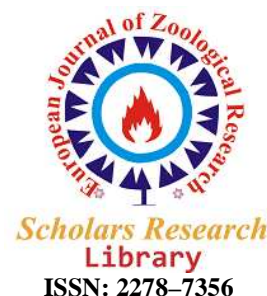




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European Journal of Zoological Research, 2013, 2 (6):59-62
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Effects of feeding 1% inulin on young male coturnix quail on body, liver and gizzard weight and ALP, calcium, magnesium, sodium, potassium and phosphorus of blood serum

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ABSTRACT

Inulin is one of the prebiotics that has been under further studies. Inulin is a non-sugar and polysaccharide herbal carbohydrate containing soluble fiber. In this study, 20 male Coturnix quail were selected. Then the quail were divided into two groups of 10 quail. Water and sugar solution of 5% was applied for feeding on the first day. From the second day, the control group was fed with basal diet and the treatment group was fed with basal diet plus 1% inulin. After 19 days, feeding was cut in 20th day and blood sampling was taken on the 21st day from control and test groups. After sampling the body was weighed. In this study sodium review was performed using ISE method, magnesium using XilidiBlue method, phosphor using U.V. method, calcium using CPC method, potassium using ISE and ALP(Alkaline Phosphatase) using Kinetik method. The results of the sodium, phosphorus, calcium, potassium and ALP in serum did not show any significant differences between treatment groups and control groups also there was no significant difference between weights of body, liver and gizzard considering the control group and the treatment group with 1% inulin. According to the present study, 1% inulin dietary consumption does not have any pathological effects on average ALP, calcium, magnesium, sodium, potassium and phosphorus and no significant differences was observed in the levels of these factors between control and treatment groups. Consumption of 1% inulin is not recommended for weight gaining of quail but further investigations are needed from immunity point of view.

Key words: Inulin Prebiotics, Male Coturnix Quail, Blood Biochemical Parameters, Growth

INTRODUCTION

Prohibition of antibiotics due to appearing resistance by pathogen objects, in developed countries and some developing countries, has made scientists to alternative antibiotics with materials such as prebiotics. Prebiotics are non digestive materials which stimulate the growth of beneficial microbes of intestinal flora and have beneficial effects for the host (10). Inulin is one of the prebiotics that has been under further studies. Inulin is a non-sugar and polysaccharide herbal carbohydrate containing soluble fiber (1, 9). Prebiotics inulin can prevent the growth of pathogen objects in the intestinal tract of host poultry and increase the health care poultry industry. Nowadays, in order to improve the health and efficiency of the industry and along with the development of quail breeding industry in the world and Iran, the demand for of chemicals has increased. But still the consumption of these substances in poultry consumption has not been well studied. Because of the diversity of bird species, researchers are constantly

involved in their health and wellness. In order to achieve a more accurate diagnosis and examining the best diet, physiology and pathology of poultry nowadays a biochemical blood test is used (2). As a fluid liquid, blood is one of the most important biologic fluids of the body in which under physiological and pathologic conditions, its compounds are subject to changes and fluctuations. Hence, having normal levels of blood parameters and investigating the manner of their change can be helpful for identifying problems and determining the poultry organs' health (4, 6, 7). The aim of this study is to investigate the 1% inulin diet of quail on sodium, potassium, calcium, phosphorus, magnesium and ALP factors.

MATERIALS AND METHODS

In this study, 20 male Coturnix quail were selected and weighed. Then the quail were divided into two groups of 10 quail so that the weighted average of the two groups showed no significant differences. Chickens accumulation was adjusted to 10 chickens per square meter. The first day the room temperature was 34 ± 1 and a 2 to 3°C decrease in temperature was applied on the second day. And finally it was fixed on 24°C. Water and sugar solution of 5% was applied for feeding on the first day. From the second day, the control group was fed with basal diet and the treatment group was fed with basal diet plus 1% inulin with Mr ≈ 5000 of Dahila tubers produced by SIGMA Company (By 1% inulin in the diet we mean 10 g per 1kg of seed). Feed was analyzed and the results are given in Table 1-1. The consumed water was the city tap water. The environment was exposed to 24-hour lighting during the experiment. The airing of the room was considered to be 20cm per a cubic meter of the room. A feeding level of 5cm and a drinker of 3cm have been designated for each quail chick.

Table 1-1: composition and chemical analysis of the quail diet

Ingredients (%)	Diet
Corn	47.00
Sot bean meal	33
Full-fat soybean	15
Vegetable oil	1.75
Limestone	1.5
Common salt	0.30
VMP*	0.40
Chemical composition	Diet
Metabolic energy(Kca/Kg)	3200
Crude fiber (%)	2.50
Crude fat (%)	7.50
Crude protein (%)	22.00
Ash (%)	10.00
Moisture (%)	11.00

VMP: Vitamin and Mineral Premix which provides per Kg vitamin A, 1500IU; vitaminD3,5000IU; vitaminE,50mg; vitaminK3,10mg; vitaminB1,4mg; vitamin B2,8mg; vitaminB6,5mg; vitaminB12,0.025mg; niacin,50mg; pantothenic acid,20mg; folic acid,20mg; biotin,0.25mg; choline175mg and manganese,100mg; zink,150mg; iron,100mg; cupper,20mg; iodine,1.5mg; cobalt,0.5mg; selenium,0.2mg; molybdenum,1mg; magnesium,50mg.

Blood sampling and serum analysis

After 19 days, feeding was cut in 20th day and blood sampling was taken on the 21st day from control and test groups. The blood was added into the serum tube manufactured by Eurotube Company. After clotting, the blood was centrifuged with the speed of 3000 rpm for 10 minutes and the serum was removed. In this study sodium review was performed using ISE method, magnesium using XilidiBlue method, phosphorus using U.V. method, calcium using CPC method, potassium using ISE and ALP using Kinetik method and All the introducing kits in this study are manufactured by Pars Azmoon company. After sampling the body was weighed. Then after dissection liver and gizzard were also weighed using scale. Precision of the scale is 0.1 gram.

Statistical Analysis

All raw data of this experiment was investigated by SPSS software version 15.00. The comparison T-test was used to analyze the data. Mean and standard deviation (mean \pm Std. Deviation) was used to evaluate the data. Data with 5% ($\alpha < 0.05$) level of significance were considered statistically significant.

RESULTS AND DISCUSSION

The results of the body, liver and gizzard weighing have been placed in Table I. there was no significant difference between weights of body, liver and gizzard considering the control group and the treatment group with 1% inulin. Also the results of serum biochemical parameters have been placed in Table II. The results of the sodium, phosphor, calcium, potassium and ALP in serum did not show any significant differences between treatment groups and control groups.

Table I: Body weight, liver weight and Gizzard weight Results (Mean \pm Std.Deviation)

Parameter	Control group	Treatment group	P-value
Body weight	86.460 \pm 10.2992	86.360 \pm 6.5742	0.975
Liver weight	2.160 \pm 0.2547	1.980 \pm 0.2860	0.297
Gizzard weight	3.320 \pm 0.3553	3.360 \pm 0.3921	0.867

Table II: Blood biochemical parameters analysis Results (Mean \pm Std.Deviation)

parameter	Control group	Treatment group	P-value
ALP (IU/l)	2536.40 \pm 1064.297	3144.80 \pm 740.231	0.222
Ca (mg/l)	10.54 \pm 3.22	10.34 \pm 3.28	0.255
Mg (mg/dl)	3.420 \pm 1.1612	3.620 \pm 0.9461	0.718
K (mEq/l)	4.420 \pm 1.9013	4.160 \pm 0.9300	0.700
P(mg/dl)	8.92 \pm 2.602	8.64 \pm 1.620	0.810
Na (meq/l)	145.20 \pm 3.425	141.20 \pm 5.051	0.139

In most birds, the normal levels of serum sodium and potassium has been reported as about 130 to 170 Meq g for sodium and 5/2 to 6 Meq g for potassium per liter. (3, 4, 6, 7). Cortical adrenal gland abnormalities, such as aldosterone, body's water state such as dehydration diarrhea, salt gland abnormalities (salt gland) and all birds, alter normal serum sodium of poultry (4, 7). Non-renal excretion of salt in many bird species occurs by special glands called specialized. n. y or salt gland or supraorbital gland. In response to osmotic changes in the blood, these glands act as regulators of osmotic pressure and excrete too much sodium to outside the body. These mechanisms of reduction of serum sodium concentration and urine of birds, are affected by pituitary-adrenal responses (3, 4, 7). Methods of sampling and sample storage is of great importance on the measurement of sodium and potassium of serum, since the existence of hemolysis or difficulty in separating serum from blood clot will reduce sodium and increase potassium (5). In the present study, the range of sodium and potassium of blood serum were normal in both control and test mode and there was no significant differences at 5% levels between control and treatment groups with inulin 1%. Calcium ion regulates a number of important physiological and biochemical events of the body including excitability of nerves and muscles, blood coagulation, secretion process, membrane integrity, plasma membrane transport, enzymatic reactions, release of hormones, neurotransmitters and intracellular activities of a number of hormones (2, 8). Parathormone and calcitonin hormones and vitamin D or calciteriol are the main regulators of calcium metabolism (2, 4, 8). Serum calcium levels have been reported to be 8 to 18 mg per liter in most birds (4, 6). In the tested quails, the calcium level of serum was in this range and no significant difference was observed between the control group and treatment group with 1% inulin in calcium level of quails' serum. In most of the birds, in normal circumstances, the phosphorus levels have been reported to range from 2 to 5/4 mg per dL (2, 3). In 1982 Dein stated the normal value of serum phosphorus of birds to be from 2 to 6 mg per dL (4). Increased phosphorus level occurs in renal diseases so that in this case, the amount of serum phosphorus reaches 5.9 mg per deciliter or more. The normal range of phosphorus level in the treated group and not having a significant difference between the control and treatment groups with 1% inulin shows the non-significant physiological and pathological effect of 1% inulin consumption on the blood phosphorus factor of quails. Alkaline phosphatase, is considered as a non-specific enzymes of birds (3, 4, 7). Alkaline phosphatase has no activity on lung, skeletal muscle and heart muscle of poultry and its activities on liver is negligible (2, 7). Measurement of serum alkaline phosphatase, is not considered as a helpful test to diagnose the hepatic disease of non-carnivorous birds. Also in poultry, ALP serum activity is not increased in obstructive hepatic disease (3, 4, 7). Many researchers believe that the measurement of serum alkaline phosphatase is not useful to diagnose the hepatic disease of birds and is considered as a weak test and contrarily, its measurement was extremely useful to demonstrate the increased osteoblastic activity of birds (4, 6, 7). In this study, no significant difference was observed between alkaline phosphatase of the control and treatment group with 1% inulin. Also, no significant difference was observed between treatment and control groups in mean levels of magnesium. Considering weight variation, there was no significant difference between the average weights of two groups with 1% inulin dietary. Consumption of 1% inulin dietary is not recommended for weight gaining of

quail. Investigating weight variation of quails' gizzard and liver showed no significant difference between control and treatment groups.

According to the present study, 1% inulin dietary consumption does not have any pathological effects on average ALP, calcium, magnesium, sodium, potassium and phosphorus and no significant differences was observed in the levels of these factors between control and treatment groups. Consumption of 1% inulin is not recommended for weight gaining of quail but further investigations are needed from immunity point of view.

Acknowledgement

I would like to express my deepest appreciations to those who sincerely assisted us in this research project. The Persian-English translator of this study is M.A Mehdi Asghari. The laboratory technician of Imam Reza Hospital, Naser Ardrizi also assisted us in the experiments.

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