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Prevalence and Identification of Nematodes in Chickens from District Charsadda, KPK, Pakistan

Luqman Khan^{*1,2}, Asma Waheed Qureshi², Mian Naveed Shah², Khurram Feroz¹,
Abu Mansoor², Omer Draz¹, Shah Fahad¹

¹Department of Zoology, Government College University Faisalabad, Pakistan

²Department of Zoology, Abdul Wali Khan University Mardan, Pakistan

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Abstract

Chicken providing livelihood and income for mini scale farmers especially in the off cropping season, poultry combines very well with other husbandry activities like cropping. Chickens die each year because of various infections. Prevalence of gastrointestinal parasites is still much uncontrolled. The local chicken feeds on a broad range of food substances. This ranged from grains, fruits to insects, which may pork infective stages of parasites thereby making them vulnerable to parasitic infection. In order to study the prevalence of gastrointestinal nematode in the backyard (Desi) chickens in district Charsadda Khyber Pakhtoon Khwa, Pakistan. The present study was intended during January 2013 to May 2013. Nematodes are intestinal helminthes parasites and cause a large number of disease, severe infections and economic loss. Thirty-six domestic chicken samples (Male and Female) were collected randomly from two different areas for identification and severity of nematodes by the intestinal scraping method. The result showed that backyard chickens in district Charsadda were severely infected by the gastrointestinal nematode. The rates of infection were found to be 58.32%. Out of which (38.89%) were infected by *Heterakis gallinarum* while (27.7%) was infected by *Ascaridia galli*. The study indicated that male chicken (52.1%) were more infected by *Heterakis gallinarum* as compared to female chicken (39.9%). Whereas single infection is, 55.56% and double infection are 2.78%. These helminthes cause the hindrance in the production of chicken in district Charsadda.

*Corresponding Author: Luqman Khan ✉ luqman.zoology@gmail.com

Introduction

Poultry industry resides an important position in the supplying of animal protein to man and generally play a major role in the national economy as an income provider. Chicken is one of the intensively reared off domesticated fowl species and the most developed and beneficial animal production venture (Nnandi and George 2010). The Poultry industry plays a large role in the economy of Pakistan. It is estimated that these provide 12 kg of poultry needs per resident per year whereas cattle provide 5.3 kg (Mephosa and Masika, 2010). In developing countries poultry production offers an opportunity to feed the rapidly growing human community and to provide an earning source for poor farmers. Moreover, Poultry in many parts of the present day is considered not only inexpensive animal protein but also of high-quality human food (CSA, 2009).

Therefore, poultry meat is more available to the people than beef. Poultry production in Africa and parts of Asia is still particularly divided into commercialized and village venture subsector, each with its peculiarities (Nnadi and George., 2010). Studies in some countries have shown that the prevalence of parasitic infestations in the domestic chicken group is very high ranging from 50 to close to 100% (Mungube *et al.*, 2008, Nnadi and George 2010). Unfortunately, village chicken production is constrained by many extrinsic factors among which malnutrition, bad management; the absence of supplement feed and the lack of biosecurity are outstanding. In backyard production system, the chickens are uncovered to a higher chance of infection by a wide variety of parasites, which range from lice, mites, fleas, ticks, and helminthes to gnats and coccidia (Nnadi, 2009). Although the prevalence of parasitic infection has been greatly decreased in the commercial production system, mostly due to improving housing, hygiene, and management operation (Yoriya *et al.*, 2008).

Lack of proper nutrition and adequate management force the free range for poultry to scavenge for food in contaminated environments, which leave open them to arthropod-borne helminthes infections (Mukaratirwa *et al.*, 2008).

In inclusion to many bacterial and viral diseases, the gastrointestinal parasitism is one of his larger threats to domestic fowls. The great infestation to parasitic eggs causing large economic losses in term of delayed growth, low weight gain and less production (Puttalakshamma *et al.*, 2008). The gastrointestinal cestodes parasites cause decline in egg production, diarrhea, hindrance of the intestine, morbidity, important hemoglobin depression and great mortality chances in backyard chicken (Katoch *et al.*, 2012). Moreover, roundworms are the most beneficial group of helminthes parasites of chicken. This is because of the large number of parasitic species that occurs damage to the host, especially in high infections. Most nematodes affect the gastrointestinal tract, with accidental parasites targeting the trachea or eye. Each species of roundworm has to damage a certain area of the gastrointestinal tract. Different species of the similar genus may infect numerous different areas of the tract (Jacobs *et al.*, 2010). Of helminthes parasites of poultry birds, roundworm constitutes an important class of helminthes parasites of poultry both in a number of species and in the level of damage, they caused. The main genera consist *Ascaridia*, *Heterakis* and *Capillaria* (Matur. 2010) generally, roundworm of poultry infection are broadly distributed in different areas of the world and large number of research has been done to prevent the death of poultry from parasitic diseases and the prevalence of two roundworm species, *Heterakis-gallinarum* and *Subulurасuсtoria* from the cecal of Guinea fowl (*Numidia meleagridis*) (Aman *et al.*, 2013). After a while three roundworm species from white leghorn chicken namely; *Ascaridiagalli*, *Heterakisgallinarum* and *Subulurabrupti* were recorded (Mohammed 2007). On the other hand, coccidiosis causes a significant economic loss in the poultry industry such as decreased growth rate. Weak feed conversion leading to bad performance and death especially in broiler chickens. Chickens are vulnerable to at least nine species of coccidia. The most common species are *Eimeriatenella*, which gives rise to cecal-coccidiosis while *E. acervulina* and *E. maxima* give rise to severe intestinal coccidiosis. *Ascaridia galli* causes larger death chances in the small birds. Helminthes parasites are of a great cause of the decrease in poultry productivity (delay of growth, reduced egg production, the death of young birds).

The recording of gastrointestinal helminthes was investigated in various studies done on back-yard poultry from various regions of Africa (Mungube *et al.*, 2008). Generally, roundworm of chicken infection are broadly distributed in different areas of the world and large research has been existed to control the death of poultry from parasitic diseases and the prevalence of two nematodes species, *Heterakis gallinarum* and *Subulurasuctoria* from the cecal of Guinea fowl (*Numidia meleagris*) (Aman *et al.*, 2013). So keeping in mind the importance of these parasites in poultry. This study was planned to investigate the prevalence and indicate the different species of GI nematode parasites infecting fowls and to provide a guideline in adopting the preventive tools to treat and control the parasitic infection. *Ascaridia galli* can also have detrimental effects through interaction with other disease conditions such as coccidiosis and infectious bronchitis. These worms are characterized by complete absence of the digestive tract and obtain their nourishment by absorption from the gut contents of the host. Furthermore, the role of poultry worms such as *Heterakis gallinarum* has been associated with the transmission of *Histomonas meleagris* in turkeys and chickens. Poultry production in Charsadda, KPK, Pakistan is distinctively divided into commercialized and village enterprise subsectors with its peculiarities. Village chicken production is compelling by many external factors i.e. malnutrition, bad management and the absence of biological security are outstanding. Losses have also been attributed to restrict housing and veterinary care services. Beside above factors, the threat of many making problems because of parasitism is always exists when chickens are raised.

There is a large data on the prevalence of gastrointestinal parasites in chickens. Therefore, a point prevalence study was conducted to determine the gastrointestinal Nematode in chickens in Charsadda. This is significant in controlling the prevalence of helminthiasis.

Material and method

Study Area

The study was conducted from January 2013 to May 2013 in rural areas of district Charsadda,

Khyber Pakhtoon Khwa, Pakistan. Thirty-six (36) chickens were randomly sampled from two villages. These villages were Rajjar and Gul Abad of district Charsadda (Fig 1). The average temperature was 22.5°C and annual average rainfall was 460 mm.

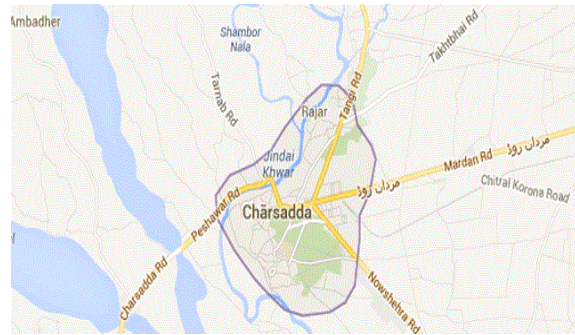


Fig. 1. Map of District Charsadda, Khyber Pakhtoon Khwa (KPK), Pakistan by Google maps.

Sampling

The villages were considered as one population. The samples were collected from those chickens which were not vaccinated against any disease or parasites. The observation were done in parasitological research laboratory of Zoology Department of Abdul Wali Khan University Mardan, KPK (Fig 2).



Fig. 2. observation of gastrointestinal tracts.

Collection of Parasites

The chickens under experimentation were slaughtered and observed for the presence of intestinal helminthes parasites. The complete gastrointestinal tracts (GI tract) collected, were divided into four sections and open longitudinally and washed it carefully via a 100 mm test sieve. The mucosa was scraped in order to collect the embedded helminthes in mucosa.

The contents were examined with magnifying glass and all endoparasites were collected and stored in 70% alcohol for further examination under light microscope.

Identification of parasites

All parasites were identified by using the helminthological keys of Calnek (1991) and Ashenafi (2004).

Results

Out of 36 gastrointestinal tract of chicken 21 (58.32%) harbored intestinal Nematodes.

Two species of Nematode *Heterakis gallinarum* 14 (38.89%) and *Ascaridiagalli* were found in 10 chicken with prevalence rate of (27.78%). The predilection site of both species was ileum and duodenum (table and fig. 1). The infection rate was more in male chicken (62.2%) than in female chicken (46.14%) show in Tables (2 and 3) Fig. (2 and 3). The chickens had higher prevalence of single infection (55.56%) compare to double (2.78%). No triple infections were found.

Table 1. Prevalence of nematodes based on species infesting domestic chickens at Charsadda. (Single and mixed infestation N=36).

Parasite species	No. of chickens infected=36	Prevalence (%)	Predilection Site
<i>Heterakis gallinarum</i>	13	36.11	Duodenum/Ileum
<i>Ascaridiagalli</i>	9	19.44	Duodenum/Ileum
Double(<i>Heterakis gallinarum</i> + <i>Ascaridiagalli</i>)	1	2.77	Duodenum/Ileum
Total	21	58.32	Small intestine

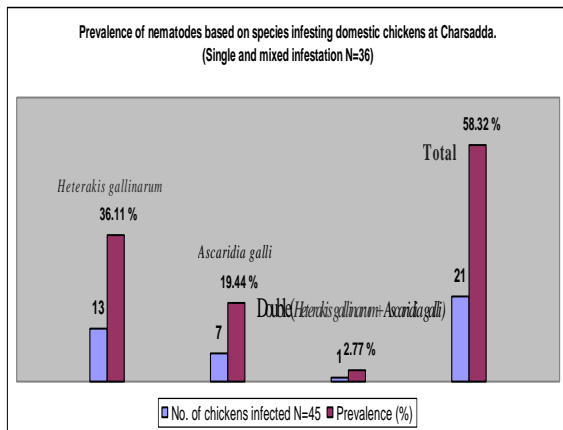


Fig. 1. Prevalence of nematodes based on species infesting domestic chickens at Charsadda. (Single and mixed infestation N=36).

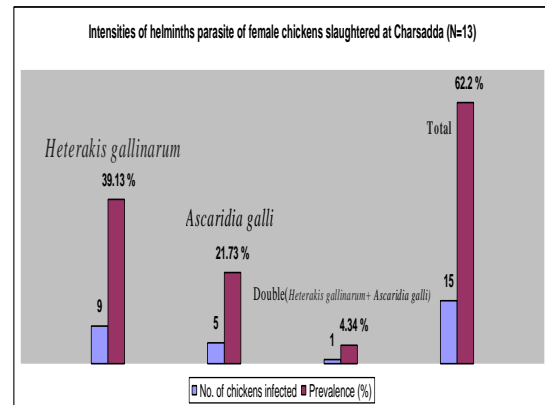


Fig. 2. Intensities of helminthes parasites of male chickens slaughtered at Charsadda (N=23).

Table 2. Intensities of helminthes parasites of male chickens slaughtered at Charsadda (N=23).

Parasite species	No. of chickens infected	Prevalence (%)	Predilection Site
<i>Heterakis gallinarum</i>	9	39.13	Duodenum/Ileum
<i>Ascaridiagalli</i>	5	21.73	Duodenum/Ileum
Double(<i>Heterakis gallinarum</i> + <i>Ascaridiagalli</i>)	1	4.34	Duodenum/Ileum
Total	15	62.2	Small intestine

Table 3. Intensities of helminthes parasite of female chickens slaughtered at Charsadda (N=13).

Parasite species	No. of chickens infected	Prevalence (%)	Predilection Site
<i>Heterakis gallinarum</i>	4	30.76	Duodenum/Ileum
<i>Ascaridiagalli</i>	2	15.38	Duodenum/Ileum
Total	6	46.14	Small intestine

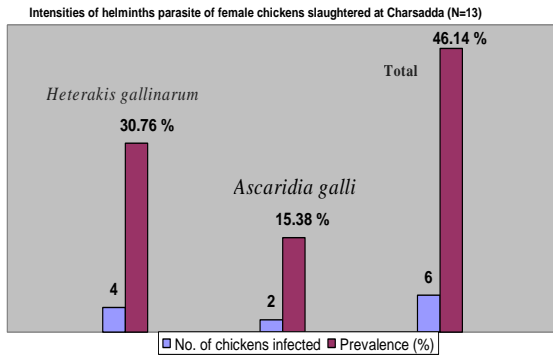


Fig. 3. Intensities of helminthes parasite of female chickens slaughtered at Charsadda (N=13).

Discussion

The most dreadful and debilitating parasitic disease of domestic animals especially in poultry caused by nematodes species. In this study one of the roundworm species, *Ascaridia galli* has a worldwide distribution as a parasite of poultry.

The prevalence was (58.32%) of roundworm parasites, this finding was matched to the report of (Yehualashet *et al.*, 2011) and (Matur *et al.*, 2010) who recorded a prevalence of 59.64% and 53% in Ethiopia and Nigeria. This variance could be related to the differences in the management network, study method, sample size and sway practices in the area. The same finding (60%) were reported in Jeddah Province, Saudi Arabia (Dehlawi 2007). The finding was also similar with the report of (Ajanusi *et al.*, 2012) who investigated a prevalence of (63.6%) in Makurdi. The small difference may be due to the climatic conditions of the areas. This finding was higher than previous reports of (Hirut *et al.*, 2009) and (Nnadi and George *et al.*, 2010) with a prevalence of 39.2% and 35.5% from Ethiopia and Nigeria respectively.

The most prevalent roundworm species experienced in the present study was *Heterakis gallinarum* (38.89%) followed by *Ascaridia galli* (27.78%). *Heterakis gallinarum* begins infections that are pathogenic to a small extent. Although, it often transfer protozoan that causes of Histomoniasis. While *Ascaridia galli* causes impede growth, less productivity, irritation, and inflammation of the mucosa thus deduce with the absorption of food.

The prevalence of *Heterakis gallinarum* (38.89%) connected with the finding of (Ajanusi *et al.*, 2012), which were (27.7%). The prevalence of *Heterakis gallinarum* in this study was by distinctly higher than that of Kenya (1.43%) (Kaingu *et al.*, 2010). The prevalence in the present study may be due to the reason that the chicken that included in this study was more of managed in extensive management system hence elevated chances for infection with gastro-intestinal roundworms and from climatic conditions and conventional breeding which were appropriate for infections.

Because the chickens search their food in the soil and this one habitually contaminated with infective phases of parasites and living organisms (earthworms, insects, and mollusks) which work as intermediate hosts (Yousafi *et al.*, 2013). Nevertheless, till the prevalence of the present study is slightly higher than (Berhanu *et al.*, 2013) describe *Heterakis gallinarum* (51.6%) in Ethiopia. The large prevalence of *Heterakis gallinarum* might because of agro-ecological changes. *Heterakis galli-narum* in the present finding is much higher than 8.25% (Mungube *et al.*, 2008).

Prevalence of *Ascaridia galli* is on next position that shows resemble to that of 25.63%, in indigenous fowls from Kenya (Kaingu *et al.*, 2010) while lesser than 48.39% from Nigeria (Nnadi and George *et al.*, 2010). Although the prevalence of *Ascaridia galli* was much lesser than the previous finding works 38.0% from Haramaya (Tesfaheywet 2012).

The prevalence of roundworms (*Ascaridia spp.*) reported during the study was 27.79% which is less than the report of 37.3% in Arkansas (Tesfaheywet *et al.*, 2012) and 32.3% in Ethiopia (Heyradin *et al.*, 2012) similarly. This is also matching to that of 25.63% from Kenya (Irungu *et al.*, 2004) and lesser than 10.3% from Kenya (Kaingu *et al.*, 2010) similarly and very lower result of 5.8% in Trinidad (Babool *et al.*, 2012) which is in contrast highly lesser than 56.00% in Iran (Estami *et al.*, 2009) and 75.6% in Palestine (Rayyan 2010). This is because to misunderstanding in management systems, de-worming application and/or agro-ecological situation of the study population.

This study indicates that male chicken had high prevalence of (62.2%) while female have less prevalence (46.14%). It was resembles with the result of (Sonaiya and Matur, *et al.*, 2010). This result is in contrast with another finding from Haramaya by (Tesfaheywet *et al.*, 2012) in which gastrointestinal roundworm infection was high prevalent in males (52.1%) than females (39.9%). This change may be due to sample size and nutritional unavailability. This might not be associated to their feeding. The lesser prevalence in female chickens in this study could be reason that female birds limit their feeding habits during the incubation phases and concentrate highly on grains and food remnant being served to them during incubation stage. Large number of farmers takes significant care of the incubating fowls by providing them food and water to atone for the time serve in incubatory. This minimizes the chances of being infected. The male birds go far for looking of food and mate as a result maximizes the rate of infection with those species of helminthes parasites that need intermediate hosts to occurs. The maximum prevalence could be attributed to the habit of domesticated birds feeding on a broad range of diets under poor farming, and large number of beetles, cockroaches and earthworms that could function as intermediate hosts, predisposing them to parasitic infections (Luka and Ndams, 2007; Onyirioha, 2011). As reported in this finding multiple or mixed helminthiasis has been resulted as most common in chicken kept extensively (Nnadi and George, 2010). In the present study sex seems to have larger prevalence of GI nematodes that could related to the greater susceptibility of Males. Our study is discrepancy with the work of Sonaiya (2006) and Matur, *et al.*, 2010) that they investigated female birds were more infected with GI nematode parasites as compared to the males in both domestic and exotic species. Because the female fowls are known to be high voracious in their feeding habits especially during egg lying than the males which remain largely selective and matching with the study of (Tesfaheywet *et al.* 2012) in which GI roundworm infection was more widespread in males (52.1%) than females (39.9%).

This difference may be due to sample size and diet deficiency. The other report shows that there was no usual natural empathy of GI nematode species to either sex of the host of chickens.

The finding of *Heterakis gallinarum* in this study is important due to its association with the protozoan *Histomonas meleagridis* the causal agent of blackhead disease of local birds (Nnadi and George, 2010).

Conclusion

This study has verified the high prevalence nematode and identification of *Heterakis gallinarum* in male chickens of Charsadda. Therefore, producers and management practice should be improved especially withbreeders. Finally, more studies that will comprehensivelycarried out to highlight and control different aspects of parasitism in this bird and to increase the production of chicken in the district Charsadda, KPK, Pakistan.

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