

Original Research Article

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A Retrospective Study on the Prevalence of Infectious Diseases in Desi Fowls of Tirupur District, India

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ABSTRACT

This retrospective study was undertaken to determine the prevalence of common infectious disease that caused major mortality and economic loss in desi chicken farming in Tirupur district of Tamil Nadu. Disease prevalence was studied in a total of 261 ailing or dead desi chicks that were presented for disease diagnosis to the Veterinary University Training and Research Centre, Tirupur between 2017 to 2019. Majority of desi birds were affected by Newcastle disease (ND) (27.59%) followed by Fowl cholera (16.86), Aspergillosis (8.42 %), Colibacillosis (7.66%), Coccidiosis (7.66%), Fowl pox (7.66 %), Heat stress (6.89 %), Worm infestation (5.36%) Respiratory infection (3.83) and Nutritional deficiency (3.06 %). Death due to Lymphoidleukosis (1.92 %), infectious bursal disease (0.77%), Mycoplasma (0.77 %), gout (0.77%) and Pecking (0.77%), was very minimum. Birds in the age group of 9-18 weeks showed high prevalence (44.06 %) of disease followed by the young chicks in the age group of 0-8 weeks (40.23 %). Adult birds more than 18 weeks of age were the least affected (15.71 %) in this study. Similarly the diseases were recorded frequently during summer (40.61%) followed by rainy (31.80%) and winter season (27.59%).

Keywords

Disease prevalence,
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Introduction

Poultry farming in India can be classified as commercial poultry farming and backyard poultry farming. Backyard poultry farming is mainly practiced in the rural areas with desi birds wherein the enterprise operates with low

investment and least technical knowledge. Tirupur district of Tamil Nadu is the hub for broiler and breeder farms of India. Currently desi fowl rearing has become popular in this district and the enterprise has taken the form of integrated farms and small scale commercial farms apart from backyard

farming. All the three systems of farming encounter great economic impact due to infectious disease. The major poultry disease includes colibacillosis, Newcastle disease, infectious bronchitis, coccidiosis, enteritis, infectious Coryza, fowl pox, hydropericardium syndrome, salmonellosis and aspergillosis. (Khan *et al.*, 2000; Bano *et al.*, 2003).

The prevalence of diseases especially with regard to desi bird in a particular area depends on several factors like geographical condition, management practices by the farmer, knowledge on vaccination schedule in desi birds, type of breeds, bio-security status of farm etc. This retrospective study on the prevalence of infectious disease in desi fowls was done to understand seasonal prevalence of the infection and identify the common bacterial and viral diseases affecting desi birds of Tirupur district of Tamil Nadu. The results of such study will provide an overall scenario of disease prevalence in a particular district so that proper control measures can be taken and educating the rural farmers on the scientific methods of desi bird farming (Badruzzaman *et al.*, 2015; Jamil *et al.*, 2016; Parthiban *et al.*, 2017).

Materials and Methods

The study was based on post mortem findings recorded at the Veterinary University Training and Research Centre, Tirupur during the period from January 2017 to December 2019. A total 261 sick and dead desi chickens were examined during the study. The diagnosis of different diseases was done based on the clinical history of the flock, age of affected birds, clinical signs and symptoms, characteristic post-mortem gross lesions, morbidity and mortality rates and laboratory investigations including bacteriological and parasitological examinations (Samad, 2005). For viral disease

diagnosis classical post mortem lesions were taken into consideration. In cases suspected for bacterial disease suspected materials were incubated in McConkey agar and blood agar. The growth obtained was identified by various biochemical and sugar fermentation tests following methods described by Harrigan, (1998). In some complicated cases suspected specimens were sent to Veterinary College and Research Institute Namakkal, for final confirmation. Feed samples were sent for analysis to the Animal Feed Analytical and Quality Assurance Laboratory, Veterinary College and Research Institute, Namakkal, in cases where the post mortem lesions suggested presumptive aflatoxin poisoning. The study also included the season of disease occurrence, vaccination history, mortality and morbidity pattern, medications given and type of farming systems.

Results and Discussion

The present three year retrospective study showed that the desi birds were affected mainly by Newcastle disease (ND) (27.59%) and the maximum (47.22 %) was recorded during summer with 41.66 % being in the age group of 9-18 weeks. The magnitude of occurrence of this disease in desi birds is mainly due to improper vaccination and through contact with wild and migratory birds which are not vaccinated. Moreover there is a general belief among the rural farmers that desi birds are disease resistant and vaccination is not necessary. Similar results were also recorded by Jamil *et al.*, (2016), Parthiban *et al.*, (2016), Arthanarieswaran *et al.*, (2018). Since desi chickens act as reservoirs of virulent ND virus these birds are considered to be a continuing threat to the poultry population throughout the world.

Another major threat noticed in the desi birds was fowl cholera (FC) (16.86%). The growers between the age group of 9-18 weeks showed

maximum prevalence of 86.36 % followed by the adult birds showing 13.63 % of the disease. Fowl Cholera is said to be one of the oldest poultry diseases and is commonly found in mature chickens over 16 weeks of age but rarely occurs in young chickens of less than 8 weeks of age (Petersen *et al.*, 2001; Glisson *et al.*, 2008). The disease is seen more frequently in layers than in broilers because of age factors (Sander and Glisson, 1989). In our study majority of the FC occurrence was recorded during winter (90.90 %) and equally distributed (4.55 %) during summer and rainy season. It is said that the disease is more prevalent in the late summer, fall, and winter and occurs both sporadically and enzootically. Fowl cholera occurs in every month of the year, but is most prevalent in late summer and fall (Dorsey and Harshfield, 1953; Patricia *et al.*, 2016). The causative organism *Pasturella multocida* causes the infection through contaminated feed, water and equipment. Improving the sanitation will reduce the infection. It is important to note that recovered birds may remain as carriers even after 9 weeks after infection (Parvin *et al.*, 2011). On studying the case history of the birds affected with FC, it was found that most of the affected desi birds were raised in deep litter system for commercial purpose and reasons could be attributed to poor sanitation and carrier status.

The occurrence of Aspergillosis was recorded as 8.42 % and high prevalence (72.72 %) was noticed in young chicks (0-8 weeks) followed by 27.27 % in adult birds (more than 18 weeks old). Acute aspergillosis usually affects young birds leading to high morbidity and mortality whereas the chronic form is sporadic. It affects older birds with lesser mortality, breeders in poultry are more susceptible, presenting a compromised immune system due to poor husbandry conditions (Pascal *et al.*, 2011). The disease was generally recorded during rainy season 45.45 % than during summer (36.36%) and

winter (18.18%). The main biosecurity measures employed in Aspergillus contamination is by prevention. Dust and mouldy litter or feed should be avoided. Routine assessment of the quality of feed and litter material is considered as key to prevention of the disease (Kunkle *et al.*, 2003).

In the current study it was noted that colibacillosis a bacterial disease caused by *E.coli* occurred in 7.66 % of the total birds (20/261). Seventy percent of the disease was recorded in the age group between 9 to 12 weeks and the rest in young chicks between 0 to weeks. Our study did not record any cases in adult birds. Prevalence of avian colibacillosis were recorded in all age groups of birds by Rahman *et al.*, (2004) and Kabir, (2010) recorded maximum mortality in young chicks in his study. A study conducted by Matin *et al.*, (2017) recorded 0.84 % prevalence of colibacillosis in broilers chicks and 0.80 % in layer chicken. The season wise prevalence of this disease showed maximum occurrence during winter season (50%), followed by summer (30%) and rainy (20%) seasons. The most common cause for this bacterial disease is intensive farming system. Indiscriminate use of antibiotics to control early chick mortality has become a common practice in commercial chicken farming. This has paved way for development of drug resistant *E.coli* strains leading to treatment failures (Olarinmoye *et al.*, 2013). Studies have indicated that the source for many of the infectious diseases may be through contaminated water and poultry feed (Rahman *et al.*, 1999).

A total of 261 desi birds were examined during the period of three years and 20 (7.66%) of these samples were tested positive for coccidiosis. Occurrence of coccidiosis was highest in rainy season (80%), followed by summer season (20 %). The age group affected was mainly between 0 to 8 weeks.

Studies made by Toulah (2007) and Nematollahi *et al.*, (2009) showed that the mortality and economic losses were very high in young chicks in the age group of 3 to 18 weeks due to coccidiosis. Saravanajeyam *et al.*, (2016) reported that the incidence of intestinal coccidiosis in desi chicken was high due to poor managerial practices, malnutrition and non-inclusion of coccidiostats in feed as preventive measure. This is in accordance with the history given by the desi bird farmers who raise their flock in commercial mode with poor managerial practices and noninclusion of coccidiostats in feed as preventive measure. The researchers also state that warmth and moisture favoured greater transmission and contamination of oocysts in the environment.

Fowl pox (FP) a viral disease, causes significant economic losses in domestic poultry flocks through transient drop in egg production in layers and retarded growth in young birds. Morbidity and mortality rates due to FP may be higher than 50% (Skinner, 2008). In this study the incidence of fowl pox was 7.66 % and the prevalence was 65 % in 0-8 weeks old chicks followed by 25 % in 9-18 weeks old chicks and the adult birds showed 10% mortality. Pathak (2016) recorded mortality due to fowl pox in domestic birds to be 23.60 % at 0-8 weeks followed by 14.43 % at 9-20 weeks 11.11% in the birds of above 20 weeks. This mortality pattern in different age groups showing highest incidence during 0-8 weeks in desi chicks may probably be due to the absence of maternal antibody in the chicks, as vaccination against FP is not done in desi birds regularly (Pathak 2016). In this study early summer season recorded 80 % prevalence and rainy season recorded 20 % of the disease incidence. Fowl pox is transmitted by direct contact between infected and susceptible birds or by mosquitos (Adebajo *et al.*, 2012) and this may be the reason for the season specificity.

Our study showed 6.89 % mortality due to heat stress over a period of three years. In poultry production in the tropical and subtropical regions, heat stress is very common and the economic losses on poultry production as a result of stunted growth, decrease in hen-day production, increased cost of production, high rate of mortality due to depressed immunity, and reproductive failure (Ayo *et al.*, 2011). The comfortable ambient temperature for poultry is between 18 and 24°C. Above this, birds fail to maintain their normal internal body temperature (41.6°C), due to the absence of sweat glands and complete feather coverage of the body. When the ambient temperature rises above the ideal, a chicken's internal body temperature also rises, leading to a drop in feed consumption (>26-32°C), heat stress (>35°C), panting, prostration (>35°C) and death (>38°C) (Reddy and Ramya, 2015). Age wise mortality pattern in this study was 11.11% in 0-8 weeks old birds, 55.56 % in 9-18 weeks and 33.33 % in birds more than 18 weeks old. From the information gathered from the farmers it was noted that most of the death occurred in the backyard farming system where the birds were not given proper housing, feed and water during summer to combat the heat stress. Mortality in the desi birds was noticed in summer when the temperature in Tirupur district records its highest temperature of 38°C between March and May (<https://www.timeanddate.com/weather/india/tiruppur/historic>). Studies made by Ayo *et al.*, 2010 in Nigeria recorded 3.7% average mortality in laying birds during the hot-dry season, while Abd-Ellah (1995) reported as high as 28% mortality in arid weather conditions of Egypt with an average ambient temperature of about 43°C. Many studies have shown that the heat stress in poultry production can be managed through proper environmental management (such as facilities design, ventilation, sprinkling, shading, *etc.*), nutritional manipulation (*i.e.*,

diet formulation according to the metabolic condition of the birds), as well as inclusion of feed additives in the diet (e.g., antioxidants, vitamins, minerals, probiotics, prebiotics, essential oils, *etc.*) and water supplementation with electrolytes (Lara and Rostagno, 2013).

The results of this study suggested that gastrointestinal parasitic infestation occurred in the study area in a less severe manner with a prevalence of 5.36% (14/261). This result was lower than a prevalence of 71% (71/100) that reported positive of gastrointestinal parasites by gross examination of gastrointestinal tract of desi chicks in Bangalore (Puttalakshamma *et al.*, 2008). Another similar study revealed 63.21 % (311) of overall prevalence of gastrointestinal parasites in desi fowl in Andhra Pradesh (Sreedevi *et al.*, 2016). Many authors have stated that such variation in the prevalence of parasitic infection could be due to the difference in climatic conditions of region, availability of intermediate hosts or adoptability of managerial practices. (Magwisha *et al.*, 2002; Percy *et al.*, 2012). The current study noted that the highest prevalence of gastrointestinal infestation was noticed in rainy season as 71.42% followed by summer season showing 28.57%. The seasonal prevalence of different gastrointestinal parasites being favorable during rainy and summer seasons have been periodically reported in many studies. (Hange *et al.*, 2007; Mungube *et al.*, 2008; Dube *et al.*, 2010; Sreedevi *et al.*, 2016)

The present study showed 3.83 % of the overall prevalence of infectious coryza in desi fowl. Infectious coryza is an acute respiratory disease of chickens characterized by nasal discharge, sneezing, and swelling of the face under the eyes (Okitoi, 2007). Although mortality from infectious coryza is usually low, but its impact reduces egg production and increases the incidence and severity of other diseases (Shankar, 2008).

In this study the disease was observed only in chicks between 0 to 8 weeks. The results are in accordance with the study of village chickens in Thailand that reported that infectious coryza was the most common cause of death in chickens less than 2 months old and those over 6 months old (Thitisak, 2008). Major infection was noticed during rainy and winter season (40 %) respectively and 20 % occurred during the summer season. The disease is observed primarily during the autumn and winter months in subtropical climates, or during the rainy season in a tropical climate. All age groups of chickens are susceptible, but the disease appears to be more severe in birds of 4 weeks old and upwards (CABI, 2019).

Most of the desi birds raised in the backyard system are either allowed to scavenge or fed with table scraps. This diet is not sufficient to meet the nutritional demands of the birds resulting in poor bone growth, weight loss, poor growth and poor skin and in some cases specific nutrient deficiency like calcium and vitamins cause characteristic signs and lesions. In our study mortality due to nutritional deficiency was 3.06 % and highest mortality in chickens due to nutritional deficiency was recorded during summer (75%) followed by rainy season (25%). Uddin *et al.*, (2011) in their report on the mortality and disease pattern in commercial layer farms have shown that mortality due to nutritional deficiency was 0.68% and the maximum was recorded during rainy (0.27%) in comparison to summer (0.24%) and winter (0.16%) seasons. The reason for increased mortality rate due to nutritional deficiency in our study could be due poor feed quality and the high mortality during summer may be due to the high temperature prevailing in Tirupur district. Nutritional deficiency was recorded in age groups of chickens from 0 to 18 weeks.

Marek's disease (MD) is a lympho-

proliferative disease of chicken caused by Alpha herpes virus of Herpes viridae family. In our study the occurrence of Marek's disease was 1.92 % when compared to other infectious disease. These results support the earlier reports of Sawale *et al.*, (2014) who recorded 1 to 10 % mortality due to neural form of MD in 18 different desi fowl farms in Maharashtra State over a period of one year. Mortality (100 %) caused by MD was recorded only in birds more than 18 weeks of age in comparison to other age groups of chickens. Seasonal mortality due to MD was recorded highest during rainy (60 %) in comparison to summer (40 %) and no cases was recorded during winter. Reports made by Arulmozhi *et al.*, (2012) showed nearly 60 % mortality in an outbreak of MD in a desi chick

farm comprising of 180 birds at 18 weeks of age. Similarly Jeyalakshmi *et al.*, (2016) recorded mortality due to MD in commercial layer in the age of 16 to 76 weeks.

The prevalence of Infectious bursal disease (0.77 %), was very minimum in our study and mortality was observed in 0 to 8 weeks old chicken and the incidence occurred between March to June. In an 8 year retrospective study conducted to understand the epidemiology of infectious bursal disease (IBD) in broiler chicken flocks in Haryana state showed overall mortality of 2.61 % during July to September between the age group of 0-50 days of age. Pooja *et al.*, (2018).

Table.1 Age wise prevalence of the disease

Disease	0-8 weeks (Starter)		9-18 weeks (Grower)		>18 weeks		Total	
	No of cases	Prev. %	No of cases	Prev.%	No of cases	Prev.%	No of cases	Prev.%
Viral Disease								
New Castle disease	26	36.11	30	41.66	16	22.22	72	27.59
Fowl pox	13	65	5	25	2	10	20	7.66
Infectious bursal disease	2	100	0	0	0	0	2	0.77
Lymphoid Leukosis	0	0	0	0	5	100	5	1.92
Bacterial Disease								
Fowl Cholera	0	0	38	86.36	6	13.63	44	16.86
Collibacillosis	5	25	15	75	0	0	20	7.66
Infectious Coryza	10	100	0	0	0	0	10	3.83
Fungal Disease								
Aspergillosis	16	72.72	0	0	6	27.27	22	8.42
Mycoplasma infection	1	50	1	50	0	0	2	0.77
Parasitic disease								
Coccidiosis	20	100	0	0	0	0	20	7.66
Gastrointestinal parasites	4	28.57	10	71.42	0	0	14	5.36
Nutritional disorders and others								
Heat stress	2	11.11	10	55.56	6	33.33	18	6.89
Nutritional Deficiency	2	25	6	75	0	0	8	3.06
Pecking	2	100	0	0	0	0	2	0.77
Gout	2	100	0	0	0	0	2	0.77
Disease Prevalence		40.23		44.06		15.71		

Table.2 Season wise prevalence of the disease

Disease	Summer March to June		Rainy July to November		Winter December to February		Total	
	No of cases	Prev. %	No of cases	Prev.%	No of cases	Prev.%	No of cases	Prev.%
Viral Disease								
New Castle disease	34	47.22	28	38.89	10	13.89	72	27.59
Fowl pox	16	80	4	20	0	0	20	7.66
Infectious bursal disease	2	100	0	0	0	0	2	0.77
Lymphoid Leukosis	2	40	3	60	0	0	5	1.92
Bacterial Disease								
Fowl Cholera	2	4.55	2	4.54	40	90.90	44	16.86
Collibacillosis	6	30	4	20	10	50	20	7.66
Infectious Coryza	2	20	4	40	4	40	10	3.83
Fungal Disease								
Aspergillosis	8	36.36	10	45.45	4	18.18	22	8.42
Mycoplasma infection	0	0	0	0	2	100	2	0.77
Parasitic disease								
Coccidiosis	4	20	16	80	0	0	20	7.66
Gastrointestinal parasites	4	28.57	10	71.42	0	0	14	5.36
Nutritional disorders and others								
Heat stress	18	100	0	0	0	0	18	6.89
Nutritional Deficiency	6	75	2	25	0	0	8	3.06
Pecking	2	100	0	0	0	0	2	0.77
Gout	0	0	0	0	2	100	2	0.77
Season wise Prevalence %		40.61		31.80		27.59		

Another study made by Sathyamoorthy *et al.*, (2018) revealed death of 16 days old desi broiler chickens in a farm in Hyderabad due to infectious bursal disease. Effective sanitary measures and adequate decontamination with sufficient fallow period before restocking of birds and following proper vaccination schedule can prevent the outbreak of infectious bursal disease in a poultry farm.

Mycoplasma gallisepticum is considered the primary cause of chronic respiratory disease (CRD) and characterized by respiratory signs and lesions and a prolonged course in the flock (Samad, 2005). Our study recorded 0.77% (n=2) mortality due to mycoplasmosis in desichickens upto 18 weeks of age and was

observed during winter. Similar observations by Bharathy *et al.*, (2018), reported mortality due to mycoplasmosis in desi chicks to be 0.91% (5/545) in 75 days old birds. The authors further report that the *Mycoplasma gallisepticum* outbreak was effectively controlled by using effective treatment with 1% Tylosin and following strict bio-security measures.

In pecking the birds indulge in feather pulling, vent and head pecking leading to hemorrhages and death. The causes may be due to insufficient lighting, stocking density, vitamin and mineral deficiency, insufficient feeder or drinker space, irritation from external parasites. In this study mortality due

to pecking was seen in two cases (0.77 %) with severe vent pecking in the age group of 0 to 8 weeks old chicks during summer. Santhosh *et al.*, 2011 reported that feather pecking behavior was noticed more in Aseel breed under floor system of rearing which starts around four to five weeks of age. Uddin *et al.*, 2011 in his study recorded highest mortality due to cannibalism in layer chicken during summer (0.11%) in comparison to winter (0.08%) and rainy (0.08%) seasons. Pakhira *et al.*, 2016 stated that feather pecking and cannibalism can be effectively prevented without the use of beak trimming, proper housing and feeding management and also by selecting birds that are less prone to feather pecking and cannibalism.

Gout is a common metabolic disorder that results in abnormal accumulation of urates in domestic birds. In our study we have recorded mortality in two birds (0.77%) due to gout. Mudasir *et al.*, 2017 reported gout in ten desi birds based on the deposition of urate crystals on the pericardium and kidneys on post mortem examination. Mir *et al.*, 2005 recorded an outbreak of gout in a flock of favorella poultry in Kashmir causing a mortality of 18.76 per cent (46 of 245) birds over a period of six months. The authors further explained that exclusion of concentrate feed, and maintaining the birds on only maize along with incorporation of ammonium sulphate 5g per kg feed helped in control of gout.

More such studies in a particular area might give a better understanding of the prevalence of infectious diseases and the methods to control them. Since farm management practices including biosecurity measures, poultry species and rearing scale differ between different poultry farming methods and understanding these practices is important for implementing preventive measures to control infectious diseases.

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