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## Pathogenic bacteria isolated from *Hemidactylus turcicus* in Baghdad Province, Iraq

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### Abstract

This study was conducted to identify zoonotic and pathogenic bacteria from gecko feces. A total of 95 fecal samples were collected from four locations in Baghdad province (AL-Hurriyah, Hay-Al-Khadhraa, AL-Jadriyah, Al-Zaa'faraniyah) from March 2015 to May 2016, 112 Bacterial isolates were revealed, the main were : *E. coli* spp. (35%), *Staphylococcus* (19%), *Salmonella* (9%), *Klebsiella* spp. (9%), *Proteus* (7.1%), *Pseudomonas* (6.2%), *Serratia* (5.3%), *Yersinia* (5.3%) and *Shigella* (4.4%). The highest frequency of bacterial infection was observed in samples collected from Al-Zaa'faraniyah (25%) followed by Hay-Al-Khadhraa (18.9%), AL-Jadriyah (17.8%) and AL-Hurriyah (15.7%). This study concluded that wall gecko feces harbour pathogenic bacteria of public health importance, which transmitted to human beings through the contamination of environment.

**Keywords:** Wall geckos, fecal samples, bacteria, biochemical properties

### 1. Introduction

Wall geckos are considered small to middling large lizards belonging to the Geckkonidae family which are found in warm climates throughout the world <sup>[1]</sup>. These house lizards are indigenous to Southeast Asia but are now disseminated to other regions of the world such as northern parts of Australia, Africa and America <sup>[2]</sup>. They can be seen at night on the walls and ceilings of houses, buildings, eateries, porches and balconies to hunt for insects that are attracted to lights <sup>[3]</sup>. The most common Gecko in Iraq is *Hemidactylus turcicus*, predominantly found in houses <sup>[4]</sup> and belongs to the Geckkonidae family, class Reptilian <sup>[5]</sup>. The lizards are often considered as a source of many pathogens <sup>[6]</sup>. Many reports stated that Geckos are carriers of many zoonotic enteropathogens including non typhoidal salmonellae <sup>[7]</sup> <sup>[8]</sup>, *Citrobacter freundii*, *C. Intermedius*, *Erwinia herbicola*, *Enterobacter cloacae*, *Shigella sonnei*, *Edwardsiella tarda*, *Enterobacter* species, *Serratia marcescens*, *Proteus* spp. , *Klebsiella pneumonia*, and *Escherichia coli* <sup>[9]</sup> *Campylobacter jejuni* <sup>[10]</sup>. The major mechanism of acquiring several bacteria by lizards occurs by a close contact with mothers just after hatching, studies indicated that mothers may transfer microbes to their progeny vertically through different ways depending on their biology <sup>[11]</sup>. Environment is the second source of bacteria, lizards might acquire them horizontally from air, water and food <sup>[12]</sup>. The present study was designed to examine the incidence of zoonotic bacteria in wall gecko droppings to know their epidemiology and to place consideration in formulating measures to control pathogenic disease in Baghdad, Iraq.

### Materials and methods

#### 1-sample collection

Ninety five animals (95) were captured during the period from March 2015 to May 2016, from different areas in Baghdad (AL-Hurriyah, Hay-Al-Khadhraa, AL-Jadriyah, Al-Zaa'faraniyah) by using adhesive boards. Geckos were typed and classified according to <sup>[13]</sup> as *Hemidactylus turcicus* that was called the (Mediterranean Geckos). The fecal samples were collected from animals during the first 24 hours of capture and were transported to the laboratory of Zoonotic Diseases Unit, Veterinary Medicine College, Baghdad University to cultivate and identify the bacteria according to the method of <sup>[14]</sup> depending on gram staining, morphology of colonies and cells, growing on selective media and biochemical properties.

#### 2-Sample Inoculation

Each fecal sample was placed in a test tube containing enriched brain-heart infusion broth

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(BHI) and incubated for 24 hours at 37 °C for cultivation of bacteria, then the growing bacteria were transferred to Petri dishes containing MacConkey agar, Eosin Methyl Blue (EMB) agar, Sorbitol MacConkey agar supplemented with Cefexim and Potassium tellurite (CT-SMAC) agar, Salmonella-Shigella Agar (S. S) agar, Manitol salt agar, trypticase soya agar. The biochemical properties were tested are Sulfur Indole Motility Test (SIM), Triple Sugar Iron (TSI), Simmon Citrate Test (SC), Urease and Methyl Red - Voges Proskauer test (MR/VP).

## Results and discussion

Geckos (common house lizards) are widely known as a source of important pathogenic and zoonotic bacteria which may be present in their intestine and thus the geckos are considered as a potential threat in the spread of diseases [8].

In this study a total of (95) fecal samples were obtained from common house geckos collected from different places in Baghdad. The results showed that 74 (78%) samples were positive and belong to (9) species of genera table (1), this result confirmed the results of [15] who found 32 (31%) positive house gecko samples.

Table (2) show the different types of bacteria identified including *E. coli* that had the highest prevalence 39(34. 8%), followed by *Salmonella* 10(9%), *Serratia* 6(50. 3%), *Klebsiella* 10(9%), *Pseudomonas* 7(6. 2%), *Proteus* 8(7. 1%), *Shigella* 5(4. 4%), *Staphylococcus* 21(19%) and *Yersinia* 6(5%). This disagreed with [5] and [9] who recorded *Salmonella* as the most frequent pathogen. The lizards may be the reservoir of *Salmonella* but they do not shed it in their feces in any time therefore it does not present in their fecal droppings sometimes [3].

The results of [16] showed that *Enterobacter spp.*, *Staphylococcus spp.*, *Escherichia coli*, *Shigella spp.*, *Proteus*

*spp.* and *Klebsiella* has recorded 19. 6%, 18. 2%, 12. 4%, 10. 6%, 10. 4% and 3. 2% respectively, this confirms our results.

Table (3) shows percentage of mixed infection of bacteria isolated from gecko feces, the highest percentage was of *Staph + E. coli* 10(35. 6%).

Table (4) shows the percentage of bacteria isolated according to area, the highest percentage was in Al-Zaa' faraniyah (25. 2%) followed by Hay-Al-Khadhraa (18. 9%), AL-Jadriyah (17. 8%) and AL-Hurriyah (15. 7%).

The insects and house flies captured by these geckos serves as a major source of pathogens because these insects have a great contact with human and animal excrete and waste [17].

Lizards transfer symbiotic and pathogenic microbes from generation to generation and this has been reasoned to be the major source for their reservoir status [9].

**Table 1:** Percentage of positive gecko samples

No. of fecal samples	No. of positive samples	No. of negative samples	Percentage of infection (%)
95	74	21	78%

**Table 2:** Percentage of bacteria isolated from gecko feces

Bacteria type		No. of isolated		Percentage (%)
<i>E. coli ssp.</i>	<i>E. coli O157</i>	39	6	34%
<i>Salmonella</i>		10		9%
<i>Serratia</i>		6		5. 3%
<i>Klebsiella</i>		10		9%
<i>Pseudomonas</i>		7		6. 2%
<i>Protease</i>		8		7. 1%
<i>Shigella</i>		5		4. 4%
<i>Staphylococcus</i>		21		19%
<i>Yersinia</i>		6		5%
Total		112		100%

**Table 3:** Percentage of mixed infection of bacteria isolated from gecko feces

No. of fecal sample	Bacteria type	Percentage%
3	<i>Pseudomonas + E. coli</i>	10. 6%
10	<i>Staph + E. coli</i>	35. 6%
2	<i>Protease + E. coli</i>	7. 2%
3	<i>Klebsiella + Shigella + E. coli</i>	10. 7%
5	<i>Salmonella + Staph</i>	17. 9%
2	<i>Protease + E. coli + Salmonella</i>	7. 2%
2	<i>Klebsiella + E. coli</i>	7. 2%
1	<i>Yersinia + Klebsiella + Staph.</i>	3. 6%
28	Total	100%

**Table 4:** Percentage of bacteria isolates according to area

Area	No. of gecko	No. of isolate	Percentage%
Hay-Al-Khadhraa	23	18	18. 9%
Al -Zaa' faraniyah	33	24	25. 2%
AL-Hurriyah	21	15	15. 7%
AL-Jadriyah	18	17	17. 8%
Total	95	74	78%

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