



Effect of Pendulous Crop on Certain Clinicopathological and Biochemical Parameters in Japanese Quails

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ABSTRACT

In this case report, clinicopathological findings and certain biochemical parameters were presented in quails with the pendulous crop. The animal material of the study consists of a total of 3 Japanese quails (*Coturnix coturnix japonica*). The quails were examined clinically first, followed by the post-mortem examinations. The investigations of Na, K, Mg, total TP and Alb were conducted using autoanalyzer. The plasma levels of sodium, potassium, magnesium, total protein and albumin in the blood samples collected from the animals were found to be higher than the averages for quails. Postmortem examination of quails has revealed that the veins of their crops were prominently pronounced and that the crops were filled with a yellowish, foul-odor liquid containing whole grain particles. Furthermore, the crop mucosa of an animal contained ulcerative lesions. As a result, it was found that certain mineral levels and protein profiles of animals were affected by the pendulous crop phenomenon, and that laboratory findings should be considered alongside physical findings when dealing with it.

Keywords: Quail, Pendulous crop, Clinicopathologic, Biochemical parameters

INTRODUCTION

The pendulous crop is a physiological disorder characterized by abnormal dilatation of the crops of poultry animals, and its etiology is still unknown (Ebling et al., 2015; Qasim et al., 2015). Once the crop dilates and prolapses it can't return to its normal posture which is the characteristic symptom of the disease. It is reported that this phenomenon is most commonly encountered turkeys (Arda et al., 1990; Venkatasivakumar et al., 2016; Gonder, 2018), but its incidence in broilers have also reportedly increased in recent years (Ebling et al., 2015), and it can even rarely be encountered in quails (Al-Soudi et al., 1974; Hurst, 1978).

While the cause of the disease is not exactly known, it is reported that hereditary causes are the most significant factor (Hinshaw and Asmundson, 1936;

Asmundson and Hinshaw, 1937; Willems et al., 2014; Gonder, 2018). Besides genetic susceptibility, extended periods of hot weathers and excessive water consumption due to this heat are reported as preparative factors (Asmundson and Hinshaw, 1937; Willems et al., 2014). Furthermore, in some cases of the disease encountered in broilers, it was found to be related to the presence of Marek's disease or parasites (Ebling et al., 2015).

The feed consumption of diseased animals does not change significantly, but the digestion slows down nevertheless, and the contents can't be sent to the gizzard at the normal rate, causing malnourishment and dehydration (Arda et al., 1990; Ebling et al., 2015). The weakening of the crop and its supportive tissues in animals in this condition causes the crop to sag, resulting in the pendulous crop (Willems et al., 2014). The enlargement rate of the crop depends

on the course and extent of the disease. In most cases, a semi-liquid content is present inside the crop (Arda et al., 1990; Qasim et al., 2015; Venkatasivakumar et al., 2016). In some cases, the crop content is watery and sour-smelling, while in others it may have the consistency of mud (Venkatasivakumar et al., 2016; Gonder, 2018). In advanced forms of the disease, necrotic ulcers can be noticed. Scraping of the necrotic tissue over the crop reveals the bleeding parts below (Arda et al., 1990). In most cases, treatment of the diseased poultry is in vain (Bacon, 1968; Qasim et al., 2015). Hereditary methods and management are reported as the two main approaches to preventing the disease (Bacon, 1968; Willems et al., 2014). The animals with pendulous crop should be removed from the facilities, and they shouldn't be used for breeding, whether they are male or female. Improvement of animal raising conditions is most important, and attention to shadow areas, water presence and, proper diet is also significant in hot regions (Bacon, 1968).

In this case, it was aimed to investigate the clinicopathological findings and certain biochemical parameters of quails diagnosed with the pendulous crop.

CASE HISTORY

The animal material of the study consists of a total of 3 Japanese quails (*Coturnix coturnix japonica*) of 4 to 6-week ages, of which 2 were females and 1 was a male. The quails were examined clinically first, followed by the post-mortem examinations. The blood samples for the biochemical analyzes were collected during the slaughtering of the animals. The samples were taken into non-anticoagulant tubes, which were centrifuged in 3000 rpm for 10 minutes and were transferred into 1.5 ml microtubes. The samples were kept in -20 °C till their analysis. The investigations of sodium (Na), potassium (K), magnesium (Mg), total protein (TP) and albumin (Alb) were conducted using autoanalyzer (ADVIA 1800 Chemistry System, Germany).

Inspections have revealed that the ventral part of the animals' necks was abnormally dilated, and their crops were full and bulging (Fig. 1A). Dehydration was also detected in the quails. Postmortem examination of quails has revealed that the veins of their crops were prominently apparent and the crops were filled with a yellowish, foul-odor liquid containing whole grain particles (Fig.

1B). Ulcerative areas were detected in the crop mucosa of a quail (Fig. 1C). Duodenum, jejunum, and ileum of the animals were found to be empty (Fig. 1D). The results of biochemical examinations are shown in Table 1. As can be seen in Table 1, the Na, K, Mg, TP, and Alb levels of both male and female quails were found to be higher than their counterparts in the literature.

Table 1. Serum biochemical parameters in Japanese quails.

Biochemical Parameters	Cases			References
	I (Male)	II (Female)	III (Female)	
Na (mmol/l)	144	145	147	142.60 ± 8.55 ^a
K (mmol/l)	4.50	3.60	3.50	2.40 ± 0.76 ^a
Mg (mg/dL)	5.07	4.26	5.41	3.77 ± 0.16 ^b
TP (g/dL)	2.60	2.90	3.50	2.40 ± 0.10 ^c
Alb (g/dL)	1.20	1.30	1.50	0.90 ± 0.00 ^c

^a: (Suchý et al., 2010), ^b: (Karabulut and Eren, 2006), ^c: (Tufan et al., 2015)

DISCUSSION AND CONCLUSION

While the pendulous crop disease is reported to be most commonly encountered in turkeys (Venkatasivakumar et al., 2016; Gonder, 2018), its incidence in broilers have also reportedly increased in recent years (Ebling et al., 2015). There are a limited number of studies reporting the disease for the quails (Al-Soudi et al., 1974; Hurst, 1978).

Some researchers have reported that extended periods of hot weathers played an important role for the occurrence of the disease, besides the genetic susceptibility of the animals (Hinshaw and Asmundson, 1936; Asmundson and Hinshaw, 1937; Willems et al., 2014). Pendulous crop cases in this study were detected in Siirt province. The weather of the province has the semi-arid climate classification. The lowest and highest average temperatures in summers are 36.9 °C and 18.9 °C, respectively. Water shortages are common during summer months. It is possible that the very hot summer months of the Siirt province climate could have played a role in the occurrence of the pendulous crop disease in quails.

In their studies of the disease in turkeys, the researchers (Bacon, 1968; Qasim et al., 2015) have reported that the crops were initially slightly swollen, and the swelling increased as the disease progressed. Qasim et al. (2015) have reported that one of the turkeys with pendulous crop was languid, anorexic, and recumbent, and a foul-odor

liquid was being discharged from its mouth. Similar to the findings of these researchers, abnormally swollen ventral neck sections were present in our study as well, and palpations revealed content-filled and swollen crops.

In their postmortem inspections, Qasim et al. (2015) have found that one of the turkeys with pendulous crop condition had an enlarged crop filled with soft content, and the veins of the crop were prominently apparent. When they incised the crop, the content was noticeably full of a liquid containing whole grain particles, while the duodenum, jejunum, and

ileum of the animal were found to be empty. Bacon (1968) reports that postmortem crop content had a sour odor and the walls of the crop were thinner than normal. Rigdon et al. (1960) have reported that some degenerative objects had caused ulcers in the inner part of the crop, and the muscles around the crop were weaker than usual. The findings of the swollen crop, prominent crop veins, crop content containing whole grain particles, and empty duodenum, jejunum, and ileum in our study, along with the ulcerative areas in the crop mucosa of one of the quails, is consistent with the findings of the other researchers.

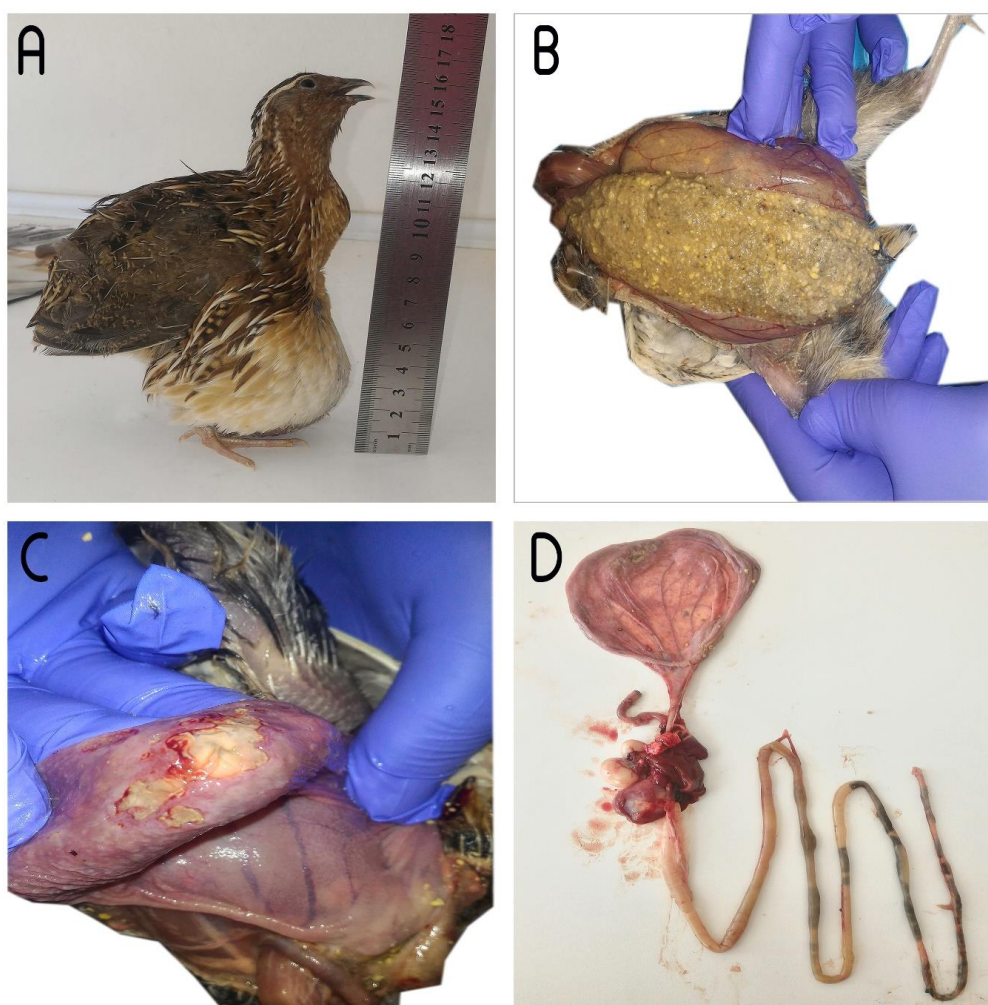


Figure 1. (A) Pendulous crop in male quail, (B) semi-liquid crop content with grain particles, (C) ulcerative areas in the crop mucosa, (D) Empty bowels

Al-Soudi et al. (1974) report that the quail chicks that were separated into a group for a low protein (17.9%) glucose monohydrate-soybean meal diet displayed 44.0% pendulous crop occurrence, compared to 11.8% of the control group fed with normal ration. Wheeler et al. (1957) were able to experimentally create pendulous crop in animals by

using either starch or diet purified by glucose monohydrates. Since the content of the feed used for feeding the quails in this study was in accordance with the requirements of the National Research Council (NRC, 1994), it can be surmised that the pendulous crops that occurred in our study couldn't have originated from the diet.

The monitoring of biochemical indicators in blood samples from poultry is now a routine part of experimental studies in veterinary medicine and animal husbandry. Blood parameters are influenced by many factors such as genotype, age, physiological status, gender, diet, micro and macro climate conditions, growth method, seasons and pathological factors (Suchý et al., 2010).

In a study that investigated the clinicopathologic characteristics of pendulous crops observed in turkeys, it was found that the protein and glucose levels of diseased turkeys had slightly increased compared to the reference values (Qasim et al., 2015). In the present study, total protein and albumin levels were found to be higher than the values reported by Tufan et al. (2015).

In broiler chicks, the muscles around the crop are damaged due to the increased tension caused by the sagging, and as the weakened muscles are unable to transfer the nutrients to the proventriculus, dehydration and malnourishment begin to occur (Ebling et al., 2015). Dehydration is basically defined as the reduction in total intra and/or extracellular liquids due to reduced liquid intake or increased liquid discharge and is a common symptom that develops during the course of numerous diseases. In addition to increased hematocrit, hemoglobin, serum TP and albumin concentrations in dehydrated animals, significant deviations can occur in the serum electrolyte concentration and acid-base balance of the blood. In cases of dehydration, it is possible that serum Na and K concentrations will stay at normal levels, but they may get increased or reduced as well (Aktaş, 2007). In this study, the increase in serum TP, albumin, Na, K, and Mg levels in male and female quails diagnosed with pendulous crop could be due to dehydration caused by the incapability of transferring the nutrients to the proventriculus.

Pendulous crop cases were detected in 1 male and 2 female quails in this study. This distribution might be caused by the fact that females usually consume more feed than males. This difference in feed consumption arises due to the hormonal changes occurring in the male quails in 30 to 40 days of age which initiate the sexual activities. This period also coincides with the formation of social hierarchy in the covey, causing increased stress in male quails. Due to all these developments, males of this age consume less feed compared to females (Seker et al., 2007; Bolacali and Irak, 2017; Tufan and Bolacali, 2017). The relatively higher feed consumption

amount may explain why pendulous crop incidence is higher in the females.

As a result, in this case report, it was found that certain mineral levels and protein profiles of animals were affected by the pendulous crop phenomenon, and that laboratory findings should be considered alongside physical findings when dealing with it. It was also surmised that it could be possible to reduce the incidence of the disease by improving animal care and nutrition conditions.

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