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Clinicopathological studies on the effect of probiotic in quails

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LIST OF ABBREVIATIONS

A/G ratio : Albumin/Globulin ratio
ALP : Alkaline phosphatase
ALT : Alanine amino transferase
AST : Aspartate amino transferase
BG : Body gain
b.wt : Body weight
CAT : Catalase
EDTA : Ethylene diamine tetraacetic acid
FAO : Food and Agriculture Organzation
FCR : Feed conversion rate
FL : Femtoliter
Fig : Figure
Gp : Group
Hb : Hemoglobin
HDL : High density lipoprotein
H&E : Hematoxylin and Eosin
IL-1β : Interleukin-1beta
IL-2 : Interleukin-2
IL-3 : Interleukin-3
IL-4 : Interleukin-4
IL-5 : Interleukin-5
IL-6 : Interleukin-6
IL-8 : Interleukin-8
IL-13 : Interleukin-13
IL-18 : Interleukin-18
INF- γ : Interferon gamma
LDL : Low density lipoprotein
LSD : Least significant difference
MDA : Malondialdehyde
MCH : Mean corpuscular hemoglobin
MCHC : Mean corpuscular hemoglobin concentration

MCV : Mean corpuscular volume
NK : Natural killer
PBS : Phsophate buffer saline
PCV : Packed cell volume
P.M : Post-mortem
PG : Picogram
RBCs : Red blood cells
S.E : Standard error
SOD : Superoxide dismutase
Tab : Table
TC : Total cholesterol
TG : Total triglycerides
Th1 : T. helper 1
Th2 : T. helper 2
TLC : Total leukocytic count
TP : Total protein
VLDL : Very low density lipoprotein
WBCs : White blood cells

SUMMARY

The present work was performed to study the effect of toltrazuril, probiotic and thyme essential oil on ***growth*** *performance, immunity, antioxidant enzyme activity and blood parameters on* Eimeria spp. *infected and non-infected quails.*

One hundred and sixty eight one day old quails were used in this study. The birds were divided into eight equal groups. Group (1) was kept as normal control. Group (2) administrated probiotic (1 gm/L drinking water) from one day till 28 days old. Group (3) supplemented with thyme essential oil 450 mg/kg mixed with the diet from one day till 28 days old. Group (4) administrated toltrazuril at 16 days old at a dose of 25 ppm (1 ml/L drinking water) for 2 consecutive days. Group (5) experimentally inoculated intracrop with 4.1 x 10^4 sporulated oocysts of *Eimeria spp.* at 14 days old. Group (6) administrated probiotic (1 gm/L drinking water) from one day till 28 days old and experimentally inoculated intracrop with (4.1 x 10^4) sporulated oocyst of *Eimeria spp.* at 14 days old. Group (7) supplemented with thyme essential oil 450 mg/kg mixed with the diet from one day till 28 days and experimentally inoculated intracrop with (4.1 x 10^4) sporulated oocyst of *Eimeria spp.* at 14 days old. Group (8) experimentally inoculated intracrop with (4.1 x 10^4) sporulated oocyst of *Eimeria spp.* at 14 days old and

treated with toltrazuril at 16 days old at a dose of 25 ppm (1 ml/L drinking water) for 2 consecutive days.

Clinical signs were observed. The ration was weighed daily to determine the feed consumption/week. The weekly feed consumption was subdivided on the weekly increase in the body weight to give feed conversion rate. Five quails, from each group, were sacrificed and collected blood samples at the end of the 3rd and 4th weeks. Specimens were collected, at the time of sacrifice, from the intestine, caecum and cecal tonsils.

Groups (5) showed ruffled feathers, depression, decreased appetite, emaciated breast muscle, knife edged keel bone and bloody diarrhea. Three quails from the 5th group were died at the end of the 3rd week. No mortalities were recorded in other groups. Majority of quails supplemented either with probiotic or thyme essential oil and infected with *Eimeria spp*. (Gps. 6&7) showed mild diarrhea with slight depression. However, group (8) which infected with *Eimeria spp*. and treated with toltrazuril showed no clinical signs.

A significant increase in body gain and decrease in FCR was reported in probiotic and thyme essential oil supplemented birds (Gps. 2& 3). However, groups (5) revealed reduction in the body weight, performance and feed consumption together with increased feed conversion rate at the end of the 3rd and 4th weeks. The use of probiotic, thyme essential oil or toltrazuril in *Eimeria spp*. infected quails (Gps. 6-8) produced an improvement in the

body weight and gain at the end of the 3rd and 4th week compared with (Gp. 5).

The erythrogram of groups (5-8) showed significant decreases in the RBCs count, Hb concentration and PCV with development of normocytic normochromic anemia at the end of the 3rd week and macrocytic hypochromic anemia at the end of the 4th week.

Concerning to the result of leukogram, Group (2) showed a significant leukocytosis and lymphocytosis at the end of the 3rd and 4th weeks. A significant leukocytosis, heterophilia, lymphocytosis and eosinophilia were recorded in groups (5-8) at the end of the 3rd week. Also leukocytosis, heterophilia and monocytosis were recorded in the same groups at the end of the 4th week.

Regarding to the results of liver function tests, group (5) showed significant decreases in the serum total proteins, albumin and globulin levels, while the serum ALT, AST and ALP activities were increased along the experimental periods compared with the normal control. Supplementation with probiotic or thyme essential oil and treatment with toltrazuril (Gps. 6-8) resulted in significant improvement in the serum levels of total proteins, albumin and serum activities of ALT, AST and ALP compared with *Eimeria spp.* infected group along the experimental periods.

Regarding the lipogram of group (2-3) the results showed significant decreases in the serum cholesterol, triglycerides, low-density and very low-density lipoproteins, with insignificant changes in the serum high-density lipoproteins along the experimental periods compared with the normal control. Groups (5-7) showed significant decreases in the serum cholesterol, triglycerides, high-density lipoprotein, low-density and very low-density lipoproteins along the experimental periods compared with the normal control. Group (8) showed significant increase in the serum cholesterol, triglycerides, high-density lipoprotein and very low-density lipoproteins levels with a significant decrease in low-density lipoproteins compared with group (5) at the end of the 3rd and 4th weeks.

The current work showed a significant increase in the plasma CAT activity with a significant decrease in MDA level and insignificant changes in SOD activity in (Gp. 3) compared with the normal control along the experimental periods. *Eimeria spp.* infected quails (Gp. 5) revealed significant increase in the plasma CAT activity and MDA level with a significant decrease in the serum SOD activity along the experimental periods compared with the normal control. Groups (6-8) showed significant decrease in the plasma CAT activity and MDA level with a significant increase in the plasma SOD activity compared with group (5).

Concerning the cellular immunity of group (5), the result proved significant increases in the cecal IFN-gamma and IL-2 all over the experimental periods compared with the normal control. However, groups (6&7) showed significant decreases in the cecal IFN-gamma and IL-2 at the end of the 3rd and 4th week compared with *Eimeria spp*. infected group (Gp. 5). Toltrazuril treated group (Gp. 8) showed significant decreases in the cecal IFN-gamma and IL-2 compared with *Eimeria spp.* infected group, which returned to normal at the end of the 4th week.

It could be concluded that

1- *Eimeria spp.* infection caused badly alteration in the erythrogram, leukogram, liver function, lipid profile, antioxidant balance and cellular immunity.

2- Probiotic or thyme essential oil can be used as a potential alternative anticoccidials in quails to avoid side effects of chemical and anticoccidial drugs such as anticoccidial residues and resistance.

3- Moreover, the addition of probiotic (1 gm/L drinking water) or thyme essential oil (450 mg/kg mixed with the diet) enhances the growth performance, cellular immunity and antioxidant enzyme system.

4- The administration of therapeutic dose of toltrazuril is proved to be curative against *Eimeria spp.* infection in quails.

We recommended:

- It is preferable to use probiotic or thyme essential oil as food additive in quails ration because it enhances growth performance, cellular immunity, antioxidant enzyme system and had anticoccidial properties.