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Retrospective analysis of avian salmonellosis in poultry in Maiduguri, Nigeria

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ABSTRACT

Aim: Purpose of the study was to determine the prevalence and seasonal occurrence of salmonellosis carried out in Maiduguri.
Method and materials: A total of 985 cases of poultry brought to the VTH during the period from 2018 to 2022 and were taken into consideration in this study. The disease was diagnosed based on history/clinical signs, necropsy and microbiology.
Results: The result of the study showed that 17.25%, 11.97% and 10.05% of the cases were diagnosed. It was the highest prevalence of salmonellosis in 2021. The study also found a significant association between salmonellosis and season ($p<0.05$, CI= 1.6033 to 3.7423, O.D 2.23).
Conclusion: It was concluded that the prevalence in this study is important in view of the economic importance of this disease.

Keywords: Retrospective, Avian, Salmonellosis, Poultry

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Introduction

Salmonella organisms are widely distributed in nature and survive well in a variety of food and can occur at multiple steps along the food chain (Barde *et al*, 2021). It is a bacterial agent that can cause human and animal salmonellosis (Hardy, 2004 and Gut *et al*., 2018). Avian Salmonellosis remains a major constraint to poultry production in all parts of Nigeria (Mbuko *et al*., 2009). *Salmonella* was first isolated and described by Daniel E. Salmon as a rod shape gram negative facultative non spore forming bacilli which belongs to the family *Enterobacteriaceace* (Popoff et al., 2003). Salmonellosis caused by *Salmonella* specie is an important disease of chicken all over the world. Avian host specific salmonellae include *Salmonella gallinarum* (*S. gallinarum*) and *Salmonella pullorum* (*S. pullorum*), *Salmonella typhimurium* or *Salmonella enteritidis* which causes fowl typhoid and pullorum disease respectively.

Direct and indirect contact with animals can be used to acquire infection. (Hale *et al*., 2012). It is the most common enteric pathogenic diseases with a high degree of morbidity and preventive issues (Scallan *et al*., 2011; Anderson *et al*., 2013). They can cause severe mortality among chicken resulting in huge economic loss. Fowl salmonellosis is increasingly rampant if not endemic, with a huge bearing on the economy as well as the future development of poultry sector (Barrow and Freitas 2011). Poultry is an important reservoir of bacterial agents. Infected poultry can be a source of disease transmission. Pathogenic microorganisms can cause infectious disease, which is the main disease and the highest cause of death in animals and humans (Suardana *et al*., 2014). Despite awareness of the risks of Salmonellosis from handling raw poultry, the public is generally unaware that *Salmonella* can also spread between live birds and humans (Behravesh *et al*., 2014). This emphasizes the need for a global initiative with a control and monitoring system in order to protect public health related to *Salmonella* species from poultry farms.

There are relatively a smaller number of reports of salmonellosis from Maiduguri despite its very

high prevalence, which can be attributed to limited diagnostic facilities under field conditions and underreporting. This study aims to determine the prevalence and trend of Avian salmonellosis diagnosed in the Veterinary teaching hospital, University of Maiduguri.

Materials and Methods

All the cases were studied and presented to the poultry unit of the Veterinary Teaching Hospital, University of Maiduguri, located in Maiduguri, a city situated between 11° 32'N and 11° 40'N and longitudes 13° 32'E and located between the Sudan savannah and Sahel savannah vegetation zones (Udo 1981)

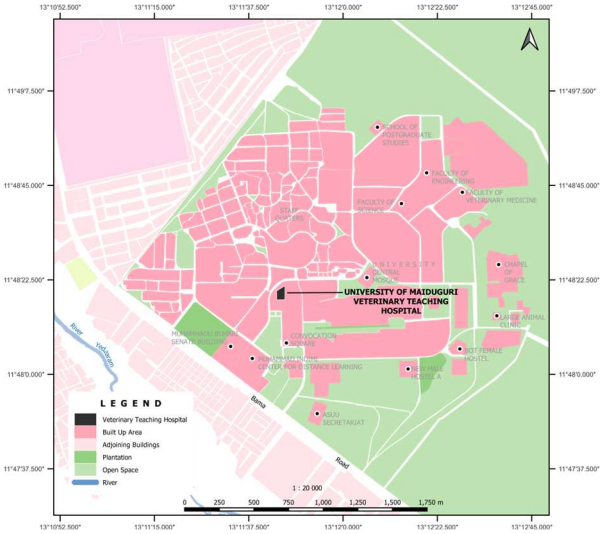

Fig 1. Map of University of Maiduguri showing the sampling area

Data Collection

Clinical records of cases diagnosed at the Poultry Clinics, Necropsy unit and Veterinary Microbiology Laboratory of the University of Maiduguri Veterinary Teaching Hospital (UMVTH) Borno state, Nigeria, were obtained from January 2018 to December, 2022. A case was defined as a farm that reported an outbreak of a disease and was diagnosed based on history/ clinical signs, postmortem findings, and laboratory results.

Sample size

A total of 985 reported cases of avian salmonellosis at the poultry clinic in the VTH was used for this retrospective study from 2018 to 2022.

Data analysis

Data generated were analyzed using the Epinfo version 7.2-5. The prevalence was determined as proportion of positive case examined and expressed in percentage. Variables (season) was assessed for association using chi-square and odds ratio at 95% confidence interval for statistical association P< 0.0003.

Results and Discussion

Out of the 212, 199, 255 ,150 and 169 cases reported to the VTH 43 (20.28), 33 (16.58), 41 (16.07), 30 (20.00) and 23 (13.60) were positive for salmonellosis based on history/clinical signs in 2018, 2019, 2020, 2021 and 2022 respectively (Table 1). The table also showed that 14.15 %, 11.55 %, 11.37 %, 13.33% and 9.46% of cases reported were positive for salmonellosis based on necropsy. The result of microbiology also shows that 10.84%, 9.54%, 9.80%, 12.00% and 8.28% were positive for salmonellosis in 2018, 2019, 2020, 2021 and 2022 respectively.

The seasonal prevalence of salmonellosis in poultry in Maiduguri, Borno state. Out of 392 examined 59 (15.05%) were positive for salmonellosis during the rainy season while of the 593 examined 40 (6.74%) were also positive for salmonellosis (Table 2). Based on laboratory analysis Avian salmonellosis showed high trend of prevalence of 12.00 % in 2021 (Fig 2). The sharp rise in the prevalence could be as a result of increase in the number of birds supplied to the state by the FAO in other to mitigate the effect of covid 19 pandemic.

Salmonellosis in poultry is known to cause high economic loss due to mortality and reduced production (Khan *et al*., 2014; Tadele *et al*., 2014; Barde *et al*., 2017. The result of this study showed a prevalence of 10.05% with an annual range of 8.28% to 12.0% cases following bacteriological isolation. The findings in this study appeared lower compared to the 28.4 and 19.0 % reported by barde *et al*., 2021 in NVRI Plateau state and 12.21 reported by Balami *et al*., 2014 in Maiduguri, Borno state, Nigeria. The result of the study has shown a gradual decline in the number of confirmed cases of salmonellosis with the exception of 2021 which had a sharp rise in the prevalence. The gradual decline in the prevalence might be as a result of increase awareness on biosecurity and as a result of recent campaign by the Food and Agricultural Organization in the study area. A significant association was observed between salmonellosis and season (P<0.05, CI= 1.6033 to 3.7423, O.D 2.23).

Higher prevalence was observed in the rainy season; this could be due to high humidity which favor pathogen survival and proliferation and

Table 1. Prevalence of Salmonellosis in University of Maiduguri Veterinary Teaching Hospital (UMVTH) based on Clinical sign, necropsy microbiological diagnostic procedure between 2018-2022

Variable year	No. Examined	Clinical sign No (%). Positive	Necropsy No (%). Positive	Microbiology No (%). Positive
2018	212	43 (20.28)	30 (14.15)	23 (10.84)
2019	199	33 (16.58)	23 (11.55)	19 (9.54)
2020	255	41 (16.07)	29 (11.37)	25 (9.80)
2021	150	30 (20.00)	20 (13.33)	18 (12.00)
2022	169	23 (13.60)	16 (9.46)	14 (8.28)
Total	**985**	**170 (17.25)**	**118 (11.97)**	**99 (10.05)**

Table 2. Seasonal Prevalence of Salmonellosis in Maiduguri between 2018-2022

Seasonal Prevalence	No. examined	No. (%) Positive	O. D	P-V	Confidence interval Lower	Upper
Rainy	392	59 (15.05)	2.23	0.0003	1.6033	3.7423
Dry	593	40 (6.74)				

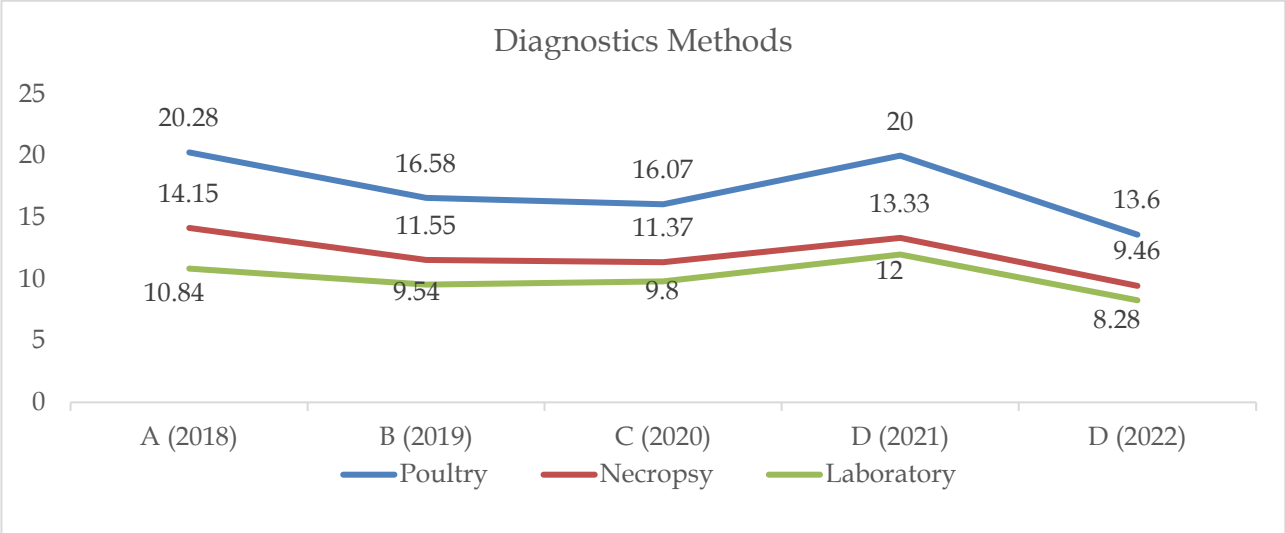

Fig 2. The trend of Avian salmonellosis in the VTH

potentially increasing the loads in animals. The sharp rise in the trend of Avian salmonellosis in 2021 could be as a result of increase in the number of birds supplied to the state by the FAO in other to mitigate the effect of covid 19 pandemic.

Limitation

The limitation faced during the course of this work was inadequate variables in the data to explore, incomplete data entering, missing data, missing records and lack of adequate case reporting by the farmers to the clinics for proper identification and diagnosis.

Conclusion

The study explicitly indicated that avian *Salmonellosis* has high prevalence in the study area, this may be attributed to the fact that few poultry farmers vaccinate their birds against most diseases and this could play a great role in lowering poultry productivity in the study area. A comprehensive study on the epidemiology of salmonellosis should be carried out as: Sensitization of farmers on ensuring proper biosecurity measures, Vaccinations and stress management. There should be proactive measures in response to disease outbreaks and treatment with specific medications that are effective against the diseases.

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