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Prevalence of coccidiosis in broiler chicken farms in and Around Marand city, Iran

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Abstract
A cross sectional study was conducted from October 2014 to March 2015 in and around Marand city, Iran with the objectives to determine the prevalence of poultry coccidiosis. A total of 384 faecal samples were examined using flotation technique to detect coccidian oocysts. The study revealed 35.2% were positive for coccidian oocysts. The prevalence of coccidiosis was accounted 14.8%, 23.1%, 26.9%, 32.2%, and 62.3% in Zonouze, Yamchi, Dolatabad, Koshksaray and Markazi respectively. Significantly (P<0.05) highest prevalence of coccidiosis was recorded in White leg horn (26.9%) and local breed chicken (24.6%). Among age group higher prevalence rates (47.6%) was observed in young (2-8 weeks) than adult chicken. Young chicken had 2.6 (OR=2.6, P>0.05) higher risk of acquiring coccidiosis than adult. Higher prevalence of 45.2% was recorded in intensive poultry birds as compared to chicken kept under extensive management system (24.6%). Even though relatively higher prevalence of coccidiosis was recorded in male (36.7%) than female chicken (34.5%), 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 warrants appropriate control strategies need to be designed in order to reduce the impact of poultry coccidiosis in the study area.

Keywords: Coccidiosis, Prevalence, broiler Poultry, Marand city, Iran

1. Introduction
Coccidiosis is a common protozoan disease in domestic birds and other fowl, characterized by enteritis and bloody diarrhoea. The intestinal tract is affected, with the exception of the renal coccidiosis in geese. Clinically, bloody faeces, ruffled feathers, anaemia, reduced head size and somnolence are observed [7]. The infection is realized by a faecal-oral route. After ingestion of sporulated (infective) oocysts, sporozoites are released that enter asexual and sexual cycles of development resulting in the emergence of thousands of new oocysts in the intestines. Oocysts are distributed by faeces. Soon, they sporulate and become infective for chickens [1, 2]. The microscopic examination of a native preparation of intestinal content or superficial mucosal layer reveals a significant number of oocysts in one observation field. Prevention. The use of coccidiostatics with forages on a rotation basis is the most extensively used means. The immunization against coccidiosis with commercial vaccines is used in broiler breeder flocks. If the chickens are exposed to the natural effect of a moderate number of oocysts in their environment, they develop immunity to the respective parasitic species [3]. Coccidiosis is one of the diseases that is caused by protozoan parasites of the phylum Apicomplexa, family Eimeriidae of the genus *Eimeria*. Earlier researches conducted in Iranhave identified mainly several species of *Eimeria* which includes *E. tenella*, *E. necatrix*, *E. maxima*, *E. acervulina* and *E. mitis* [4-6]. *E. tenella*, *E. necatrix* and *E. brunette* are highly pathogenic species whereas *E. acervulina*, *E. maxima* and *E. mivati* slightly too moderately pathogenic. *E. mitis*, *E. praecox* and *E. hagani* are relatively non-pathogenic species are recognized as infecting chickens [8, 9]. Disease characterized by dysentery, enteritis, emaciation, drooping wings, poor growth, low production [10, 11], with high rate of mortality and morbidity [12, 13].

In Iran even though poultry coccidiosis have been studied by several researchers in different areas of the country, the disease is still continued being a major constraint in poultry production which needs more research and further investigations [14]. There is little information regarding the prevalence of coccidiosis and their impact on poultry production in and around Marand city, Iran. Therefore the present study was done with the objectives to determine the prevalence of poultry coccidiosis and assess the risk factors associated with the disease in poultry kept under different production in the study area.

2. Materials and Methods

2.1. Study area description

Marand city, Iran is located in North-west of Iran. The study populations were all apparently healthy chickens in and around Marand city, Iran and kept under different management system mainly intensive. The study animals were grouped into sex (male and female), breeds (exotic and local) and the age was classified according to Ashenafi *et al*. (2004) as young (2-8 weeks) and adult (above 8 weeks of age).

2.2. Sample size determination

Since there is no earlier report from the study area, the sample size was calculated according to the formula given by Thrusfield (2005) using 50% expected prevalence with 95% confidence interval and 0.05 desired absolute precision using. Therefore, total sample sizes of 384 chickens were used for this study.

2.3. Study design and sampling method

Cross-sectional study was conducted to determine the prevalence of coccidiosis in chicken in and around Marand city, Iran. A total of 384 faecal samples were collected from broiler flocks farms. The faecal sample were collected from the upper surface of the litter immediately after dropping of faeces with spatula then each faecal sample was placed in a pre-labelled universal bottle from each chicken and brought to Tabriz city, Iran Regional Veterinary laboratory for parasitological analysis. During sample collection information regarding age, breed and sex were appropriately recorded.

2.4. Laboratory investigations

Freshly deposited faecal sample were collected from the upper surface of the litter immediately after dropping and examined thoroughly. The sample was collected with a spatula, which was washed and cleaned after each collection in order to avoid contamination. Each faecal sample was placed in a pre-labelled universal bottle indicating the age, breed and sex of the chicken. Oocysts in each faecal sample of chicken were detected by using floatation technique using saturated sodium chloride solution (Conway and McKenzie, 2007). One gram of faecal sample was weighed using a top loader balance put into a beaker and mixed with saturated salt solution. It was thoroughly mixed and strained using 90 mesh sieves into another beaker. The filtrate was poured into test-tube of respective faecal sample number and these were placed in test-tube stands. Each test tube then filled to the brim with salt solution of sodium chloride. Cover-slip was placed on test tube surface and left to stand for 15 minutes after which they were gently lifted off without brushing against the tubes. This was then placed on microscopic slides sideways in one quick movement to avoid air bubbles on the glass-slide and viewed under the microscope. Examinations of the slides were carried out using 40X objective lens.

2.5. Data analysis

The raw data were entered and managed in Microsoft Excel spread sheet. All statistical analyses were done using STATA 11 (StataCorp Texa, USA). The prevalence was calculated for all data by dividing positive samples by total number of examined samples and multiplied by hundred. The association between the prevalence of the disease and hypothesized risk factors were assessed by Chi-square test. Univariate logistic regression was used to calculate the odds ratio for associated risk factors. A statically significant association between all variables was set at *P value* < 0.05.

3. Results

A total of 384 chicken samples were examined 135 (35.2%) of the faecal samples were positive for coccidian oocysts. Among study areas the highest prevalence 64 (61.5%) was observed in Markazi farm followed by 32.1%, 26.9%, 23.8% and 14.8% prevalence obtained in Koshksaray, Dolatabad farm, Yamchi and Zonouze respectively (Table 1).

Table 1: The prevalence of poultry coccidiosis in the study area

Farm	Number examined	Number negative	Number positive	Prevalence %
Zonouze	61	52	9	14.8
Koshksaray	84	57	27	32.1
Yamchi	42	32	10	23.8
Dolatabad	93	68	25	26.9
Markazi	104	40	64	61.5
Total	384	249	135	35.2

In this study Higher prevalence rate was recorded in chicken grouped under 2-8 weeks (young) (47.6%) compared to chicken with 8 weeks (adult) age categories with significant difference (P<0.05). Young chickens had 2.6 (OR 2.6, 1.69-3.99 95%CI) higher risk of being infected by coccidiosis as compared to adult chickens. Higher prevalence of 45.2% was observed in poultry kept under intensive farms as compared poultry under extensive management (24.6%). Even though relatively higher prevalence was obtained in male (36.7%) than female chicken (34.5%), statistically significant (P>0.05) difference in the prevalence of coccidiosis was not observed between sex groups of birds (Table 2).

Table 2: Association between coccidiosis prevalence and risk factors

Variable	Sample examined	No. positive (%)	χ^2	*P-value*	Univariable OR (95% CI)	*P-value*
Sex						
Female	264	91 (34.5)	0.17	0.68	1.0	
Male	120	44 (36.7)			1.1 (0.7-1.73)	0.68
Age (years)						
Adult	220	57 (25.9)	19.3	<0.001	1.0	
Young	164	78 (47.6)			2.6 (1.69-3.99)	< 0.001
Breed			43.7	< 0.001		
Local	187	46 (24.6)			1.0	
White leg horn	91	25 (26.9)			1.3 (0.64-1.99)	0.68
Management			17.8	< 0.001		
Extensive	187	46 (24.6)			1.0	
Intensive	197	89 (45.2)			2.5 (1.6- 3.9)	< 0.001

4. 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 35.5% (135/384).This finding was lower than the report done by Gebretensae *et al*. (2014) from Gondar town (North West Ethiopia) with the prevalence of 43%, Hadipour *et al*. (2013) in Iran 64% and Sharma *et al*. (2013) in Jammu region (India) 39.6%. However, the current finding in contrary with the finding of Garbi *et al.* (2015) from Nekemte town, (Western Ethiopia), Oljira *et al*. (2012) in and Around Ambo Town, and Gharekhani *et al*. (2014) in Western Iran who reported the prevalence of 19.5%, 20.5% and 31.8% 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 on the disease [16, 17]. And difference in management systems of the farms.

The prevalence rate of the disease was significantly *(P*<0.05*)* higher in White leg horn, (26.9%) breed than local chickens (24.6%). This result in agreement with the most previous research work done in different parts of the world, who reported higher prevalence of coccidiosis in exotic breed than local chickens [18, 19] In contrary to this finding study conducted in Tiyo District, Arsi Zone, Ethiopia [21] and Iran [20, 23] indicated no association between coccidiosis occurrence and breed of chicken.

The result of the current study was in concordance with the reports of Garbi *et al*. (2015) and Gebretensae *et al*. (2014) from Eastern Wollega and Gondar town Ethiopia respectively. In contrary to this finding several other researchers reported higher prevalence of poultry coccidiosis in female as compared to male chickens [22, 24, 25]. Absence of statistically significant difference between female and male might be due the equal chance of exposure for the coccidiosis infection.

This result disagree with the report made by Oljira *et al*. (2012) who recorded similar prevalence of coccidiosis among age groups 20.75% in young (2-8weeks) and 20.4% in adult (>8 weeks) chicken.

In this study, it found that there was statistically significant difference with the occurrence of poultry coccidiosis between different management system (intensive and extensive) (*P*<0.001). Chickens that kept under intensive management system were found to be 2.5 more likely to be infected than chickens kept under extensive management system. However, the current result was disagreement with the previous report in Gondar (Ethiopia) by Gebretensae *et al*. (2014) who recorded higher prevalence in chickens which are managed in backyard production system (45.7%) than floor (49.1%) and cage (25.6%) production systems. The observed higher prevalence of coccidiosis in intensive management system might be explained in terms of the rearing systems where all of the poultry farms included in the study practiced deep litter rearing system. Deep litter poultry houses further exacerbate the risk of coccidial infection as it provides optimal condition of temperature and humidity for oocyst sporulation [26-28]. On other hand poor poultry management where there is overcrowding, leaking water troughs and accumulation of faeces are factors that contributed to the high prevalence rate.

5. Conclusion

In conclusion, the result of this study indicated that poultry coccidiosis is major threat to poultry producers in the study areas which warrants appropriate intervention. Age, breed and management systems were among risk factors that were associated with chicken coccidiosis in the study areas. Strategic prophylaxes and treatment against *Eimeria* should be developed and implemented in order to reduce the economic losses due to the disease in area. Furthermore, efforts needed to be done to develop economical and sustainable prevention and control strategies as coccidiosis remains a major challenge to poultry producers in country wide.

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7. Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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