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Mortality pattern of broiler chicken reared in Kashmir: Effect of season and age

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Abstract

Present study was undertaken to investigate the mortality pattern among broiler chicken in Kashmir. Samples comprised of mortalities from various poultry farms operating in Srinagar, Ganderbal, and Budgam, Districts along with their adjoining areas during April 2014 to June 2015. Disease diagnosis involved systematic approach based on the history, clinical signs and lesions, after following a thorough post mortem examination. Monthly, seasonal and age-wise mortality distribution; case prevalence of diseases / disease conditions; disease-wise, month-wise, seasonal and age-wise proportionate mortalities were worked out. Out of a total of 16935 necropsies, higher proportionate mortality was encountered during autumn (41.17%), followed by spring (24.93%), summer (23.63%) and winter (10.27%). Higher proportion of carcasses belonged to 0-7 day age group. Necropsy examination revealed highest case prevalence for colibacillosis (29.873) followed by respiratory tract affections (20.466%) throughout the year. Other diseases/disease conditions observed include, Sudden Death Syndrome, Omphalitis, Ascites, Hepatic Affections, Salmonellosis, IBD, Nephrosis, Coccidiosis, Visceral gout, Nonspecific enteritis, Newcastle disease, and Aspergillosis. While most of the diseases were prevalent throughout the year, occasional out breaks of ND, IBD, and aspergillosis were recorded. The case prevalence and proportionate mortality showed marked seasonal and age effects for different diseases.

Keywords: Broiler chicken, Kashmir, mortality pattern

Introduction

Poultry diseases pose a potential threat to the economics of poultry industry and at many occasions have caused severe financial losses to the farmers (Rahman and Samad, 2003). The occurrence and distribution of diseases is influenced by genetic and epidemiological factors. Selection of birds for high juvenile body weights, intensivism with high stock density, improper biosecurity and compromised managerial practices are prime predisposing factors leading to emergence or re-emergence of disease. While zoonosis is an important human health concern, human-to-poultry host jump, adaptation and pandemic spread of pathogens under changing climatic conditions, and spillover of the pathogens from and into wild bird species is an emerging challenge warranting continued clinical and laboratory surveillance (Lowder *et al.*, 2009; Garcia-Martinez *et al.*, 2013) [15, 8]. Varying mortality rates have been reported from different places (Saleque and Rehman, 2003; Joshi *et al.*, 2004; Bhende, 2006; Awobajo *et al.*, 2007) [24, 12, 5, 3]. While the geographical area and period under investigation including age of birds and season constitute the major variants, the management practices at the farm and design of study also, has great impact on the observed mortality (Aengwanich and Simaraks, 2004; Behra *et al.*, 2009) [1, 4]. Besides the disease out breaks due to highly pathogenic infections greatly modify the overall mortality rate at a given point of time (Yunus *et al.*, 2008) [28]. More importantly, the changing pattern of diseases and pathogens has led to a precarious situation.

In Kashmir valley, poultry sector is faced with inherent challenges from essentially small scale farming with closed housing because of temperate climatic conditions, importation of chicks/table and culled birds, feed ingredients and vaccines, and lack of controlling body and policy regarding preventive biosecurity. The migratory birds constitute an additional risk factor. Hence the sector is perhaps one of the most vulnerable to a natural and/or introduction of a foreign, emerging, re-emerging and/or zoonotic diseases, posing a future threat that may be viewed as an anticipated catastrophe. Perusal of literature reveals individual case reports or fragmented research related to avian diseases occurring in this area (Darzi *et al.*, 2006; Kamil *et al.*, 2006; 2011; Salam *et al.*, 2008; 2009a,b; 2010; Shah *et al.*, 2010; Nazir *et al.*, 2012; Ito

et al., 2013; 2014) [7, 14, 13, 20-23, 26, 17, 10, 11]. Hence, present study was undertaken to investigate the mortality pattern among broiler chicken in Kashmir.

Materials and Methods

Samples comprised of mortalities from various poultry farms operating in Srinagar, Ganderbal, and Budgam, Districts along with their adjoining areas brought to Division of Veterinary Pathology, Sher-e-Kashmir University of Agricultural Sciences and Technology Kashmir, for post-mortem examination during April 2014 to June 2015. Disease diagnosis involved systematic approach based on the history, clinical signs and lesions, after following a thorough post mortem examination of birds. Monthly, seasonal and age-wise mortality distribution was worked out. Case prevalence of diseases / disease conditions was calculated as a function of total mortality received and disease-wise, month-wise, seasonal and age-wise proportionate mortalities were, also, worked out. Data regarding mortalities including case prevalence and proportionate mortalities, and farm level

biosecurity information was presented as percent and effect of various factors was analyzed using Chi Square test. For incidence studies descriptive statistics was used for calculation of means and standard error.

Results and Discussion

Mortality Distribution

A total of 16935 postmortems were recorded. Monthly distribution revealed maximum number of cases during September (18.13%) followed by October (14.84%), May (13.65%), Aug (12.95%), Nov (8.20%), Dec (6.47%), April (6.34%), June (6.24%), March (4.94%), July (4.44%), February (2.43%), and Jan (1.37%) in that order (Table 1). Seasonal distribution revealed maximum number of cases in autumn (41.17%), followed by spring (24.93%), summer (23.63%) and winter (10.27%)(Table 2). Number of cases recorded were higher in age group 0-7 days followed by 8-14 days, 15-21 days, 22-28 days and > 28 days with proportionate mortality of 25.59%, 21.06%, 19.43% and 15.15% respectively.

Table 1: Age-wise proportionate mortality distribution among broiler chicken during different months

Month	Mortality											
	Total	0-7days		8-14 days		15-21 days		22-28 days		>28 days		
	N	n	%*	n	%*	n	%*	n	%*	n	%*	
Jan	n	232	96	23.36	22	5.35	38	9.25	47	11.44	29	7.06
	%	1.37	2.22		0.62		1.15		1.48		1.13	
Feb	n	411	117	28.47	59	14.36	75	18.25	72	17.52	88	21.41
	%	2.43	2.70		1.65		2.28		2.27		3.43	
Mar	n	837	231	27.60	188	22.46	162	19.35	131	15.65	125	14.93
	%	4.94	5.33		5.27		4.92		4.12		4.87	
Apr	n	1073	312	29.08	178	16.59	259	24.14	201	18.73	123	11.46
	%	6.34	7.20		4.99		7.87		6.32		4.79	
May	n	2312	651	28.16	413	17.86	398	17.21	482	20.85	368	15.92
	%	13.65	15.02		11.58		12.09		15.17		14.34	
June	n	1057	283	26.77	286	27.06	189	17.88	105	9.93	194	18.35
	%	6.24	6.53		8.02		5.74		3.30		7.56	
July	n	752	138	18.35	197	26.20	211	28.06	111	14.76	95	12.63
	%	4.44	3.18		5.52		6.41		3.49		3.70	
Aug	n	2193	593	27.04	322	14.68	411	18.74	512	23.35	355	16.19
	%	12.95	13.69		9.03		12.49		16.11		13.83	
Sep	n	3071	678	22.08	730	23.77	511	16.64	639	20.81	513	16.70
	%	18.13	15.65		20.47		15.53		20.11		19.99	
Oct	n	2513	725	28.85	533	21.21	398	15.84	481	19.14	376	14.96
	%	14.84	16.73		14.94		12.09		15.14		14.65	
Nov	n	1388	276	19.88	322	23.20	351	25.29	228	16.43	211	15.20
	%	8.20	6.37		9.03		10.67		7.17		8.22	
Dec.	n	1096	233	21.26	317	28.92	288	26.28	169	15.42	89	8.12
	%	6.47	5.38		8.89		8.75		5.32		3.47	
Total	N	16935	4333	25.59	3567	21.06	3291	19.43	3178	18.77	2566	15.15

%*: Proportionate mortality between different age groups within a month

%: Proportionate mortality between the months within the age group

Table 2: Age-wise proportionate mortality distribution among broiler chicken during different seasons

Seasons	Mortality											
	Total	0-7days		8-14 days		15-21 days		22-28 days		>28 days		
	N'	n	%*	n	%*	n	%*	n	%*	n	%*	
Winter	n	1739	446	25.65 ^A	398	22.89 ^A	401	23.06 ^A	288	16.56 ^B	206	11.85 ^C
	%	10.27 ^a	10.29 ^a		11.16 ^a		12.18 ^a		9.06 ^a		8.03 ^a	
Spring	n	4222	1194	28.28 ^A	779	18.45 ^B	819	19.40 ^B	814	19.28 ^B	616	14.59 ^C
	%	24.93 ^b	27.56 ^b		21.84 ^b		24.89 ^b		25.61 ^b		24.01 ^b	
Summer	n	4002	1014	25.34 ^A	805	20.11 ^B	811	20.26 ^B	728	18.19 ^C	644	16.09 ^D
	%	23.63 ^c	23.40 ^c		22.57 ^b		24.64 ^b		22.91 ^c		25.10 ^b	
Autumn	n	6972	1679	24.08 ^A	1585	22.73 ^A	1260	18.07 ^B	1348	19.33 ^B	1100	15.78 ^C
	%	41.17 ^d	38.75 ^d		44.44 ^c		38.29 ^c		42.42 ^d		42.87 ^c	
Total	N	16935	4333	25.59 ^A	3567	21.06 ^B	3291	19.43 ^C	3178	18.77 ^C	2566	15.15 ^D

%*: Proportionate mortality between different age groups within a season

%: Proportionate mortality between the seasons within the age group

Case Prevalence of Diseases / Disease Conditions

Monthly case prevalence for different diseases were calculated out of the total mortality of 16935 received. While most of the diseases were prevalent throughout the year, occasional outbreaks of ND, IBD, and aspergillosis were recorded (Table 3). The overall case prevalence was highest 29.873% for colibacillosis followed by 20.466% for respiratory affections; 8.397% for colibacillosis +

Salmonellosis; 7.086% for SDS; 6.242% for ascites/PHS; 6.171% for Omphalitis; 5.527% for hepatic affections; 4.659% for salmonellosis; 2.22% for IBD; 1.665% for nephrosis; 1.399% for coccidiosis; 1.399% visceral gout; 1.305% for IBD + Ascites; 1.075% for Colibacillosis + Ascites; 1.027% for non-specific enteritis; 0.892% for ND; 0.307% for Aspergillosis; 0.201% for colibacillosis + coccidiosis; and 0.083% for coccidiosis + Ascites (Plate 1,2).

Table 3: Month-wise case prevalence (%) of different disease conditions observed in broiler chickens (N= 16935)

Month		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
SDS	n	17	39	87	156	219	78	48	64	192	145	60	95	1200
	%	0.100	0.230	0.514	0.921	1.293	0.461	0.283	0.378	1.134	0.856	0.354	0.561	7.086
Omphalitis	n	10	33	78	87	101	100	52	120	117	86	119	142	1045
	%	0.059	0.195	0.461	0.514	0.596	0.590	0.307	0.709	0.691	0.508	0.703	0.839	6.171
Colibacillosis	n	77	125	241	314	697	328	232	594	1087	675	364	325	5059
	%	0.455	0.738	1.423	1.854	4.116	1.937	1.370	3.508	6.419	3.986	2.149	1.919	29.873
Salmonellosis	n	7	13	51	39	107	61	43	184	127	77	38	42	789
	%	0.041	0.077	0.301	0.230	0.632	0.360	0.254	1.087	0.750	0.455	0.224	0.248	4.659
colibacillosis + salmonellosis	n	27	29	22	70	168	104	58	212	243	238	121	130	1422
	%	0.159	0.171	0.130	0.413	0.992	0.614	0.342	1.252	1.435	1.405	0.714	0.768	8.397
ND	n	0	0	0	0	54	0	0	62	35	0	0	0	151
	%	0.000	0.000	0.000	0.000	0.319	0.000	0.000	0.366	0.207	0.000	0.000	0.000	0.892
IBD	n	0	0	0	7	80	0	29	101	139	0	0	20	376
	%	0.000	0.000	0.000	0.041	0.472	0.000	0.171	0.596	0.821	0.000	0.000	0.118	2.220
Coccidiosis	n	0	0	5	17	40	24	40	43	2	45	17	4	237
	%	0.000	0.000	0.030	0.100	0.236	0.142	0.236	0.254	0.012	0.266	0.100	0.024	1.399
Colibacillosis + Coccidiosis	n	0	0	0	5	27	0	0	2	0	0	0	0	34
	%	0.000	0.000	0.000	0.030	0.159	0.000	0.000	0.012	0.000	0.000	0.000	0.000	0.201
Aspergillosis	n	0	0	0	0	20	32	0	0	0	0	0	0	52
	%	0.000	0.000	0.000	0.000	0.118	0.189	0.000	0.000	0.000	0.000	0.000	0.000	0.307
Visceral Gout	n	4	0	0	0	32	61	50	88	0	0	2	0	237
	%	0.024	0.000	0.000	0.000	0.189	0.360	0.295	0.520	0.000	0.000	0.012	0.000	1.399
Ascites	n	24	50	100	91	84	15	14	113	210	132	152	72	1057
	%	0.142	0.295	0.590	0.537	0.496	0.089	0.083	0.667	1.240	0.779	0.898	0.425	6.242
Colibacillosis + Ascites	n	5	0	14	7	20	0	5	29	46	49	7	0	182
	%	0.030	0.000	0.083	0.041	0.118	0.000	0.030	0.171	0.272	0.289	0.041	0.000	1.075
Coccidiosis + Ascites	n	0	0	7	0	7	0	0	0	0	0	0	0	14
	%	0.000	0.000	0.041	0.000	0.041	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.083
IBD + Ascites	n	0	0	0	48	42	0	0	70	61	0	0	0	221
	%	0.000	0.000	0.000	0.283	0.248	0.000	0.000	0.413	0.360	0.000	0.000	0.000	1.305
Respiratory Tract Affections	n	61	122	198	188	353	100	109	167	680	804	439	245	3466
	%	0.360	0.720	1.169	1.110	2.084	0.590	0.644	0.986	4.015	4.748	2.592	1.447	20.466
Hepatic affections	n	0	0	29	20	189	106	30	212	92	199	38	21	936
	%	0.000	0.000	0.171	0.118	1.116	0.626	0.177	1.252	0.543	1.175	0.224	0.124	5.527
Nephrosis	n	0	0	5	0	44	33	27	70	28	63	12	0	282
	%	0.000	0.000	0.030	0.000	0.260	0.195	0.159	0.413	0.165	0.372	0.071	0.000	1.665
Non Specific Enteritis	n	0	0	0	24	28	15	15	62	12	0	18	0	174
	%	0.000	0.000	0.000	0.142	0.165	0.089	0.089	0.366	0.071	0.000	0.106	0.000	1.027

Disease-wise Proportionate Mortality

Disease wise proportionate mortality during different months ranged from 1.417 to 18.250% for SDS; 0.957 to 13.589% for Omphalitis; 1.522 to 21.486% for colibacillosis; 0.887 to 23.321% for salmonellosis; 1.547 to 17.089% for colibacillosis + salmonellosis; 0.00 to 41.06% for ND; 0.00 to 36.968% for IBD; 0.00 to 18.143% for coccidiosis; 0.00 to 79.412% for colibacillosis + coccidiosis; 0.00 to 61.538% for

aspergillosis; 0.00 to 37.131% for visceral gout; 1.419 to 19.868% for ascites; 0.00 to 26.923% for colibacillosis + ascites; 0.00 to 50.00% for coccidiosis + ascites; 0.00 to 31.674% for IBD + ascites; 1.76 to 23.197% for respiratory tract affection; 0.00 to 22.650% for hepatic affections; 0.00 to 24.823% for nephrosis; and 0.00 to 35.632% for non-specific enteritis (Table 4).

Table 4: Disease/ Disease condition-wise proportionate mortality distribution (%) observed in broiler chickens during different months

Month	N	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
SDS	1200	1.417	3.250	7.250	13.000	18.250	6.500	4.000	5.333	16.000	12.083	5.000	7.917
Omphalitis	1045	0.957	3.158	7.464	8.325	9.665	9.569	4.976	11.483	11.196	8.230	11.388	13.589
Colibacillosis	5059	1.522	2.471	4.764	6.207	13.777	6.483	4.586	11.741	21.486	13.343	7.195	6.424
Salmonellosis	789	0.887	1.648	6.464	4.943	13.561	7.731	5.450	23.321	16.096	9.759	4.816	5.323
Colibacillosis + Salmonellosis	1422	1.899	2.039	1.547	4.923	11.814	7.314	4.079	14.909	17.089	16.737	8.509	9.142
ND	151	0.000	0.000	0.000	0.000	35.762	0.000	0.000	41.060	23.179	0.000	0.000	0.000

IBD	376	0.000	0.000	0.000	1.862	21.277	0.000	7.713	26.862	36.968	0.000	0.000	5.319
Coccidiosis	237	0.000	0.000	2.110	7.173	16.878	10.127	16.878	18.143	0.844	18.987	7.173	1.688
Colibacillosis + Coccidiosis	34	0.000	0.000	0.000	14.706	79.412	0.000	0.000	5.882	0.000	0.000	0.000	0.000
Aspergillosis	52	0.000	0.000	0.000	0.000	38.462	61.538	0.000	0.000	0.000	0.000	0.000	0.000
Visceral Gout	237	1.688	0.000	0.000	0.000	13.502	25.738	21.097	37.131	0.000	0.000	0.844	0.000
Ascites	1057	2.271	4.730	9.461	8.609	7.947	1.419	1.325	10.691	19.868	12.488	14.380	6.812
Colibacillosis + Ascites	182	2.747	0.000	7.692	3.846	10.989	0.000	2.747	15.934	25.275	26.923	3.846	0.000
Coccidiosis + Ascites	14	0.000	0.000	50.000	0.000	50.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
IBD + Ascites	221	0.000	0.000	0.000	21.719	19.005	0.000	0.000	31.674	27.602	0.000	0.000	0.000
Respiratory Tract Affections	3466	1.760	3.520	5.713	5.424	10.185	2.885	3.145	4.818	19.619	23.197	12.666	7.069
Hepatic affections	936	0.000	0.000	3.098	2.137	20.192	11.325	3.205	22.650	9.829	21.261	4.060	2.244
Nephrosis	282	0.000	0.000	1.773	0.000	15.603	11.702	9.574	24.823	9.929	22.340	4.255	0.000
Non Specific Enteritis	174	0.000	0.000	0.000	13.793	16.092	8.621	8.621	35.632	6.897	0.000	10.345	0.000

Month-wise Proportionate Mortality

The month wise proportionate mortality distribution due to different diseases/ disease conditions, calculated on the basis of total mortality during a month showed that the disease pattern differed during different months. Proportionate

mortality was higher for colibacillosis and respiratory tract affections during all months. Mortality due to IBD and ND were associated with occasional outbreaks. In general, significantly higher proportion of mortality was associated with colibacillosis and respiratory tract affections (Table 5).

Table 5: Monthly proportionate mortality distribution (%) observed in broiler chickens

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Total Mortality	232	411	837	1073	2312	1057	752	2193	3071	2513	1388	1096
SDS	7.328	9.489	10.394	14.539	9.472	7.379	6.383	2.918	6.252	5.770	4.323	8.668
Omphalitis	4.310	8.029	9.319	8.108	4.369	9.461	6.915	5.472	3.810	3.422	8.573	12.956
Colibacillosis	33.190	30.414	28.793	29.264	30.147	31.031	30.851	27.086	35.396	26.860	26.225	29.653
Salmonellosis	3.017	3.163	6.093	3.635	4.628	5.771	5.718	8.390	4.135	3.064	2.738	3.832
Colibacillosis + Salmonellosis	11.638	7.056	2.628	6.524	7.266	9.839	7.713	9.667	7.913	9.471	8.718	11.861
ND	0.000	0.000	0.000	0.000	2.336	0.000	0.000	2.827	1.140	0.000	0.000	0.000
IBD	0.000	0.000	0.000	0.652	3.460	0.000	3.856	4.606	4.526	0.000	0.000	1.825
Coccidiosis	0.000	0.000	0.597	1.584	1.730	2.271	5.319	1.961	0.065	1.791	1.225	0.365
Colibacillosis + Coccidiosis	0.000	0.000	0.000	0.466	1.168	0.000	0.000	0.091	0.000	0.000	0.000	0.000
Aspergillosis	0.000	0.000	0.000	0.000	0.865	3.027	0.000	0.000	0.000	0.000	0.000	0.000
Visceral Gout	1.724	0.000	0.000	0.000	1.384	5.771	6.649	4.013	0.000	0.000	0.144	0.000
Ascites	10.345	12.165	11.947	8.481	3.633	1.419	1.862	5.153	6.838	5.253	10.951	6.569
Colibacillosis + Ascites	2.155	0.000	1.673	0.652	0.865	0.000	0.665	1.322	1.498	1.950	0.504	0.000
Coccidiosis + Ascites	0.000	0.000	0.836	0.000	0.303	0.000	0.000	0.000	0.000	0.000	0.000	0.000
IBD + Ascites	0.000	0.000	0.000	4.473	1.817	0.000	0.000	3.192	1.986	0.000	0.000	0.000
Respiratory Tract Affections	26.293	29.684	23.656	17.521	15.268	9.461	14.495	7.615	22.143	31.994	31.628	22.354
Hepatic affections	0.000	0.000	3.465	1.864	8.175	10.028	3.989	9.667	2.996	7.919	2.738	1.916
Nephrosis	0.000	0.000	0.597	0.000	1.903	3.122	3.590	3.192	0.912	2.507	0.865	0.000
Non Specific Enteritis	0.000	0.000	0.000	2.237	1.211	1.419	1.995	2.827	0.391	0.000	1.297	0.000

Seasonal Mortality Pattern

The season-wise proportionate mortalities and case prevalence rates of different diseases / disease conditions calculated as a function of total mortality revealed that during winter proportionate mortality was highest for colibacillosis (30.30%) followed by respiratory tract affection (24.61%), colibacillosis + salmonellosis (10.70%), omphalitis (10.64%), SDS (8.68%), Ascites (8.40%), salmonellosis (3.57%), Hepatosis (1.21%), IBD (1.15%), coccidiosis (0.23%), and visceral gout (0.23%), where as other conditions were not noted. During spring proportionate mortality was highest for colibacillosis (29.65%) followed by respiratory tract affection (17.50%), SDS (10.94%), Hepatosis (5.64%), Ascites (6.51%), omphalitis (6.30%), colibacillosis + salmonellosis (6.16%), salmonellosis (4.67%), IBD + ascites (2.13%), IBD (2.06%), coccidiosis (1.47%), ND (1.28%), enteritis (1.23%), nephrosis (1.16%), colibacillosis + ascites (0.97%), visceral gout (0.76%), colibacillosis + coccidiosis (0.76%), aspergillosis (0.47%), and coccidiosis + ascites (0.33%). During summer proportionate mortality was highest for colibacillosis (28.84%) followed by respiratory tract affection (9.40%), colibacillosis + salmonellosis (9.35%), Hepatosis (8.70%), salmonellosis (7.20%), omphalitis (6.80%), visceral gout (4.97%), SDS (4.75%), Ascites (3.55%), IBD (3.25%),

nephrosis (3.25%), coccidiosis (2.67%), enteritis (2.30%), IBD + ascites (1.75%), ND (1.55%), colibacillosis + ascites (0.85%), aspergillosis (0.80%), and colibacillosis + coccidiosis (0.05%). During autumn proportionate mortality was highest for colibacillosis (30.49%) followed by respiratory tract affection (27.58%), colibacillosis + salmonellosis (8.63%), Ascites (7.09%), SDS (5.69%), Hepatosis (4.72%), omphalitis (4.62%), salmonellosis (3.47%), IBD (1.99%), nephrosis (1.48%), colibacillosis + ascites (1.46%), coccidiosis (0.92%), IBD + ascites (0.87%), ND (0.50%), enteritis (0.43%), and visceral gout (0.03%). In general, colibacillosis alone or in association with other conditions and respiratory tract affections constituted the major cause of mortality during all the seasons. Non-specific conditions like hepatosis, nephrosis and enteritis also represent a substantial component of overall mortality. Aspergillosis was noted during spring and summer only. The case prevalence and proportionate mortality showed marked seasonal effects for different diseases. Markedly higher case prevalence and proportionate mortalities were recorded for omphalitis, colibacillosis, colibacillosis + salmonellosis, IBD, ascites and respiratory tract affections in autumn; salmonellosis, ND, IBD, coccidiosis, aspergillosis, visceral gout, hepatic affections, nephrosis and non-specific enteritis in summer; and SDS in spring. Other conditions were occasionally noted (Table 6).

Table 6: Season-wise proportionate mortality distribution and case prevalence rates of different diseases / disease conditions observed in broiler chickens

Month	N	Winter				Spring				Summer				Autumn			
		No.	PMS	PMD	CP	No.	PMS	PMD	CP	No.	PMS	PMD	CP	No.	PMS	PMD	CP
SDS	1200	151	8.68	12.58	0.892	462	10.94	38.50	2.728	190	4.75	15.83	1.122	397	5.69	33.08	2.344
Omphalitis	1045	185	10.64	17.70	1.092	266	6.30	25.45	1.571	272	6.80	26.03	1.606	322	4.62	30.81	1.901
Colibacillosis	5059	527	30.30	10.42	3.112	1252	29.65	24.75	7.393	1154	28.84	22.81	6.814	2126	30.49	42.02	12.554
Salmonellosis	789	62	3.57	7.86	0.366	197	4.67	24.97	1.163	288	7.20	36.50	1.701	242	3.47	30.67	1.429
Colibacillosis + Salmonellosis	1422	186	10.70	13.08	1.098	260	6.16	18.28	1.535	374	9.35	26.30	2.208	602	8.63	42.33	3.555
ND	151	0	0.00	0.00	0.000	54	1.28	35.76	0.319	62	1.55	41.06	0.366	35	0.50	23.18	0.207
IBD	376	20	1.15	5.32	0.118	87	2.06	23.14	0.514	130	3.25	34.57	0.768	139	1.99	36.97	0.821
Coccidiosis	237	4	0.23	1.69	0.024	62	1.47	26.16	0.366	107	2.67	45.15	0.632	64	0.92	27.00	0.378
Colibacillosis + Coccidiosis	34	0	0.00	0.00	0.000	32	0.76	94.12	0.189	2	0.05	5.88	0.012	0	0.00	0.00	0.000
aspergillosis	52	0	0.00	0.00	0.000	20	0.47	38.46	0.118	32	0.80	61.54	0.189	0	0.00	0.00	0.000
Visceral Gout	237	4	0.23	1.69	0.024	32	0.76	13.50	0.189	199	4.97	83.97	1.175	2	0.03	0.84	0.012
Ascites	1057	146	8.40	13.81	0.862	275	6.51	26.02	1.624	142	3.55	13.43	0.839	494	7.09	46.74	2.917
Colibacillosis + Ascites	182	5	0.29	2.75	0.030	41	0.97	22.53	0.242	34	0.85	18.68	0.201	102	1.46	56.04	0.602
Coccidiosis + Ascites	14	0	0.00	0.00	0.000	14	0.33	100.00	0.083	0	0.00	0.00	0.000	0	0.00	0.00	0.000
IBD + Ascites	221	0	0.00	0.00	0.000	90	2.13	40.72	0.531	70	1.75	31.67	0.413	61	0.87	27.60	0.360
Respiratory Tract Affections	3466	428	24.61	12.35	2.527	739	17.50	21.32	4.364	376	9.40	10.85	2.220	1923	27.58	55.48	11.355
Hepatic affections	936	21	1.21	2.24	0.124	238	5.64	25.43	1.405	348	8.70	37.18	2.055	329	4.72	35.15	1.943
Nephrosis	282	0	0.00	0.00	0.000	49	1.16	17.38	0.289	130	3.25	46.10	0.768	103	1.48	36.52	0.608
Non-Specific Enteritis	174	0	0.00	0.00	0.000	52	1.23	29.89	0.307	92	2.30	52.87	0.543	30	0.43	17.24	0.177
Total Mortality	16935	1739				4222				4002				6972			

PMS: Proportionate Mortality within Season; PMD: Proportionate Mortality for disease between seasons; CP: Case Prevalence with N= 16935

Age-wise Mortality Pattern

The age-wise proportionate mortalities and case prevalence rates of different diseases / disease conditions were calculated as a function of total mortality (Table 7). In age group 0-7 days proportionate mortality was highest for SDS (27.69%) followed by colibacillosis (26.96%), respiratory tract infections (13.75%), omphalitis (12.74%), colibacillosis + Salmonellosis (5.35%), hepatitis (3.95%), salmonellosis (3.90%), visceral gout (2.52%), nephrosis (1.92%), and aspergillosis (1.20%) in that order. In age group 8-14 days highest proportionate mortality was attributed to colibacillosis (40.51%) followed by respiratory tract infections (23.77%), omphalitis (13.82%), colibacillosis + salmonellosis (10.65%), salmonellosis (4.12%), hepatitis (3.48%), visceral gout (3.00%), and nephrosis (0.64%). In age group 15-21 days proportionate mortality was highest for colibacillosis (25.43%), followed by respiratory tract infection (23.21%), colibacillosis + salmonellosis (15.56%), salmonellosis (10.97%), hepatitis (7.72%), nephrosis

(3.56%), IBD (3.19%), Ascites (3.04%), coccidiosis (2.28%), ND (1.88%), enteritis (1.88%), visceral gout (0.64%), colibacillosis + ascites (0.43%) and coccidiosis + ascites (0.21%). In age group 22-28 days highest proportionate mortality was due to colibacillosis (27.28%), followed by respiratory tract infections (23.13%), ascites (16.68%), hepatitis (7.52%), IBD (4.56), IBD + Ascites (3.56%), coccidiosis (3.46%), colibacillosis + salmonellosis (3.43%), colibacillosis + ascites (2.67%), enteritis (2.17%), ND (1.70%), colibacillosis + coccidiosis (1.07%), nephrosis (1.01%) and coccidiosis + ascites (0.22%). In the age group >28 days highest proportionate mortality was due to colibacillosis (28.92%) followed by Respiratory tract infection (20.38%), ascites (16.64%), colibacillosis + salmonellosis (7.32%), hepatitis (5.77%), IBD (4.91%), IBD + Ascites (4.21%), colibacillosis + ascites (3.23%), salmonellosis (2.46%), coccidiosis (2.03%), enteritis (1.68%), ND (1.36%) and Nephrosis (1.05%).

Table 7: Age-wise proportionate mortality distribution and case prevalence rates of different diseases / disease conditions observed in broiler chickens

Disease/ Disease Condition	Age Group																
	0-7 Day			8-14 Day			15-21 Day			22-28 Day			>28 Days			Overall	
	No	PMA	PMD	No	PMA	PMD	No	PMA	PMD	No	PMA	PMD	No	PMA	PMD	No.	PMD
SDS	1200	100.00	27.69	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1200	7.09
Omphalitis	552	52.82	12.74	493	47.18	13.82	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	1045	6.17
Colibacillosis	1168	23.09	26.96	1445	28.56	40.51	837	16.54	25.43	867	17.14	27.28	742	14.67	28.92	5059	29.87
Salmonellosis	169	21.42	3.90	147	18.63	4.12	361	45.75	10.97	49	6.21	1.54	63	7.98	2.46	789	4.66
Ecoli + sal	232	16.32	5.35	380	26.72	10.65	512	36.01	15.56	109	7.67	3.43	189	13.29	7.37	1422	8.40
ND	0	0.00	0.00	0	0.00	0.00	62	41.06	1.88	54	35.76	1.70	35	23.18	1.36	151	0.89
IBD	0	0.00	0.00	0	0.00	0.00	105	27.93	3.19	145	38.56	4.56	126	33.51	4.91	376	2.22
Cocci	0	0.00	0.00	0	0.00	0.00	75	31.65	2.28	110	46.41	3.46	52	21.94	2.03	237	1.40
Ecoli + Cocci	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	34	100.00	1.07	0	0.00	0.00	34	0.20
aspergillosis	52	100.00	1.20	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	52	0.31
Visceral Gout	109	45.99	2.52	107	45.15	3.00	21	8.86	0.64	0	0.00	0.00	0	0.00	0.00	237	1.40
Ascites	0	0.00	0.00	0	0.00	0.00	100	9.46	3.04	530	50.14	16.68	427	40.40	16.64	1057	6.24
Ecoli + Ascites	0	0.00	0.00	0	0.00	0.00	14	7.69	0.43	85	46.70	2.67	83	45.60	3.23	182	1.07
Cocci + Ascites	0	0.00	0.00	0	0.00	0.00	7	50.00	0.21	7	50.00	0.22	0	0.00	0.00	14	0.08
IBD + Ascites	0	0.00	0.00	0	0.00	0.00	0	0.00	0.00	113	51.13	3.56	108	48.87	4.21	221	1.30
NS RTI	596	17.20	13.75	848	24.47	23.77	764	22.04	23.21	735	21.21	23.13	523	15.09	20.38	3466	20.47
NS Hepatosis	171	18.27	3.95	124	13.25	3.48	254	27.14	7.72	239	25.53	7.52	148	15.81	5.77	936	5.53
NS Nephrosis	83	29.43	1.92	23	8.16	0.64	117	41.49	3.56	32	11.35	1.01	27	9.57	1.05	282	1.67
NS enteritis	0	0.00	0.00	0	0.00	0.00	62	35.63	1.88	69	39.66	2.17	43	24.71	1.68	174	1.03
mortality	4333	25.59		3567	21.06		3291	19.43		3178	18.77		2566	15.15		16935	

SDS was observed only in age group 0-7 days (100%) whereas omphalitis was observed in age groups 0- 7 days and 8-14 days with proportionate mortalities 52.82% and 47.18% respectively. Colibacillosis, salmonellosis, colibacillosis + salmonellosis, respiratory tract infections, hepatitis, and nephrosis were observed in all age groups with proportionate mortalities ranging from 14.67 to 28.56%, 7.98 to 45.75%, 7.67 to 36.01%, 15.09 to 24.47%, 13.25 to 27.14% and 9.57 to 41.49%, respectively. Visceral gout was observed in age groups 0-7, 8-14 and 15-21 days with proportionate mortalities of 45.99%, 45.15% and 8.86% respectively. ND, IBD, coccidiosis, and ascites were observed from day 15 onwards

A number of techniques have been followed for disease monitoring and surveillance (Scuda more, 2002) [25]. Perusal of literature reveals that majority of the data available with respect to poultry diseases is from sentinel field and laboratory surveillance of farms in a given geographical area especially describing the mortality pattern reflecting the losses inflicted as well as the changing pattern of various prevalent, emerging and reemerging diseases (Aengwanich and Simaraks, 2004; Behra *et al.*, 2009) [1, 4]. The mortality pattern observed in present study may be attributed partially to less number of farms operational during winter due to inclement weather and involvement of higher production cost. Higher proportionate mortality observed during early brooding may be attributed to transportation stress and sudden death syndrome (Aengwanich and Simaraks, 2004; Behra *et al.*, 2009) [1, 4].

Colibacillosis has been recognized throughout the world as one of the major and principal causes of morbidity and mortality either as primary or as a secondary disease imposing great threat to poultry industry (Altekruse *et al.* 2002). Higher case prevalence of respiratory diseases may be attributed to epidemiological factors including farm construction design challenging temperature and ventilation management especially during inclement weather conditions. Respiratory diseases have been reported as one of the major causes of mortality among broilers (Malik *et al.*, 2004; Yunus *et al.*, 2008; Roussan *et al.*, 2008; Itoo *et al.*, 2013, 2014) [16, 29, 19, 10, 11]. Workers from different areas have reported different mortality patterns vis-à-vis incidence/ prevalence of diseases/ disease conditions (Islam *et al.*, 2009; Uddin *et al.*, 2010) [9, 27]. Buragohain and Kalita (2010) [6] reported that in Mizoram (India), ascites syndrome (34.3%) was the main cause of mortality, significantly more than colibacillosis (19.23%), yolk sac infection with omphalitis (12.18%) or caecal coccidiosis (8.33%). The discrepancies may be attributed to multiple reasons including geographical area, period under investigation, the management practices, and other epidemiological factors (Yassin *et al.*, 2009; Itoo *et al.*, 2014) [28, 10]. Further, the outbreak of diseases like highly pathogenic infectious bursal disease, very very virulent Newcastle disease, avian encephalitis, avian influenza, infectious bronchitis, fowl cholera, etc. greatly modify the overall mortality rate at a given point of time (Yunus *et al.*, 2008) [29].

References

- Aengwanich W, Simaraks S. Pathology of heart, lung, liver and kidney in broilers under chronic heat stress. Songklanakarin Journal of Science and Technology. 2004; 26(3):417-424.
- Altekruse SF, Elvinger F, Lee KY, Tollefson LK, Pierson EW, Eifert J *et al.* Antimicrobial susceptibilities of *Escherichia coli* strains from a turkey operation. Journal of American Veterinary Medicine Association. 2002; 221:411-416.
- Awobajo OK, Akinrolabu RT, Mako AA, Igboanu AO, Olatokunbo OT. The mortality rate of two different breeds of broilers after brooding stage to maturity. Middle East Journal of Scientific Record. 2007; 2(1):37-42.
- Behra D, Panda SK, Panda N, Simal N. Mortality Pattern of chicken in and around Bhubneswar. Proceedings of xxvi Annual conference of IAVP AD. 2009; 35:150.
- Bhende MJ. Production and cost of broiler meat- a case study of Karnataka. Research Report. 2006; 9:118
- Buragohain R, Kalita G. Assessment of mortality pattern of broiler under intensive system of management in Mizoram, Tamilnadu. Journal of Veterinary Animal Science. 2010; 6:239-241.
- Darzi MM, Mir MS, Nashiruddullah N, Kamil SA. Nocardiosis in domestic pigeon (*Columba livia*). Veterinary Record. 2006; 158:834-836
- Garcia-Martinez R, Caracenni P, Bernardi M, Gines P, Arroyo V, Jalan R. Albumin: Pathophysiologic basis of its role in the treatment of cirrhosis and its complications. Hepatology. 2013; 58:1836-184
- Islam A, Trisha AA, Das M, Amin MR. Retrospective study of some poultry diseases at gaibandha district in Bangladesh. Bangladesh Journal of Veterinary Medicine. 2009; 7(1):239-247
- Itoo FA, Kamil SA, Mir MS, Khan HM, Darzi MM, Khan AA. Occurrence of Respiratory Affections in Commercial Broiler Chicken Reared in Srinagar (J&K) India. Journal of Veterinary Advances. 2014; 4(1):350-357.
- Itoo FA, Kamil SA, Mir MS, Baba OK, Dar TA, Darzi MM. Occurrence and pathology of diseases with associated respiratory tract affections in commercial broiler chickens reared in Kashmir. SKUAST Journal Research. 2013; 15(1):23-34.
- Joshi BP, Rank CG, Patel AK, Vachhani KV, Ghodasara, Jani PB. Pathological and serological studies on respiratory infections in commercial broiler chicks. XXI Annual conference of Indian Association of Veterinary Pathologists. 2004; 41:32-25.
- Kamil SA, Darzi MM, Mir MS, Shah SA, Shah SN, Khan FA. *Tetrameres fissispina* Infection in Ducks from Bandipora area of Kashmir Valley, Israel Journal of Veterinary Medicine. 2011; 66(2):43-47.
- Kamil SA, Nashiruddullah N, Darzi MM, Mir MS. Occurrence of histomoniasis (Enteric hepatitis) in broiler breeder chickens by possible lateral transmission. Indian Journal of Veterinary Pathology. 2006; 30(2):14-17
- Lowder BV, Guinane CM, Ben Zakour NL, Weinert LA, Morris AC, Cartwright RA *et al.* Recent human-to-poultry host jump, adaptation, and pandemic spread of *Staphylococcus aureus*. Proceedings of the National Academy of Sciences, USA. 2009; 106(46):19545-19550.
- Malik YS, Patnayak DP, Goyal SM. Detection of Three Avian Respiratory Viruses by Single-Tube Multiplex Reverse Transcription Polymerase. Chain Reaction Assay. Journal of Veterinary Diagnostic Investigation. 2004; 16:244.
- Nazir S, Kamil SA, Darzi MM, Mir MS, Khalid Nazir, Abadi Amare. Pathology of Spontaneously Occurring Salmonellosis in Commercial Broiler Chickens of Kashmir Valley. Journal of World's Poultry Research. 2012; 2(4):63-69.

18. Rahman MA, Samad MA. Pattern of occurrence of single and concurrent diseases associated with mortality in commercial chickens in Bangladesh. *Bangladesh Journal of Veterinary Medicine*. 2003; 1(1):15-20
19. Roussan DA, Haddad R, Khawaldeh G. Molecular survey of avian respiratory pathogens in commercial broiler chicken flocks with respiratory diseases in Jordan. *Poultry Science*. 2008; 87:444-448.
20. Salam ST, Khan AR, Mir MS. Prevalence and seasonal variation of ectoparasites in pigeons of Kashmir Valley. *Indian Journal Applied Pure Biology*. 2008; 23(2):261-265.
21. Salam ST, Mir MS, Khan AR. Prevalence and seasonal variation of ectoparasite load in free-range chicken of Kashmir valley. *Tropical Animal Health Production*. 2009b; 41:1371-1376
22. Salam ST, Mir MS, Khan AR. Prevalence and pathology of *Raillietina cesticillus* in the indigenous chicken (*Gallus gallus domesticus*) in temperate Himalayan region of Kashmir. *Veterinarski Arhiv*. 2010; 80(2):323-328
23. Salam ST, Mir MS, Shahnaz S, Khan RA. Prevalence and associated lesions of *Cheilosporira (Acuaria) hamulosa* in the indigenous chicken of Kashmir valley. *Journal of Parasitology*. 2009a; 95(6):1436-1439.
24. Saleque MA, Rehman MI. A Retrospective analysis of chicken disease diagnosed at the barc poultry disease diagnostic center of the Gazipur Bangladesh. *Journal of Veterinary Medicine*. 2003; 1(1):29-31.
25. Scudamore J. Partnership, Priorities and Professionalism- A Proposed Strategy for Enhancing Veterinary surveillance in the UK. *Veterinary Surveillance Division, Department for Environment Food and Rural Affairs, London, 2002, 96.*
26. Shah SN Kamil, Willayat SA, Darzi MM, Mir MS. Antibioqram of Salmonella isolates recovered from various outbreaks in commercial broiler farms of Kashmir valley. *Indian Journal of Comparative Microbiology, Immunology and Infectious Disease*. 2010; 31(1, 2):78-79.
27. Uddin MB, Ahmed SSU, Hassan MM, Khan SA, Mamun MA. Prevalence of poultry diseases at Narsingdi, Bangladesh. *International Journal of Biological Research*. 2010; 1(6):09-13.
28. Yassin H, Velthui AGJ, Boerjan M, van Riel J. Field study on broilers first week mortality. *Poultry Science*. 2009; 88:798-804.
29. Yunus AW, Nasir MK, Farooq U, Böhm J. Prevalence of poultry diseases and their interaction with mycotoxicosis in district Chakwal: 1. Effect of age and flock size. *Journal of Animal and Plant Sciences*. 2008; 18(4):107-113.