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EFFECT OF SELENIUM AND VITAMIN E ON SOME ENZYMATIC ACTIVITIES OF GUT CONTENTS AND SERA OF CHICKEN

(With 3 Table)

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تأثير السلينيوم وفيتامين / هـ/ على بعض الانشطه الانزيميه في محتويات القناة الهضمية ومصل الكتاكيت

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تناول البحث دراسة تأثير السلينيوم وفيتامين (هـ) على بعض الانشطة الانزيميه فى محتويات القناة الهضمية ومصل الكتاكيت. وقد اجرى البحث على عدد (٨٠) كتكوت فيومى عمر ست أسابيع واحتوت العليقه القياسيه التى أعطيت على سلينيوم بمقدار ١٥ر٠ جزء من المليون، ١٠٠ وحدة دوليـــة مـــن فيتامين (هـ) لكل كيلو جرام من العليقة. تم تقسيم الكتاكيت عشوائيا الى أربع مجموعات. الاولى تناولت العليقة القياسية. والثانية تم اضافة عشرون وحدة دولية من فيتـامين (هـ) لكل كيلو جرام من العليقة القياسية والثالثة تم أضافة عشر اضعاف كمية السلينيوم المعطاه للمجموعة القياسية. أما المجموعة الرابعة فأعطيت العليقة المعطاه للمجموعة الثالثة مضافا اليها عشرون وحدة دولية من فيتامين (هـ) لكل كيلو جرام عليقة. بعد مرور خمس اسابيع تم تقدير النشاط الانزيمى، للانزيم المحلل للنشويات (الاميليز) والانزيم المحلل للمواد الدهنيـــة(الليبز) ونشاط الانزيم المحلل للبروتينات (Tryptic A.).

وأسفرت النتائج عما يلى: - اضافة السلينيوم وفيتامين (هـ) كل على حده أو معا لعليقة الكتاكيت أديا الى زيادة النشاط الانزيمى، الذى يلعب دورا فى حماية النسيج الكبدى وكذلك المعثكلة من بعض الافراد. كما أشار البحث أن النتائج المتوصل اليها تفسر زيادة النمو الذى يحدث فى الكتاكيت عند اضافة السلينيوم وفيتامين (هـ) فى الابحاث السابقة.

SUMMARY

Eighty Fayoumi chickens of six weeks age were used in the present study. Chickens were kept on a basal ration containing selenium (0.15 pmm) and Vit. E (100 iu/Kg diet). They were allocated randomly into four groups 20 bird in each. They received selenium (Ten times the basal diet) and/or Vit. E (20 iu/Kg diet) for about five weeks. The amylolytic, tryptic and lipolytic activities in gut and sera contents were measured. Results obtained showed that, addition of selenium and/or Vit. E to the diet of broilers increased the enzymatic activities in the intestinal contents which may be of beneficial effect in protecting pancreatic and hepatic tissues from some effects. The data ensured that was proved before about the increase in growth of the chickens fed diets supplemented with selenium and/or Vit. E.

INTRODUCTION

Selenium and Vit. E addition into animal and poultry rations have been found to be effective and recommended. It has been shown that poultry rations must contain an optimum level of both elements to protect cells from the deterious effect of oxygen *COMB (1981)*, and *CANTOR* et al. *(1982)* reported that Na2 Se03 and selenomethionine are equal in prevention of gizzard myopathy in turkey poults, but selenomethionine was proved to be more better than Na2 Se03 in prevention of pancreatic fibrosis in chicks *(CANTOR* et al., *1975 a)*. Abnormal levels of selenium and Vit. E induce different changes in metabolic enzymes *(HILL and BURK, 1985; MERCURIO & COMP, 1985 and AZOUZ* et al., *1990)*.

MOKSNES (1983) and ECHEVARRIA et al. *(1988)* cleared that the high levels of Se in poultry diets increased the concentration of this mineral in liver, Kidney, plasma and muscle, beside, inhibition of some enzymes as succinic dehydrogenase, choline estrase and tyraminase *(UNDERWOOD, 1962)*. Meanwhile, *COMBS and CAMBS (1986)* found correlation between various signs of Se deficiency and tissue concentration of the element when Se deficient rations were given. Concerning total liver fat, *JENSEN* et al. *(1974) and AZOUZ* et al. *(1990)* cleared the effect of selenium supplementation in reducing the fatty liver content and increasing the hepatic functions.

Vit. E has different actions on hepatic lipids, cholesterol and some liver enzymes *(PORTA ET AL., 1981; SKLAN, 1983 and ZAKI et al., (1980).* Also, *SKLAN (1983)* discussed the effect of Vit E on entrohepatic circulation of cholesterol lipid absorption and secretion in the gastro intestinal tract.

Selenium has a pronouced effect on reproduction, immunitty and enzyme function in chickens *(TAKESHI, 1991). BEHNE et al. (1991)* pointed out that feeding of selenium incorporated into the protein of liver and muscle. Moreover *SU et al. (1991)* mentioned that selenium has an important role in protecting pancreas from the necrotic effect beside its role in some minerals metabolism as Cu, Zn and Mn.

The intestinal contents posses an amylolytic, proteolytic and lipolytic activities as recorded by *LEPKOVSKY et al. (1964). EL-MOUGY (1969)* detected trypsin activity in the contents of duodenum, jejunum and ileum. Chicken amylase was also reported in the small intestine by *BIRD (1971). MORAN (1982) and RODEHEAVER & WYATT (1985)* pointed out that the pancreas was the major source of amylase. They also found a similar pancreatic origin for the amylase in serum and liver.

The present study was carried out to evaluate the effect of supplemented commercial broiler diet with ten times the optimum level of selenium with or without Vit. E on the amylolytic, lipolytic and tryptic activity of the serum and different parts of the gastro intestinal tract.

MATERIAL and METHODS

Eighty fayoumi chickens of six weeks age were given a diet purchased from Pyramids company with an optimum levels of selenium (0.15 ppm) and Vit. E (100 i.u/Kg diet) for about two weeks as preliminary period. The chickens were allocated randomly into four groups. The first group was kept on basal diet and considered as a control. The second group was fed basal diet with 20 I.U.Vit E/Kgm diet. The third group was fed on diet in which selenium level was raised ten times that of the basal one (1.5 ppm). The fourth group was fed the diet given to the third one plus 20 I.U of Vit.E/Kgm diet. Light, temperature and humidity were adjusted as recommeded for broilers production. All groups were fed the different diets for five weeks.

At the end of the experimental period, chickens were slaugtered, blood samples, gizzard, duodenal, jejunal and ileal contents were collected. to reduce the possiblity of antiperistalsis, and regurgitation of food, chickens were slaughtered in a horizontal position. Birds were then split

open along the vertical column, exposing all parts of the intestinal tracts. In order to minimize the possibility of mixing between the contents of the adjacent sections, the gut was clamped with artry forceps at the end of gizzard, duodeum, jejunum and ileum then the contents of each region were collected, weighed and kept in equal quantities of buffer saline. The mixture was then centrifuged, the superatant fluid was decanted and used for determination of amylolytic, tryptic and lipolytic activities. Amylolytic activity was determined by kits according to *SMITH and ROE (1957),* tryptic activity according to *ERLANGER* et al. *(1961)* while lipolytic activity was measured according to *ZEGENHORN (1979).*

RESULTS

The data presented in table (1) revealed that selenium supplmentation induced an increase in the amylolytic activity of the intestinal contents all over the intestial segments, while it did not affect the amylolytic activity of proventricular contents. Regarding Vit E addition, the increased amylolytic activity are recorded in both jejunum and ileum contents and no changes either in proventriculus or in intestinal segment were obtained by combination of Vit. E and selenium supplementation. Data presented in table (2) indicated no changes in the tryptic activity of the duodenal contents in all treated groups. Tryptic activity in proventricular content in the group supplemented by Vit. E showed decreased activities, while there was a significant increase in the tryptic activity of the ileal contents of the same group. Supplementation of selenium revealed decreased tryptic activities in both jejunum and ileum contents while there was a significant increase of this activity in case of group fed diet enriched with both selenium and Vit. E.

Lipolytic activity, table (3) showed different pictures, Vit. E or selenium with Vit. E supplemented rations increased the activity of the proventricular and jejunal contents. The activity was increased in the duodenal contents of all treated groups, while sera and ileal contents did not show significant altertion.

Table 1: Effect of Vit. E and selenium on amylolytic activity of serum and gastrointestinal contents of Fayoumi chickens (U/dl).

Site of sampling	Control	Selenium	Vit. E	Selenium +Vit.E
Proventriculs	658.10±17.4	537.12±11.45	596.21±20.4	528.79±16.83
Duodenum	514.39±23.3	640.15±37.2[a]	556.06±27.15	523.94± 9.54
Jejunum	565.91±13.62	699.24±16.59	755.30±20.88[c]	596.21±34.53
Ileum	535.61±16.47	615.15±15.27[b]	692.42±22.14[c]	521.21±20.31
Serum	141.4 ±12.59	126.3±17.5	156.66±38.7	127.4 ±14.82

Table 2: Effect of selenium and/or Vit. E on tryptic activity of gastro intestinal contents of Fayoumi chickens.

Site of sampling	Control	Selenium	Vit. E	Selenium + Vet. E
Proventriculus	9.48±2.62	6.21±0.97	4.71±1.03[a]	18.10+3.63
Duodenum	61.18±9.83	33.02±6.49	44.77±14.07	81.22±4.06
Jejunum	62.65±5.80	36.22±7.64[a]	86.03±11.10	84.92±2.50[a]
Ileum	67.96±3.19	30.52±4.23[c]	92.17±10.49	79.38±3.10[b]

Table 3: Effect of selenium and/or Vit. E on lipolytic activity of serum and gut contents of Fayoumi chickens.

Site of sampling	Control	Selenium	Vit. E	Selenium + Vit. E
Proventriculus	672.64 ±47.87	600.81 ±54.06	803.60 +74.83	922.20 ± 8.77[c]
Duodenum	876.00 ±11.29	1404.40 +10.81[c]	1416.20 ±10.63[c]	1599.20 ±24.04[c]
Jejunum	1219.00 ±37.97	1345.20 ±65.82	1701.8 ±115.95[c]	1013.40 ±48.61[a]

Mean ± Standard error

a: Mean significantly differ from control at P<0.05

b: Mean significantly differ from control at P<0.01

c: Mean significantly differ from control at P<0.001

DISCUSSION

Selenium has been shown to be an essential element intimately related to Vit. E metabolism. These two dietary factors affect the oxidant defence mechanism of the chickens *(COMB, 1980)*, metabolic enzymes *(AZOUZ* et al., *1990)*, growth of chicken *(ZAKI* et al., *1989)* and lipid absorption *(SKLAN, 1983)*. Results of the present investigation revealed that both selenium and Vit. E supplementation have no effect on amylolytic activity of either proventricular cotnents or of Fayoumi chickens but it increased the amylolytic activity in the intestinal contents. The tryptic activity also increased in proventricular and duodenal contens of chicken fed Vit. E alone or with selenium. Normal regulation of the secretion of the amylase, trypsin and lipase from the pancreas into small intestine is controlled by the pancrozymin hormone. This hormone is produced by the duodenal mucosa and stimulates the pancreas to secrete pancreatic juice into the small intestine *(SOLIMAN* et al., *1973)*. *SU* et al. *(1991)* mentioned that Se has an important role in protecting pancreas from necrotic effect.

Chickens fed diets supplemented with the two dietary factors, selenium and/or Vit.E showed different elevations in lipolytic activity of the gut contents. Results of the present study is in agreement with the data previously reported by *PETER (1981)* who mentioned that addition of selenium protect hepatic cells from fatty liver syndrome. Moreover the present work agrees with *JENSEN* et al. *(1974) and AZOUZ* et al *(1990)* in that selenium supplmentation beside reduceng fatty liver it also reduce serum phospholipid concentration.

The increase in the enzymatic activities of intestinal contents in chickens offered ration supplemented with selenium alone or with Vit. E can be considered of value in protecting pancreatic tissues from necrosis, as well as protection from fatty liver, this agreed with the results pointed by *(AZOUZ* et al., *1990)* and *KROGDAHL & SELL (1989)* that the enzymes activities in the intestinal contents might be a better indicator for development of digestive processes, as well as, to some extent pancreatic tissue activities. At the same time, our results may clarify the increased growth rate in the chicken fed diet supplemented with selenium and Vit. E as these elements improve digestion and aborption by increasing the main intestinal enzymes.

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