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Respiratory disease caused by *Citrobacter freundii* in Ball Python

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Abstract

A six-month-old ball python with a severe respiratory illness was the subject of a rare case at Birdinex Avian & Exotic Pet Speciality Hospital in Palarivattom, Ernakulam. However, the Department of Veterinary Microbiology was performed the identification of the casative agent and antibiogram analysis. *Citrobacter freundii* was isolated by the culture and biochemical methods. According to this study, every category of antibiotic showed signs of resistance. In the groups Aminoglycoside, Polymyxins, Quinolones, Tetracyclines, Cephalosporins, Sulfonamides, and Penicillin, this strain exhibits multiple antibiotic resistance. Gene mutation and high variant resistance can result from the improper use of antibiotics and the transfer of resistant genes from one person to another.

Keywords: Multi-drug resistant, *Citrobacter freundii*, ball python, respiratory disease

1. Introduction

According to Mitchell (2009) ^[10], the demand for exotic pets such as reptiles around the world is relatively new. But their popularity has grown to such an extent that, in the global exotic pet trade, they are now believed to be the second most species-rich vertebrate class (after birds) (Bush *et al.* 2014) ^[3].

In recent decades, there has been growing concern about the role that the global trade in wildlife, whether legal or illegal, plays in the transmission of diseases (Smith *et al.* 2009; Can *et al.* 2019) ^[14, 4]. These worries are specifically about the manner in which diseases spread when people take wild animals out of their natural environments, transport them by land, sea, and air, and then trade them-dead or alive-for goods in other countries or regions of the world (e.g., Morens *et al.* 2004; Karesh *et al.* 2005) ^[11, 7].

Reports of infections related to reptiles, like salmonellosis and other bacterial infections are widely available for certain species (Arena *et al.* 2012; Bosnjak *et al.* 2016; Green *et al.* 2020) ^[1, 2, 6]. Captive reptiles are frequently found to be reservoirs of pathogenic bacteria. The isolation, identification, and antibiogram of the isolate from the respiratory tract infection on ball python are the main objectives of this study.

2. Materials and Methods

A six month old ball python (Fig.1) with respiratory distress was brought to Birdinex Avian & Exotic Pet Speciality Hospital in Palarivattom, Ernakulam in August 2024. An oral sample was obtained for the examination. The sample was cultured on brain-heart Infusion agar (BHIA), MacConkey's agar (MAC), then incubated at 37 °C for 24-48 hrs. The colonies were identified by morphological, staining and biochemical techniques like indol, MR, VP, citrate, urease, arabinose, xylose, rhamnose, raffinose trehalose, lactose, catalase, oxidase and triple sugar iron (TSI) (Koneman *et al.*, 1983; Quinn *et al.*, 1994) ^[8, 12]. Antibiogram was performed with 22 antibiotics by disc diffusion method as per The following antibiotics were used: Vancomycin (VA) 5 mcg, Piperacillin (PI) 100 mcg, Moxifloxacin (MO) 5 mcg, Cefoperazone (CPZ) 5 mcg, Levofloxacin (LE) 5 mcg, Doxycyclin Hydrochloride (DO) 30 mcg, Amikacin (AK) 30 mcg, Tetracyclin (TE) 30 mcg, Piperacillin Tazobactam (PIT) 100/10 mcg, Gentamicin (GEN) 30 mcg, Chloramphenicol (C) 30 mcg, Imipenem (IPM) 10 mcg, Extapenem (ETP) 10 mcg, Clindamycin (CD) 2mcg, Azithromycin (AZM) 15 mcg, Ceftriaxone Sulbactam (CIS) 30 mcg, Cefixime, (CFM) 10 mcg, Neomycin (N) 30 mcg,

Streptomycin (S) 10 mcg, Pencillin-G (P) 10 mcg, Cefipime (CPM) 30 mcg, Metranidaxole (MT) 5 mcg. The zones of inhibition were measured in mm and compared with CLSI.

3. Results and Discussion

In BHIA the organism showed large, mucoid, greyish colonies and pinkish colonies with lactose fermentation on MAC is observed. On Gram staining the organism appearance as Gram-negative coccobacilli. In the biochemical test, the organism gave a positive result in the catalase, lactose, arabinose, xylose, rhamnose, raffinose, trehalose, citrate utilization and methyl red tests, sugar fermentation occurs and had production. The organism showed results in negative on Voges proskauer, indole, urease and oxidase. The bacteria was identified as *Citrobacter freundii* according to the morphology of the colonies and biochemical tests. However, in this present study, the antibiotics all antibiotics were exhibits resistant pattern. Due to their multi-drug resistance MDR profiles. It has occasionally been linked to septic arthritis, particularly in older patients with long-term illnesses (Liu *et al.*, 2016)^[9]

However, *Citrobacter freundii* demonstrated a potential for maximal resistance to carbapenems in this study, which are only allowed for absolutely necessary applications in human medicine. With roughly half of the isolates exhibiting resistance to aminoglycosides and chloramphenicol, these antimicrobials turned out to be the most successful options when considering other antimicrobials authorised for use in veterinary medicine. Globally, doctors are starting to worry more about *K. pneumoniae*, an MDR infection that is considered to be a serious zoonotic agent with consequences for both human and animal health (Schmiedel *et al.*, 2014)^[13].



Fig 1: Ball Python

4. Conclusion

Isolation, identification and antimicrobial resistance in exotic pet Ball python have not been widely studied. Intimate interactions between people and exotic species like this increase the risk of bacterial infections that are incurable and

dangerous to both human and animal health. To safeguard human health, it is crucial to be aware of pet birds as potential sources of zoonotic bacterial pathogens.

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6. Conflict of Interest

Not available

7. Financial Support

Not available

8. References

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