

قسم الباثولوجيا والطفيليات  
كلية الطب البيطري - جامعة القاهرة  
رئيس القسم : أ.د/ محمد السرجاني

### زهري الطيور في الكتاكيت الفيومي

محمد السرجاني ، آن مرسي\* ، نبيهه رمضان ،  
صفاء ياسين ، منى محرز\*

قام الباحثون باستحداث العدوى بميكروب زهري الطيور في كتاكيت فيومي ذات أعمار مختلفه من سن ٣ أسابيع الى ٧ أسابيع لمعرفة قدرة هذه الكتاكيت ذات الأعمار الأولى على ظهور رد الفعل في صورة التغيرات في الدم والتغيرات العينية والمجهريه نتيجة العدوى المستحدثة •

وقد استخدم ( ٦٣ ) كتكوت في هذه التجربة وقد ظهرت تغيرات في مكونات الدم كيميا ونوعيا وخصوصا في المجامع الاولى والثالثة •

أما عن التغيرات العينية فقد تمثلت في تبقع الطحال واحتقانه وكذلك ظهور الاحتقان بالكلى كما ظهر الالتهاب الدموي بالأمعاء واختلاف في لون القلب مع وجود بقع نزفية •

والتغيرات الباثولوجية تمثلت في تميح الدم والنزف والتميح في الطحال والتكاثر الكمي بالعقد الليمفاوية مع ظهور ضمور هذه العقد بعد ثلاثة أو خمسة أيام من الحقن وتغيرات متعددة بالكبد والكلى بالخلايا البرشيمية والجهاز الوعائي والليمفاوي ومما سبق يتضح أن زهري الطيور يظهر في السن المبكر من الكتاكيت مما يدعو الى الاهتمام بتشخيص وعلاج الكتاكيت المصابة بهذا المرض •



Dept. of Pathology and Parasitology,  
Faculty of Vet. Med., Cairo University,  
Head of Dept. Prof. Dr. M. El-Sergany.

**SPIROCHAETOSIS IN YOUNG FAYOUMI CHICKS**  
(With One Table & Two Figures)

By  
**M. EL-SERGANY; ANN MORSY\*; NABIHA RAMADAN;**  
**SAFAA YASSIEN and MONA MEHRIS\***  
(Received at 1/3/1987)

**SUMMARY**

Experimental spirochaeta infection was done in Fayoumi chickens of different age (3-7 weeks old). It was proved that the young chicks were susceptible to infection. Pathological examination revealed that the spleen was the principle organ mostly affected by spirochaeta followed by liver, kidneys and intestine. Histopathological examination of the internal organs and lymphoid tissues was performed. Blood haematology showed generally anaemia and leucopenia due to the decrease of heterophils and lymphocytes.

**INTRODUCTION**

Avian spirochaetosis was firstly reported by MARCHOUX SALIBENI (1903). Since then, the disease became known as one of the serious problems of poultry. In a recent study by SNOYENBOUS (1965), spirochaetosis was found to have a world wide distribution and of substantial economic importance in poultry. In Egypt, MASON (1915) was the first to recover spirochaetosis in chickens, ducks and geese. EISSA (1960) considered the disease as one of the common and serious infectious diseases of poultry in Egypt.

It is worthy to know that the available literature were scanty concerning to the role of age and the blood changes in this concept (AHMED, et al. 1965 and SOLIMAN, et al. 1965).

Therefore, the present experiment was carried to study the histopathological alterations of internal organs and the haemogram in Fayoumi chicks of different ages infected with spirochaeta organism (Borrelia anserina).

**MATERIAL and METHODS**

Three groups of Fayoumi chickens of 3,5 and 7 weeks old (group 1,2,3 respectively) were employed in the present experiment. Each group included 21 apparently normal chickens obtained from a flock which known to be free from spirochaeta infection. Twelve birds from each group were intramuscularly inoculated each with 0.75 ml of citrated blood containing Borrelia anserina viable organisms. Infected culture were obtained from Animal Health Research Institute, Abasia, Egypt. Nine chickens were kept separatly as non infected controls.

\* Animal Health Research Inst. Dokki. Cairo.



M. EL-SERGANY, et al.

Twenty four hours post infection (p.i) and daily thereafter until the end of the experiment, blood films were prepared from infected birds, stained by Giemsa stain and examined microscopically for the presence of the infecting organisms. Blood samples for haematological studies were collected by heart puncture, every other day during 3-7 days (P.I.), from 4 infected and 3 control birds from each of the examined groups. Values of the haemogram were determined according to HEURICK (1952) and SCHALM, et al. (1975). After blood sampling, the birds were sacrificed and P.M. examination was performed. Specimens were collected from the parenchymatous organs for routine histopathological studies (LILLIE, 1948).

Data obtained from blood analysis was statistically evaluated according to standard equations given by SNEDECOR and COCHRAN (1967).

## RESULTS

### Observation of spirochaeta organisms in blood, clinical symptoms and mortalities:

Infecting spirochaeta organisms were demonstrated in blood smears of three weeks old birds from 24 hours up to 120 hours (P.I.). In chickens of five and seven weeks old, the organisms were only demonstrated for 72 hours (P.I.). Infected chickens of all ages appeared droopy, with cyanosis of the head and ruffling of feathers. Formation of greenish diarrhea and signs of increased thirst were observed. Four birds of 3 weeks old and one bird of 5 weeks old were died between the 2<sup>nd</sup> days of infection.

### Haemogram:

Results obtained from chickens of different groups showed no significant differences between samples obtained of 3,5 and 7 days (P.I.) within each group. Therefore the data was pooled and presented as the mean and the standard deviations between 3-7 days of infection (table 1).

A significant decrease ( $P < 0.05$ ) in the values of red cells, haemoglobin and packed cell volume was noticed in all infected groups. Total number of leucocytes was also decreased in group 1 and 3 but was comparable to normal in group 2. The decrease of total W.B.Cs. was attributed to the decrease of heterophils and lymphocytes. Eosinophil cells tended to elevate throughout the experiment specially in group 1.

### Post mortem findings:

Generalized hyperaemia of body muscles was noticed in both dead and sacrificed birds of 3 days (P.I.) in all groups. The spleen was enlarged and mottled. Liver was variably enlarged and congested. The kidneys were also enlarged and somewhat pale in colour. Varying intensity of catarrhal or sometimes, haemorrhagic enteritis were noticed in many cases. The heart had a pointed apex and a parboiled appearance. The lungs were hyperaemic. Similar P.M. findings were seen after 5 and 7 days of infection together with severe enlargement and ecchymotic haemorrhages in the spleen and necrotic foci in the heart.

### Histopathological findings:

Tissue alterations in chickens of different ages infected with Borrelia anserina were rather similar. Severity of the lesions varied however, among different groups.

Many dilated sinusoids of the spleen containing haemolysed blood were seen in the center of degenerated and faintly stained areas of reticular cells. Multiple irregular areas of haemorr-



## AVIAN SPIROCHAETOSIS

hages and oedema were observed scattering among the splenic parenchyma. Hyperplasia of the lymphoid tissue was frequently seen particularly in those birds sacrificed seven days (P.I.). Few cases examined after three and five days (P.I.) showed marked depletion of splenic lymphoid structures. Blood vessels of the spleen and also other organs showed excessive thickening of tunical media and adventitia which sometimes showed degeneration, hyalinization and infiltration with mononuclear cells particularly lymphocytes. The endothelial cells were frequently degenerated, swollen and projected in the lumen (Fig. 1).

Absence of the lobular demarcation, dissociation of hepatocytes and multiple irregular focal areas of necrosis infiltrated with variable numbers of lymphocytes were seen in the liver. Nearly all the hepatic vessels were congested with perivascular lymphoid aggregations particularly in the portal areas (Fig. 2). Activation of Kupffer cells was frequently observed.

The renal vessels were congested and there were small to large areas of haemorrhages in both cortex and medulla. The tubular cells suffered from necrobiotic changes with or without desquamation. The glomeruli were noticeably hypercellular. Degeneration and focal necrosis of some glomeruli were recognized five days (P.I.). The interstitial tissue showed varying degree of mononuclear cells infiltration. The epithelium of the ureters was degenerated, necrotized and or desquamated with advanced hyperplasia of the submucosa lymphoid tissue. Proventriculus and intestine suffered from variable degree of degeneration, necrosis and detachment of the epithelial lining in various parts with lymphoid hyperplasia of the submucosa.

Lungs and heart showed areas of severe congestion and haemorrhages. There were degeneration, metaplasia, hyperplasia and necrosis of the epithelium of the tertiary bronchiol together with slight thickening of the alveolar walls. The myocardium was focally degenerated in association with intermuscular oedema.

## DISCUSSION

In the present experiment spirochaeta organism were observed in blood for 120 hours (P.I.) in birds infected at three weeks of age (group 1) and for 72 hours in chickens infected at five and seven weeks old (group 2&3). Four out of twelve birds of group 1 were died after 2-4 days of infection which indicates increased susceptibility of young ages to the infecting organisms. The present findings agree with SNOYENBOUS (1965) and KHOGALI and SHOMEIN (1974).

The spleen appeared to be the principle organ mostly affected by spirochaeta followed by liver, kidneys and intestine as observed histopathologically. The wide spread areas of inflammation and haemorrhages observed in different organs were reflected by the decrease of cellular elements of the blood, haemoglobin and packed cell volume. Similar findings were recorded by SOLIMAN, *et al.* (1965). Hypoplasia of the haemopoietic system secondary to abnormal function of the spleen and liver was also suggested by SHOMEIN and KHOGALI (1974). The retrogressive changes observed in the different parenchymatous organs, vascular endothelia and epithelial covering may be due to the direct action of the circulating organisms or the effect of their toxic biproducts (REDDY, *et al.* 1966). The latter view is supported by the fact that after disappearance of spirochaeta from the blood stream, the retrogressive changes in all organs were very much pronounced. Results similar to the present histopathological findings were reported by MCNIEL, *et al.* (1949), REDDY, *et al.* (1966) and TIWARI, *et al.* (1979).

It can be concluded that infection of Fayoumi chicks with Borrelia anserina causes changes



M. EL-SERGANY, et al.

in cellular blood constituent and normal pattern of internal organs which could help the diagnosis of the disease in poultry. The results bear great evidence that young ages are more susceptible to infection than older ages, on the contrary to what was previously known and so particular attention must be taken to protect young aged poultry from this serious infection.

### REFERENCES

- Ahmed, A.A.; Bahgat, M.A. and Soliman, M.K. (1965): Studies of spirochaetosis in Fayoumi chickens. The pathology of experimental spirochaete infection. *J. Vet. Sci.* 25-36.
- Bandopahyay, A.C. and Vegad, J.L. (1984): Enteritis and green diarrhoea in experimental avian spirochaetosis. *Res. Vet. Sci.* 381-382.
- Eissa, Y.M. (1960): Poultry diseases in southern region of U.A.R. *Proc. 1st Ann. Cong., Cairo*, 18-20.
- Khogali, A.R. and Shomein, A.M. (1974): Studies on spirochaetosis in fowls in the Sudan. I. Epizootiology and experimental transmission. *Bulletin of epizootic disease of Africa*, 22, 251-254.
- Lillie, R.D. (1948): *Histopathological techniques*. The Blakiston company Philadelphia.
- Mason, F.E. (1915): Observation on the disease of Egyptian live-stock. *Min. Agric. Vet. Serv. Ann. Rept., Cairo*, 34-38.
- Mcniel, E.; Hinshaw, W.R. and Kissling, R.E. (1949): A study of Borrelia anserina infection (spirochaetosis in turkey). *J. Bact.*, 57, 191-206.
- Morchous, E. and Salibeni, A. (1903): Cited in M.V.Sc. Thesis of pathology. Histopathologically infected by spirochaetosis. *Cairo Univ., Fac. of Vet. Med.* (1980).
- Natt, M.P. and Henrick, C.A. (1952): A diluent for counting the erythrocytes and leucocytes of the chickens. *Poultry Sci.*, 31, 735-738.
- Reddy, M.V.; Ramachandren, P.K. and Ranachandran, S. (1966): Histopathological studies on experimental avian spirochaetosis in chicks. *Indian J. Vet. Sci.*, 1-12.
- Sabry, M.E. and Sheble, A. (1960): Vaccination against avian spirochaetosis in Egypt. *Proc. of 1st Ann. Vet. Cong. Cairo*. 61-65.
- Schalm, O.W.; Jain, N.C. and Carroll, E.T. (1975): *Veterinary haematology*. 3rd Ed., Lea & Febiger, Philadelphia.
- Shomein, A.M. and Khogali, A.R. (1974): Fowl spirochaetosis, haematological and histopathological studies. *Bulletin of epizootic disease of Africa*, 22, 255-261.
- Snedecor, G.W. and Cochran, W.G. (1976): *Statistical methods*. 6th Ed., Iowa State Univ. press, Ames. Iowa.
- Snoyenbous, G.H. (1965): Chapter of spirochaetosis in Bister and Schwarte, 1948. *Disease of poultry* 2nd Ed. Iowa State college Press, Ames., Iowa.
- Soliman, M.K.; Ahmed, A.A.; El-Amrousi and Mostafa, I.H. (1965): Cytological and biochemical studies on the blood constituents of normal and spirochaete infected chicks. *Avian disease*, 10, 394-400.
- Soni, J.L.; Adval, S.C. and Kolte, J.M. (1980): Preliminary observation on anaemia, splenomegally and cold agglutinin production during acute avian spirochaetosis. *Indian J. of animal Sci.*, 50, 1110-1113.
- Tiwari, S.P.; Mehata, M.L. and Awaahiya, R.I. (1979): Histopathological changes in fowl spirochaetosis due to the local (Jabalupr) strain of Borrellia gallinarum. *Jukvv Res. J.* 10, 253-254.



## AVIAN SPIROCHAETOSIS

Table (1)  
Haemogram of control and infected chickens with spirochaeta organisms-  
(means + standard errors)

Group	R.B.Cs $10^6$ /ul	Hb g/dl	PCV %	W.B.Cs.			Absolute values		
				Total	Eosino	Hetero	Lympho	Mono	
1	C	1.73 $\pm$ 0.06	7.89 $\pm$ 0.22	20.17 $\pm$ 0.62	63.17 $\pm$ 0.70	0.20 $\pm$ 0.06	9.89 $\pm$ 0.31	53.10 $\pm$ 0.74	0.20 $\pm$ 61.98
	t	1.10 $\pm$ 0.11	6.73 $\pm$ 0.12*	18.00 $\pm$ 0.27*	53.14 $\pm$ 3.10*	3.54 $\pm$ 0.06	11.95 $\pm$ 0.89*	42.10 $\pm$ 2.68*	0.19 $\pm$ 58.62
2	C	2.49 $\pm$ 0.22	7.74 $\pm$ 0.25	23.40 $\pm$ 0.95	59.40 $\pm$ 2.67	0.34 $\pm$ 0.82	9.39 $\pm$ 0.64	49.72 $\pm$ 2.51	0.0 + 0.0
	t	1.94 $\pm$ 0.03*	5.82 $\pm$ 0.17*	19.20 $\pm$ 0.05*	60.40 $\pm$ 0.85	0.47 $\pm$ 0.47	7.27 $\pm$ 0.49*	53.37 $\pm$ 0.48	0.0 + 0.0
3	C	2.26 $\pm$ 0.08	8.65 $\pm$ 0.36	26.80 $\pm$ 1.16	36.04 $\pm$ 1.21	0.14 $\pm$ 0.07	7.93 $\pm$ 0.57	27.99 $\pm$ 0.66	0.07 $\pm$ 35.11
	t	1.87 $\pm$ 0.02*	7.28 $\pm$ 0.14*	20.64 $\pm$ 0.30*	27.00 $\pm$ 0.51*	0.18 $\pm$ 0.03	2.89 $\pm$ 0.09*	24.50 $\pm$ 0.50*	0.0 + 0.0

\* P/ 0.05

C = control

t = infected



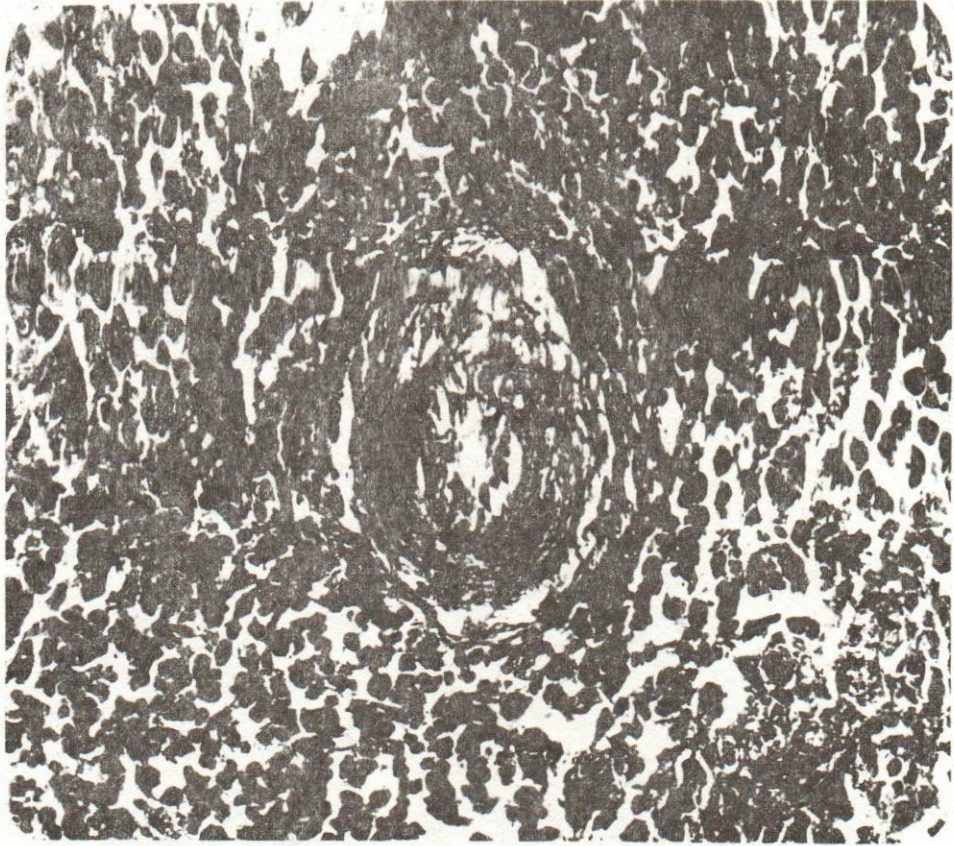


Fig. (1): Spleen showing swollen and degenerated endothelium with thickening and degeneration at its blood vessels wall.  
H&E (X 200)

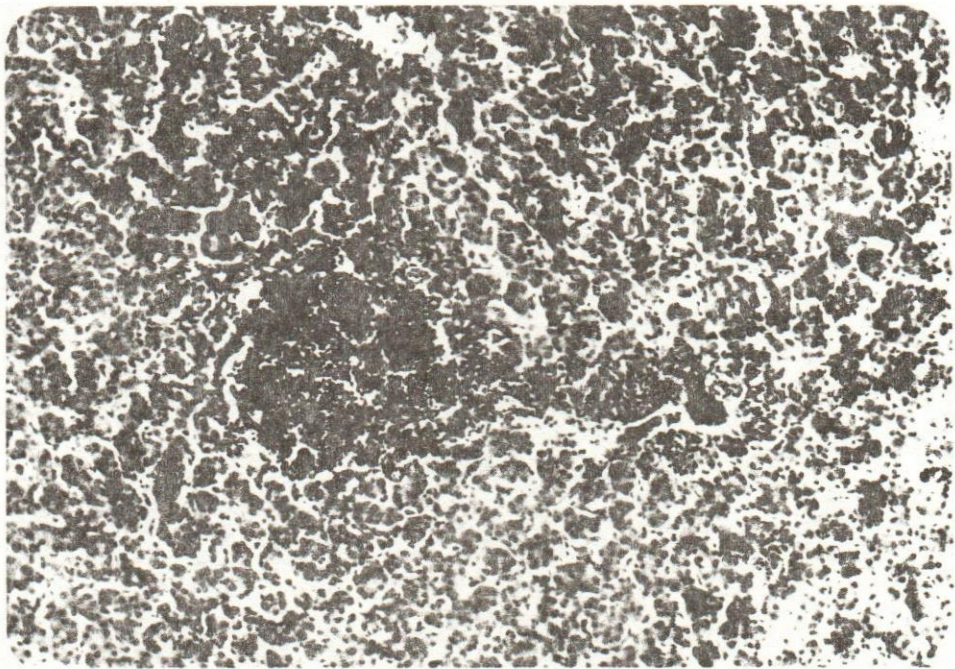


Fig. (2): Liver showing large lymphoid nodules and prevascular lymphocytic aggregation. H&E (X 100)