AVIAN SALMONELLOSIS: GROSS AND HISTOPATHOLOGICAL LESIONS

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ABSTRACT

Gross and histopathological details were recorded in different visceral organs of naturally Salmonella affected chicken layers. Livers, intestines and spleens were the most consistently involved. Enlargement, congestion and bronze discolouration were the main gross lesions in liver. Enlargement and congestion were seen in few lungs. In some cases, heart was congested and slightly enlarged. Discoloured and misshaped ova were recorded in the affected ovaries. Congestion, fatty changes and thickening of the capsule were recorded in the liver and spleen, while in other organs various degrees of degenerative and cellular infiltrative changes were recorded.

Key words: Salmonellosis, layer, gross and histopathological lesions

INTRODUCTION

Intensive poultry raising is confronted with a extremely complicated disease complexes in which salmonellosis occupies an important place (vd-Giessen *et al.*, 1991; Protais *et al.*, 1996) through out the world (Singer *et al.*, 1992; Holt *et al.*, 1999). Salmonellosis is quite prevalent in Pakistan and one of the major health hazards for the establishment of poultry industry (Siddique *et al.*, 1989).

The clinical evaluation, which is difficult and even impossible to be diagnosed by symptoms results in a morphopatholotical picture, with few macroscopic characteristics. Keeping in view the importance of avian salmonellosis, the present investigations were carried out to study gross and histopathological alterations in commercial layer chickens naturally affected with various salmonella serotypes.

MATERIALS AND METHODS

One hundred and thirty three commercial layer farms with various disease problems in and around Faisalabad were surveyed and the flocks suspected for salmonellosis were selected for detailed investigations. Dead and sacrificed birds were examined for gross lesions and different visceral organs including liver, lungs, heart, spleen, kidneys and intestines were collected for histopathological studies. For morphopathological studies, appropriate portions of these tissues were fixed in 10 per cent buffered formaline solution, dehydrated through ascending grades of ethyl alcohol, cleared in xylol and infiltrated by melted paraffin. The tissues were embedded in paraffin and tissue blocks were prepared. Section of 5-6 um thickness were cut with a rotary microtome and stained with haematoxylin and eosin method.

RESULTS AND DISCUSSION

Among 133 commercial layer flock, 18 flocks were positive for salmonellosis in examination, indicating a perevalence of 13.53 per cent. Much higher prevalence (65.4%) has been reported from USA in spent hens (Waltman *et al.*, 1982). According to vd-Giessen *et al.* (1991), 47 and 94 per cent layer and broiler flocks, respectively showed prevalence of Salmonella in Netherlands. Of various visceral organs from sixty affected birds, lesions were consistently seen in liver, intestines and spleen (Table 1).

Variable degree of occurrence of gross lesions in different organs was observed (Table 2). The livers were invariably enlarged, friable (20.0%), soft in consistency, congested and showed bronze discoluration (26.66%) with metallic sheen (Fig. 1). Necrotic foci were seen scattered throughout the liver surface in 8.33 per cent cases. Among positive Salmonellosis cases, spleen was friable (70.0%), slightly enlarged, congested (25.0%) and showed pin point haemorrhages in 11.67 per cent cases. Congestion of liver and spleen was also reported in avian salmonellosis by Nafees (1984) and Siddique *et al.* (1985).

Kidneys showed congestion, enlargement (55.0%) anaemic changes and friability with varying degrees of parenchymatous degeneration. In most of the cases, the lungs appeared normal in size, shape, colour and consistency. However, in some cases there was congestion and pneumonic changes (13.33%) alongwith necrotic foci. Excessive amount of fat was observed in between epicardium and myocardium extending form the coronary grove towards the apex in hearts in 58.35 per

cent cases. Heart was congested (21.67%) and slightly enlarged, tinny areas of ecchymosis (18.33%) were seen on the auricles, necrotic nodules in the myocardium and increased serous fluid in the pericardial sac was observed (Table 2). Accumulation of fat on the myocardium was also reported by Nafees (1984).

The most characteristics lesions were seen in the ovaries of salmonella positive birds. There was necrotic, discoloured and misshapen ova (Fig. 2). On cutting misshaped ova, cheesy material yielded. Ovarian follicles were attached to the ovary with endunculated stalks. The ovaries were also slightly congested and there were haemorrhages in the yolk sac. Pedunculation of ova in laying birds was also reported by Sajid *et al.* (1986).

Most of the intestines, especially from young chicks contained cheesy core particularly in the caeca which in 6.67% cases was also tinged with blood. Walls of the intesitne were thickened and peritonitis was obvious. Catarrhal inflammation of the intestine was also observed. Similar gross lesions were also reported by Athar (1982), Khan (1982) and Siddique *et al.* (1985).

Histopathological lesions in different visceral organs were also studied. Histopathological changes were almost similar in all the birds affected with various salmonella isolates. Hofstad *et al.* (1984) reported few differences in different visceral organs of birds affected with various salmonellae. In liver, there was congestion, fatty change (Fig. 3) and thickening of the capsule. Cloudy swelling alongwith pyknotic nuclei and degenerative changes were seen. Monocuclear cell infiltration was seen replacing the degenerative or necrotic foci. Splenic capsule along with its trabeculae were thickened and detached at various places (Fig. 4). Splenic nodules lost their normal architecture in 17 carcasses. Congestion was noted in 28 cases and oedema in 22 of the affected birds. There was thickening of vascular endothelium in four cases. Similar histopathological changes were seen in salmonella affected spleens by other workers (Nafees, 1984; Siddique *et al.*, 1985). There were areas of haemorrhages in 12 lungs. Small capillaries and blood vessels were engorged with blood and RBC's were also seen in the intravascular areas.

Table 1: Involvement of different visceral organs in chicken Salmonellosis.

S. No.	Case No.	Liver	Intestine	Spleen	Kidneys	Lung	Heart
1	33	+++	-	++	-	-	-
2	52	-	+	+	++	-	-
3	54	+++		+++	+	-	-
4	72	-	+	++	+	-	-
5	112	++	-	+	+	-	-
6	117	-	-	+	+++	+	-
7	121	+	+	++	-	-	-
8	142	+++	-	-	-	-	-
9	165	++	+	-	-	-	-
10	173	+	++	-	-	+++	-
11	171	+++	+	+++	-	-	-
12	172	++	++	-	-	-	-
13	191		++	-	-	-	-
14	197	+	+++	-	-	-	-
15	210	++	++	-	+++	-	-
16	216	+++	-	-	+	-	-
17	221		+++	-	-	-	-
18	273	+++	+++	+++	++	++	+++
Total		13	12	10	8	3	2
%		72.22	66.67	55.56	44.44	16.67	11.11

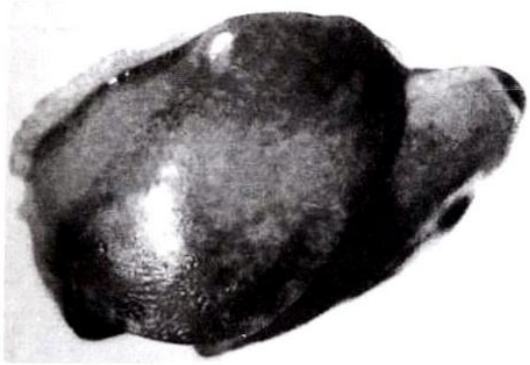

Fig. 1: Photograph of liver showing enlargement, bronze discolouration and necrotic areas on the surface.

Fig. 3: Micro photograph of liver showing congestion, cellular infiltration and fatty change (H&E, X1200)

Fig. 2: Photograph of ovary showing distorted degenerated and angular ova.

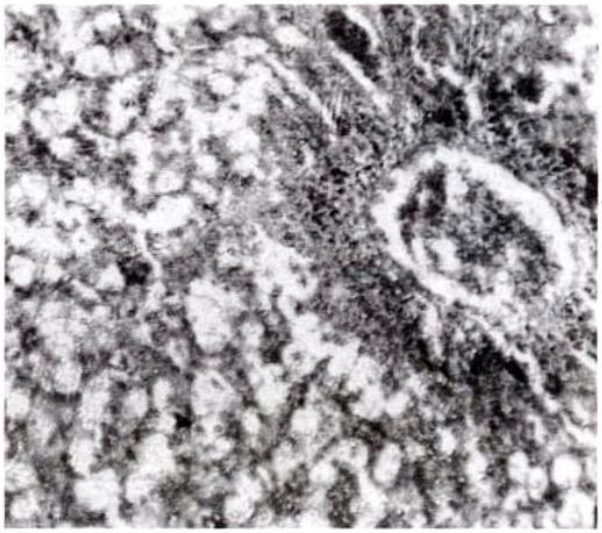

Fig. 4: Spleen showing thickened and devalued capsule

Table 2: Distribution of gross lesions of salmonellosis in affected commercial layer (n=60).

Organ/Lesions	No.	%
Liver		
Bronze discolouration	16	26.66
Friable	12	20.00
Necrotic foci	5	8.33
Spleen		
Friable	42	70.00
Congestion	15	25.00
Pinpoint haemorrhages	7	11.67
Kidneys		
Congestion & enlargement	33	55.00
Friable/anaemic changes	13	21.67
Lungs		
Pneumonic changes	8	13.33
Heart		
Fat deposition (between epi and myocardium)	35	58.33
Congestion	13	21.67
Ecchymosis	11	18.33
Nicrotic foci	4	6.67
Increased fluid in pericardium	4	6.67
Ovaries		
Misshapen ova	16	26.67
Congestion	35	58.33
Intestines		
Cheesy core with blood	4	6.67
Enteritis & peritonitis	21	35.00
Catarrhal inflammation	12	20.00

Focal areas of fibrosis alongwith extensive connective tissue proliferation and pneumonic changes were also observed in 8 lungs. In some zones, the alveoli were collapsed showing atelectasis, whereas alveoli in other zones were dilated showing compensatory emphysema and mononuclear cell infiltration. The most salient histopathological lesion in the intestines was thickening of muscular mucosa, along with lymphocytic cell infiltration. Haemorrhagic exudate was also seen in sections from intestines of 18 carcasses. There were broken villi and areas of haemorrhages in 9 cases. Similar histopathological lesions in intestines of salmonella positive birds have also been reported by Siddique *et al.* (1985). Among the 60 kidneys from salmonella positive birds, there were haemorrhagic areas, swollen tubules along with cellular infiltration in 34 cases. Congestion, fatty degeneration and edematous fluid was also seen in kidneys. Similar lesions in kidneys have been described by Bercea *et al.* (1981) and Hofstad *et al.* (1984).

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