World Applied Sciences Journal 34 (6): 683-687, 2016
ISSN 1818-4952

DOI: 10.5829/idosi.wasj.2016.34.6.410

Prevalence of *Eimmeria* Species among Chickens In Bahir Dar Town, Ethiopia

AbebeBelete and Mekonnen Addis

School of Veterinary Medicine, College of Agriculture and Veterinary Medicine,
Jimma University, P.O. Box 307, Jimma, Ethiopia

Abstract: Parasitic diseases are among the major constraints of poultry production. The common internalparasitic infections that occur in poultry include cestodes, nematodes and protozoa (*Eimeria*species). A cross sectional study was conducted in Bahir Dar town between October 2013 and April 2014 to determine the prevalence of *Eimmeria* species of chickens kept under different management systems and to assess the effect of sex, age and breed on the occurrence of *Eimmeria* species. Three hundred eighty four faecal and sixty mucosal scrapping samples collected from randomly selected chickens were examined using floatation and direct smear techniques respectively. In this study, the overall prevalence of *Eimmeria* species was found to be 40.6%. Out of the total of 195 and 189 village and small scale commercial chickens examined for *Eimmeria* species, 25.6% and 56.1% chickens respectively were found to be positive and the difference in prevalence of *Eimmeria* species between management systems was statistically significant ($P<0.05$). The overall prevalence of *Eimmeria*species was significantly higher ($P<0.05$) in young, exotic and small scale commercial chickens than adult, local and village chickens. There was no statistically significant difference ($P>0.05$) in the overall prevalence of *Eimeria*species between male and female chickens. The high prevalence of *Eimmeria*species among chickens in the study area may be due to low level of management and health care services. This suggests the need to implement awareness creation among chicken producers on management and health care services of chickens; improvement of management practices and set up of prevention and control strategies so as to harvest the diverse products that may be generated from the poultry production sector.

Key words: Prevalence · Eimmeria species · Chickens · Management Systems · Bahir Dar Town · Ethiopia

INTRODUCTION

The Poultry industry occupies an important position in the provision of animal protein (meat and egg) to man and generally plays a vital role in the national economy as a revenue provider. Poultry production in Africa and parts of Asia is still distinctively divided into commercialized and village enterprise subsector [1].

Disease is among the major constraints of poultry production. The common internal parasitic infections in poultry include cestodes, nematodes and *Eimeria* species that cause considerable damage and great economic losses to the poultry industry due malnutrition, decreased feed conversion ratio, weight loss, lowered egg production and death in young birds [2].

In Ethiopia, many researches had been conducted on coccidian parasites [3], but many of them focused on village chicken production only. Studies on the occurrence of *Eimmeria*species in chickens kept under different management systems are limited and little has been done on the prevalence of *Eimmeria*species of chickens in Bahir Dar town. Therefore, this study was geared with the objectives to determine the prevalence of *Eimmeria*species of chickens that are kept under different

Corresponding Author: Mekonnen Addis, School of Veterinary Medicine, College of Agriculture and Veterinary Medicine, Jimma University, P.O. Box: 307, Jimma, Ethiopia. Mob: +251-912112251.

management systems and assess the influence of host related risk factors such as sex, age and breed on the occurrence of *Eimmeria*species in Chickens.

MATERIALS AND METHODS

Study Area: The study was conducted from October 2013to April 2014in Bahir Dar town which is located in theNorth Western part of Ethiopia at a physical distance of 565 kilometers from Addis Ababa, the capital city ofEthiopia. The study area is located at 11°29'-11°41' Nlatitude and 37°16'-37°27'E longitude. The averageelevation in the town is about 1795 m.a.s.l with 'WeinaDega' type of agro-ecological zone. The town covers anarea of about 16,000 hectares. The mean annualprecipitation depth recorded at Bahirdar Station in 37years period from 1962 to 1999 is about 1437 mm. Thestudy area experiences average annual rainfall that rangesfrom 1200-1600 mm and it has mean annual temperature of26°C [4].

Study Animals: Two groups of chickens based on management practice which included; 195 (50.8%)chickens under village and 189 (49.2%) chickens undersmall scale commercial, management systems wereconsidered. The chickens' demographic characteristics(age, sex and breed) were considered important. Theages of chickens were determined using criteria as usedby Bachaya *et al.,* [5] and Amare *et al.,* [3].Thosechickens less than 6 months of age were classified asyoung (n=168) and those of the chickens greater than 6months of age were categorized as adults (n=216).Chickens of 139 (36.2%) and 245 (63.8%) males andfemales respectively were sampled. Breed of the chickenswas also another important factor considered and thus,about 197 and 187 local and exotic chickens respectivelywere sampled.

Study Design: A cross-sectional study was conducted from October 2013 to April 2014 in Bahir Dartown. Sampling was carried out repeatedly fromapparently healthy chickens under different managementsystems (with their varying sex, age and breed) on localmarkets, merchants, households and poultry farms in thetown and parasitological examination of faecal andmucosal scraping samples from selected chickens wereexamined for the presence of *Eimmeria* species.

Sampling Method and Sample Size Determination: Multistage random sampling technique was employed toselect individual and/or farm chickens so as to determinethe prevalence of gastrointestinal helminthes of chickensand assess the potential risk factors for infection byemploying simple floatation and direct smear techniquesfor faecal samples and intestinal mucosa scrapingsrespectively. Thus, chickens in Bahir Dar town weregrouped in to two groups (chickens under villageproduction systems and small scale commercialproduction systems). Then after, successive simplerandom sampling was undertaken to the levels of themarkets, farms, households and individual chickens.

To calculate the total sample size, the following parameters were used: 95% level of confidence interval (CL), 5% desired level of precision; and with the assumption of 50% expected prevalence of gastro intestinal helminthes among chickens in the studyarea, the sample size was determined using the formula given in Thrusfield [6].

$$n = \frac{1.96^{2} * P_{exp} * (1 - P_{exp})}{d^{2}}$$

Where, n=required sample size, P_{exp}=expected prevalence, d^2=desired absolute precision.By using this formula, the sample size was calculated to be 384.

Sample Collection and Study Methodology: Chickens weregrouped in to two groups based management systems;and repeated random samplings by lottery system werecarried out to select local markets, sites of merchants,households and farms. Faecal samples from chickens werecollected directly from the vent of the chickens, by usingswab and from top layers of fresh voided litter whereasscrapings from intestinal mucousa were collected, fromthe intact gastrointestinal tracts of sacrificed chickens, byusing scissors and scalpel blades. All samples wereplaced in air and water tight sample vials (universalbottle containing 10% formaldehyde solution), labeled accordingly and then transported to Bahir Dar AnimalHealth Investigation and Diagnostic Laboratory wherethey were analyzed for Helminthes' ova and *Eimmeri a*oocysts. The presences of *Eimmeria* infections were confirmed by floatation and direct smeartechniques for faecal and intestinal mucousal scrapingsrespectively. The results obtained in either of thetechniques were considered as positive when at least oneoocyst was observed in one of thetechniques employed. Common salt (NaCl) floatationsolution was prepared in the laboratory and used as afloatation solution. Mucousal scrapings from sixty (60)sacrificed chickens were examined by mucosal scraping

examination procedures as decribed by Lobago *et al*. [7]. Identification of *Eimeria oocysts*were carried outusing a light microscope with x10 and x40 objectives. Identification of characterstic *Eimmeria* oocystswered one by using identification keys mentioned in Jordan and Pattison [8].

Age Estimation: Ages of the chickens examined wereclassified into two categories as young (0-6 months) andadult (>6 months) as used by Bachaya *et al.,* [5] andAmare, *et al.,* [3].

Statistical Analysis: Computation of descriptive statisticswas conducted using SPSS version 16.0. Descriptivestatistics such as percentages, proportions and frequency distributions were applied to compute some of the data. The prevalence of the *Eimmeria* species was calculated bydividing the number of chickens harboring a givenparasite by the number of chickens examined (i.e. theproportion of positive results among tested chickens).Pearson's chi-square (χ^2) to measure association betweenprevalence of the *Eimmeria* species with the age, sex, breed and management systems of chickens was usedas the statistical tool. Confidence level was held at 95%and statistical analysis for the difference in prevalence of*Eimmeria* species among risk factors wereconsidered significant when the P-value was less than 0.05 (P<0.05).

RESULTS

Overall Prevalence of *Eimmeria* Species among Chickens: A total of three hundred eighty four(384) chickens, i.e. 195 from village and 189 from smallscale commercial management systems, were examined out of which 139 (36.2%) and 245 (63.8%) were males andfemales respectively. One hundred fifty six (40.6%) of the chickens were positive for one or another of the *Eimeriaoocysts* that may imply to the different *Eimmeria* species.

Prevalence of *Eimmeria*species among Chickens Between Management Systems: Of the 195 and 189 chickens examined from village and small scale commercial management systems respectively, overall prevalence of 25.6% in village and 56.1% in small scale commercial chickens were recorded and the difference in prevalence of *Eimmeria* species was statistically significant (P<0.05) between the management systems (Table).

Prevalence of *Eimmeria* Species Among Chickens Between Sexes: Out of 139 male and 245 female chickens examined for the presence of *Eimmeria*oocysts, 54 (38.8%) and 102 (41.6%) males and females respectively were found infected by one or another of the *Eimmeria* species. Statistical analysis of data showed the presence of a statically insignificant (P>0.05) difference in prevalence of *Eimmeria*species between the sexes (Table).

Prevalence of *Eimmeria* species among Chickens Between Ages: In the study, the prevalence of *Eimeria species* was found higher in young (60.1%) than in adult (25.5%) with a statistically significant (P<0.05) difference of the prevalence between age groups (Table).

Prevalence of *Eimmeria* Species among Chickens Between Breeds: A total of 197 local and 187 exotic breeds of chickens were examined for the presence of *Eimmeria* species; out of which 49 (24.9%) and 107 (57.2 %) respectively were found infected and the

Table 1: Prevalence of *Eimmeria*species between risk factors.

		No of positive (prevalence in %)			
Risk factors		With risk factors	Total (N=384)	χ^2	P-Value
Management system	Village (195)	50 (25.6 %)	156 (40.6)	36.877	0.000
	SSC (189)	106 (56.1 %)			
Breed	Local (197)	49 (24.9)	156 (40.6)	41.613	0.000
	Exotic (187)	107 (57.2)			
Sex	Male (139)	54 (38.8)	156 (40.6)	0.285	0.594
	Female (245)	102 (41.6)			
Age	Young (168)	101 (60.1)	156 (40.6)	40.054	0.000
	Adult (216)	55 (25.5)			

statistical data analysis showed that the difference in prevalence was statistically significant (P<0.05) between the breeds (Table).

Based on personal observations, it was identified that most of the people producing chickens were not having animal production or veterinary basis of education but carry out production based on their traditional knowledge, experiences and because they are beneficiaries with the income generated from poultry production. Most of the local chickens are fed grain and spend most of the times by scavenging. In addition to this, chicken owners do not seek treatments for chickens and taking sick chickens to Veterinary Clinics is not a common practice in Bahir Dar town. But in the small scale commercial production systems, even though feeding of some rations (to which coccidiostats are included) was found common, but the housing, drinking and biosecurity practices were identified not to be set as recommended. Small scale commercial farms were found to have private Veterinarians who attend the health of the chickens. However, symptomatic and prophylactic treatments without laboratory diagnoses were found common practices.

DISCUSSION

The prevalence of *Eimeria*species among chickens inBahir Dar town (40.6%) confirmed in this study was lower than the findings of Comfort and Rita [9] who reported 69% in Nigeria. But the present finding was comparable to the reports by Nnadi and George [1] and Mwale and Masika [10] who reported prevalence of 35.5% and 41.43% in chickens from Nigeria and South Africa respectively. In contrary to these, the present finding had shown higher prevalence than the findings of Amare *et al*., [3] and Ohaeri and Okwum [11] who reported overall prevalence of 25.24% and 8.9% in central Ethiopia and Abia state Nigeria respectively. The differences in prevalence of *Eimmeria*species among the findings from different countries and different places of Ethiopia could be attributed to differences in agro-ecology, management systems, the breeds and age groups of chickens, diagnostic methods used, public awareness about gastrointestinal helminthes of chickens, health care management and prevention and control strategies set among chicken producing countries and/or communities.

In this study, there was a significant difference (P<0.05) in the prevalence of *Eimmeria*species between the different age, breed and management system groups. The higher infection prevalence of *Eimmeria*species was observed in the young, exotic and small scale commercial than in adult, local and village chickens. This can be supported by the justifications of different findings that discuss *Eimmeria*species to be more common in young and that reared under intensive management systems [3] and Bachaya *et al.,* [5]. The prevailing study revealed a higher prevalence of *Eimmeria*speicies in chickens under small scale commercial management system than that of village chickens and the difference in prevalence was statistically significant (P<0.05). This was in agreement with [12] and[3]who showed that coccidiosis was not common among village chickens and suggested that it is a problem more related to intensive rather than extensive management.

CONCLUSION

In this study, *Eimmeria* species were proofed to occur frequently in small scale commercial than village chickens which may be an implication to wet litter and other suitable conditions for sporulation of oocysts in the confined systems of management. The study revealed that *Eimmeria* species were more common in young and exotic chickens with the prevalence differences between age and breed groups having statistical significance (P<0.05). The high prevalence of *Eimmeria*species in the study area together with the low awareness of chicken producers about the health care of chickens may pose devastating health problems to the chickens and economic losses to poultry production sector.

ACKNOWLEDGEMENTS

The authors would like to thank College of Agriculture and Veterinary Medicine, Jimma University for the unreserved cooperation and financial support that it provided for this study. The authors are also deeply grateful to all poultry owners, who helped them in samples collection and contributing significantly during the research.

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