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Research Article

Bacteria Isolated from the Liver of Agama Lizards Found Around Poultry Pens in Zaria, Nigeria

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Abstract

This study was designed to evaluate an aspect of biosecurity in poultry pens by investigating the possible liver pathogens in lizards and their role as pathogen reservoirs and transmitters to poultry. 100 Agama Lizards were caught randomly around poultry Pens in Zaria, Nigeria. In this study *Staphylococcus aureus* and *Corynebacterium species* were isolated from 67% and 13% of the livers respectively. Each Lizard was humanely euthanized. A small block of the livers were harvested into sterile polythene bags and preserved in a freezer for microbiological culture and isolation. Bacteria were isolated and identified based on standard cultural, morphological and biochemical methods. It can be concluded that lizards harbor bacteria pathogens and giving them free access into poultry could be counterproductive. They are a potential source of infection to poultry by fecal shedding and even indirectly to humans through meat and egg consumption. Therefore, strict biosecurity practices should be maintained so as to prevent the entry of lizards into poultry pens.

Keywords: Agama Lizard; Bacteria; Liver; Staphylococcus; Corynebacterium; Poultry

Introduction

Agama Common Agama or Rainbow lizard [1] is found in most sub saharan Africa [2]. They can inhabit urban, suburban and wild areas that provide optimal vegetation for reproduction and food [1]. In Nigeria, *Agama* lizards are one of the common animals usually found within animal houses, particularly poultry pens. They sometimes have unrestricted access to the feeding and water troughs [3]. Generally, Lizards including Agama lizards have been observed to be capable carriers and/or reservoirs of pathogenic organisms for humans and animals [4,5].

In a study conducted in India on the faecal droppings of Common House Lizards or Geckos (*Hemidactylus frenatus*), 34 species of bacteria were detected with *Escherichia coli* the most frequent. Other important isolated bacteria species include *Citrobacter freundii, Klebsiella pneumoniae*, *Salmonella indica, Enterobacter gergoviae, Enterobacter agglomerans, Listonella damsel, Raoltella terrigena, Salmonella salamae, Salmonella houtenae, Edwardsiella tarda, Edwardsiella hoshinae* and *Klebsiella oxytoca* [6]. An investigation of aerobic bacteria flora of the intestine of wall geckos (*Hemidactylus brookei*) discovered 35 isolates of salmonella and several other species of Enterobacteriaceae namely *Shigella sonnei, Edwardsiella tarda, Enterobacter spp, Citrobacter freundii, Serratia marcescens*, *Proteus* spp, *Klebsiella pneumoniae*, and *Escherichia Coli* isolates [7].

Agama Lizards have been discovered to play a role in the epidemiology of *Salmonella enterica* serotype Pullorum in poultry and also in the transmission of antibiotic resistant pathogens to poultry in Oyo State, Nigeria [3]. Several species of bacteria were identified from the oral and cloacal swab of Agama Lizards co-habiting with poultry in Ibadan, Nigeria [8]. A gastrointestinal *Salmonella* carriage rate of 32, 39 and 48% were observed for the wall gecko the Agama lizard and 'snake' lizard respectively was reported in Rivers State, Nigeria [9]. In Imo State Nigeria, different bacteria species have been identified from the faecal droppings of Gecko. These include; *Escherichia* species, *Salmonella* species, *Shigella* species, *Proteus* species, *Enterobacter* species, *Staphylococcus* species and *Klebsiella* species [10]. There seem to be a diversity of faecal microbiome of geckos and Agama Lizards [3,6,7,10]. Several researchers have observed the possible role of Lizards in the transmission of Drug resistant Pathogens [7,11,12]. Consequently, studies on significant enteric pathogens in lizards require the collection of lizards and euthanasia so as to harvest the internal contents or organs in-order to ascertain the presence of bacteria pathogens [6]. The goal of this study therefore was to investigate the presence of bacteria pathogens on the liver that may lead to infection either in the lizards or can be transmitted both to poultry and possibly humans.

Materials and Methods

Sample collection

A total of 100 Lizards were captured from different poultry pens around Zaria. They were caught either by hand or by using baited sticky traps as described by [13]. The lizards were then transported in properly ventilated cartoons to the Postmortem Laboratory of the Department of Veterinary Pathology Ahmadu Bello University, Zaria. Restrain was done by hands with hand gloves on. The lizards were euthanized by the application of a sufficient blow to the head [14]. The euthanized lizard was positioned on dorsal recumbence and a mid-ventral incision was done from the mandible down towards the vent to expose the internal organs. The liver was exposed and small portion was excised. The excised portions were inserted into sterile polythene bags and kept in a freezer for microbiological culture and isolation [15].

Bacteriological analysis

The Liver samples were removed from the freezer and allowed to defrost. The surface of each liver was then decontaminated by the use of a hot spatula that was heated by Bunsen burner flame. A sterilized scissors was used to cut the liver sample open and the parenchyma was swabbed using sterile swab. The swab was streaked on blood agar plates and incubated at 37°C for 24 hours. The colonial morphologies of the bacterial growths on blood agar observed were recorded and described appropriately using their sizes, colours, textures, edges and effect on the media [16,17].

Statistical analysis

The recorded data from bacteriological analysis of the liver samples from lizards were subjected to descriptive statistics. Bar graph was drawn with each segement representing the percentage of the isolated bacterial species.

Results

Bacterial Colonies on Blood agar were yellowish; medium sized, round, moist, smooth edged and hemolytic colonies indicative of *Staphylococcus* species. These were found to be gram positive cocci and positive to catalase test. Altogether, *Staphylococcus* species were isolated from 67% of the samples. In 13% of the Liver samples streaked on Blood agar, bacterial colonies were grayish, medium sized, round, dry, rough edged and weakly hemolytic colonies. The organism from such colonies were gram positive short rods, negative to catalase test and identified as *Corynebacterium species*. There were 20% liver samples which were negative for bacterial growth after 24 hours of incubation.

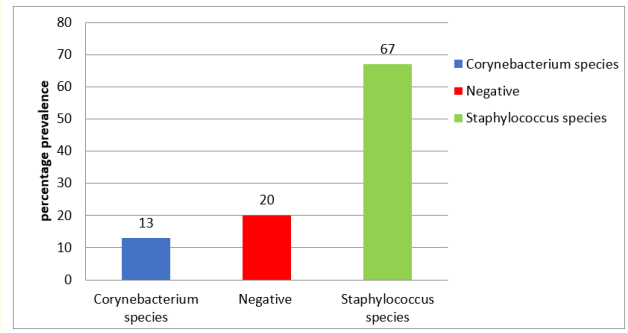

Figure 1: Bar graph showing the percentage prevalence of isolated organisms.

S/N	Bacteria isolates	Number isolated (%)
1	*Corynebacterium species*	13/100(13%)
2	*Staphyloccocus species*	67/100(67%)
3	*Negative*	20/100(20%)

Table 1: Bacterial species in liver samples from lizards in poultry houses around Zaria, Nigeria.

Discussion

A total of 80 bacteria isolates were obtained from a total of 100 samples analyzed. The two different bacteria identified include *Staphylococcus* species and *Corynebacterium* species. Figure 1 shows the prevalence of each pathogenic bacterium. From the result, Staphylococcus has the highest prevalence of 67% while Corynebacterium has a prevalence rate of 13%. The prevalence rate of 67% for Staphylococcus speices in this study is higher than the prevalence of staphylococcus isolated from the droppings of gecko in Imo State, Nigeria [10].

This study has demonstrated that lizards harbor pathogenic organisms and could serve as source or risk factor in the transfer of these organisms to poultry and Man. Both *Staphylococcus* species and *Corynebacterium* species have been isolated from Poultry in Bangalore, India [18], also in Oregon, United States of America and as secondary bacterial infections in poultry [20-23]. Furthermore, *Staphylococcus aureus* has been incriminated as a human food borne pathogen [24] while *Corynebacterium diphtheriae* has been demonstrated as a zoonotic pathogen in Lagos, Nigeria [25].

Conclusion

The bacteria isolation from the liver of Lizards in the study confirmed that lizards are carriers of pathogenic bacteria with the possibility of shedding it through the faeces thus leading to environmental contamination. It is therefore paramount to prevent the contamination of our food and water sources by these droppings of lizards as well as put in place measures to minimize the population of Lizards in and around poultry houses and even human houses.

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