



Histological study of adding different concentrations of plantago lanceolata L in Rose (308) strain broiler chickens

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Abstract

The aim of this research is to test the effect of adding 1 gm, 3 gm and 5 gm of plantagolanceolata powder per kg of basic diet food on the histological structure of liver and intestine. In this study, Two hundred (200) Rose (308) strain unsexed broilers were employed, and the experiment was run from day 1 of chicken life until five weeks later (35 day old). The broilers were divided into four groups, each of which contained fifty broilers. The first group (T1) received a basic diet; the second group received a basic diet plus 1 gm/kg of plantagolanceolata; the third group received a basic diet plus 3 gm/kg of plantagolanceolata powder; and the fourth, a basic diet plus 5 gm/kg of plantagolanceolata powder. The ambient temperature was 32°C during the first week of life and then dropped by 2°C per week until it reached 25°C at the end of the experiment. Regarding the light. One hour of darkness and 23 hours of light were supplied. Blood from the wing vein was obtained in a test tube at day 35 of age without the use of an anticoagulant. Serum was obtained by Centrifuging the blood for 5 minutes at 3000 rpm, and it was then placed in a deep freezer (-20) until analysis. After sacrifice the animal liver and intestine sample has been taken and they were immediately put into a 10 % fixative formalin solution. Through the current study the result show that there is a significant decrease in serum GOT in T4 group when compared to the other groups. Also Albumin showed a significant increase in T3 and T4 when compared to the other group. Histological result show liver showed mild central vein dilatation slightly dilated sinusoids separating hepatocytes lobules.

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KeyWords: plantagolanceolata, broilers, Rose (308), liver enzyme, liver structure.

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Introduction

Plantago lanceolata is a species of flowering plant that is a member of the Plantaginaceae family, which also contains plantains. Its common names include ribwort plantain and thin leaf plantain (BSBI list, 2007; Al-Khazraji, 2009).

The plant is a perennial herb that forms rosettes and has silky, hairy blossom stalks without leaves (10-40cm or 3.9 - 15.7 in). The basal leaves are lanceolata, spreading or erect, with 3-5 strong parallel veins that narrow to a short petiole. They are little serrated. The deep-furrowed flower stem terminates in an ovoid inflorescence of several tiny blooms, each with a pointed bract. (Blamey, et al., 2003).

It is endemic to temperate Eurasia, is found across the British Isles, but is uncommon on the most acidic soils (pH 4.5). As an invasive species, it is widespread and prevalent in the Americas and Australia. Pollen diagrams are thought to be an indication of agriculture. Since the early Neolithic period, *Plantago lanceolata* has been discovered in western Norway, and it is thought that this is a sign that the region was grazing at the time (Hjelle, et al., 2006).

Plantago lanceolata is a species of plants that are widely distributed in pastures and green areas in the temperate world. It has been used for various medicinal purposes for centuries such as related to the skin, wound healing, inflammation, disorders of respiratory and digestive organs, reproductive system, blood circulation and cancer because of contained a number of exceptional properties (Temür & Sema., 2019).

In herbal teas and other herbal medicines, *plantago lanceolata* is commonly employed as ice tea (archived. 2009). Tea made from the leaves is employed as a cough suppressant. *Plantago lanceolata* leaves have been used either orally or topically (as Freshleaves) in traditional Austrian medicine to treat problems involving the respiratory system, the skin, bug bites, and infections (vogel S., et al., 2013).

Previous research has demonstrated that the *plantago* genus comprises five chemical classes of physiologically active substances, including phenolic compounds, flavonoids, monoterpenoids, and triterpenoids (Stewart

1996; Chiang et al. 2003; Moore .et al. 2006).

High amounts of glucosinolate (GS) are found in *Plantago lanceolata* seed, which is connected to the Plantaginaceae family of plants (Talalay and Fahey., 2001 and D,Antuono et al., 2008). Because they are anti-carcinogenic and antioxidant, these substances are crucial for both human and animal health (Kim et al., 2004).

The flavonoids and phenolic compounds found in *plantago lanceolata* seeds have potent antioxidant capabilities both in vitro and in vivo by inhibiting free radicals and functioning as a mineral-attracting substance known as the chelating agent (Barillari et al ., 2005; Alam et al., 2007).

In addition to being high in carotene and vitamins like vitamin K, C, and E, as well as the majority of vitamin B groups including biotin (B12), riboflavin (B2), and thiamine, *plantago lanceolata* seeds also include a high percentage of calcium, magnesium, salt, iron, potassium, phosphorus, and iodine (Barillari et al ., 2005; Cartea et al., 2011).

So that *Plantago lanceolata* are used mainly in inflammation of the upper respiratory tract and accelerate skin regeneration , showing bactericidal and anti - diarrheal effect . it can also be used against insect and snake bites, toothaches or as an immunity enhancer (Grigore A. et al. 2015).

Material and methods:

Two hundred (200) unsexed one day old broilers of Rose (308) strain broilers of Rose (308) strain were used in this experiment, which were prepared from Al-debla hatchery in AL-dewanea Governorate. The broilers were divided in to four group and each group contain 50 broilers.

The first treatment group (T1):- they were fed on a basic diet, and the diet was given control without any addition.

The second treatment group (T2):- they were fed on basic diet plus 1 gm from *plantago lanceolata* powder per kg of feed.

The third treatment group (T3):- they were fed on basic diet plus 3 gm from *plantago lanceolata* powder per kg of feed.



The fourth treatment group (T4):- they were fed on basic diet plus 5 gm from plantagolanceolata powder per kg of feed.

The ambient temperature was 32°C during the first week of life and then dropped by 2°C per week until it reached 25°C at the end of the experiment. Regarding the light. One hour of darkness and 23 hours of light were supplied.

Blood was drawn from the wing vein at the conclusion of the experiment and deposited in a special gel tube without any anticoagulant. Centrifuging the serum for 5 minutes at 3000 rpm separated it, and it was then placed in a deep freezer (-20) until analysis.

Sample collection and tissue preparation:

Liver samples were collected at the end of the experiment once the animal had been sacrificed, and they were immediately placed in a 10% fixative solution of formalin, where they were kept for 24 hours before being processed. The samples were first dehydrated in graded alcohol for two hours at each of the following concentrations: 70%, 80%, 90%, and 100% before spending two hours in xylene and three hours in molten paraffin wax. After that, the samples were positioned and inserted into fresh paraffin (paraffin blocks). The blocks were sectioned using a microtome at a thickness of 5 m to examine the sections . Standard hematoxylin and eosin (H&E) staining techniques were used on the sections. Photomicrographs of each section were taken using a digital camera (canon , japan) using a light microscope to analyze the sections under examination (Suvarna et al.,2018).

Result:

The main value of serum GOT show a significant (p≤0.05) decrease in T 4 group as compared to the other group. Also T3 show no significant defiance when compared to T1, on the other hand T2 show significant (p≤0.05) increase when comperd to the other group as shown in table (1)

While the main value of serum Albumin show a significant (p≤0.05) increase in T 4 group as compared to the T1 and T2 groups. While there is no significant defiance when compared to T3, on the other hand T1 and T2 show no

significant defiance as shown in table (1)

Table (1): Effect of Plantagolanceolata on Got and Albumin

Test Group	Got	Albumin
T 1	4.76± 180.15 B	0.06± 1.11 B
T 2	9.53± 215.80 A	0.03± 1.14 B
T 3	4.03± 189.14 B	0.02± 1.41 A
T 4	2.95± 153.16 C	0.11± 1.51 A

Histological result:

The control group (T1) of broiler chicken showed a significant normal architectural histology of the liver normal hepatocytes with normal rounded nuclei, slightly dilated sinusoids separating hepatocytes lobules and significant normal hepatic capsule surrounding the tissue Figure (4). While liver tissue section from 1 gm/kg added Plantagolanceolata (T2) to diet group broiler chicken showed changes in the normal arrangements of hepatocytes, mild to moderate congestion and dilatation of central vein and portal vein and mild necrotic changes of hepatocytes represented by slight hepatic nuclear pyknosis Figure (2). Additionally liver tissue section from 3 gm/kg added Plantagolanceolata (T3) to diet group broiler chicken , showed mild central vein dilatation slightly dilated sinusoids separating hepatocytes lobules Figure (3). While liver tissue section from 5 gm added Plantagolanceolata (T4) to diet group broiler chicken , showed moderate central vein congestion and dilatation (white arrow) and some degenerative changes of hepatocytes Figure (4).



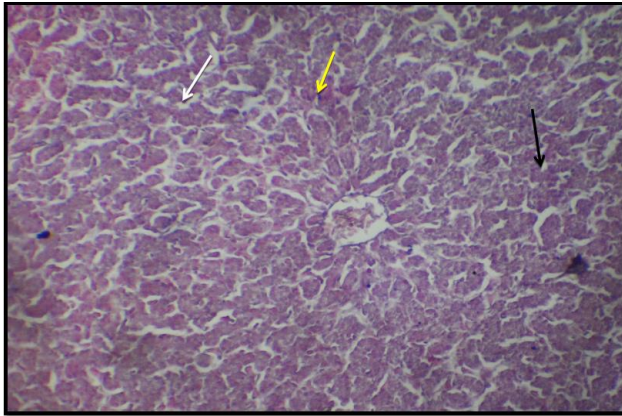


Figure 1 Photomicrograph of liver tissue section from control group broiler chicken, showed the significant normal architectural histology, normal hepatocytes with normal rounded nuclei (white arrow) slightly dilated sinusoids separating hepatocytes lobules (black arrow) and significant normal hepatic capsule surrounding the tissue (yellow arrow) (H and E, 40X).

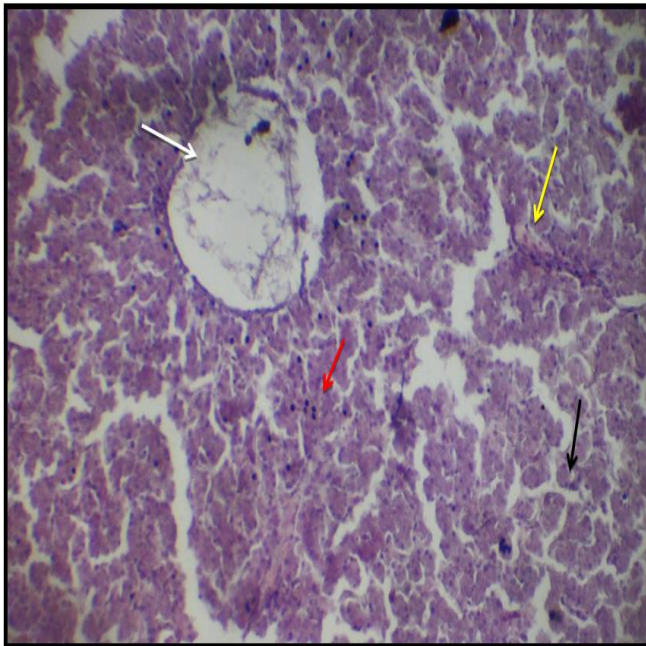


Figure (2) Photomicrograph of liver tissue section from 1 gm added Plantagolanceolata to diet group broiler chicken, showed changes in the normal arrangements of hepatocytes (black arrow), mild to moderate congestion and dilatation of central vein (white arrow) and portal vein (yellow arrow), mild necrotic changes of hepatocytes represented by slight hepatic nuclear pyknosis (red arrow). (H and E, 10X).

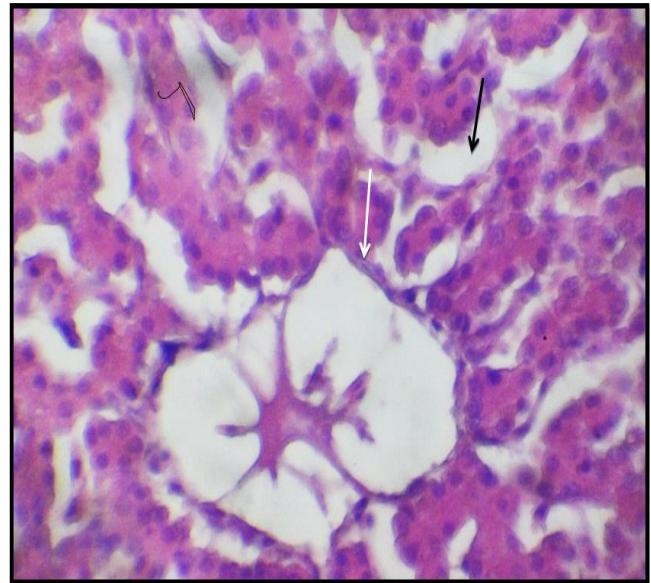


Figure (3) Photomicrograph of liver tissue section from 3 gm added Plantagolanceolata to diet group broiler chicken, showed mild central vein dilatation (white arrow) slightly dilated sinusoids separating hepatocytes lobules (black arrow) (H and E, 40X).

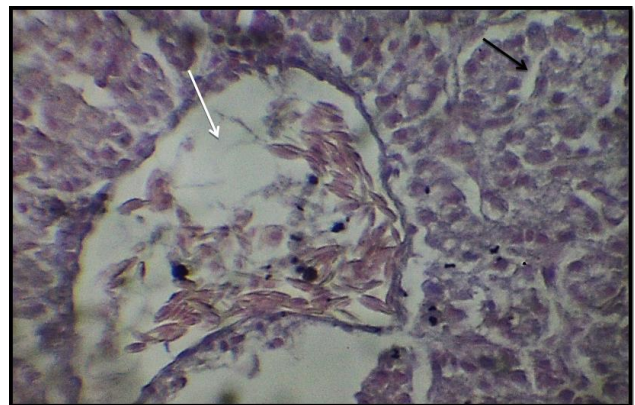


Figure (4) Photomicrograph of liver tissue section from 5 gm added Plantagolanceolata to diet group broiler chicken, showed moderate to severe central vein congestion and dilatation (white arrow) with some degenerative changes of hepatocytes (black arrow). (H and E, 40X).

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Discussion:

The absence of an increase in the level of enzyme got indicates the absence of any defect or damage in the cell, which in turn was reflected in the metabolic processes inside the cell and that the different levels of plantagolanceolata addition in this study did not affect these enzyme and



therefore did not negatively affect the birds and did not happen any stress factor whether nutritional or administrative, and this is what was observed with regard to deaths, as no deaths occurred throughout the experiment period (Giannini et al., 2005).

It was also found when plantagolanceolata was used in the ration that the GOT enzyme was not significantly affected, while there was a decrease in the level of GPT enzyme and it also indicated that the decrease in the effectiveness of these enzymes will be dangerous to the life of the cells tissues and organs. The result is agree with (Khadiga, et al., 2008)

Histologically Central vein congestion may be due to the presence of toxic substance in the liver causing an inflammatory response with increasing blood entry into the inflamed area (Hassan, 2016), or can be explained by hepatic vein blockage, causes stopping of blood flow (Al-Rawi, 2007).

Flavonoids in plantagolanceolata also play an important role as antioxidant component reduce oxidative stress and inhibits lipid peroxidation process, by scavenger ROS production and raising the level of antioxidants (Jagadeesan and Kavitha, 2006; Amin et al., 2007). Plantagolanceolata contains glucosinolates and isothiocyanates, which have numerous biological properties such as antioxidant effects, antibacterial and antifungal, therefore plantagolanceolata has an effective role in recovery the toxic effects of oxidative agents such as liver damage and decrease serum liver enzymes levels (Hussein et al., 2010).

The liver produces a variety of proteins, including blood proteins, enzymes, hormones, clotting and immune factors. it functions as both an endocrine and exocrine gland (Denbow, 2000).

In order to maintain a healthy bird, this organ should be kept in an excellent condition. Better understanding of the metabolic functions and the factors that can cause disruptions in the liver is important for the production of healthy birds.

Conclusion:

From the previous result, showed that adding 5 gr/kg of Plantagolanceolata basil diet improve liver function as showed from decreasing the serum GOT enzyme and increase albumin production.

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