Bacterial Detection and Anatomical Descriptions of the Digestive System of the Iraqi Gecko (*Hemidactylus turcicus*) in Baghdad Province

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Abstract

This study was carried on 64 Geckos of different sizes collected from five locations at Baghdad province over a period from July 2002 up to February 2003. Bacteriological examination of 84 swabs taken from the digestive tract of these animals revealed that 81 swabs (96.4%) were positive for bacterial isolates. The most predominant bacteria were *Salmonella spp*. (50%) followed by *E.coli* (26.2%) and *Klesiella spp.* (14.3%), which were isolated mostly from the small intestine and feces. The highest frequency of Salmonella infection was observed in Geckos collected from Al-Mahmodeia and Al-Amereia (100%), (83%) respectively, where as the lowest frequency (26.6%) was found in Geckos collected from Baghdad Al-Jadida. Geckos of large size were more frequently infected in comparison with the smaller size. However the study of the anatomy of the digestive system showed that Geckos have a wide triangular mouth with pointed teeth, the stomach was small and the duodenum was large, the liver had a gall bladder and the pancreas opens in to the duodenum by many ducts. The study indicated that the large size of the duodenum plays an important role in bacterial growth and multiplication. Therefore it could be concluded that Geckos considered to be a source and reservoir for harmful pathogens that could be transmitted to human beings.

الخلاصة

أجريت هذه الدراسة على 64 من كائنات ابى برص جمعت من خمسة مناطق فى محافظة بغداد خلال المدة ما بين تموز 2002 ولغاية شباط 2003 . تم اخذ 84 مسحة من الجهاز الهضمي لهذا الكائن لغرض الفحص البكتيريولوجي.

اظهرت النتائج ان 81 مسحة (96.4 %) كانت موجبة للعزلات الجرثومية، وكانت جرثومة *Salmonella spp.* اكثرالجراثيم شيوعا(50%)،تلتها جرثومة *E.coli* (26.2%) وجرثومة *Klebsiella spp.* (14.3%)، واغلبها عزلت من الامعاء الدقيقة والبراز. وكانت أعلى نسبة إصابة بجراثيم *Salmonella spp.* من كائنات ابي بريص التي تم جمعها من منطقتي المحمودية والعامرية وبنسبة (100%و83%) على التوالي، في حين سجلت اقل نسبة (26,6%) من الكائنات التي جمعت من بغداد الجديدة. وشكلت الكائنات الكبيرة الحجم تعرضا اكثر للإصابة بالمقارنة بالكائنات الصغيرة الحجم وبينت دراسة الجهاز الهضمي لأبي بريص العراق وجود فم مثلث وعريض يحوي أسنان مدببة، وكانت المعدة صغيرة أما العفج فهو واسع وكبير، والكبد يحوي الصفراء اما البنكرياس فانه يفتح بالعفج بواسطة عدة قنوات. وقد اشارت الدراسة الى ان كبر حجم العفج يلعب دور مهم في نمو وتكاثر الجراثيم. لذا يمكن ان نستنتج ان كائن ابي بريص يعد مستودع للجراثيم الخطرة وهو مصدر لنقل هذة الجراثيم للانسان والحيوان.

Introduction

Hemidactylus turcicus is the most common Gecko in Iraq and often found in houses [1].It belongs to the family Geckonidae, class Reptillia [2].

Bacterial infection are not of unusual occurrence in reptiles [3]. Many reports have implicated Salmonella as an etiological agent in gastroenteritis in reptiles particularly snakes and turtles [4,5,6], pet reptiles associated Salmonellosis continues as a public health problem in many parts of the world ,for patients who have direct or indirect contact with reptiles such as lizards, snakes or turtles [5,7].

In Iraq very few works were conducted on Gecko [1], but there is no study concerning the bacterial isolation of this species, also there is no previous study associated with the anatomy of the digestive tract. Accordingly the present investigation was carried out for the first time to determine the bacterial isolates with special attention to the anatomy of the digestive tract of the Iraqi Gecko.

Materials and Methods

Sixty four Geckos of different sizes were collected from five locations at Baghdad province (Al-Amereia, Al-Ceddeia, Al-Mahmodeia, Baghdad Al-Jadida and Zaiona),during the period from July 2002 up to February 2003. Geckos were typed and classified as *Hemidactylus turcicus* that was called the Mediterranean Geckos [2]. All geckos were kept alive in an ice chest at 7c until necropsied and examined within 72 hours. Geckos were killed using an over dose of ether according to Criscione&Font [8]. Sterile swabs were collected from the stomach, liver, small intestine and feces, samples were immediately transferred to the laboratory under cold condition for bacteriological investigations.

Laboratory procedures:

1-Direct microscopical examination was done for all swabs by Gram's staining technique.

2-Each swab was inoculated in selenite enrichment broth and incubated at 37c for 24-48 hours, then the swabs were subcultured on each of the following media:

Blood agar plates, MacConkey and Salmonella Shigella agar at 37c for 24 hours.

3-Colonies were checked and the bacteria were identified according to Cowan & Steel [9].

Anatomical methods

Geckos' abdomens were exposed, then perfused with normal saline followed by 10% formalin solution [10].

The position and relation of the digestive system were observed before their removal. The shape and measurements of the organs were recorded.

Results

1-Bacterial identification:

Out of 84swabs examined from 64 Geckos 81 yield positive bacterial growth (Table 1). Hence the prevalence of bacterial isolates were (96.4%). *Salmonella* spp. was the most predominant isolate (50%), which was isolated mostly from the feces and small intestine, *E.coli* found to be the second frequent one (26.2%), which was isolated more frequently from the small intestine (Table 2).

It was indicated that all Geckos (100%) collected from Al-Mahmodeia were infected with *Salmonella spp*.,followed by those collected from Al-Amereia (83%),where only (26.6%) of Geckos that were collected from Baghdad AL-Jadida were infected (Table 3). The study also indicated that Geckos of the larger sizes were more frequently infected than the smaller sizes.

2-Anatomical descriptions:

The parts of the digestive tract were shown in (Fig.1). A triangular mouth of equal quarters with its base backward and its apex forward. The mouth contains sharp pointed teeth at the free boarders of the upper and lower jaws. Each jaw contained about 40 teeth. The tongue was triangular with its apex forward, it lies at the midway of the lower jaw. The salivary glands lies at the corners of the mouth, it is colorless. The esophagus was short tube which lies between the mouth and the stomach.

The stomach was fusiform and had an upper and lower ends, its length about 2.0-3.5 cm. The length of the small intestine was 6-8 cm., it consists of large duodenum of U shape with wide diameter, the jejunum was short and small in diameter, the ileum was the smallest part of the small intestine. The cecum was large and had spheroid to oval shape. The large intestine was short tube, wide in diameter and open exteriorly at the cloaca. The liver was thin, brownish in color and covers the stomach completely, it had four lobes (Right, Left, Middle and Papillary) and contained a large gall bladder. The pancreas was white to pink, it attached to the stomach and opened in to the duodenum by many ducts.

Table (1): Frequency of Bacterial isolation from Iraqi Gecko *(Hemidactylus turcicus)*

Isolates	No.	%
Salmonella spp.	42	50
E.coli	22	26.2
Klebsiella spp.	12	14.3
Brucella spp.	2	2.4
Staphylococcus aureus	2	2.4
Streptococcus spp.	1	1.2
No growth	3	3.6
Total	*84*	*100*

Table (2): No. of Bacterial isolates according to the site of isolation from Iraqi Gecko *(Hemidatylus turcicus)*

Type of bacteria	Stomach	Liver	Small intestine	Feces	Total
Salmonella spp.	5	6	14	17	42
E.coli	6	3	8	5	22
Klebsielli spp.	3	4	5	-	12
Brucella spp.	-	1	-	1	2
S.aureus	-	-	-	2	2
Streptococcus spp.	-	1	-	-	1
Total	14	15	27	25	81

Table (3): Frequency of Salmonella spp. isolated from Iraqi Gecko according to the Locations of Baghdad. *(Hemidatylus turcicus)*

Area	No. of Gecko	No. of isolate	%
Al-Amereia	18	15	83
Al-Ceddeia	13	9	69.2
Al-Mahmodeia	8	8	100
Zayona	10	6	60
Baghdad Al-Jadida	15	4	26.6
Total	64	42	

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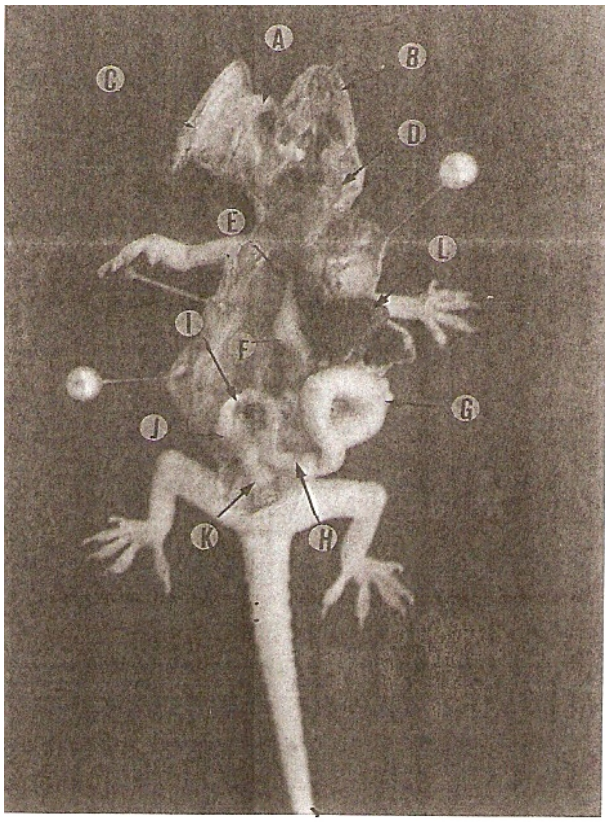

Fig. (1): Digestive organs of Iraqi Gecko *(Hemidactylus turcicus)*
A- Tongue E- Esophagus I- Ileum
B- Upper Jaw F- Stomach J- Cecum
C- Lower Jaw G- Duodenum K- Large intestine
D- Salivary gland H-Jejunum L- Liver

Discussion

High rate of bacterial isolates recovered from Iraqi Gecko (Table 1). All of these bacteria were recorded for the first time in Iraq from this animal, amongst them *Salmonella spp*. was the most frequent pathogen, this finding follows the previous review on Salmonellosis in reptiles by Chiodini & Sundberg [6], who stated that reptiles particularly turtles have been a frequent source of Salmonella infection in human such as gastroenteritis, arthritis, meningitis, wound infection and septicemias.

However other reptiles such as lizards have been responsible for zoonotic *Salmonellosis* [11]. From the results summarized in (Table 2), it was clear that a high frequency of bacterial species were isolated from the feces and small intestine especially from the large duodenum which could be a good media for bacterial growth in compareson with the other parts; like the stomach that posses the acidic juice which inhibits the bacteria [12], although 14 species of bacteria

were isolated from this organ. This study indicated that there was a significant variation in the frequency of Salmonella infection in Geckos from the different locations of Baghdad. The high frequency of infection rate were found in Geckos collected from Al-Mahmodeia and Al-Amereia which could be attributed to the nature of broad diat of the Geckos in each location and their living in the sewers or in the sewage water with high incidence of infected insects with microorganisms. Therefore the high frequency of Salmonella in such places is considered to be dangerous for human and animal health. It was also indicated in this study that the large size Geckos were more frequently infected, this could be due to their high motility and easy pick up insects. The anatomical descriptions of the digestive tract of this animal were reasonable to those showed in lizard [3].

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