

Seroprevalence of *Mycoplasma gallisepticum* infection in backyard and commercial layer chickens in Bhola district, Bangladesh

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ABSTRACT

This study aimed to determine the seroprevalence of *Mycoplasma gallisepticum* (MG) infection in the chicken population of Bhola district, Bangladesh, during the period from April 2011 to March 2012. A total of 480 blood samples from chickens were collected from different *upazilas* (sub-districts) of Bhola district. The sampling considered the types of chicken (backyard and commercial layer), age groups (pullet, adult and old) and seasons (summer and winter). On the basis of the serum plate agglutination test, 55.83% (n=268/480) chickens were found positive for MG. The MG infection was higher (62.5%) in backyard chickens as compared to those being reared in commercial farming systems (53.61%). With respect to age groups, the prevalence was highest in pullets (60.63%) followed by adults (55.63%) and old chickens (51.25%). Moreover, chickens reared in winter showed higher prevalence of MG (60.42%) as compared to those reared in summer (51.25%). In conclusion, MG infection is prevalent in the chicken population of Bhola district, Bangladesh. Appropriate strategies should be taken for successful prevention and control of this disease in Bangladesh.

Keywords:

Backyard chicken, Bhola district, commercial layer, *Mycoplasma gallisepticum*, seroprevalence

Received : 1 January 2014, Revised: 18 January 2014,
Accepted : 22 January 2014, Published Online: 15 February 2014.

INTRODUCTION

In the last few years, poultry industry has made remarkable progress in Bangladesh (Giasuddin et al., 2002). Despite rapid growth of this industry, it is vulnerable to certain infectious agents (Sarkar et al., 2005). A number of microbial diseases are the major health hazards being faced by poultry birds and mycoplasmosis is of paramount important in this regard (Heleili et al., 2011). *Mycoplasma gallisepticum* (MG), *M. synoviae* (MS), *M. meleagridis* (MM) and *M. iowae* (MI) are four major pathogens that cause mycoplasmosis in poultry birds (Bradbury, 2001; Evans et al., 2005). Among these species, MG is the most important cause of chronic respiratory disease (CRD) in chickens (Ley, 2008). Birds of all age groups are susceptible to this disease, but young birds are more prone to infection than adults (Seifi and Shirzad, 2012). MG is transmitted either horizontally from clinically infected or carrier birds by direct contact, or vertically from some carrier birds through transovarian transmission (Ley, 2008). The common clinical features of MG infection in chicken are respiratory rales, nasal

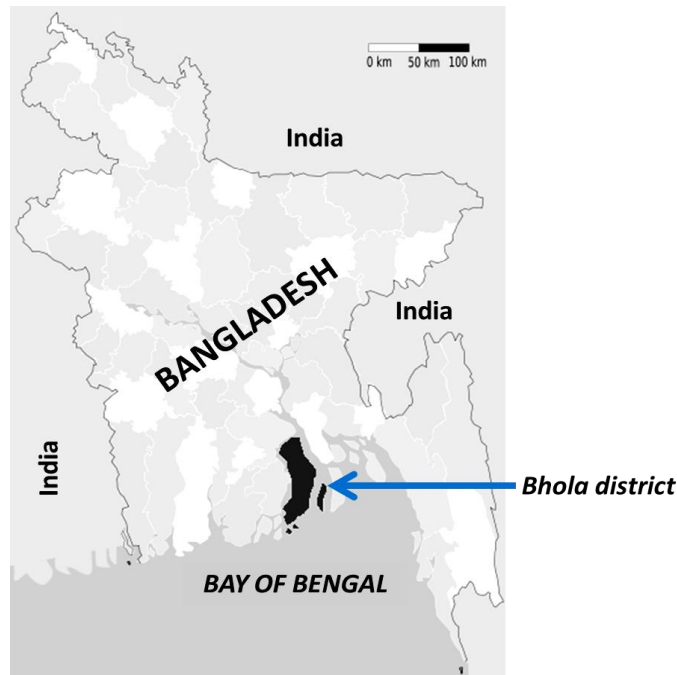


Figure 1. Site of sample collection. The black filled areas indicate Bhola district.

discharge, coughing, and occasionally conjunctivitis (Ley, 2003). MG can be diagnosed by studying its morphology, cultural characteristics, biochemical and serological properties (Ley, 2008). Among serological tests, the serum plate agglutination (SPA) test can be used as a tool for quick detection of MG infection (Sarkar et al., 2005; Seifi and Shirzad, 2012). Attenuated MG vaccines are commonly used within the layer industry to control MG-induced mycoplasmosis (Evans et al., 2012). Test and slaughter are the most effective control measures for total eradication of MG infection (Ley, 2003), but in practice this is expensive and impossible (Levisohn and Kleven, 2000). Due to its economic importance, diagnosis of avian mycoplasmosis has gained great attention from clinicians and researchers. Reports on seroprevalence of mycoplasmosis in chickens in the Bhola district of Bangladesh are limited. Therefore, this study aimed to determine the seroprevalence of MG infection in chickens of Bhola district, with a view to contribute in designing effective control strategies against MG in this region.

MATERIALS AND METHODS

This study was conducted in the Laboratory of District Veterinary Hospital, District Livestock Office, Bhola district, Bangladesh.

Study area and selection of birds: Sixty different backyard chicken rearing houses and 60 commercial layer farms were randomly selected in different *upazilas*

(sub-districts) of Bhola, a southern district in Bangladesh (Figure 1). A total of 480 blood samples (Table 1) were collected from the wing vein of unvaccinated and healthy chickens during the period from April 2011 to March 2012. The sampling considered the types of chicken (backyard and commercial layer), age groups (pullet, adult and old) and seasons (summer and winter).

Blood collection and serum preparation: From each live bird, 2 mL of blood was collected using sterilized syringes (5 mL), and blood was kept at room temperature for 2 hours. A clean straw colored serum was seen around the clotted clump. The serum was poured into a labeled screw capped vial and stored at -20°C until use (Hossain et al., 2007).

Serum plate agglutination (SPA) test: The SPA test was performed by crystal violet stained MG commercial antigen (Nobilis® MG) purchased from Intervet Company Ltd. (The Netherlands). According to the manufacturer's instruction, 0.03 mL antigen and 0.03 mL serum were placed side by side with pipette on a glass plate and mixed well by glass rod, followed by rocking. In positive samples, granules were formed slowly within 2 minutes which could be seen during rocking; whereas, in negative samples, no such granules were observed. Agglutination was assigned score from (+) to (+++). The sera samples having agglutination score (++) or greater were recorded as positive and used for calculation of prevalence.

Table 1. Seroprevalence of *M. gallisepticum* in chickens of Bhola district, Bangladesh

Parameters	No. of Samples examined	Seropositive		P value (χ^2 test)		
		No.	%	Within group	Cumulative	
Types of chicken	Backyard	120	75	62.50	0.089	
	Commercial	360	193	53.61		
	Total	480	268	55.83		
Age groups of chicken	Pullet	Backyard	40	28	70.00	0.161
		Commercial	120	69	57.50	
		Subtotal	160	97	60.63	
	Adult	Backyard	40	25	62.50	0.312
		Commercial	120	64	53.33	
		Subtotal	160	89	55.63	
Old	Backyard	40	22	55.00	0.584	
	Commercial	120	60	50.00		
	Subtotal	160	82	51.25		
Total	480	268	55.83	-	0.240	
Seasons	Summer	Backyard	60	35	58.33	0.205
		Commercial	180	88	48.89	
		Subtotal	240	123	51.25	
	Winter	Backyard	60	40	66.67	0.253
		Commercial	180	105	58.33	
		Subtotal	240	145	60.42	
Total	480	268	55.83	-	0.043*	

No. = Number, % = Percentage,

Summer = April to September, Winter = October to March

*p value less than 0.05 was considered as significant.

Statistical analysis: The data obtained from this study were analyzed using SPSS-version 17.0. Significant difference among the variables was calculated using Pearson's Chi-square test. P values less than 0.05 were considered as significant.

RESULTS AND DISCUSSION

The overall prevalence of MG infection in chickens was 55.83% (Table 1). The present finding agrees with several previous reports (Zhang et al., 2001; Biswas et al., 2003; Hossain et al., 2010). Earlier, Biswas et al. (2003) and Zhang et al. (2001) reported 54.9% and 53.0% seroprevalence of MG infection in chickens in parts of Bangladesh and Mongolia, respectively.

In our studies, higher prevalence of MG was found in backyard chickens (62.5%) as compared to commercial layer chickens (53.61%) but the difference was statistically non-significant ($p > 0.05$) (Table 1). The prevalence of MG in commercial chickens in this study supports the findings of Sikder et al. (2005), Sarkar et

al. (2005) and Hossain et al. (2007). They described the overall seroprevalence of MG infection in different flocks of commercial layer chickens in Patuakhali as 56.9%, in Feri as 58.9%, and 55.13% in Rajshahi district of Bangladesh. In another study, Hossain et al. (2010) found 45.1% prevalence of MG in Rajshahi and surrounding districts of Bangladesh. However, very few studies describing the seroprevalence of MG among backyard chickens in Bangladesh are available in literature.

Data obtained from this study were also analyzed to identify the difference in the seroprevalence of MG as affected by age groups of chickens (pullets, adults and old) and seasons (summer or winter). The highest prevalence of MG was found in pullets (60.63%) followed by adults (55.63%) and old (51.25%) chickens, but the difference was not significant ($p > 0.05$) (Table 1). Similarly, in a study in Pakistan, Mukhtar et al. (2012) recorded the highest prevalence of MG in pullets (54.84%), followed by adult and old laying flocks with seroprevalence of 46.34% and 44.44%, respectively.

Hossain et al. (2007) also reported a higher prevalence of MG infection (72.72%) in 18-25 weeks old age group; whereas, the lower prevalence (44.00%) was recorded in birds with age \geq 66 weeks. Similar findings have also been reported by Sikder et al. (2005) and Sarkar et al. (2005). According to the present study, seasons have a significant effect on the prevalence of MG ($p < 0.05$). The prevalence of MG was higher in winter (60.42%) than summer (51.25%) season (Table 1). This seasonal variation in prevalence might be due to the sudden change in temperature and cold stress on the birds. These results support several other findings (Sarkar et al., 2005; Hossain et al., 2007; Mukhtar et al., 2012).

CONCLUSIONS

MG is prevalent among chickens in Bhola district of Bangladesh and can cause severe economic losses. No significant difference was recorded in the seroprevalence of MG with respect to type and age groups of chickens. Seasons showed a significant effect on the prevalence of MG which was higher in winter. In view of these findings, efforts should be made towards educating the poultry farmers. Moreover, biosecurity should also be improved especially in commercial layer farms. A detailed study on the country-wide prevalence of MG should be designed to establish the current status of this disease in Bangladesh.

ACKNOWLEDGEMENT

The authors express their deepest sense of gratitude and sincere thanks to Dr. Pradip Kumar Karmaker, District Livestock Officer, Bhola for his constructive and informative suggestions and constant inspiration during the research work.

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