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Prevalence and bacteriological studies of dermatitis in domestic fowl (*Gallus domesticus*)

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Abstract

Prevalence of dermatitis in poultry were studied in 1386 poultry of different age, sex and breeds, out of those 304 samples were positive for dermatitis. This investigation revealed that the overall occurrence of dermatitis was 21.93 per cent in Rajasthan state.

Various forms of dermatitis were observed viz. perivascular dermatitis (9.87 per cent), interface dermatitis (7.57 per cent), vasculitis (4.61 per cent), nodular dermatitis (3.62 per cent), diffuse dermatitis (12.17 per cent), intraepidermal vesicular and pustular dermatitis (8.22 per cent), subepidermal vesicular and pustular dermatitis (6.91 per cent), panniculitis (8.88 per cent), perifolliculitis, folliculitis and furunculosis (10.53 per cent), ulcerative dermatitis (14.47 per cent), interstitial dermatitis (4.93 per cent), fibrosing dermatitis (5.92 per cent), atrophic dermatitis (2.30 per cent).

Bacteriological studies indicated that the various bacteria isolated from cases of dermatitis were *Staphylococcus aureus*, *Bacillus sp.* and *E. coli*.

Keywords: Prevalence, bacteriological, dermatitis, domestic, *Gallus domesticus*

Introduction

The poultry industry is one of the most important contributors for the growth of rural economy in our country. It is one of the fastest growing segments of the animal husbandry sector in India today, because of its early assured returns, short generation interval and limited land requirement. Their growth rate has been rising at 8 to 10 per cent *per annum*. India ranks 8th for poultry population in the world with 450 million gross population which contributes about 3 per cent of total global population and poultry population of Rajasthan is about 5 million (Board of revenue, Sensex 2007).

The skin is largest organ of the body and the anatomic barrier between the bird and environment. The skin infections in poultry also have a zoonotic importance. The same causative organisms which produce dermatitis in poultry also isolated from poultry industry workers. The skin infections are caused by bacteria, viruses, parasites, fungi and other environmental factors like nutritional deficiency, allergy, burn, radiation etc. Among skin infections, dermatitis is a common problem associated with deep litter system of rearing.

Among bacterial infections Clostridial, Staphylococcal, Streptococcal, *E. coli* etc. species are major causes of different types of dermatitis. Viral causes of dermatitis are fowl pox virus, chicken anemia virus etc. Many types of fungus and parasites also cause dermatitis in poultry birds. There are different types of dermatitis including gangrenous dermatitis, foot pad dermatitis, contact dermatitis, ulcerative dermatitis etc. Out of these, gangrenous dermatitis is most severe type causes upto 60% mortality in poultry birds.

Skin scratches affect the health of the bird and dramatically decrease the value of the end product. Chicken feet (paws) are valuable products in the Asian market. Revenue from chicken paws in 2008 alone was worth \$280 million. Harvesting large, unblemished paws has become a priority to poultry companies all over the world.

Although the research on dermatitis in poultry had been ongoing since the 1930s and has looked into many different areas including nutrition, environment and infections. But there is scarcity of information regarding this skin condition in the state of Rajasthan. Hence, it is essential to analyze the dermatitis through its gross and histopathological examination in the state of Rajasthan. Therefore, the present investigation has been undertaken with following objectives:

1. To find out the occurrence of different types of dermatitis in domestic fowl (*Gallus domesticus*) in Rajasthan.
2. To isolate the causative organisms from the lesions of affected domestic fowl wherever possible.

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Materials and Methods

For the present study a total of 1386 poultry were examined, out of those 304 skin samples showing frank macroscopic lesions were collected to identify the various types of dermatitis in poultry in the different areas of Rajasthan.

Bacteriological sampling and isolation

For bacteriological examination the samples were collected with the help of sterile swab. Then the swab was placed into appropriate transport medium nutrient broth. The isolation and identification of bacteria was done on the basis of culture and morphological characteristics as per Slander method (Carter, 1984) [4].

Histopathological processing of tissue showing frank lesion

The tissue samples were collected for histopathological work in 10 per cent formalin. Tissue samples were processed manually for paraffin embedding by acetone and benzene technique (Lillie, 1965) [8] for histopathology. Tissue section of 4-6 micron thickness were cut and stained with haematoxylin and eosin staining technique as a routine.

Results

In the present investigation, a total of 1386 poultry of different age groups, sex and breeds were examined and out of those, 304 (21.93%) skin samples showing frank macroscopic lesions were collected for histopathological and bacteriological examination. The results recorded were as follows:-

Prevalence

The predominant 21.93 per cent Prevalence of dermatitis were further sub-classified on the basis of the histopathological characteristics as ulcerative dermatitis (14.47 per cent), diffuse dermatitis (12.17 per cent), perifolliculitis, folliculitis and furunculosis (10.53 per cent), perivascular dermatitis (9.87 per cent), panniculitis (8.88 per cent), intraepidermal vesicular and pustular dermatitis (8.22 per cent), interface dermatitis (7.57 per cent), subepidermal vesicular and pustular dermatitis (6.91 per cent), fibrosing dermatitis (5.92 per cent), interstitial dermatitis (4.93 per cent), vasculitis (4.61 per cent), nodular dermatitis (3.62 per cent) and atrophic dermatitis (2.30 per cent).

Table 1: Prevalence of various types of dermatitis in poultry observed during the study

S. No.	Conditions	No. of cases	Percentage
	Dermatitis	304	21.93
(i)	Perivascular dermatitis	30	9.87
(ii)	Interface dermatitis	23	7.57
(iii)	Vasculitis	14	4.61
(iv)	Nodular dermatitis	11	3.62
(v)	Diffuse dermatitis	37	12.17
(vi)	Intraepidermal vesicular and pustular dermatitis	25	8.22
(vii)	Subepidermal vesicular and pustular dermatitis	21	6.91
(viii)	Panniculitis	27	8.88
(ix)	Perifolliculitis, folliculitis and furunculosis	32	10.53
(x)	Ulcerative dermatitis	44	14.47
(xi)	Interstitial dermatitis	15	4.93
(xii)	Fibrosing dermatitis	18	5.92
(xiii)	Atrophic dermatitis	7	2.30

Bacteriological Studies

Table 2: Bacterial isolates from different types of dermatitis in poultry

S. No.	Conditions	No. of cases	Bacteria isolated
(i)	Perivascular dermatitis	20	<i>S. aureus</i> , <i>E. coli</i> , <i>Bacillus sp.</i>
(ii)	Interface dermatitis	16	<i>Bacillus sp.</i> , <i>E. coli</i>
(iii)	Vasculitis	9	<i>S. aureus</i> , <i>Bacillus sp.</i>
(iv)	Nodular dermatitis	7	<i>S. aureus</i> , <i>E. coli</i>
(v)	Diffuse dermatitis	26	<i>S. aureus</i> , <i>Bacillus sp.</i>
(vi)	Intraepidermal vesicular and pustular dermatitis	18	<i>S. aureus</i> , <i>E. coli</i> , <i>Bacillus sp.</i>
(vii)	Subepidermal vesicular and pustular dermatitis	14	<i>S. aureus</i> , <i>E. coli</i> , <i>Bacillus sp.</i>
(viii)	Panniculitis	17	<i>S. aureus</i> , <i>E. coli</i>
(ix)	Perifolliculitis, folliculitis and furunculosis	19	<i>S. aureus</i> , <i>E. coli</i> , <i>Bacillus sp.</i>
(x)	Ulcerative dermatitis	33	<i>S. aureus</i> , <i>Bacillus sp.</i>
(xi)	Interstitial dermatitis	9	<i>Bacillus sp.</i> , <i>E. coli</i>
(xii)	Fibrosing dermatitis	11	<i>S. aureus</i> , <i>E. coli</i>
(xiii)	Atrophic dermatitis	3	<i>Bacillus sp.</i>

Conclusion

There was 21.93 percent occurrence of dermatitis in poultry in Rajasthan, which were classified and described on the basis of their histopathological alterations. *S. Aureus* & *E. Coli* bacteria were the major pathogens isolated from dermatitis, while *Bacillus sp.* Isolated from a lesser no. of cases.

Discussion

Prevalence

A lower incidence was recorded by Willemart and Schricke (1972) [13] as 10 per cent. However higher incidence was recorded by Bergmann *et al.* (1980) [3] as 28.95 per cent, Valentin and Willsch (1987) [10] as 30 per cent, Valentin *et al.* (1988) [11] as 50 per cent, Ekstrand and Algers (1997) [5] as 98 per cent, Berge (1998) [2] as 78 per cent, Wang *et al.* (1998) [12] as 92 per cent and Hilaire (2003) [6] as 31.4 per cent. Anna *et al.* (2020) [1] reported 74 per cent occurrence of foot pad dermatitis. Whatever differences exists in the occurrence of dermatitis in poultry in Rajasthan and other parts of India can be attributed to possible variation in the nutritional status, stress factors and management practices. Differences in the geographic and climatic conditions are also supposed to play their role in these variations.

Bacteriological studies

The various bacteria isolated in the present investigation from different types of dermatitis were *Staphylococcus aureus*, *E. coli*, and *Bacillus sp.* amongst which *Staphylococcus aureus* and *E. coli* were the most commonly isolated microorganisms. Hoffman (1939) [7] isolated *Staphylococcus* from the vesicular dermatitis in chickens, which is in agreement with the findings of the study in text. Rajeshwari *et al.* (1995) [9] isolated *Staphylococcus aureus*, *Clostridium septicum*, *Clostridium perfringens* and *E. coli* from poultry skin lesions, which were also in agreement of present study.

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