

## Research Article

# A Study on Copro-Epidemiology of Poultry Coccidiosis in and Around Jimma Town, Oromia Regional State, Ethiopia

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Submitted: 06 December 2018

Accepted: 24 December 2018

Published: 26 December 2018

ISSN: 2379-948X

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## Keywords

• Coccidiosis; Coprology; Floatation; Jimma; Poultry; Prevalence

## Abstract

A Coprology based cross sectional study was conducted on poultry coccidiosis of local and exotic breed from April to June, 2018 in and around Jimma town, Oromia regional state, south western Ethiopia. A total of 367 faecal samples were collected from exotic and Indigenous breeds of chickens randomly, including both younger and adult age groups from different management system. Saturated solution of sugar was used as floating medium. Out of the 367 chicken examined, 119 were positive for coccidian parasites giving the overall prevalence of 32.4%. Among age groups, breed, sex, management system, hygienic status and medication history and vaccinated, higher prevalence was observed in young (48.8%), exotic chicken (36.4%), male (35%), and those with intensive management system (39.5%), poor hygienic status (37%) and not medicated (36%) and vaccinated (35.5%) respectively. Young chicken and those with intensive management, poor hygienic status, exotic breed and not medicated had higher risk of acquiring coccidiosis ( $P < 0.05$ ). Even though relatively higher prevalence of coccidiosis was recorded in the chicken that were vaccinated (34%) than non-vaccinated (30.5%), but no significant difference ( $P > 0.05$ ) was obtained. In conclusion, the present study showed that coccidiosis is an important disease of poultry and this warrant appropriate control strategies need to be designed in order to reduce the impact of poultry coccidiosis in the study area.

## INTRODUCTION

Ethiopia has large population of chickens estimated to be 56.53 million with native chickens of non-descriptive breed, hybrid of chickens and exotic breed of chickens mainly kept in urban and peri-urban areas representing 94.31%, 3.21% and 2.49%, respectively [1]. From the total population of chicken in Ethiopia, 99 % are raised under the traditional back yard management system, while 1% is under intensive management system [2]. Despite the presence of large number of chicken in Ethiopia, contribution to national economy or benefit from the sector is very limited due to disease, nutritional and management factors. Among those diseases are Newcastle diseases, Coccidiosis, salmonellosis, chronic respiratory disease and nutritional deficiency [3].

Coccidiosis caused by parasites of the genus *Eimeria* is an infection known to damage poultry. It is a ubiquitous disease of almost universal importance in poultry production. The disease may strike any type of poultry in any type of facility and causes large economic losses. It is also a realistic problem and one of the most important diseases of poultry worldwide that invade the cells of the poultry intestine [4]. Chickens suffering from coccidiosis quickly become less productive and, if they survive, poor performance continues the rest of their lives. Laying hens suffering intensive from coccidiosis will experience a reduction in rate of egg production [5].

The losses caused by chicken coccidiosis without including the sub clinical coccidiosis are estimated to be 2 billion USD throughout the world. Quantitative losses due to chicken coccidiosis in Ethiopia is not well documented, although it has been reported by [6] in Debre zeit, [7] in Adiss Ababa, [8] in Ambo, [9] in Arsi Tiyo District, and [10] in and around Jimma town. In general chicken Coccidiosis contributes to 8.4% loss in profit in large scale farms and 11.9% loss in profit in small scale farms [9]. Losses due to mortality following a severe outbreak may be devastating and incidence rates as high as 80% were observed to occur in the form of an outbreak in Ethiopia [10].

To the authors' knowledge, the prevalence and associated risk factors of poultry coccidiosis in and around Jimma town poultry has not been well addressed. Therefore, the objectives of this study were to determine the prevalence of poultry coccidiosis and to identify the associated risk factors of poultry coccidiosis in thereby providing updated epidemiological data that can be a basis for control and prevention of the disease in the study area.

## MATERIALS AND METHODS

## Study area

The study was conducted in and around Jimma town, in Jimma University College of Agriculture and Veterinary Medicines's (JUCAVM) poultry farm and chickens that reared in backyard that came from in and around jimma town to JUCAVM open air clinic, south western Ethiopia. Jimma town is located in Oromia region,

south west of Ethiopia, at a distance of about 352 km from Addis Ababa. Geographically, Jimma is located at 7°13' and 8°56' N latitude and 35°52' and 37°37'E longitude. The climatic condition of the area is 'Woynadega' with altitude ranging between 1720 to 2110 m above sea level and receives annual rainfall which ranges between 1200 to 2000mm. There are two rain seasons, short rainy season (November to April) and long rainy season (July to October). The annual mean temperature ranges from about 12.1°C to 28°C. The number of livestock in Jimma zone is estimated to be 2.02 million cattle, 288,411 goats, 942,908 sheep, 152,434 equines, 1,139,735 poultry and 418,831 beehives [11].

### Study population and study design

The study populations were chickens in poultry farm of Jimma University, indigenous and exotic breed of chickens that came to JUCAVM open air clinic owned by local people in and around Jimma town. The study birds were grouped into exotic and indigenous breed, management farm type (intensive with deep litter, semi intensive and extensive backyard rearing system) and ages as young (2-8 weeks) and adult (above 8 weeks of age). The study was conducted from selected poultry farm in JUCAVM which 200 of the total population size of the study and another 167 from backyard rearing system of indigenous and exotic chickens that came to open air clinic were collected based on geographical location and easily accessibility. The owners of the flock were interviewed and information about flock size, breed and management system were asked, then after representative chickens were selected and the samples were taken.

A cross-sectional study was undertaken on randomly selected Chickens to determine the prevalence of poultry coccidiosis and associated risk factor in study area from JUCAVM poultry farms and chickens owned by local individuals reared under backyard that came to JUCAVM open air clinic.

### Study methods and coprological examination

A total of 367 samples were collected from JUCAVM poultry farm (200) and 167 from chicken that came to JUCAVM open air clinic. Probability sampling (simple random) was used to select the population to be sampled. The freshly voided faecal samples were collected directly and put in plastic bottles from each chicken, labelled and brought to Parasitology laboratory of the Department of Veterinary Laboratory for examination [12]. Samples were kept in refrigerator at 4°C to be examined for coprological examination. Before microscopic observation, floatation technique was used to concentrate the oocysts in order to increase the sensitivity of the examination. Saturated solution of sugar was used as floating medium. The diagnosis of the oocysts in the faeces was made using 10x optical lens of the microscope [13].

### Sample size determination

Since the prevalence of coccidiosis in chickens in poultry farm and extensive back yard rearing system has been reported by [10], 39.6% expected prevalence rate was used. In addition, 95% confidence interval (CI) and 5% desired absolute precision were also used (Thrusfield, 2005), accordingly 367 study populations were selected.

### Data analysis

The data which was collected from the study area, the

result obtained from fecal examination was recorded in the format developed for this purpose and later on the raw data were entered and managed in Microsoft Excel worksheet and descriptive statistic was utilized to summarize the data. The point prevalence was calculated for all data by dividing positive samples by total number of examined samples and multiplied by hundred. All statistical analyses were done using SPSS statistical software version 20. The association between the prevalence of the disease and risk factors was assessed by Chi-square ( $\chi^2$ ). A statically significant association between variables was considered to exist if the computed P value was less than 0.05.

## RESULTS

### Coprological result and risk factors

During the study period 367 faecal (dropping) were collected from the two study sites and examined for the presence of *Eimeria* oocysts. Accordingly, 119 (32.4%) chickens were found to be positive for *Eimeria* oocysts and 248 (67.6%) were found to be negative for *Eimeria* oocysts.

Higher infection rate were detected in young (48.8 %) than Adults (30.2%). Age and risk of coccidial infection were significantly associated ( $p=0.014$ ) as noticed in the table 1.

Amongst 119 positive cases 32.3% of examined female and 35% males had oocysts, however the differences were not statistically significant ( $p>0.05$ ) as noticed in the table 2.

Prevalence was slightly higher in exotic breed (36.4%) than indigenous breed (23.7%) and association is significant with breed ( $p=0.016$ ) as indicated in the table 3.

Regarding the origin (24%) was from clinic and (39.5%) were from JUCAVM poultry farm and prevalence was high in chicken sourced from JUCAVM. So origin was significantly associated with the coccidial infection ( $p=0.002$ ) as indicated in the table 4.

Prevalence was high in chickens having poor hygienic status (37%) than chickens with good hygienic status (19.1%), infection rate was significantly associated with Hygienic status ( $p=0.003$ ) as noticed in the table 5.

On management system infection rate was high in intensive management system (39.5%), than semi intensive (23.8%) and extensive or back yard (24.2%) poultry farm. As  $p < 0.05$  management were significantly associated with the risk of coccidial infection as noticed in the table 6.

The prevalence of infection was higher in not medicated (36%) than medicated (23%). This association was statistically significant ( $p=0.017$ ) as noticed in the table 7.

Concerning vaccination status even though prevalence of coccidiosis was higher in vaccinated (35.5%) than not vaccinated (29.3%), there was no vaccinations were not significant association between coccidial infection and vaccination status as  $p > 0.05$  as noticed in the table 7.

## DISCUSSION

Results obtained in this study revealed that coccidiosis was wide spread in the study area. In the present study an overall prevalence of chicken coccidiosis was found to be 32.4% (119/367). This finding was lower than the report done by [14] from Gondar town (North West Ethiopia) with the prevalence of 43%, [15] in Iran 64%, [16] in Jammu region (India) 39.6% and

**Table 1:** Prevalence of poultry coccidiosis between ages.

Age	Examined	Positive	Prevalence (%)	x <sup>2</sup>	df	p-value
Young	43	21	48.8	5.988	1	0.014
Adult	324	98	30.2			
Total	367	119	32.4			

**Table 2:** Prevalence of poultry coccidiosis between sexes.

Sex	Examined	Positive	Prevalence (%)	x <sup>2</sup>	df	p-value
Male	20	7	35	0.064	1	0.800
Female	347	112	32.3			
Total	367	119	32.4			

**Table 3:** Prevalence of poultry coccidiosis between breed.

Breed	Examined	Positive	Prevalence (%)	x <sup>2</sup>	df	p-value
Local	114	27	23.7	5.766	1	0.016
Exotic	253	92	36.4			
Total	367	119	32.4			

**Table 4:** Prevalence of poultry coccidiosis between Origins.

Origin	Examined	Positive	Prevalence (%)	x <sup>2</sup>	df	p-value
Farm	200	79	39.5	0.498	1	0.002
Clinic	167	40	24			
Total	367	119	32.4			

**Table 5:** Prevalence of poultry coccidiosis among hygienic status.

Hygienic status	Examined	Positive	Prevalence (%)	x <sup>2</sup>	df	p-value
Good	118	26	19.1	8.571	2	0.003
Poor	249	93	37.0			
Total	367	119	32.4			

**Table 6:** Prevalence of poultry coccidiosis among Management.

Management	Examined	Positive (%)	Prevalence	x <sup>2</sup>	df	p-value
Intensive	200	79	39.5	10.043	2	0.007
Semi intensive	105	25	23.8			
Extensive	62	15	24.2			
Total	367	119	32.4			

**Table 7:** Prevalence of poultry coccidiosis between Medicated and non-medicated.

Medication history	Examined	Positive	Prevalence (%)	x <sup>2</sup>	df	p-value
Medicated	100	23	23	5.573	1	0.017
Not medicated	267	96	36			
Total	367	119	32.4			

[10] in and around Jimma 39.6%. However, the current result was in agreement with finding in western Iran [17]. In contrary to this, the finding was lower than that of [18] from Nekemte town, (Western Ethiopia) and [8] in and Around Ambo Town, who reported the prevalence of 19.5% and 20.5% respectively. The variation in prevalence of the disease may be due to the difference in the climatic conditions, agro-ecological set-up and

lack of adequate information and difference in management systems of the farms.

In this study, the prevalence of coccidiosis was 48.8% in young chickens while in adult 30.2%. It was observed that there was statistically significant difference ( $p < 0.05$ ) in the prevalence of coccidiosis among the two different age groups examined. This

may be due to management system and breed factors [19]. The current prevalence is lower compared to the result of the survey in Nigeria [20] and in Pakistan [21] reported 52.9% and 36.6%; 60.16% and 37% in young and adult, respectively. In the current study occurrence of coccidiosis was statistically not significant between the sex groups.

The prevalence of the coccidiosis was significantly higher ( $P<0.05$ ) in exotic breed (36.4%) than local breed (23.7%). Higher prevalence in exotic breeds was also reported by [6], who stated that, the frequency occurrence of coccidial infection in exotic breed was significantly higher than the local strain and this could be due to management system and breed factor [22].

The current study also reveal that statistically significant difference  $P<0.05$  ( $X^2=10.043$ ,  $P=0.007$ ) between occurrence of coccidial diseases and management system of chickens. The prevalence rate of 24.2% in backyard (extensive) rearing system, 23.8% in semi intensive and 39.5% in intensive rearing system was recorded. This finding suggests that the coccidiosis was higher in modern deep litter than the other management system. This is the fact that in deep litter system the exposure to contaminated coccidial oocyst was high as compared to other system of management. This finding was agreed with the finding of [22,23].

The current study also reveal that there was statistical significance  $p<0.05$  between chickens that were medicated (23%) and not medicated (36%) as most drugs used as prophylaxis following outbreak of the disease. There was also significance difference ( $p<0.05$ ), in chicken that were kept in poor hygienic status than other. This is due to the fact there was higher chance ingesting sporulated oocyst in poor hygienic status. Also there no significance ( $p>0.05$ ) between vaccination of chicken, the prevalence of coccidiosis was higher in vaccinated than non-vaccinated chicken. This may due to the reason that the chicken may vaccinated after showing clinic sign or the vaccine is of other disease.

## CONCLUSION AND RECOMMENDATIONS

Poultry coccidiosis is a problem wherever chickens are raised under intensive and extensive conditions of poultry rearing system. They are present in all most all chicken which affects food security, economic development, and lead to poverty. The result of the present study indicates that the overall prevalence rates of 32.4%. This result indicates that the disease is endemic in the study area. The diseases is more sever in the young, poultry houses with poor hygienic status, in extensive management system and those poultry that are not medicated. Age, management System, medication and Hygienic status are important risk factors that need to be worked on to minimize the impact of coccidiosis.

In general, this study showed that poultry coccidiosis is an important chicken health problem for poultry owners in and around Jimma town which needs careful attention demanding

interventions that will reduce the burden of coccidiosis. Based on the above facts, we recommended the following:

- Efforts toward educating the local chicken farmers especially in villages to control coccidiosis through good management practices, and the proper use of anticoccidial drugs should be considered.
- Clean out the houses of the poultry, wash the walls, floor and disinfect the room using disinfectant that can kill coccidial oocysts and keep sanitation of the area were birds spend most of their time including feed and drink area to maintain good hygiene condition.
- Controlling moisture with the appropriate installation and management of watering systems and avoid damp areas in house of the poultry.

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### Cite this article

Tadesse T, Teshome L (2018) A Study on Copro-Epidemiology of Poultry Coccidiosis in and Around Jimma Town, Oromia Regional State, Ethiopia. *J Vet Med Res* 5(11): 1167.