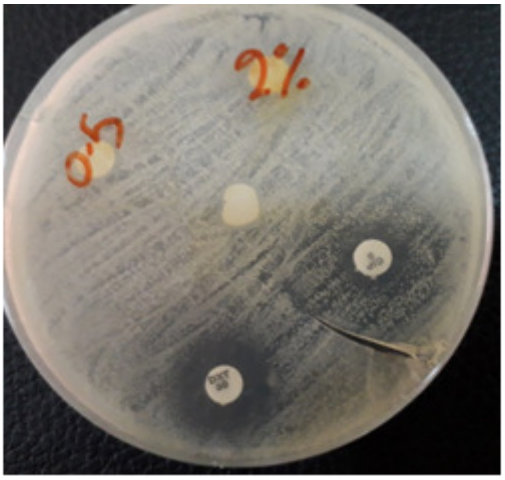

Fig. 7 : Two concentrations of Acacia plant (0.5 and 2%) and its effect on *S.aureus* with Ciprofloxacin (right side) and Doxycycline (down).

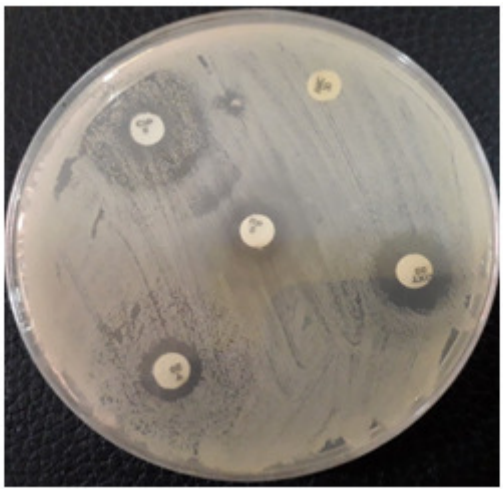

Fig. 8 : Different types of antibiotics and their effect on *S. aureus*.

symptoms, but the infection can recur. Tylosin tartrate can also be added to drinking water. Oral antibiotics can be given to help treat respiratory symptoms. Treatment is generally given for 14 days, after which time, samples will be taken again and tested to assess your bird's recovery. The underlying cause will also need to be treated (Griggs, 2019).

CONCLUSION

Staphylococcus aureus has been revealed high resistant to all concentrations of Acacia extract (*Senegalia greggii*). Doxytetracycline is more effective to inhibit the growth of *S. aureus* fallowed by Ciprofloxacin and Rifampicin and with no efficacy of amoxicillin.

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