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" بعض الدراسات عن السـالمونيلا فى الرومـــى "

مصطفـــى عـبد المطلب، عبد الخالق الطمـاوى*، محسن الدمرداش

- بالفحص البكتريولوجى لعدد ١٨٠ حالة كتكوت رومى نافق و ٥٠٠ مسحة برازيـة من الرومـــى السليم ظاهريا ، تم عزل ٨٢ عترة للسالمونيلا وبتصنيف هذه العـترات تبين أنها سالمونيـلا أتاتم (٢٨عـترة) ، سالمونيلا ميلجريدس (١٤) ، وسـالمونيلا شمـــتر (٦) .
- أجرى اختيار العدوى الصناعية لدراسة ضراوة الأنواع المختلفـة من السالمونيلا المعزولـــة
- تبين أن الادوية الاسبيسلين ، الفيورا زوليدون ، والكلورمفينيكول ذات كفاءة عالية باجـــراء اختبارات الحساسية لهذه العترات المعزولة معمليـا .
- سجل فى هذا البحث اصابة حقلية بهاء السالمونيلا فى كتاكيت الرومى وقد تم السيطرة علـــى المرض باستخدام عقارى الاسبيسلين والفيورازوليدون بجانب الاحتياطات الصحية الأخـــرى .

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SOME STUDIES ON SALMONELLOSIS OF TURKEYS

(With 4 Tables)

By

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SUMMARY

Out of 180 freshly dead one-day up to 3-weeks old turkey poults as well as 500 faecal cloacal swabs from apparently healthy turkeys, 82 strains of Salmonella were isolated.

The isolated strains were serologically differentiated into 5 serotypes: S. anatum (28 isolates), S. typhi-murium (19), S. thompson (15), S. meleagridis (14) and S. chester (6).

The pathogenicity of the isolated serotypes was studied. In vitro the most effective drugs were found to be, Ampicillin, Furazolidone and Chloramphenicol.

Field trials showed the efficacy of Ampicillin and Furazolidone as well as the sanitary precautions for controlling an outbreak of Salmonella infection among poults in a turkey farm.

INTRODUCTION

Till now paratyphoid infections in turkeys in which Salmonella serotypes are the causative agents constitute one of the most important veterinary problems which face the turkey industry in many countries including Egypt.

The disease is not only responsible for high mortality in youngs but also for lowering the rate of hatchability, fertility and egg production (GRAHAM and MICHAEL, 1936; POMEROY and FENSTERMACHER, 1941 and KAUFFMAN, 1966).

Tracing the litera ture back on the isolation of salmonella serotypes from turkeys in A.R.E. indicated that serval authors were successful in isolating S. gallinarumpullorum, S. typhi-murium, S. clerken well, S. westhampton, S. senttenberg, S. thompson, S. meunchen, S. heidelberg, S. sandiego, S. mission and some untyped strains(EL-AGROUDI 1960; 1963; 1964; EL-AGROUDI and SADEK, 1968 and SHOUMAN and MOUSTAFA, 1974).

However, only one attempt was made by EL-AKKAD et al. (1967) to study the incidence of salmonella in turkey farms maintained in the New-Valley province of Upper Egypt.

The present work deals with:

1- The recovery of Salmonella serotypes from turkeys in Assiut and New Valley.
2- The pathogenicity of different isolated serotypes as well as in vitro determination for their sensitivity of different antimicrobial agents.
3- The means and measures used to control an outbreak of Salmonella infection among turkey poults in the field.

MATERIAL and METHODS

180 freshly dead one-day up to 3 weeks old turkey poults were collected from different farms and localities in Assiut and New-Valley provinces. The specimens were subjected to post-mortem and bacterillogical examination.

Also, faecal cloacol swabs derived from 500 apparently healthy turkeys (7 -20 months old) were examined bacteriologically.

Trials for Salmonella isolation were carried out from, liver, gall bladder, heart blood, spleen, kidney, yolk sac, intestinasl contents of the dead poults. These samples were taken aseptically and they as well as the cloacol swabs

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were directly transferred to tetrathionate broth and selenite F broth media. The enrichment broth tubes were incubated for 18 hours at 37°C, followed by plating onto S. S. agar, Brilliant green phenol red agar and xylose lysine desoxycholate (X. L. D.) agar plates and incubated for another 24 - 48 hours.

Suspected Salmonella colonies from the different media (pale yellow or nearly colourless colonies on S. S. agar, pink red on brilliant green agar and red with or without black centers on (X. L. D.), were subjected for different biochemical reactions (EDWARDS and EWING, 1972). Serological identification of suspected isolates that produced biochemical reactions simulating Salmonella was carried out according to Modified-Kauffmann - White Schema for salmonella and Arizone as described by McWHORTER, et al. (1977). The slide agglutinastion test was used against specific antisera obtained from Wellcome Research Laboratories, Bekenham, England.

The pathogenicity of the isolated Salmonella serotypes was determined in one-day old turkey poults. Before infection, a random sample which included 10 poults were sacrified for P. M., and bacteriological examination t prove that these birds were healthy and Salmonella free. Other poults were divided into several groups, each group of 10 birds, and was infected orally by a dose of 10×10^7 viable organisms of one of the Salmonello serotypes. Another group was left as a control. All infected groups and control group were kept under observation. Clinical signs and post-mortem findings were observed. Trials for re-isolation of the inoculated serotypes were conducted.

In vitro antibiotic and chemotherapeutic sensitivity testing of identified strains was performed by the disc plate technique described by FLAIR et al. (1970). Discs were prepared according to the method recorded by STUCKES and WATERWORTH (1972). Antibiotic sensitivity discs including Amplcillin (10 mg), Furazolidone (100 mg), Chloramphenicol (30 mg), Neomycin (10 mg), Kanamycin (30 mg), Garamycin (10 mg), Streptomycin (10 mg), Oxytetracycline (30 mg), Tetracycline (30 mg), Erthromycin (15 mg), and Penicillin (10 I. U.) were used.

RESULTS

The results of Salmonella isolation and identification are given in Tables 1 & 2). Table (3) illustrates the results of experimental infection.

The effect of different types of antimicrobial agents on different Salmonella serotypes are summarized in Table (4).

DISCUSSION

Taking into consideration that salmonellosis in turkeys constitutes one of the economic problems, the present work was carried out to study and investigate some aspects about this subject in Assiut and New-Valley provinces. It is evident from the results that 62 salmonella isolates, representing an incidence percentage of 34.44%, could be recovered from 180 dead turkey poults.

Also, Salmonella organisms could be isolated 20 times (4%) from 500 faecal cloacal swabs of apparently healthy turkeys.

Serological typing indicated that isolated strains from the dead poults included S. anastum, S. typhi-murium and S. thompson in a descending manner, while the serotypes from living turkeys were S. meleagridis and S. chester.

In similar studies the semen salmonella serotypes have been isolated from turkeys by different investigators in many countries including Egypt, SMITH and BUXTON (1951) and BAKER et al. (1966) reported on the isolation of S. anatum. SMITH and BUXTON (1951), EL-AGROUDI (1960), GOETZ (1962), EL-AKKAD et al. (1967), ASERKOF et al. (1970) and SHOUMAN and MOUSTAFA (1974) succeeded in isolation of S. typhi-murium, EL-AKKAD et al. (1967), recorded S. thompson. BAKER et al. (1966) and FILEV et al. (1968) could isolate S. meleagridis. While BAKER et al. (1966), were able to recover S. chester.

Moreover, In A.R.E., S. anatum was previously isolated from chickens and ducks by EL-AGROUDI, (1960), EL-AKKAD et al. (1967) and SHAHATA (1979). Also, S. melegridis was recovered by EL-AGROUDI (1963), from chickens. While S. chester was isolated form chicken by SHOUMAN and MOUSTAFA (1972).

In the present work, Xylose Lysine Desoxycholate agar medium (TAYLOR, 1965) used for Salmonellae isolation. Salonella colonies on "X. L. D." medium were circular, measuring approximately 1 - 3 mm. in diameter, with a smooth low convex surface entire edge, and butyrous, in consistency. Colonies of hydrogen sulphide-positive salmonella were red with black centers while those of hydrogen sulphide negative salmonella were red in colour. This conclusion had been also recorded by CHADWICK (1971) and WERN (1975).

The results of pathogenicity of the isolated Salmonella serotypes to one-day old poults revealed that all the inocul-ated salmonella types were highly pathogenic according to the daily deaths post infection and the mortality rate. Deaths started 48 hours post infection and discontinued by the 9th day. The mortality rate due to infection with S. typhi-murium and S. thompson was 90% for each, and 80% for S. anatum and S. meleagridis and was 70% for S. chester. Re-isolation trials of Salmonella from the internal organs of experimentally infected poults were positively obtained from heart blood and liver of dead birds.

Similar results were cited by some authors (MITROVIC, 1956; BIERER, 1960 and SINGH, 1967). While our results agreed to some extent with those recorded by POMEROY (1944).

In the present study two pathogenic salmonellae were isolated from apparently healthy turkeys, Accordingly these birds may act as chronic carriers and play an important role in spreading the infection. Therefore, attention should be paid for the detection of carrier cases. For this purpose it is recommended to use a polyvalent antigen from the serotypes prevalent in a flock or an area.

With regard to the in vitro sensitivity of the 82 isolated strains (5 serotypes) to 11 different antimicrobial agents, it was found that Ampicillin, Furazolidone and Chloramphenicol were the most effective drugs with an incidence of 100%, 100% and 98.78% respectively. Very similar results were demonstrated by some workers (SETTNES, 1968; GHUNG and FROST, 1969; VIAENE et al. 1970; SOJKA et al. 1972 and McGARR et al. 1977). However some reverse results were obtained by (SOJKA and HUDSON, 1976; GLEDEL et al. 1977 and SOJKA and WRAY, 1980).

On the other hand, our isolates were completely resistant to Erthromycin and Penicillin, While the actions of Neomycin, Kanamycin, Garamycin, Streptomycin, Oxytetracycline and Tetracycline were variable.

It is worth to mention that during the collection of specimens for the present research work an outbreak with a high mortality rate (15%) took place among poults 1 - 7 days old at Kharga turkey station, New Valley. S. anatum and S. typhi-murium were isolated form dead poults. Control measures were taken which included combined treatment with Ampicillin at a level of 5 mg/bird for 5 days in drinking water and Furazolidone at the rate of 300 gm/ton of feed for 10 days, together with disinfection of all houses, waterers and feed containers. When these measures were conducted the mortality rate was significantly reduced.

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Table (1): Salmonella serotypes isolated from 180 turkey poults.

Salmonella serotypes	Sero-group	Antigenic O factors	Structure H factors I phase	Structure H factors II phase	No. of isolates	Percentage
S. anatum	E_1	3, 10	e,h	1,6	28	45.32
S. typhi-murium	B	1, 4, 5 12	i	1,2	19	30.64
S. thopson	C_1	6, 7	k	1,5	15	24.19
Total					62	

Table (2): Salmonella serotypes isolated from 500 apparently healthy turkey

Salmonella serotypes	Sero-group	Antigenic O factors	Structure H factors I phase	Structure H factors II phase	No. of isolates	Percentage
S. meleagridis	E_1	3, 10	e,h	l,w	14	70
S. chester	B	1,4,5,12	e,h	e,n	6	30
Total					20	

Table (3): Results of experimental oral infections of poults with salmonella erotypes

Group No.	Inoculated serotypes	No. of Infected poults	No. of deaths per day post infection 1st day	2nd day	3rd day	4th day	5th day	6th day	7th day	8th day	9th day	Table No. of deaths	No. of survivors	Mortality rate %
1	S. anatum	10		1		2		1	1			8	2	80
2	S. typhi-murium	10		2	2	2	2	1				9	1	80
3	S. thopson	10		2	2	3	1		1			9	1	90
4	S. meleogridis	10		1	1	1	3	1	1			8	2	80
5	S. chester	10		1		2	1	1	1	1		7	3	70
6	Control	10										0	10	0
	Total											41	19	

No deaths were recorded from the 9th day till the end of the observation time (30 days).

Table (4)

Antibiotic and chemotherapeutic sensitivity of salmonella serotypes isolated from turkeys

Therapeutic agents	Concentration	S. anatum		Salmonella serotypes								Total	
				S. typhi-murium		S. thompson		S. meleagridis		S. chester			
		S	R	S	R	S	R	S	R	S	R	S	R
Ampicillin	10 ug	28 100%	- 0%	19 100%	- 0%	15 100%	- 0%	14 100%	- 0%	6 100%	- 0%	82 100%	- 0%
Furazolidone	100 ug	28 100%	- 0%	19 100%	- 0%	15 100%	- 0%	14 100%	- 0%	6 100%	- 0%	82 100%	- 0%
Chloramphenicol	30 ug	28 100%	- 0%	19 100%	- 0%	14 93.33%	1 6.67%	14 100%	- 0%	6 100%	- 0%	81 98.78	1 1.22%
Neomycin	10 ug	23 82.14%	5 17.86%	16 84.21%	3 15.79%	13 86.67%	2 13.33%	12 85.71%	2 14.29%	6 100%	- 0%	70 85.37%	12 14.63%
Kanamycin	30 ug	22 78.57%	6 21.43%	16 84.21%	3 15.79%	11 73.33%	4 26.67%	11 78.57%	3 21.43%	4 66.67%	2 33.33%	64 78.05%	18 21.95%
Garamycin	10 ug	20 70.43%	8 29.57%	14 73.68%	5 26.32%	12 80%	3 20%	12 85.71%	2 14.29%	5 83.33	1 16.67%	63 70.83%	19 23.17
Streptomycin	10 ug	20 70.43%	8 29.57%	12 63.16%	7 36.84%	10 66.67%	5 33.33%	9 64.29%	5 35.71%	5 83.33%	1 16.67%	56 68.29%	26 31.71%
Oxytetracycline	30 ug	16 57.14%	12 44.64%	12 63.16%	7 36.84%	10 66.67%	5 33.33%	9 64.29%	5 35.71%	3 50%	3 50%	50 60.98%	32 39.02%
Tetracycline	30 ug	14 50%	14 50%	10 52.63%	9 47.37%	6 40%	9 60%	7 50%	7 50%	2 33.33%	4 66.67%	39 47.56%	43 52.44%
Erthromycin	15 ug	- 0%	28 100%	- 0%	19 100%	- 0%	15 100%	- 0%	14 100%	- 0%	6 100%	- 0%	82 100%
Penicillin	10 ug	-	28	-	19	0%	100%	0%	100%	0%	100%	0%	100%