

Short communication



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Prevalence of antibodies to *Mycoplasma gallisepticum* (Mg) in indigenous and exotic chicken in Southwestern Nigeria

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Abstract

Avian mycoplasmosis has been reported to be endemic in Nigeria especially in exotic chickens despite integrated control measures and the use of chemotherapeutic agents. Serological evidence or diagnosis has been advocated for the determination of Mycoplasma-induced disease and epidemiological investigations. In this study, blood from 368 clinically healthy adult laying birds between 20 and 54 weeks and 144 pullets (0-8 weeks old) under an intensive system of management, and 452 healthy adult local chickens under a free-range management system were sampled, and subjected to ELISA technique to detect antibodies of Mycoplasma gallisepticum. It was observed that 81.3% of local chicken and 64.8% of exotic chicken were observed to have antibodies to Mycoplasma gallisepticum (Mg). This study also showed that Mg infection is significantly ($p < 0.05$) more commonly seen in older flocks with a higher seroprevalence. There is a need for a national control program that would reduce vertical transmission in breeder farms through routine vaccination with the Indigenous Mg vaccine.

Introduction

The Nigerian indigenous (local) chicken constitutes over 70% of the nation's poultry population, and they are reared in most rural and peri-urban areas for their meat and eggs [1]. These birds have been known to play important roles in the epidemiology of several important poultry diseases such as Egg Drop Syndrome (EDS), infectious bursa disease, and Newcastle disease, infectious bronchitis and fowl typhoid [2]. Avian mycoplasmosis has been reported to be endemic in Nigeria, especially in exotic chickens despite integrated control measures and the use of chemotherapeutic agents [3]. There is no vaccine available locally and the recently introduced imported vaccines are mainly used for parent stock. The diagnosis of avian mycoplasmosis in the past has been based mainly on clinical signs and gross post-mortem

findings with very low isolation of the causative agent. Therefore, serological evidence or diagnosis has been advocated for the determination of Mycoplasma-induced disease and epidemiological investigations [4]. There are reports on the seroprevalence of Mycoplasma infection in local chicken in other parts of Africa and the Northern part of Nigeria with fewer reports in southern Nigeria [5]. The diagnoses in most of the reports in Africa were based on the rapid plate agglutination technique test and haemagglutination-inhibition test [6] with little on ELISA. This paper describes the results of an ELISA-based serological survey to determine the relative distribution of *Mycoplasma gallisepticum* (Mg) activity in unvaccinated Indigenous and exotic chickens in the humid Southwestern parts of Nigeria.

Methods

Study area: this study was carried out in the humid southwestern part of Nigeria, where most of the intensive poultry production in Nigeria is concentrated specifically in Ibadan and Lagos.

Birds sampled: a total of 226 healthy adult local chickens under a free-range management system from 48 flocks were sampled. The flock size varied from between 8-20 birds per household. All the chickens had no history of vaccination. One out of every three adult birds per household flock was randomly selected for blood collection for fear of mortality, the owner did not allow a larger number of birds to be sampled. In addition, a total of 368 clinically healthy adult laying birds between 20 and 54 weeks old and 144 pullets (0-8 weeks old) under an intensive system of management from 24 flocks were sampled the flock size varied from 3,000-100,000 birds. All the chickens had no history of vaccination against Mg infections.

Serological test: the indirect enzyme-linked immunosorbent assay (ELISA) was employed to detect antibodies against *Mycoplasma gallisepticum* (Mg) infection. Based on the manual of the ELISA kit, the test was validated if the

normal control average optical density (OD) is less than 0.200 and the corrective positive control (CPC) is between 0.250 and 0.900.

Data analysis: data were analyzed using the SAS GLM mode statistical package (SAS, 1992) Chi-square analysis was used to determine significant differences between the seroconversion rates. Significance is reported at the $p < 0.05$ level.

Results

The overall prevalence of Mg in the local chicken was 81.4% while in the commercial flocks; a prevalence rate of 64.8% was obtained. The difference in the seroprevalence of Mg concerning the type of birds was statistically significant ($p = 0.025$). With regards to the age of birds, the highest prevalence of Mg antibodies was recorded in adult birds between 34-51 weeks of age (81.8%) as compared to 78.1% recorded in birds less than 2 weeks of age, 46.5% recorded in birds between 20-34 weeks, and 17.5% recorded in birds which were 8 weeks old. The difference between the seroprevalence of Mg concerning the age of birds was statistically significant ($p = 0.000$). The location of birds had a significant effect ($p = 0.001$) on the seroprevalence of *Mycoplasma gallisepticum* antibodies of which a seroprevalence of 81.3% was recorded for birds sampled from Ibadan, and 39.6% for birds sampled from Lagos as shown in Table 1.

Discussion

This study found *Mycoplasma gallisepticum* (Mg) antibodies in 81.4% of local chickens and 64.8% of commercial chickens. The findings of this study compared to similar Nigerian studies with similar objectives and focus from three decades ago warranted this current study. Jibril *et al.* [7] found a *Mycoplasma gallisepticum* (Mg) seroprevalence of 23% and 64.5% in commercial and local chicken in southeast Nigeria, compared to 81.4% and 64.8% in this study. Despite the lack of recent studies comparing Mg antibodies in local and

commercial chicken in Nigeria, Messa *et al.* [8] reported a 48.8% seroprevalence for *Mycoplasma gallisepticum* in backyard village chicken in Mozambique, lower than this study's 81.4%. The differences in *Mycoplasma gallisepticum* seroprevalence in these study areas may be due to geographical location, disease endemicity, and bird exposure. The high Mg infection rate in local chickens in this study may be due to free-range management and increased pathogen exposure.

In this study, 64.8% of commercial birds tested positive for *Mycoplasma gallisepticum*. This commercial chicken seroprevalence is lower than the 74.3% recorded in Ibadan, Nigeria by Bakre *et al.* [3]. The varied study results suggest *Mycoplasma gallisepticum* is endemic in Nigerian commercial chicken. The commercial flock's high Mg antibody seroprevalence highlights the epidemiological implications of vertical transmission through infected breeders, as chicks from infected flocks are usually infected for life. Unfortunately, Nigeria has no preventable Mg infection strategies other than post-infection control. Most farms sampled lack biosecurity measures, which may explain the high prevalence in commercial stocks. Commercial and local chicken have wide antibody titers, suggesting they were naturally exposed at different immune response stages. Natural infection may be possible because Nigeria has no local Mg vaccine and no routine Mg vaccination, especially in chickens.

This study found that Mg infection is more common in older flocks. This finding corroborates the finding reported by El-Ashram *et al.* [9] but contradicts the report of Hossain *et al.* [10], who found MG antibody seroprevalences of 71.6% in birds at 16-23 weeks and 18-20 weeks, respectively. This current study found a high seroprevalence of Mg, highlighting the need for a national control program to reduce vertical transmission in breeder farms through strict biosecurity and routine vaccination of Indigenous chicken with the Mg vaccine.

Conclusion

The study found significant differences in the prevalence of *Mycoplasma gallisepticum* (Mg) antibodies among local and commercial chicken flocks, with a higher prevalence in local birds compared to commercial birds. Additionally, the age and location of the birds significantly influenced the seroprevalence of Mg, with adult birds (34-51 weeks) showing the highest prevalence and birds from Ibadan exhibiting a higher prevalence compared to those from Lagos. It is recommended that farmers and poultry producers prioritize the vaccination and management practices that target the local chicken flocks, particularly the adult birds, to reduce the risk of Mg infections. Furthermore, the location of the birds should also be considered in disease management strategies, with a focus on the Ibadan region where the prevalence of Mg is higher.

What is known about this topic

- Avian mycoplasmosis is widespread in Nigeria, affecting various types of chickens;
- Diagnosis of avian mycoplasmosis often relies on clinical signs and post-mortem findings, with serological methods recommended for better accuracy;
- There are varying reports on the prevalence of *Mycoplasma gallisepticum* in different regions and poultry types.

What this study adds

- The study adds further scientific evidence to show that there are higher antibody rates in local chickens compared to commercial ones;
- This current study further provides data to throw more light on older flocks of birds having a higher seroprevalence of *Mycoplasma gallisepticum*;
- The study indicates a significant difference in seroprevalence between different geographical locations in Nigeria regarding *Mycoplasma gallisepticum*.

Competing interests

The authors declare no competing interests.

Authors' contributions

The authors of this study contributed to the research in the following: Godspower Obokparo Ohore was responsible for conceptualizing the study, designing the methodology, data collection, analyzing the data, and drafting the original manuscript. Samson Akparorue, Stephen Owarioro Akpavie, Theophilus Aghogho Jarikre, Benjamin Obukowho Emikpe contributed to data analysis, as well as reviewing and editing the manuscript. Derrick Adu Asare reviewed and edited the final manuscript. All the authors read and approved the final version of this manuscript.

Table

Table 1: effect of type of bird, age, and location on seroprevalence of *Mycoplasma gallisepticum*

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Table 1: effect of type of bird, age, and location on seroprevalence of *Mycoplasma gallisepticum*

Variable	Categories	Number tested	Seroprevalence of Mg		χ ²	P-value
			Negative	Positive		
Type of bird	Commercial	1024	360 (35.2%)	664 (64.8%)	32.943	0.025
	Indigenous	452	84 (18.6%)	368 (81.4%)		
Age of bird	Less than 2 weeks	128	28 (21.9%)	100 (78.1%)	431.51	0.000
	8 weeks	160	132 (82.5%)	28 (17.5%)		
	20-34 weeks	516	276 (53.5%)	240 (46.5%)		
	34-51 weeks	812	148 (18.2%)	664 (81.8%)		
Location of bird	Ibadan	940	176 (18.7%)	764 (81.3%)	296.4	0.001
	Lagos	676	408 (60.4%)	268 (39.6%)		

Mg: *Mycoplasma gallisepticum*