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STUDIES ON SALMONELLOSIS IN CAMELS

(With 4 Tables)

By

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دراسات عن السالمونيلا فى الجمال

صديق رشوان ، نوال غبريال ، عبدالخالق الطماوى

تم جمع عينات من ١٥٠ جمل فى مجموعتين الأولى ١٠٠ جمل سليم ظاهريا ، والثانية ٥٠ جمل مصابة بالإسهال. وكانت هذه العينات عبارة عن غدد ليمفاوية معوية وكبد ومحتويات الامعاء من جمال المجموعة الأولى مذبوحة بالسلخانة والاخرى عبارة عن ٥٠ عينة براز من جمال المجموعة الثانية. وأوضحت الدراسة ان نسبة العزل كانت ٨٪ من الجمال السليمة ظاهريا بينما كانت ١٢٪ فى المجموعة المصابة بالإسهال. وكانت نتيجة التصنيف السيرولوجى فى المجموعة الأولى ٣٪ سالمونيلا تيفى ميوريوم ، ٢٪ سالمونيلا انترتيدس ، ٢٪ سالمونيلا نيوبورت ، ١٪ سالمونيلا أنفنتينتس. والمجموعة الثانية ٤٪ سالمونيلا تيفى ميوريوم ، ٤٪ سالمونيلا انترتيدس ، ٢٪ لكل من سالمونيلا نيوبورت وسالمونيلا انفينتس. وكانت العترات المعزولة حساسة لكل من الكلورامفينكول جنتاميسين والنيوميسين ومقاومة لكل من الامبسلين ايرثروميسن ، الينودوميسين والبنسلين ج. وقد تبين من الدراسة ان الغدد الليمفاوية المعوية هى الأفضل لعزل السالمونيلا. وقد نوقشت الأهمية الصحية لميكروبات السالمونيلا ومدى خطورتها على الإنسان.

SUMMARY

Samples of this study were collected from 150 camel, and cultivated on different types of media for isolation of Salmonellae, It included the mesentric lymph nodes, liver and intestinal contents of 100 apparently healthy camels and 50 samples were from camels suffering from diarrhoea. The percentage of isolation of Salmonella from the first group was 8% while that of the second group was 12%. The serological typing of Salmonellae isolated from healthy camels showed the presence of *S.typhimurium* (3%), *S.enteritidis* (2%), *S. newport* (2%) and *S. infanitis* (1%), while those of the second group were *S.typhimurium* (4%), *S.enteritidis* (4%), each of S.

infanitis and *S.newport* (2%).The isolates were very sensitive to chloramphenicol, gentamycin and neomycin, but were resistant to ampicillin, erythromycin, oleandomycin and pencillin G. It was concluded that the mesentric lymph nodes proved to be the best site for isolation of Salmonellae, in camels. The hygienic importance was discussed.

Key words: *Camels - Salmonellosis*

INTRODUCTION

In Egypt, camels are considered as an important source for meat production and help in transportation of agricultural crops and other farm work.

There is no doubt that Salmonellae are recognised as one of the most important causes of infections in animal population causing variable morbidity changes and at the same time they constitute a hazard to public health. As regards the clinical symptoms, Salmonella organisms may cause enteritis, septicaemia, and abortion in camels. Chronic Salmonellosis is characterized by persistent diarrhoea, emaciation and death after a month or longer (Pegram & Tareke, 1981).

Like other animals, camels are infected with Salmonella and hence may play a role in transmitting these organisms to other animals as well as to human beings. Thus consumption of infected camel's meat could be undoubtedly responsible for cases of food poisoning (Sandiford, 1944 and Mcgrane and Higgins, 1985).

Salmonellosis in camels was reported from Somalia (Cheyne, et al., 1977). In Ethiopia, Salmonellosis was recorded to be the most important disease in sucking camel calves, with overall fatality rate reaching 20% in some areas (Pergam & Tareke, 1981). Also Salmonella were isolated from faeces of clinically normal camels in India (Malik *et al.*, 1967 and Ambwani & Jaktar, 1973), in Arab Emirates (Wernery, 1992) and in Iran (Tadjbakhch *et al.*, 1992).

Available literature on camel Salmonellosis in Egypt recently is summarized in Table 1.

The aim of this work was done to investigate the occurrence of Salmonella in camels in Assiut province and to determine the antibiotic sensitivity of the different serovars.

MATERIALS and METHODS

Samples:

Mesenteric lymph nodes, liver and pieces of small intestine were obtained from 100 apparently healthy camels slaughtered at Assiut abattoir. Besides, 50 faecal samples were collected from camels suffering from diarrhoea, the specimens were taken from the rectum with plastic gloves.

Samples were marked and transferred to the laboratory with a minimum delay where they were immediately examined.

Isolation & Identification of Salmonella species: The mesenteric lymph node or liver was first dipped into boiling water for 3-4 seconds to remove surface contaminants according to Kampelmarcher *et al* (1964). Approximately, one gram of each lymph node or liver was cut aseptically into small portions and transferred to a test tube containing 10 ml selenite "f" broth. The intestinal tract sample was seared with a hot spatula and the contents were inoculated into the selenite "f" broth. 1-3 grams of faecal samples were similarly inoculated. All tubes were incubated at 37°C for 18-20 hours, for enrichment. From each tube subculture was made on S.S. agar plates and incubated at 37°C for 24 hours. Only pale colonies were picked to be identified morphologically and biochemically according to Edwards and Ewing (1972) and Cruickshank *et al* (1975).

According to the biochemical reactions suspected isolates of Salmonellae were subjected to serological identification according to Kauffmann white Scheme (Kauffmann, 1974) and the instruction of the technical information of the manufacture laboratory (Dnon, 1975).

Antibiotics sensitivity tests:

Salmonella isolates were tested for sensitivity to 11 antibiotics [Ampicillin (10 mcg), Cephalothin (30 mcg), Chloramphenicol (30 mcg), Erythromycin (30 mcg), Gentamycin (10 mcg), Nalidoxic acid (30 mcg), Neomycin (30 mcg), Oleandomycin (15 mcg), Penicillin G. (10 mcg), Tetracycline (30 mceg), Trimethoprim sulfamethoxzole (1.25+23.75 mcg), using the agar diffusion method as described by Sojka *et al* (1972).

RESULTS

The results are shown in Tables 2, 3 and 4.

DISCUSSION

Salmonella infection occurs universally in all animal species and in man. Domestic animals are generally considered to be the principle reservoirs of Salmonellae. This fact had been correlated to the high percentage of outbreaks of food poisoning in which animal products were implicated as vehicles of infection (Wilson and Miles, 1946, Farid and Lotfi, 1978, Quinn et al 1994).

The occurrence of Salmonella infection had increased greatly over the past 30 years, and unusual Salmonella serovars were implicated as a result of the increased use of animal and fish byproducts; many of which ineffeciently sterilized (Blood et al. 1990).

In this study, from 150 camels, 14 salmonella strains were recovered from 13 infected camels with an incidence of 9.3%. These isolates were serologically typed as *S.typhimurium* (5), *S.enteritidis* (4), *S.new port* (3) and *S.infantis* (2), the last species has not been recovered before from camels in Egypt as shown in Table (1).

As regards the isolation of Salmonella serovars from apparently healthy slaughtered camels table (3) it is clear that the carrier state was (7%). This percentage is nearly similar to that (8.89%) reported by Hamada et al (1963) in Egypt as well as that (9.7%) reported by Tadjbakhch (1992) in Iran. Higher incidence rates 15% and 11.7% were reported in Egypt by Elias (1982) and Selim et al. (1990) respectively. However, lower incidences were reported by several workers in Egypt: 2% by Floyd (1955) and Farrag & El-Afify (1956), 1.5% by Zaki (1956) 3.1% by Kamel and Lotfi, (1963) while Werenery (1992) reported 4.3% in Emirates.

These significant difference may be attributed to the increase of incidence of Salmonellosis due to lack of control or the improvement of methods of isolation.

Bacterial examination of mesenteric lymph nodes, intestinal content and livers, Table (3) showed that the former proved to be the better predilection seat for Salmonella than the small intestine and liver. The recovery rate of Salmonella from lymph nodes was 46.2% compared with 7.7% from each of small intestine and liver. These findings are similar to those previously recorded by Kamel and Lotfi (1963), Elias (1982) and Selim, et al. (1990). They recommended the use of mesenteric lymph node as a reliable material for detecting the presence of Salmonella organism.

In one occasion *S.typhimurium* could be isolated from lymph node and small intestine of the same camel and this indicated spread of salmonella in that camel.

Bacterial examination of 50 camels suffering from diarrhoea (Table 3) showed that the incidence rate of Salmonella infection was 12%, which is somewhat lower than that reported (17%) by Selim et al. (1990). This difference may be due to variations in breed, place or method of isolation.

The serovars isolated from the faecal samples of apparently healthy camels were as such (2) of each of *S.typhimurium*, and *S.enterittidis* and one of each of *S.infantis* and *S.newport*.

The antibiogram of pathogenic bacteria could vary from place to place and from a case to another. This could be attributed to the wide and misuse of antibacterial drugs which may produce new resistant forms. For this reason one of the steps in controlling bacterial infection is the use of the propriate antibiotic.

In Egypt data about antibiotic sensitivity of Salmonella serovars isolated from camels had not been recorded except by Elias (1982).

In the present study, Table (4), it was proved that 92.9% of the isolates were sensitive to gentamycin, neomycin and chloramphenicol. This result is in agreement with that reported by Farid (1976) in case of gentamycin. However, Elias (1982) reported that 48.4% of isolated Salmonella from camels were sensitive, while Khalil (1988) reported that 39.6% of Salmonella isolates from calves were sensitive. These significance difference may be due to difference in place or breed.

On the other hand all the isolated serovars were resistant to ampicillin, erythromycin, Oleandomycine and Pencillin G. This finding is in agreement with that reported by Farid (1976), Elias (1982) and Khalil (1988).

From the results obtained in the present work, infected camels would constitute a public health hazard to man, either through direct or indirect contact or as a result of consumption of meat or meat products from an infected camel.

Moreover, infected animals, particularly in case of Salmonella would disseminate the organisms in their faeces and hence spread the infection to other susceptible animals through infected pasture.

Hygienic measures must be taken as regards the treatment of an animal suffering from diarrheatic symptoms with an appropriate antibiotic and the correct disposal of its faeces to minimise the spread of infection.

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Table 1: Previous reports of Salmonella serovars isolated from camels in Egypt

Author	Year	Serovars
Sandiford *and Sallam*	1936	*S.typhimurium*
Sandiford	1944	*S.typhimurium*
Floyd	1955	*S.Saintpaul, S.paratyphi, S.cholera suis*
Farrag & El-Afify	1956	*S.enteritidis*
Zaki	1956	*S.typhimurium*
Hamada *et al*	1963	*S.glostrup, S.saintpaul*
Kamel & Lotfi	1963	*S.typhimurium, S.saintpaul, S.reading, S.bovis-morbificanis, S.enteritidis, S.dublin, S. eastbourne.*
Ramadan and Sadek	1971	*S.paratyphi, S.saint paul. S.typhimurium, S.reading, S.dublin, S.eastborne. S.enteritidis, S.bovis morbificans.*
Elias	1982	*S.hidelberg, S.new lands, S.chester, S.easbourne, S.goettingen, S.typhimurium, S.barazzavile, S.lokstedt, S.israel, S.newport S.newbrun swick.*
Selim *et al*	1990	*S.newlands, S.anatum, S.typhimurium, S.tshiongwe, S.sandiago, S.muenchen, S.thompson.*

Table 2: Serotyping of 14 salmonella strains isolated from 150 camels.

Salmonella Serovars	Antgenic Structure				No. of Isolates	% Total Camels
	Group	Somatic	Flagellar			
			Phase 1	Phase 2		
S.typhimurium	B	1,4,5,12	I	1,2	5	3.3
S.enteritidis	D	1,9,12	gm	-	4	2.7
S.infantis	C1	6,7	r	1,5	2	1.3
S.newport	C2	6,7	e,h	1,2	3	2.-
Total					14	9.3

Table 3: Frequency of Salmonella serovars isolated from 13 infected camel* out of 150 camels.

Serovars	Healthy camel (100)						diseased camel (50)	
	Mesentric lymphnode		Small intestine		Liver			
	No.	%	No.	%	No.	%		%
**S.typhimurium*	2	15.4	1	7.7	-	-	2	15.4
S.enteritidis	2	15.4	-	-	-	-	2	15.4
S.new port	1	7.7	-	-	1	7.7	1	7.7
S.infantis	1	7.7	-	-	-	-	1	7.7
Total	6	46.2	1	7.7	1	7.7	6	46.7

* 13 infected camel (7 apparently healthy camel + 6 suffering from diarrhea).

Table 4: Results of antibiotic sensitivity testing of 14 strains of Salmonella isolated from camels.

Antibiotic disc	Amount/ disc	Resistance		Sensitive	
		No.	%	No.	%
Ampicillin	10 mcg	14	100	0	0
Cephalothin	30 mcg	2	14.3	12	85.7
Chloramphenicol	30 mcg	1	7.1	13	92.9
Erythromycin	30 mcg	14	100	0	0
Gentamycin	10 mcg	1	7.1	13	92.9
Nalidoxic acid	30 mcg	6	42.9	8	57.1
Neomycin	30 mcg	1	7.1	13	92.9
Oleandomycine	15 mcg	14	100	0	0
Penicillin G	10 mcg	14	100	0	0
Tetracycline	30 mcg	9	64.2	5	35.7
Trimethoprim sulfamethoxzole	(1.25+23.75) mcg)	2	14.3	12	85.7