Journal of Animal and Veterinary Advances 3 (3): 175-178, 2004

Incidence and Gross Pathology of *Salmonella gallinarium* Infection in Chicken

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Abstract: This research work was conducted to study the incidence and gross pathological alteraction produced by Salmonella gallinarium in and surrounding areas of Hyderabad City. For this purpose, all the affected organs were collected and brought to the Laboratory 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 gallinarium was recorded 36.5%. The organs which showed positive reaction towards the Salmonella gallinarium infection were 27 in ovaries (13.5%), Livers 21 (10.5%), Spleens 21 (10.5%) and Kidneys only 4 (2%). The gross pathological changes observed in overies due to Salmonella gallinarium were discoloration 62.3%, enlargement 45.5%, mottling 49.3%, haemorrhages 38.9% nodulating abscesses 19.4% and necrotic foci 25.9%. Liver showed discoloration 62.3%, enlargement 28.9%, mottling 43.4%, heamorrhages 46.3% nodulating abscesses 5.7% and nectrotic foci 10.1%. In similar way, the frequency of gross pathological alteration, which were observed in spleen comprised of enlargement 25.6%, mottling 41.1% Hemorrhages 25.2% nodulating abseccesses 15.3% and nectrotic foci 43.5% in affected birds. The affected kidneys showed discolouration 20.0%, enlargement 6.6% haemorrhages 13.3%, nodulating abscesses 6.6% and necrotic foci 20.0%.

Key words: Gross, pathology, *Slamonella gallinarium*

Introduction

People have been enating eggs and chicken for hundreds of years now, so breeding hends for this purpose has been there for several years too. However, as an organized industry, poultry farming are a relatively new concept. This is a direct results of urbanization. Earlier, vuillages used to be self-sufficient as far as their poultry needs were concerned. Any surplus would be sold to nearby towns. But as the size of towns and cities grew, so did the demand for many tings, poultry being one among them. Addressing this need, enterprising people began to breed hens in order to sell eggs and chicken. Thus the concept of a commercial poultry farm and a poultry farmer came into being. Poultry farming is a business that can be started out on a low capital investment. Undoubtedly a lot of hard work in involved, but the substantial returns more than compensate for it. Fowl typhoid is one of the bacterial diseases causing heavy economic losses in poultry productivity. 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 disease.

The salmonella organisms localize in the visceral organs such as liver, spleen, overies, kidneys heart 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 gallinarum* under natural conditions. Previously no such work has been carried out in Hederabad 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 visited regularly at 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 this test was obtained from Veterinary research Institute Lahore. A total number of 965 sick birds were tested for 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 throughly 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 minute, but were large
+	=	small clumping in colourless fluid
- -	=	When there was no clumping and no clear agglutination
±	=	Doutful 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 MacDonkey, Nutrient broth, Salmonella shigella agar, blood agar and selenite broth. Inoculated petridshes and tube were incubated for 24 to 28 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 hundreds 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 gpot agglutination test were conducted for conformation of the disease. As regards the gross pathological changes, visceral organs such as overies, 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 gallinarum* were deteced from 27 (13.5%) in case of affected ovaries, 21 (10.5%) livers, 21 (10.5%) spleens and kidney showed only 4 (2.0%) incidence of the *Salmonella gallinarum*. The gross apthological lesion which were observed in ovaries affected with Salmonella gallinarum showed discoloration 62.3%, enlargement 45.4%, mottling 49.3%. The discolored ova were containing

Table 1: Showing the No. of Birds and organs positive for *Salmonella gallinarum*

		Organs Affected								
		Overy		Liver		Spleen		Kidney		
Code No.	No. of the Birds	No. of Organ	%	No. of Organ	%	No. of Organ	%	No. of Organ	%	Over all % Of Incidence
A	25	2	8.0	3	12.0	2	8.0	-	-	28.0
B	20	3	15	2	10.0	2	10.0	1	5.0	35.0
C	18	3	16.6	1	5.5	3	16.6	-	-	38.8
D	30	5	16.6	3	10.0	3	10.0	2	6.6	43.3
E	15	1	6.6	2	13.3	2	13.3	-	-	33.3
F	20	3	15	2	10.0	1	5.0	-	-	30.0
G	20	2	10.0	2	10.0	3	15.0	-	-	35.0
H	18	2	11.1	2	11.1	1	5.5	2	5.5	33.3
I	12	2	16.6	1	8.3	1	8.3	-	-	33.3
J	22	4	18.1	3	13.6	3	13.6	-	-	45.4

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

Pathological alteration	Affected (n = 77)	Ovary %	Affected (n = 69)	Liver %	Affected (n = 39)	Spleen %	Affected (n = 15)	Kidney %
Enlargement	35	45.4	20	28.9	10	25.6	1	6.6
Discoloration	48	62.3	43	62.3	-	-	3	20.0
Mottling	38	49.3	30	43.4	16	41.1	-	-
Hemorrhages	30	38.9	32	46.3	10	25.2	2	13.3
Nodulating abscesses	15	19.4	4	5.7	6	15.3	1	6.6
Necrotic foci	20	25.9	7	10.1	17	43.5	3	20.0

Table 3: Rate of incidence of *Salmonella gallinarum* at various poultry farms

		Salmonella pullorum	
Code No.	No. of suspected bird at farms	No. of birds positive	%
A	25	07	28.0
B	20	08	40.0
C	18	07	38.9
D	30	13	43.4
E	15	05	33.3
F	20	06	30.0
G	20	07	35.0
H	18	06	33.3
I	12	04	33.3
J	22	10	45.4

Table 4: Rate of growth of Salmonella gallinarum on different selected media

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

oily and cheesy materials enclosed in thickened capsules in most of the cases. Enlarged ovarian follicle leaded to ovarian dysfunction and resulted to abdominal ovulation and impaction of the oviduct.

The gross pathological alterations as occurred in the liver comprised discoloration 62.3%, enlargement 28.9%, mottling 43.4%, heamorrhages 46.3% nodulating abscesses 5.7% and necrotic foci 10.1%. The livers were mostly enlarged, discolored, hyperemic and friable in its consistency and presented pin point heamorrhagic and mottled appearance, grayish white necroses areases and foci were found in the affected areases. The affected livers showed fatty changes by showing fatty droplets on cut surfaces in most of thew cases. At certain places pin point haemorrhagic areas were seen. The frequency of gross pathological alteration which were observed in spleen comprised of enlargment 25.6% mottling 41.1% Hemorrhages 25.2% nodulating abscesses 15.3% and necrotic foci 43.5% seen in the affected spleens. The spleen was enlarged, discolored as a darkish red and the consistency was friable and flabby. The affected kidneys showed discoloration 20.0%, enlargement 6.6%, haemorrhages 13.3%, nodulating abscesses 6.6% and nectrotic foci 20.0%. The kidneys were nelarged and discolored with anemic appearance in few of the cases but congested in most of the cases.

The present study was conducted to locate the Fowl typhoid disease in hyderabad district. 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.* (!969) who observed 29% salmonella infection in domestic fowl and Chishti (1985) reported 32% incidence and the incidence was higher as compared to the findings of Iliadis and Iordanidis (1990) who observed 0.71 per cent infection. This variation in the incidence could be due to the different in number of birds tested and the managemental conditions prevailing at various farms. In presented 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 36.5% incidence of *Salmonella gallinarum*. Shalaby *et al.* (1981) reported the common serotypes of *Salmonella pullorum* 57% and 40% Salmonella gallinarum in fowls. Athar (1982) studied the incidence of the Salmonellosis and isolated *Salmonella pullorum* 16.34% and *Salmonella gallinarum* 79.59% in poultry tissues. The statement regarding the incidence of the disease as reported by different corners varied from worker to worker. This variation would due to 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 managemental condition. During the course of studies, the incidence of gross pathological changes

recorded in *Salmonella gallinarum* was 10.5% in liver and spleen respectively, which are not the agreement with the findings 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 management condition adopted at various farms. The most common lesions encountered in various internal organs in case of *Salmonella gallinarum* were discoloration in liver, 62.3%, in ovaries 62.3% and in kidneys 20.0%. Enlargement in ovaries was 45.4%, in liver 28.9% and 6.6% in kidneys as the lowest in Spleen 30.7% Mottling 58.4% in spleen and 24.6% in liver. The findings. Regarding the discoloration, enlargement, mottling, haemrrhages, Necrotic foci of various internal organs were coincided with findings of Chishti *et al.* (1985) who recorded the pathological variation in liver affected with discoloration 60%, Mottling 45% haemorrhages 45% and necrotic foci 10%. And in spleen 27.7% mottling, necrotic foci 25% and haemorrhages 13.3. The growth rate of *Salmonella gallinarum* was lowered comparatively but only higher (more than 50%), in case of inoculation made from liver and spleen. In other media the growth rate of *Salmonella gallinarum* was almost below than 20%. The growth rate of different serotypes was the same as described by Schaffer (!931), 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 gallinarum* were only positive to maltose, mannotil and dulcitol and fermented maltose and dulcitol with out gas production. These results are in agreement to that of the Anjum (!983).

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