PREVALENCE OF PLASMODIASIS ON LOCAL BREED OF CHICKENS AT BAGA MARKET OF BAGA ROAD MAIDUGURI, BORNO STATE, NIGERIA.

pukuma M. S 1 **Babagana umar 2**

1 Department of Zoology Moddibbo Adama University of Technology PMB 2076, Yola Adamawa State, Nigeria
2 Department of Basic Sciences, Yobe State College of Agriculture Gujba, PMB 1104, Damaturu, Nigeria.

Abstract

This study was aimed at determine the prevalence of plasmodiasis on chickens at baga market, baga road Maiduguri, Borno State, Nigeria, A total of three hundred (300) blood sample of the chickens was collected at random from the study area. The blood sample was collected by puncturing the brachial (wing) vein of the chickens using sterile 26 gauge needle, the area, was picked and squeezed gently to obtain a large drop of blood. A thin blood films was prepared from each bird on ready -to- use thin film was spread using a smooth edge slide spreader using a grease pencil, slide was labeled with number for identification. The result showed that 64(21.3%), 17(5.7%), 14(4.7%), 5(1.7%), 6(2.0%) and 14(4.7%) were infected with plasmodium, haemoproteus, leucocytozoon, plasmodium+leucocytozoon, haemoproteus+leucocytozoon, and plasmodium+haemoproteus respectively. The results also shows male has the highest incidence of infection than the female. Similarly between the adult and young, the highest incidence was recorded in adult chickens. Thus, it is recommended that chickens in Maiduguri to be treated against the plasmodium and other parasitic diseases.

Keywords: Plasmodium; Parasite; Chicken; Maiduguri; Prevalence;

Introducation

Avian Malaria is a common mosquito - transmitted disease that has a world - wide distribution the disease caused by intra cellular protozoan parasites in the genus Plasmodium, which share morphological and development features with closely related Haemosporidian Parasites in the genera Haemoproteus and Leucolytozoon (Atkinson et. al, 2008).Birds Haemosporidians are the largest group of Haemosporidians by number of species. Avian malaria and related Haemosporidians are widespread, abundant, and diverse and are easily sampled without disrupting the host populations.

* Corresponding author. Tel.:08030658483;
E-mail address: bgumar2005@gmail.com
pukumam2000@mautech.edu.ng

Avian malaria is an arthropod-bone disease where protozoan blood parasites (Plasmodium species) and are transmitted to chickens by mosquitoes belongs to the dipteral group of insect. And both the male and female feed on plant fluids nectar (Derraik, T. 2006). Plasmodium reliclum plays an important role as a limiting factor in the distribution and abundance of native Hawavan forest birds (Atkinson and Van Riper, 2010).Parasitemia correlates with temperature of the environment and that vectors take part in the spreading of the parasites (Valkiunas, G.2005) his postulates and statements about the similarity between human malaria parasites and the parasites of chickens in particular were of significant biological important. (Danilewsky,1889) was the first scientist to investigate avian malaria pathology where by indicated, dissecting infected birds that the disease is accompanied by an acute anaemia, enlargement of the liver and spleen, as well as the accumulation of pigment and the presence of parasites and infected erythrocytes in the phagocytes of these organs. Avian malaria is a disease of domestic, cage and wild birds caused by species of the haematozoan parasites Plasmodium and haemoproteus (Perez-Tris et al., 2005), inoculation of the host with sporozoites via the infected bite of a mosquito (Plasmodium spp) or biting midge (Haemoproteus spp) vector is followed by a period of development and reproduction in the host tissue, called the prepatent period, before the parasites emerge into the blood.

All these characteristics turn bird blood parasites into an excellent model for the study of host—Parasite interactions.(Karamaba et al., 2013) reported the prevalence of plasmodium parasite in Kano State which revealed that out of 218 blood films from (116) and domesticated (102) birds. The frequencies of the occurrence plasmodium parasite were 19.56% for local chicken 50% for pigeons 13.95%, for Cut-throat finches, 50% for grey plantain eaters 33.3% for Negro finches and 0% for other birds.

Statement of problem

These study was designed to determine the prevalence among chickens at baga market of baga road Maiduguri, Borno State.

Aim and Objectives

The board aim of this study is to determine the prevalence of Plasmodiasis among chickens at baga market of baga road Maiduguri, Borno state.

I. To determine any association between the prevalence of plasmodium parasite and local breed of chickens
II. To determine any association between the prevalence of plasmodium parasites and the Sex of the chickens.
III. To determine any association between the prevalence of plasmodium parasite and the age of the chickens

Materials and Methods

The study was carried out at Maiduguri, the Headquarter of Borno State. It is located on latitude 11.833°N and Longitude 13.150°E with a total area of 543 square kilometer which make it the largest city in the North - Eastern region of Nigeria, It is located at the central part of the state and its shared common boundary with Jere, Konduga, Kaga, and Magumeri local government area of the state. World Map of the (Koppen-Geiger, 2006) climate classification system classified Maiduguri climate as hot semi area the highest record temperature of Maiduguri(117°F) on 28 May, 1983, while the lowest record temperature was 5°c (41°F) on 26 December,1979.

Sample collection Site

Baga market of baga road Maiduguri Borno State was the sample collection site where blood of 300 local breed of chicken was taking at random for the study.

Study Design

This study was designed to involve both field and laboratory based research, Chickens were sampled at baga market of baga road maiduguri were chickens are beings sold and the laboratory investigation to detect malaria parasite from avian blood samples was done at the department of Basic Science College of Agriculture Gujba, Yobe State.

The blood was collected by puncturing the brachial (wing) vein of the Chickens. Each chicken was restrained and the area of the brachial was sterilized by swabbing with 70% alcohol, this used to moisture the surrounding feather of the brachial vein making it more accessible, using a sterile 26 gauge needle the area was pricked and squeezed gently to obtain a large drop of blood. A thin blood films, was prepared from each bird on ready to use on glass slides, using a grease pencil, the slides was labeled with numbers for identification. The blood film was made on slides that have frosted ends for easy labeling. The smears was all dried within 5-10 seconds, after their preparation with slides in a horizontal position after which they were placed in a separate box covered with a

lid to protect them from insect and dusts, the slides was fixed in absolute methanol in the field for 1 minute on the day of the preparation. The fixed slides was packed into slides boxes, so that they did not touch each other, and conveyed to the laboratory for processing and analysis.

Data Analysis

Data collected was subjected to statistical analysis where descriptive statistics (Frequency) and Chi - square (X^2) test was used to test for association between the variables and the difference in prevalence rate which is considered significant at 1% probability level of the chi square test. The model of the statistical package is statistix 8.0.

Result

Table 1 shows the baseline characteristics of the chickens and parasite prevalence, where the result shows that 300 chickens screen, 150(50.0%) each where male and female respectively. Similarly there were 150(50.0%) young and 150(50.0%) adult each. The result of parasite prevalence showed that the number of plasmodium, haemoproteus, leucolytozoon, plasmodium+leucolytozoon, Haemproteus+leucolytozoon and plasmodium + haemoproteus infection where 64(21.3%), 17(5.7%), 14(4.7%), 5(1.7%), 6(2.0%) and 14(4.7%) respectively. Result did not showed infection in 180 chickens by any of the parasite, and this indicating that only 40% of the chickens were infected as against 60% without infection.

Table 2 shows the prevalence of plasmodiasis according to sex. In male, the result generally indicated higher incidence of plasmodium 42(65.6%) than any of the parasite. Others includes haemoproteus 10(58.8%), leucocytozoon 7(50.0%), plasmodium+leucocytozoon 4(80.0%), haemoprrpteus+leucocytozoon 6(100.0%), plasmodium+haemoproteus 9(64.3%) and 72(40.0%) with no infection respectively. similarly, in female, the result also shows higher incidence of plasmodium 22(34.4%), while haemoproteus 7(41.2%), leucocytozoon 7(50.0%), plasmodium+leucocytozoon 1(20.0%), plasmodium+haemoproteus 5(35.7%) infected and 108(60.0%) has no infection. The result in respect to sex showed higher incidences in males than female for all parasites except leucolytozoon. The result indicate highly significant difference in infection between the male and female, chi-square (22.92) and a p-value of 0.0008.

Table 3 shows the prevalence of plasmodiasis according to age (young and adult). The result indicate that adult has higher incidence of the infection than the young chicken examined. In adult, the prevalence 0f infection shows that plasmodium 57(89.0%) has the highest prevalence, followed by haemoproteus 14(82.4%), leucocytozoon 10(71.4%), plasmodium+leucocytozoon 5(100.0%),

haemoproteus+leucocytozoon 5(83.3%), plasmodium+haemoproteus 8(57.1%) infected and 51(28.3%) has no infection. Similarly, in young, the result shows higher incidence of plasmodium 7(10.9%), while haemoproteus 3(17.6%), leucocytozoon 4(28.6%), haemoproteus+leucocytozoon 1(16.7%), plasmodium+haemoproteus 6(42.9%) infected and 129(71.1%) has no infection. The result indicated highly significant differences in infection between the young and adult chickens, which is high in the adult than the young chickens with difference being highly significant. Chi-square (90.50) and a p-value of 0.0000.

Table 1. Baseline characteristics of the chickens and the parasite prevalence

parameters						
Sample size	**Sex**		**Age**		**Parasite prevalence**	
300	Male	150(50.0%)	Young	150(50.0%)	Plasmodium	64(21.3%)
	Female	150(50.0%)	Adult	150(50.0%)	Haemoproteus	17(5.7%)
					Leucocytozoon	14(4.7%)
					Plasmodium + leucocytozoon	5(1.7%)
					Haemoproteus + leucocytozoon	6(2.0%)
					Plasmodium + haemoproteus	14(4.7%)
					Nil	180(60.0%)
Total		300(100%)		300(100%)		300(100%)

Table 2. Prevalence of plasmodiasis according to sex of the local chickens examined.

Parasite	**plasmodium**	**Haemoproteus**	**Leucocytozoon**	**Plasmodium + leucocyzoon**	**Haemoproteus + leucocytozoon**	**Plamodium + haemoproteus**	**Nil**	**Total sampled**
Male	42(65.6%)	10(58.8%)	7(50.0%)	4(80.0%)	6(100.0%)	9(64.3%)	72(40.0%)	150(50.0%)
Female	22(34.4%)	7(41.2%)	7(50.0%)	1(20.0%)	0(0.0%)	5(35.7%)	108(60.0%)	150(50.0%)
Total	64(100%)	17(100%)	14(100%)	5(100%)	6(100%)	14(100%)	180(100%)	300(100%)

Chi-Square (χ^2)	22.92
P-value	0.0008**

** = Significant at 1% probability level of the Chi-Square test.

Table 3. Prevalence of plasmodiasis according to age of the local chickens examined.

Parasite	**plasmodium**	**Haemoproteus**	**Leucocytozoon**	**Plasmodium + leucocyzoon**	**Haemoproteus + leucocytozoon**	**Plamodium + haemoproteus**	**Nil**	**Total sampled**
Young	7(10.9%)	3(17.6%)	4(28.6%)	0(0.0%)	1(16.7%)	6(42.9%)	129(71.1%)	150(50.0%)
Adult	57(89.1%)	14(82.4%)	10(71.4%)	5(100.0%)	5(83.3%)	8(57.1%)	51(28.3%)	150(50.0%)
Total	64(100%)	17(100%)	14(100%)	5(100%)	6(100%)	14(100%)	180(100%)	300(100%)
Chi-Square (χ^2)	90.50							
P-value	0.0000**							

**= Significant at 1% probability level of the Chi-Square test.

DISCUSSION

Avian Haemosporidians offer an important system for studying host-parasites strategies of closely related parasites since they have a high diversity as well as diverse host fauna that is potentially available to each parasite in any particular geographical location (Covas et. al., 2006).

Because intensity of blood parasite infection varies during infection, the dynamics of infection could have been the cause of difficulties for detecting their fitness effects in wild populations of birds. This finding reflect recently two studies which showed the negative effect of malaria chronic infection to their avian hosts (Knowles et. al., 2010b) caused chronic haemoproteus infection in birds. They medicated males and female blue its cyanistscaerules with primaquine. This anti-malaria drug reduced, the intensity of haernoproteus infection in females, but not in males showing a sex-specific effect of medication on Haernoproteus intensity, probably due to sex effects on drug kinetics. Medicated females, but not in males, showed increased local surviving until the next breeding season compared to control birds, in addition, (Knowles et. al., 2010b) have illustrated that chronic avian malaria infections can have significant effects on host fitness and may thus constitutes an important selection pressure in wild bird's population. They used the anti-malarial drug malarone to test experimentally for fitness effects on chronic malaria infections in blue tits cynistescaeruleus. The recently developed molecular methodology quantitative PCR revealed that medication caused a reduction in Plasmodium infection intensity, leading to a higher hatching success, provisioning rates and fledging success. (Atkinson et.al.2008).

This result agreed with (Valkiunas, 2009) domestication and lack of proper sanitary measures by breeders or keepers of birds might have exposed them to the infection even though the local chickens are known to have high disease resistance. Lack of proper hygiene given to them might prone them to infection by Plasmodiasis of chicken. Other reason could be lack of enlightenment and proper education on how to keep the poultry chickens on the part of the breeders (Bakers, 1976.)

The study showed low prevalence compared with those of (Karamba et al., 2012) who revealed that 75% of local chickens in Kano municipal and Wudil area council were infected with Plasmodiasis. In a similar studies (Biu et al., 2005) reported 3.0% infection rate of pigeons with Plasmodium spp in Maiduguri, Nigeria. The high prevalence of Plasmodium in the study area

could be attributed to high rainfall and humidity, standing waters which vectors uses as breeding ground.

In this study, the female chickens were recorded lower prevalence of avian malaria infection with single infection of Plasmodium 4.7% and Leucocytozoon was recorded 0.0%. (Poulin, 1996); Schalk and Forbes 1997), observed higher prevalence of avian malaria in males than female among mammals and birds. The possible explanation of low prevalence of infection in female may be due oestrogen which can suppress cell-mediated immunity while boosting hormoral immunity in females (Grossman, 1985).

Conclusion

The prevalence of plasmodiasis in chicken was assessed in baga market of baga road Maiduguri, Borno State, using a thin blood film that is prepared for each chickens on ready use glass slides. Base on the finding of the study one can conclude that the prevalence and association between states of infection sexes of the chicken is significant. So also the prevalence and association between state of infection and age of chicken is also significant.

REFERENCE

Atkinson, C.T., Thomas, NJ, and Hunter, DJ3. (2008). Avian Malaria In parasitic Disease of WildBirds, Eds, 35 - 53 Wiley - Blackwell

Atkinson, C.T. and Forrester, DJ. (2008). Leucocytozoonsis. In parasitic disease of wild birds Eds, 54-107. Wiley Blackwell.

Biu, A.A., jidda, M. S. Yahaya, K. (2005). Prevalence of Blood Parasites of Domestics Pigeons in Maiduguri, Nigeria. Journal of biomedical and Health sciences. 1:21-**24**

Covas, R. Beandeli, J.S, Ishtiaq F,Melo, M., Warren, B.H. Atkinson, C.T Benson, S.s Graves, G.RJhala, Y.V., Peirce, M.A, Rahmani,A.R., Fonseca, D,M and Fleichher R.C. (2006). Global phylogsographic limits of Hawalls avian Malaria proceeding biological sciences the royal Society, 273, 2935-2944.

Danilewsky, V. (1889). Le Parasitologie Comparie du sang. I Nouvellesrecherchésur les Parasites du sang des oiSeaux. A. Dame, Khark off.

Derraik, T. (2006). Studies on the Ecology of Avian Malaria in an Alpine Ecosystem. PhD. Dissertation, University of Michigan, 66-67.

Grossman, C. J. (1985). Interactions between the gonadal steroids and the immune System. Science. 227:257-61

Knowles, S.C.L., palinauskas,V. and Scheldon, B.C (2010b). A chronic malaria infection increase family inequalities and reduces parental fitness; experimental evidence from a sild bird population. Journal of evolutionary biology, 23, 557-569.

Karamaba K. I, Kawo, A.H., N.T and Mukhtar, M.D. A (2013). Survey of avian malaria in Kano State "Northern Nigeria. International' journal for biotechnology and Molecular Biology Research, 3(1), 8-14

Kottek, M., J. Grieser, C. Beck, B, Rudolf, and F. Rubel, (2006): World Map of the Koppen-Geiger climate classification updated. Meteorol. Z, 15, 259-263. DOI:10.1127/0941-2948/2006/0130.

Perez-Tris, T.,Hasselguisl, D., Hellgren, O.;Krizanauskiene, A., Waldesnstron, J. and Bensch, S. (2005). What are parasites? Trends Parasitology, 21, 209-211.

Perez-Tris, J., Parker, P. G. and Bensch, S. (2009). Diagnosing Genetically Diverse Avian Malaria Infections. Journal of Parasitology, 131, 1-9.

Poulin, R. (1996). Helmith Growth in Vertebrates Hosts: Does host SEX matters? International Journal of Parasitology 26; 1311-1315.

Schalk, G. and Forbes, M. R. (1997). Male Biases in Parasitism of mammals: Effects of Study type, host age and parasite taxon Oikos 78: 67-74.

Valkiunas, G. (2005). Avian Malaria Parasites and other Heamosporidia. CRC Press, 978-0415300971. Boca Raton. Florida. USA.

Van Ripper, C., (2000) Bird-parasite Interactions, Ecology, Evaluation and Behavior: New York, Oxford university press; p. 09 - 18.