

Incidence and Gross Pathology of Salmonellosis in Chicken in Hyderabad

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Abstract: This research work was conducted to study the incidence and gross pathological alterations produced by Salmonellosis in and around surrounding areas of Hyderabad city. For this purpose, all the affected organs were collected and brought to the Laboratory of Department of Pathology, Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University, Tando Jam, for detailed study. The total number of birds in different farms were 14900 in which the sick birds was 965 (6.47%) the negative birds 765(5.13%) and positive birds was 200 (1.34%) in all affected organs, the rate of incidence of *Salmonella pullorum* was recorded 63.5%. The organs which showed positive reaction towards the *Salmonella pullorum* infection were 50 in ovaries (25%), Livers 48 (24%), Spleens 18 (9%) and Kidneys 11 (5.5%). The gross pathological changes observed in ovaries due to *Salmonella pullorum* were discoloration 64.9%, enlargement 51.9%, mottling 58.4%, hemorrhages 45.5%, nodulating abscesses 25.9% and necrotic foci 20.7%. The lesion were most frequently found in the chronic carrier hens. Liver showed discoloration 75.3%, enlargement 36.2%, mottling 24.6%, hemorrhages 4.4% nodulating abscesses 11.5% and necrotic foci 14.4%. In similar way, the frequency of gross pathological alteration, which were observed in spleen comprised of enlargement 30.7%, mottling 38.4%, hemorrhages 15.3% nodulating abscesses 20.5% and necrotic foci 25.3% in affected birds. The affected kidneys showed anaemic discoloration 33.3%, enlargement 40.0% mottling 26.6% hemorrhages 33.3% nodulating abscesses 13.3% and necrotic foci 40.0%

Key words: Gross, pathology, *Salmonella pullorum*

Introduction

Advanced countries of the world have filled their animal protein gap by raising poultry industry. Even in Pakistan during the last three decades poultry industry has played a commendable role in shorting the gap by making availability of animal protein in the market for human consumption. As the poultry industry developed and became more intensified, the incidence of disease become greater and the infection become widely disseminated through out the world.

Salmonellosis has been recognized as a worldwide problem in both man and animals. Among all animal species the *Salmonella* are most frequently reported from poultry and their products as cited by Aserkoff *et al.* (1970). Steele (1969) isolated more than two third of 25000 cases of Salmonellosis from the domestic fowl during thirty year of his study periods. Poultry and poultry products constitute one of the major reservoirs for salmonella infections. As more than 50 percent of the strains have been isolated from these sources alone. A large percentage of chicken that survive from an outbreak become carrier and may transmit the disease to the next generations. (Hofstad *et al.*, 1978). He further reported that the development of poultry industry would be impossible without adopting the

effective control measure against the diseases.

The *Salmonella* organisms localize in the visceral organs such as liver, spleen, ovaries, kidneys, heart and lungs etc. and produce structural changes and pathological lesion which are characteristics and often helpful for the correct diagnosis of the Salmonellosis.

The objective of this investigation was to study the incidence and gross pathological changes in disease caused by *Salmonella pullorum* under natural conditions. Previously no such work has been carried out in Hyderabad district. The findings of this research project will provide guideline and useful information to poultry Pathologist regarding the treatment and prevention against the disease.

Materials and Methods

For this research 10 poultry farms were selected and visited at regular intervals. While visiting the poultry farms, efforts were made to find out the sick birds in the flocks and to record the incidence of the disease by conducting whole blood spot agglutination test. The whole blood was collected from the wing vein of different birds. Antigen used for these test were obtained from Veterinary research Institute Lahore. A total number of 965 sick birds were tested for

Table 1: Showing the No. of birds and organs positive for salmonellosis

S. No.	Code No.	No. of birds	Organs Affected								Over all % of incidence
			Ovary		Liver		Spleen		Kidney		
			No. of Organ	%	No. of Organs	%	No. of Organs	%	No. of Organs	%	
1	A	25	6	24	7	28	3	12	2	8	72
2	B	20	5	25	4	20	2	10	1	5	60
3	C	18	4	22	5	27.7	1	5.5	1	5.5	61
4	D	30	7	23	5	16.6	3	10	2	6.6	56
5	E	15	3	20	6	40	1	6.6	-	-	66.6
6	F	20	7	35	3	15	2	10	2	10	70
7	G	20	5	25	6	30	2	10	-	-	65
8	H	18	3	16	5	27	2	11	2	11	66.6
9	I	12	4	33.3	3	25	1	1.8	-	-	66.6
10	J	22	6	27.2	4	18.1	1	4.54	1	-	54.5

Table 2: Gross pathological variation in various affected organs in *Salmonella pullorum* infection

Pathological alteration	Affected Ovary (n = 69)	Affected Liver (n = 69)	Affected Spleen (n = 39)	Affected Kidney (n = 15)
Enlargement	50 (64.9%)	52 (75.3%)	-	5 (33.3%)
Discoloration	40 (51.9%)	25 (36.2%)	12 (30.7%)	6 (40.0%)
Mottling	45 (58.4%)	17 (24.6%)	15 (38.4%)	4 (26.6%)
Hemorrhages	35 (45.4%)	10 (14.4%)	6 (15.3%)	5 (33.3%)
Nodulating abscesses	20 (25.9%)	8 (11.5%)	8 (20.5%)	2 (13.3%)
Necrotic foci	16 (20.7%)	10 (14.4%)	10 (25.6%)	6 (40.0%)

Table 3: Rate of Incidence of *Salmonella pullorum* at various poultry farms

Sr. No.	Code No.	No. of suspected bird at farms	<i>Salmonella pullorum</i>	
			No. of birds positive	%
1	A	25	18	72
2	B	20	12	60
3	C	18	11	61.1
4	D	30	17	56.6
5	E	15	10	66.6
6	F	20	14	70
7	G	20	13	65
8	H	18	12	64.7
9	I	12	08	66.8
10	J	22	12	54.6

Table 4: Rate of growth of *Salmonella pullorum* on different selected media

Media used	Affected organs			
	Ovaries	Kidney	Liver	Spleen
Mackonkey	D	C	B	C
Nutrient Broth	B	B	A	D
Blood Agar	B	A	C	B
S. S. Agar	A	A	D	B
Selenite Broth	A	B	A	C

A = Growth rate more than 50% B = Growth rate between 20 to 50%
 C = Growth rate between 10 to 20% D = Growth rate below 10%

Salmonellosis at different farms. Blood obtained from the sick bird were mixed with a drop of antigen on the glass slide. A drop of blood and antigen was mixed thoroughly by rotating the loop in circular way for 5 to 6 times. The reaction started within few seconds by clumping the antigen after mixing in case of positive reaction. The reaction was graded as follow.

- +++ = Immediate clumping on mixing
- ++ = Clumping started within one minutes, but were large.
- +
- = Small clumping in colourless fluid.
- = When there was no clumping and no clear agglutination.
- ± = Doubtful - fine dust like clumps and difficult to differentiate from normal antigen.

Out of these test birds, few positive birds were slaughtered and in case of dead birds, postmortem was conducted and lesions were recorded in both slaughtered and dead birds. Enlarged ovaries, livers, spleens and kidneys were collected from 200 poultry birds and inoculations were made from the above affected organs on different selective media including MacConkey, Nutrient broth, *Salmonella shigella* agar, blood agar and selenite broth. Inoculated petridshes and tube were incubated for 24 to 48 hours at 37°C. The inoculated plates of different media after incubation were examined for the presence of characteristics lactose negative colonies (Edwards and Ewings, 1972). The lactose negative colonies were inoculated on triple sugar iron agar for confirming *Salmonella* organisms on the basis of colony character, Gram's reaction and sugar fermentation test. Attempts were also made to record symptoms and history of the incidence of disease along with the rate of mortality and morbidity found in the birds.

Results and Discussion

For the purpose investigation, ten poultry farms were selected in Hyderabad district. These farms comprising 14900 birds were visited regularly and various methods were applied to get the results.

Two hundred sick birds of different poultry farms of the area were tested and conducted postmortem examination. In case of sick birds found at different farms were keenly observed to record the symptoms in general and whole blood spot agglutination test were conducted for conformation of the disease. As regards the gross pathological changes, visceral organs such as ovaries, spleens and kidney were found the main site for the infection. These organs were collected under the sterilized conditions and carried to the laboratory for further bacteriological examination and

confirmation. From these samples *Salmonellae* were detected from 77 ovaries (38.5%) 69 liver (34.5%) 39 spleens (19.5%) and 15 kidneys (7.5%). The gross pathological lesion which were observed in ovaries affected with *Salmonella pullorum* showed discoloration 64.9%, enlargement 51.9%, mottling 58.4%, haemorrhages 45.5%, nodulating abscesses 25.9% and necrotic foci 20.7%. The lesion were most frequently found in the chronic carrier hens. The discolored ova were containing oily and cheesy materials enclosed in thickened capsules in most of the cases. Enlarged ovarian follicle leded to ovarian dysfunction and resulted to abdominal ovulation and impaction of the oviduct.

The gross pathological alterations as occurred in the liver comprised discoloration 75.3%, enlargement 36.2%, mottling 24.6%, haemorrhages 4.4% nodulating abscesses 11.5% and necrotic foci 14.4%. The enlarged liver with yellowish green discoloration and granular liver coated with fibrinous exudates was due to disintegrative and hyperaemic changes. The mottling of liver was due to coexistence of pin point haemorrhages and necrotic foci. The affected livers showed discoloration from dark red to greenish yellow in variety of cases. The frequency of gross pathological alteration which were observed in spleen comprised of enlargement 30.7%, mottling 38.4 % Hemorrhages 15.3% nodulating abscesses 20.5% and nectrotic foci 25.3% in affected birds. The affected kidneys showed anaemic discoloration 33.3%, nodulating abscesses 13.3% and necrotic foci 40.0%. The present study was conducted to locate the salmonellosis in Hyderabad districts. For this purpose the sick birds at various poultry farms were tested for salmonellosis with rapid whole blood spot agglutination test and showed 1.34% positive reaction to the infection. The rate of incidence was lowered as compared to the finding of Kraft *et al.* (1969) who observed 29% *Salmonella* infection in domestic fowl and chishti (1985a) reported 32% incidence and the incidence was highe as compared to the findings of Iliadis and lordanidis (1990) who observed 0.71% infection. This variation in the incidence could be due to the different in number of birds tested and the managerial conditions prevailing at various farms. In prsent studies 965 birds were tested for the incidence of the disease. Out of these, 200 birds of various farms were positive and selected for isolation of organisms from various affected organs and observed 63.5% incidence of *Salmonella pullorum*. Shalaby *et al.* (1981) reported the common serotypes of *Salmonella pullorum* 57% in fowls. Athar (1982) studied the incidence of the Salmonelosis and isolated *Salmonella pullorum* 16.34% in poultry tissues. The statement regarding the incidence of the disease as reported by different

corners varied from worker to worker. This variation would be due to the difference in number of birds used, types of breed involved and the age factor. Other reasons might be due to seasonal variation, usage of medicine and housing and managerial condition. During the course of studies, the incidence of gross pathological changes recorded in pullorum disease 24.5% in liver and 9.0% in spleen which are not in agreement with the finding of Zagaevskii (1980) who reported 78% *Salmonella pullorum* and 9 to 11% other serotypes in liver and intestine of hens. This variation could be due to the different locations, breeds, changes of climate and other managerial condition adopted at various farms. The most common lesions encountered in various internal organs in case of *Salmonella pullorum* were discoloration in liver, 75.3% as the highest, followed by 64.9% in ovaries, enlargement in ovaries was highest, 51.9% and in liver 36.2%, spleen 30.7% Mottling 58.4% in spleen and 24.6% in liver. The finding regarding the discoloration, enlargement, mottling, haemorrhages, Necrotic foci of various internal organs were coincided with finding of Chishti *et al.* (1985b) who recorded the pathological variation in liver affected with discoloration 75%, Mottling 25%, haemorrhages 15.9% and necrotic foci 25% and in spleen 27.7% Mottling necrotic foci 25% and haemorrhages 13.3%. The growth rate of *Salmonella pullorum* was a rapid and higher on S.S Agar (*Salmonella Shigella*) and followed by up to 50% on selenite broth and the growth was lowest on MacConky media used in the present study. The growth rate of different serotypes was the same as described by Schaffer *et al.* (1931), Gordon (1964) and (Anjum, 1983). During the present study, effort was made to differentiate *Salmonellae* serotypes through their reaction on different chemicals and ingredients. All cultures of *Salmonella pullorum* were positive to dextrose, sorbitol, arabinose, adonitol and lactose and fermented dextrose and arabinose with production of gas. These results are in agreement to that of the Anjum (1983).

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