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ORIGINAL ARTICLE

Prevalence of Cestode Parasites of *Gallus Domesticus* in Karachi, Sindh, Pakistan

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ABSTRACT

Background: Poultry production in Pakistan is growing remarkably and contributing significantly to the economy. However, disease outbreaks are the most serious threat to poultry productivity. Among other poultry diseases which cause huge damage to poultry, parasitic diseases are also included, but no significant work has been done on this area of concern in Pakistan.

Objective: This study is carried out to evaluate the prevalence rate of one of the major helminth parasite groups, Cestodes, and their effects on the health of chickens in the districts of Korangi, Karachi, Sindh.

Method: Between February 2018 and January 2019, 76 chickens were examined for Cestodes infection. Cestodes were extracted from the gut and fixed in F.A.A. fixative for 24 hours with a little cover slip pressure. The cestodes were then thoroughly cleaned with 70% ethanol, stained with Mayer's carmalum, dehydrated in progressively stronger alcohol, clarified with clove oil, rinsed with xylene, and permanently mounted in Canada balsam.

Results: The overall prevalence was 52.6%. Parasite burden is high in males (63.8%) compared to females (45.6%). Six species of Cestodes parasites were identified from the intestine of the infected chickens. *Raillietina tetragona, R. cesticillus, R. echinobothridia, R. ransomi, Choanotaenia infundibulum,* and *Raillietina* sp. are the Cestode species that have been found. Their prevalence was 42.1%, 34.2%, 26.3%, 22.2%, 15.7%, and 7.8%, respectively. The prevalence rate also varies from season to season. Spring had the highest rate of infection at 60%, summer was next at 58%, and autumn and winter both had a rate of 40%.

Conclusion: The study concludes that heavy infestation has a negative impact on the physical health of chickens and points to the need to control Cestodes parasite infection in order to reduce mortality and increase poultry yield.

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INTRODUCTION

In Pakistan, the poultry industry is a big part of the economy because it makes eggs and meat, which are the cheapest sources of protein. It contributes 29% of the total meat production of the country, 5.8% of the agriculture sector, and 1.3% of the overall GDP. It has shown excellent growth and become a source of 1.6 million people's employment. Among other poultry diseases which cause huge damage to poultry, parasitic diseases are also included, but no significant work has been done on this area of concern in Pakistan. The common gastrointestinal helminth parasites cause negative effects on the health of chickens, which then leads to considerable damage and great economic losses to the poultry industry due to malnutrition, decreased food conversion ratio, weight loss, lower egg production, and death in young birds[1]. Parasites also make the flocks less resistant to diseases and make diseases worse[2,3]. Chicken cestodiasis not only causes loss of body weight but also may cause several problems,

such as enteritis, loss of blood, loss of production, nervous manifestations, and death. Parasitic infection causes villous atrophy, catarrhal enteritis, granuloma formation in the duodenum, desquamation of villi and submucosal gland congestion, an inflammatory response, and vacuolation of epithelial cells[4]. However, poultry production in Pakistan is growing remarkably and contributing significantly to its economy. However, disease outbreaks pose the greatest threat to productivity. Among other diseases that cause huge damage to poultry, parasitic diseases are also included, but no significant work has been done on this area of concern in Pakistan. It is necessary to investigate the rate of infection of various cestode parasites in chickens. The current research aims to study the prevalence and intensity of infection of cestode parasites of *Gallus domesticus* and to study the difference in rate of parasitic infection in different seasons and months to analyse the effect of seasonal variation on parasitic infection.

MATERIALS AND METHODS

The viscera of 76 freshly slaughtered chickens have been collected from common shops located in Korangi, Karachi, from February 2017 to January 2018. Samples were subjected to necroscopic and parasitological examination. Cestodes were collected from the gastrointestinal tract and preserved in Acetic acid Formalin Alcohol solution (AFA) for 8 to 12 hours. Then it is kept in 70% alcohol overnight and stained with Alum carmine for 3-5 minutes and is continuously checked to prevent overstrain. Then it is dehydrated through 70%, 90% and 100% alcohol for 20-30 minutes for each grade. It is then bathed in clove oil for 1-2 minutes and washed in xylol for 2-3 minutes. Finally, permanent slides were prepared by using Canada balsam. Cestodes were identified under a light microscope with 10x magnification according to their morphological characteristics[5]. However, Pearson's coefficient of correlation 'r' was used to examine the relationship among seasons and infection prevalence. At the 5% threshold of significance ($P \leq 0.05$), statistical significance was recognised. SPSS version 20 was used to analyse the data.

RESULTS AND DISCUSSION

The author intends to investigate the prevalence of cestode parasite infection in the Korangi Creek area. The sampling area is selected due to the author's residence in the area, which provides easy access to get samples. The study found that, out of 76 chickens, 40 had different species of Cestodes (Table **1**). Six species belonging to three genera were found in the digestive tract of chickens. The overall prevalence of cestodes was 52.6%. Parasite burden is high in males (63.8%) as compared to females (45.6%) (Table **2**).

Six species of Cestodes parasites were found in the intestines of infected chickens. *Raillietina tetragona*, *R. cesticillus*, *R. echinobothridia*, *R. ransomi*, *Choanotaenia infundibulum*, and *Raillietina* species are the species of Cestodes that have been found. Their prevalence was 42.1%, 34.2%, 26.3%, 22.2%, 15.7%, and 7.8%, respectively (Table **3**).

Table 1. Overall prevalence of Cestodes infection.

Helminthes group	Host Examined	Host Infected	Prevalence %
Cestodes	76	40	52.6

Table 2. Prevalence of Cestodes in relation to host's sex.

Sex of host	Host examined	Host infected	Prevalence (%)
Male	30	19	63.8
Female	46	21	45.6

Table 3. Prevalence of Cestodes parasites.

Genus	Host examined	Host infected	Prevalence (%)
Raillietina tetragona	76	32	42.1
Raillietina cesticillus	76	26	34.2
Raillietina echinobothridia	76	20	26.3
Raillietina ransomi	76	17	22.2
Choanotaenia infundibulum	76	12	15.7
***Raillietina* sp.**	76	6	7.8

Table 4. Seasonal incidence of recorded Cestodes' Species.

Season	Host Examined	Host Infected	Prevalence %
Spring	15	9	60.0
Summer	36	22	58.3
Autumn	15	6	40.0
Winter	10	3	40.0

Raillietina tetragona was reported in chicken 48.3%[6] and 51.66%[7] from Pakistan; 14.5%[8] from Western Cameron; 21.3%[9] from Tanzania; and 2.0%[10] from Nigeria; 7.4%[11] from Egypt; 51.42%[12]; and 9.16%[13] from India; 57.5%[14] from Thailand; 68.75%[15] from Algeria; 19.68%[16] from Bangladesh; and 65.94%[17] from Ethiopia

R. echinobothrida reported from the chicken with prevalence of 19.2% [6] from Pakistan, 10.4%[18] from Iran, 48.3%[14] from Northern Thailand, 25.3%[19] from Nigeria, from Brazil[20], 91.9%[21] and 6.6%[11] from Egypt, 39.86%[17] from Ethiopia, 83.3%[15] from Algeria, 37.83%[22] from Phitsanulok province, 2.3% [23] from Trinidad, 50% [24] from Bangladesh and 46.3%[9] from Tanzania while the same specie has been reported in pigeon 61.76%[25] from Greece and 32%[26] from Libya.

R. cesticillus was reported from birds with prevalence of 56.6%[24] from Bangladesh, 55.07%[17] from Ethiopia, 83.5%[27] from Pakistan, 23.22%[28] from India, 29.1%[15] from Algeria and 21.3%[19] from Nigeria, 0.9%[23] from Trinidad, 5.83%[7] and 0.8%[6] from Pakistan, 12.5%[14] from Thailand and, also reported from Brazil[20].

Choanotaenia infundibulum was reported from Hyderabad, Pakistan, with a prevalence of 89.5%[27], while *Choanotaenia* sp. with prevalence of 20% reported from the same host in Quetta, Pakistan[6]. Outside of Pakistan, the same species has been reported from Zimbabwe[29], from Trinidad[23], from Tanzania[9], from Algeria[15], from Japan[30] and from Brazil[31].

The difference in prevalence might be due to the variation in the environmental conditions of the area[32], including high temperature, humidity or dryness, annual rainfall, and the availability of intermediate hosts[33], it could also be due to sharing the same habitat with migratory birds, which increases the chance of harbouring parasites[34]. Similar attribution is also given that environmental alterations, especially increasing temperature, may have affected the occurrence of helminth infection [14], and another author stated that more than one million birds migrate from Central Asia to Pakistan during winters. During migration, they also carry parasites, which result in new host and locality records[35].

Moreover, the study found that the prevalence rate also varies from season to season. The highest infection has been observed in spring at 60%, followed by summer at 58.3%, and in autumn and winter, the same infection has been observed at 40% (Table **4**). This suggested that there was not enough variation in the prevalence and intensity of infection in different seasons. The results suggest that high temperatures increase the susceptibility of the hosts to parasitism[6]. Although parasites were discovered to be prevalent throughout the year, with a higher prevalence and parasitic load, they were found to be most prevalent in the summer season.

Furthermore, multiple infections of helminth parasites have also been found in many chickens. Similarly, a high intensity of parasites has also been observed. The intestine

was fully blocked with the worm burden. Grossly, the intestine showed a heavy infestation of Cestodes, due to which the mucosal lining of the intestine was damaged. Chronic catarrhal enteritis, hemorrhagic enteritis, and nodular enteritis have been observed. The intestinal wall was thickened and inflamed with hemorrhagic necrotic spots.

Table 5. Seasonal incidence of each specie of recorded Cestodes.

Season	*R.tetragona*		*R.cesticillus*		*R.echinobothrida*		*R.ransomi*		*Choanotaenia Infundibulum*		*Raillietina sp.*		P-Value
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	
Spring	8	88.8	6	66.6	4	44.4	2	22.2	2	22.2	0	0	0.028
Summer	17	77.2	15	68.1	13	59	11	50	8	36.3	4	18.1	0.002
Autumn	5	83.3	4	66.6	3	50	2	33.3	2	33.3	1	16.6	0.005
Winter	2	66.6	1	0	0	0	2	66.6	0	0	1	33.3	0.041

Table 6. Monthly incidence of different types of recorded Cestodes' species.

Month	*R.tetragona*		*R.cesticillus*		*R.echinobothridia*		*R.ransomi*		*Choanotaenia infundibulum*		*Raillietina* sp.		P-Value
	No	%	No	%	No	%	No	%	No	%	No	%	
Feb	3	100	2	66.6	2	66.6	1	33.3	1	33.3	0	0	0.017
Mar	2	100	2	100	1	50	0	0	0	0	0	0	0.093
Apr	3	75	2	50	1	25	1	25	1	25	0	0	0.025
May	7	77.7	7	77.7	6	66.6	5	55.5	3	33.3	2	22.2	0.002
Jun	3	75	3	75	2	50	2	50	2	50	1	25	0.001
Jul	7	77.7	5	55.5	5	55.5	4	44.4	3	33.3	1	11.1	0.004
Aug	1	100	0	0	1	100	1	100	1	100	1	100	0.004
Sep	2	100	2	100	1	50	1	50	1	50	0	0	0.013
Oct	2	66.6	2	66.6	1	33.3	0	0	0	0	0	0	0.093
Nov	1	50	1	50	0	0	2	100	0	0	0	0	0.102
Dec	0	0	0	0	0	0	0	0	0	0	0	0	0
Jan	1	100	0	0	0	0	0	0	0	0	1	100	0.175

CONCLUSION

The present study concludes that the prevalence of parasitic infection by cestodes is very high, resulting in the mortality of chickens. The high prevalence of infection leads to invisible production and economic losses. Raring area, season, availability, and contact with the intermediate host also affect the prevalence and intensity of infection. Based on the result, the following recommendations are forwarded: As the cestodes parasites have a sub-clinical occurrence, studies that focus on these ideas should be conducted. The public, especially those who are related to poultry farming, should be aware of the occurrence and economic significance of gastrointestinal parasites. Elimination of intermediate hosts in the rearing area and extensive early-season larval control have been recommended.

ETHICAL APPROVAL

Not required.

CONFLICTS OF INTERST

No conflict of interest.

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None.

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LIST OF ABBREVIATIONS

AFA Acetic acid Formalin Alcohol

GDP Gross Domestic Product

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