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A Report of *Ascaridia galli* in Commercial Poultry Egg from India

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ABSTRACT

Ascaridia galli is a major encountered species of nemathelminthes in the domestic fowl from all around the world. The parasite causes many pathological conditions which may lead to production losses in the poultry industry. Life cycle of the nematode is direct and involves a single host. Adult parasites present in the small intestine but, erratically they can migrate to the other visceral organs including oviduct. In the study, we isolated two adult female parasites of species *A. galli* from albumin portion of the poultry egg. Isolated parasites as well as extracted eggs were examined by parasitological techniques. While erratic migration, It may lead the mechanical transmission of enteric pathogens including *Salmonella* spp. to the egg. Such reports may lead to consumer complaints as well as health problems in the people who consume raw eggs. Poultry egg harbouring such nematode and Salmonella organisms is a cause of concern, as it is widely consumed by people.

Keywords: Egg, *Ascaridia galli*, Poultry, Erratic migration

INTRODUCTION

There are many helminth parasites affecting and causing production losses to the poultry industry (Permin et al., 1999). Among them, *Ascaridia galli* is a most common nematode of domestic fowl and causing ascaridiosis in the hens, turkeys, geese and some other birds (Ramadan and Znada, 1991, 1992). It is cosmopolitan in distribution and reported from many countries including India (Bhalerao, 1935; Manna, 1992). Life cycle of the nematode is direct but earthworms can ingest eggs and act as a transport host. Birds become infected by ingestion of infective eggs directly with contaminated food and water or indirectly by consumption of transport host. After ingestion, the eggs are mechanically transported to the duodenum and hatch within 24hrs. After hatching larvae penetrates the intestine for histotrophic phase and return to the lumen and finally get matured (Ackert, 1931; Permin et al., 1998). Adult parasites present in the small intestine and eggs are passed out in the droppings (Pankavich et al., 1974; Ramadan and Znada, 1992; Permin et al., 1998). The infection is found in both deep litter as well as cage system, but infection rate is more in deep litter system (Hemalatha et al., 1987). Occasionally, live or calcified adult parasites are found in the albumin portion of the egg (Akinyemi et al., 1980; Omran, 1982; Soulsby, 1982; Hoglund and Jansson, 2011). Probably it reaches to the egg while egg formation via cloaca or penetration of intestine (Akinyemi et al., 1980; Fioretti et al., 2005).

Ingestion of such eggs can not cause any clinical disease in the human as nematode will be destroyed by peptic digestion (Fioretti et al, 2005). Although presence of parasite worm in the hen's egg is not considered as hazard for public health, it can cause potential consumer complaint. While this erratic migration, parasite may lead the mechanical transmission of bacterial, parasitic, or viral

enteric organisms like *E. coli*, *Salmonella* spp., *Campylobacter* spp., *Cryptosporidium* spp., *Giardia intestinalis*, Rotavirus, avian Influenza virus etc. into the egg (Goodwin and Brown, 1989; Ahmed and Ahmed, 2006; Permin et al., 2006; Roussan et al., 2012; Zambrano et al., 2014). These pathogens may cause severe morbidity with diarrhea, vomiting, nausea, abdominal cramps and fever in immunocompromised persons, children and old aged persons (Chadfield et al., 2001). Such eggs become a potential source of pathogenic organisms for humans who consume raw egg and cause hazard for public health.

Moreover, it is also indication of presence of *A. galli* infection in the poultry production system. Poultry egg harbouring such nematode and pathogenic organisms is a cause of concern, as it is widely consumed by people. In the study, we report a case of erratic migration of *A. galli* parasite in the commercial poultry egg.

MATERIALS AND METHODS

A fresh egg with worms was bought by private consumer and submitted to our attention. As per history, the egg was purchased by consumer from the local market located in the Kolkata, India. The egg was from a poultry farm with deep litter system and a healthy and normal flock. The farm did not have veterinarian but all the deworming, vaccination and other routine practices were performed regularly at the farm. While examination, two worms were isolated from the albumin portion of the commercial poultry egg. The nematodes were viable and moving in the albumin portion. Worms were isolated and immediately examined using parasitological techniques. After isolation, worms were washed properly with the normal saline solution. Worms were cleared in lacto-phenol solution and examined under microscope for their morphological characteristics. For further confirmation, uterus of nematode was teased on glass slide to extract the eggs. Eggs and worms were examined using morphological features described by Ramadan and Znada (1991, 1992). Because of the egg was brought from the market, so it was not possible to examine other eggs of the same bird.

Ethical approval

Not applicable. This research did not involve the introduction of any intervention with birds.

RESULTS

While examination, yellowish white colored and large nematodes were found in the albumin portion of commercial poultry egg. The cuticle was semitransparent and striated throughout the body. Both the worms were approximately 50 to 55 mm long with tapering ends. The anterior end of the worm was pointed and was covered by three lips. The posterior end of the worm was blunt. The eggs were unsegmented and oval shaped. The egg shell was thick and smooth. Based on the observations, both the worms were confirmed as adult female *A. galli*.

DISCUSSION

Although very few literatures is available on pathogenecity of *A. galli*, it can cause haemorrhage, enteritis, emaciation, weight loss etc. and leads to decrease egg production in poultry industry (Reid and Carmon, 1958). Adult parasites present in the small intestine, but they can migrate up to the oviduct through cloaca or penetration of intestine and participate in the egg formation (Akinyemi et al., 1980; Fioretti et al., 2005). Occasionally, erratic migration is reported as calcified or viable worms in the albumin portion of the egg (Akinyemi *et al.*, 1980; Omran, 1982; Soulsby, 1982; Hoglund and Jansson, 2011). The occurrence of the erratic migration may be frequent but unnoticeable because of common use of boiled eggs for consumption (Fioretti et al., 2005).

In the study, we found two viable adult female parasites of *A. galli* in the albumin portion of the single poultry egg. The size of the worms was comparatively smaller than the adult female worms of Ramadan and Znada (1992). The smaller size of the worms might be due to arrested development in unusual organs.

In past, a similar case of erratic migration was reported by Fioretti et al. (2005) in an egg where private consumer submitted the egg with the history of white filiform structure in the egg. After examination, they confirmed as an adult *A. galli*. Nikitin and Pavlasek (2014) reported the case of unusual localization of *A.galli* in the chicken egg. After isolation, they carried out the morphological study of different body parts of the parasite. In addition to this reported cases, Akinyemi et al. (1980) also reported the case of erratic migration of *A. galli* in the albumin portion of the poultry egg. Machado et al. (2007) recovered viable and adult female of *A. galli* from the albumin portion of the red bark egg of poultry. From India, a case of erratic migration of *A. galli* was reported by Manna (1992) in the albumin of the hen's egg.

Although, *A. galli* does not infect the human beings as it is not zoonotic, it can cause potential consumer complaint. While erratic migration, it may lead the mechanical transmission of the enteric pathogens like *E. coli*, *Salmonella* spp., *Campylobacter* spp.,

Cryptosporidium spp., *Giardia intestinalis*, Rotavirus, avian Influenza virus etc. into the egg. These pathogens are causative agents of various gastrointestinal problems. Among them, salmonellosis and campylobacteriosis can cause the major bacterial food borne gastroenteritis (EFSA and ECDC, 2012). Such egg becomes potential source of infection to the persons who consumes raw egg (Okorie-Kanu et al., 2016). Moreover, such reported cases also indicate the presence of *A. galli* parasite in the poultry raising system.

Since helminth parasites can be easily detected in the egg by candling, candlers should be properly trained to find and remove such eggs from the channels (Reid et al., 1973). Detection and removal of such infected eggs in the marketing channel is highly desirable for both consumers and producers. Additionally, regular deworming and monitoring should be carried out regularly in the poultry raising system to minimize the infection.

CONCLUSION

The eggs sold in the market may harbour *A. galli* parasite and may cause a health hazard to the public who consumes improperly cooked or raw eggs. Detection and removal of such eggs by proper candling can cause great benefit to the consumer as well as producer. It is essential to maintain strict hygiene and timed anthelmintic treatments in the poultry raising system to minimize the infection.

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Competing interests

The authors declare that they have no competing interests.

Authors' contributions

Gamit Amit Bharat and Nanda Pramod Kumar: Designed the experiments and performed the experiments. Bandyopadhyay Subhasish and Bhar Ria: Analyzed the results, drafted and revised the manuscript. All authors have read and approved the final manuscript.

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