

The Prevalence of Parasitic Infection in Domestic Chicken: A Review

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Abstract

The relative contribution of poultry to total animal protein production in the world is increasing, the major increase in developing countries. Many types and species of ectoparasites and Endoparasites are known to infect chickens; one of the actual problems that cause economic bias in animal farms and rural areas that raise chickens annually is parasitic diseases. The common parasitic infections that occur in poultry can be divided into External parasites include arthropods Lice, Mites, Fleas and Ticks which are isolated from skin and feathers. Internal parasites include protozoa, cestodes, nematodes, trematodes which are isolated from the digestive tract, blood and pooled poultry droppings. The external and internal parasites that infect hosts possess features such as small size, cylindrical body, hook and hard body, which enhance their adaptation to the long life and effect on the poultry industry by affecting the growth rate of chickens, leading to little egg production, and death in severe infections. Prevalence of helminthic infection (cestodes and nematodes infecting the digestive tract) was high in farms and rural areas of chickens from the different studies in different sites in the world, followed by protozoa infection by blood, followed by arthropod infection by skin and feathers and followed by prevalence by trematodes.

Keywords: Prevalence, Chicken, Helminthes, External parasites, Internal parasites

Introduction

The history of chickens (*Gallus domesticus*) is still a bit of a puzzle. Scholars agree that they were first domesticated from a wild form called red junglefowl (*Gallus gallus*), a bird that still runs wild in most of southeast Asia, most likely hybridized with the gray junglefowl (*G. sonneratii*), that occurred probably about 8,000 years ago¹. Recent research suggests, however, there may have been multiple other domestication events in distinct areas of South and Southeast Asia, southern China, Thailand, Burma, and India. Since the wild progenitor of chickens is still living, several studies have been able to examine the behaviors of wild and domestic animals. Domesticated chickens are less active, have fewer social interactions with other chickens, are less aggressive to would-be predators, are less susceptible to stress, and are less likely to go looking for foreign food sources than their wild counterparts. Domestic chickens have increased adult body weight and simplified plumage; domestic chicken egg production starts earlier, is more frequent, and produces larger eggs². Parasite is an organism that lives on or in another organism, referred to as the host, and gains an advantage at the expense of the

host³, the internal and external parasites that infect hosts possess physiological and morphological features for example lesser size, shape of the body, hook and tough body, add to their adaptation to the long life also presence of hordes, these organisms are a major factor controlling of the fowl industry by affecting the rate of growth in the host, leading to organ dysfunction and ultimately death⁴. Parasitic infection or their concurrent infections also result in immunosuppression, especially in response to vaccines against some poultry diseases⁵. Parasitism has resulted in reduction of weight gain (17%) in growing chicken and reduction in egg production (12.5%) in laying hens in Bangladesh⁶. Chickens can carry ectoparasites; such as ticks, lice, mites, and Endoparasites, such as protozoans, cestodes, nematodes and trematodes. It has been recorded that they are considered a most important source of transmission of diseases and infection. Poultry has been accepted as one of the most important sources of animal protein for humans in the world, as well as consumers have high preferences for poultry products particularly during festivals. Furthermore, it is that poultry products provide proteins of high biological value⁷.

The protozoan parasites

There are many external parasites that attack poultry by either feathers or feeding on the skin or sucking blood, in small herds it is problematic to prevent contact with external environment, The protozoan parasites encountered were *Eimeria tenella*, *E. brunetti*, *E. mitis*, *E. acervulina*, *E. necatrix*, *E. maxima* and *E. mivati*. *E. tenella* was the most prevalent, while the parasite belonging to species *Eimeria mivati* the minimum abundant, the most parasites belonging to protozoa indicated the highest predominance through the wet period than the waterless period, telling us this warm environmental conditions and lower humidity favor the development of this parasite, clinical signs of parasitism are lack of development, feed conversion and poor growth, low egg production, and even death in severe infections. Moreover, the parasites can make the herd less resistant to disease and exacerbate existing of disease in herd⁽⁸⁻¹⁰⁾. Cryptosporidia are protozoan parasites classified within the class sporozoa and the subclass coccidian, They inhabit the brush border of the small intestinal mucosa of a variety of mammals¹¹. Cryptosporidiosis is a disease or infection caused by cryptosporidia. This parasite is not confined to the cryptosporidia of birds and can infect other animals, even mammals and chickens. Cryptosporidia is often spread from one animal to another on the feet of people and animals and can be borne by overland birds. Cryptosporidia is common, and symptoms are usually mild. Often, the only symptom is pale skin in yellow-skinned breeds. Cryptosporidiosis can be contracted by inhalation, leading to more severe respiratory inflammation of the intestinal form. There are no drugs for this parasite of cryptosporidiosis. Providing supportive treatment and protection from secondary infection are the only workflows. Once recovered, the birds are immune to future infections, There are a great diversity of Cryptosporidium species and genotypes recorded from fish, amphibians, reptiles, birds and mammals^(12,13) Haemosporidians are intracellular protozoan parasites found within the blood cells and tissues of their avian hosts, they are worldwide distributed and occur in a variety of avian species, including domestic chicken, the avian haemosporidian parasites (Phylum Apicomplexa) are taxonomically diverse and cosmopolitan in distribution infecting most bird families¹⁴. "The most commonly recorded parasites in smears of peripheral blood are unicellular eukaryotic parasites of the genera, Haemoproteus, Leucocytozoon and Plasmodium"¹⁵.

The greatest important groups of haemoparasites that infected chickens are Leucocytozoon, Haemoproteus and Plasmodium. The chickens haemoparasites have been recorded in the different countries of the world such as Bolivia, Pakistan, Italy, Czechoslovakia, Nigeria, Tanzania, Kazakhstan, India and South and East-Southern Asia,^(16,17).

Helminth parasites

A-The cestode parasites

Chickens is greatly susceptible to the contagion by a multiplicity of intestinal helminthes which leads to severe commercial losses during meddling with fit development in the system of late growth chiefly the chickens, making adult chickens exposure to secondary contagions, actually reduced chickens production¹⁸. Parasitic worms are common in large-scale poultry, while intensive infections are common in heavily managed stocks that cause severe pain that affects the natural activities of birds that lead to death. The cestode parasites encountered were *Raillietina tetragona*, *R. echinobothrida*, *R. cesticillus*, *Choanotaenia infundibulum* and *Hymenolepis carioca* out of which *R. cesticillus* was the least prevalent while while the parasite belonging to species *Hymenolepis carioca* was the most prevalent, cestodes are known to interfere with the metabolisms of certain compounds: they absorb glucose and galactose and stored them as glycogen as well as absorbed amino acids, polypeptides and proteins, the clinical signs include loss of ruffled feathers, drooping wings, appetite, increased mortality and decreased egg production, although with less pathogenic species, the only signs will be poor growth, weight loss paralysis, leg weakness, and a sudden raise in mean of mortality, Also stated that it is every so often possible to talk if a chicken is infested by cestodes simply by observing at the droppings. Egg of Tapeworm is observable white pellets struck in its feces^(19,20).

B- The nematode parasites

recovered included *Ascaridia galli* Shrank 1788, *Heterakis gallinarum* Shrank 1788, *Hartertia gallinarum* Theiler 1919, *Gongylonema ingluvicola* Ransome 1904, *Syngamus trachea* Montagu 1811 out of which only *A. galli* and *H. gallinarum* were most prevalent and the remaining rare⁴.

These helminthes affect on the metabolism of the host, causing in lowly feed utilization, thus impairing

growth and production ²¹.

The Arthropoda parasites

Common ectoparasites of village chickens range from lice, mites, fleas and ticks ⁶. They may constitute a clinical problem and transmit a number of infectious diseases and can also act as transport/ intermediate hosts of a range of helminth parasites ⁽²²⁻²⁵⁾. Some of the ectoparasites, especially tick and mites acts as vectors of poultry diseases such as Pastuerellosis, Fowl Pox, Newcastle disease and possibly chlamydia ^(26,27).

Table (1): shows the local studies on parasitic infection in domestic chickens.

Anthers and year	Parasites	Site of isolation parasites	samples	the prevalence %	country
Al-Zughaybi and Al-Gharawi (2010) (28)	Worms and Protozoa	digestive tract	250	10.4,1.2,7.2, 27.2	Babylon province , Iraq
Abdullah (2013) (29)	haemoparasite	blood	170	52.6.19.5 ,13.5	Sulaimani Province, Iraq
Abdullah and Mohammed (2013) (30)	External and Internal parasites	skin and feathers digestive tract	65	62.72,72.92,54.17,39.58,37.5, 10.42 81,31,8.62,1.72 55.17,31,10.34, 6.9, 3.45	Sulaimani region, Kurdistan, Iraq
Al-Dulaimi (2013) (31)	. Nematodes	digestive tract	45	8.9,8.28,17.7,15.5	Babylon province, Iraq
Al-Zubaidei (2015) (32)	Endo and ectoparasites	digestive tract skin and feathers	107	12.4,4.67,18.64 4.67	Diyala province ,Iraq
Hasson (2015) (33)	Haemoproteus spp. Plasmodium spp. Leucocytozoon spp.	blood	50	13.2,2.6 , 0	Diyala's localities ,Iraq

Table (2): The prevalence of parasitic infection in domestic chickens in different sites of the world.

Anthers and year	Parasites	Site of isolation parasites	samples	the prevalence %	country
Al-Natour et al. (2002)(34)	Eimeria spp	digestive tract	200	50	farms in northern Jordan
Hassouni and Belghyt (2006) (35)	Worms	digestive tract	300	0.7, 3.7,5.7,7,9.3 12,6,15.3,10,2.7 5.3,9,3.3	Morocco
Luka, and Ndams (2007)(10)	Protozoa Cestode Nematodes	Small and large intestine	92	67.6 43,10.9,25.0 43.8,33.7,1,1.2.2	Zaria Nigeria

Cont... Table (2): The prevalence of parasitic infection in domestic chickens in different sites of the world.

Khayatnouri et al. (2011)(36)	Heterakis gallinarum	digestive tract	120	21.66	Tabriz, Iran
Kumar et al. (2015)(37)	Worms and protozoa Gallinarum Infundibulum	Pooled poultry dropping	58	73.33,26.6,20 6.67,0,6.67 6.67,6.67	Uttar Pradesh and Uttarakhand India
Sreedev et al. (2016)(38)	Cestodes Nematodes Eimeria spp	digestive tract	492	32.47, 39.87,39.9	Andhra Pradesh India
Butboonchoo and Wongsawad (2017)(39)	Worms	digestive tract	120	50.8,86.7,1.7,0.8 48.3,57.5,12.5,35. 8,14.2,32.5	Phayao province northern Thailand
Muhammad et al. (2017)(40)	Plasmodium Haemoproteus, Leucocytozoon	Blood	384	31.5, 24.4,13	District Layyah, Punjab, Pakistan
El-Dakhly et al. (2018)(41)	Cestodes Nematodes	digestive tract	156	16.02,10.98,6.41 1.28,15.38,8.97 1.28	Aswan province, Upper Egypt
Van et al. (2019)(42)	Nematodes Cestodes Trematodes	small intestine	210	63,49,19,14 1	The Mekong Delta region southwest of Vietnam

Conclusion

These parasites inhibit with the metabolism of host, causing in lowly feed utilization, thus decreasing growth, parasites could be increase capability then cooperation the immunological restraint to injection of treatment.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the college of Education for Pure Sciences, Al Muthanna University, Samawah, Iraq and all experiments were carried out in accordance with approved guidelines.

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