
Effect of albendazole on liver and kidney function

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ABSTRACT: The present study has been done to evaluate the effect of albendazole on kidney and liver function and histopathology changes in broiler chicken. The animal were divided into three groups; Group one kept as a control non treated, group two treated with albendazole 0.25mg/kg orally for 21 successive day to broiler chicken, group three treated with albendazole in dose 0.25 mg/kg in combination with vitamin E 100 mg/kg orally for 21 successive day to broiler chicken. The chickens were sacrificed and blood samples were collected immediately from each chicken separately in a dry clean centrifuge tube. Blood samples were centrifuged mes like ALT, AST, AIP activities compared to control animals. Histopathology examination of chicken kidneys revealed peritubular edema (PTE, arrow), interstitial round cell aggregation (RCA, arrow) and renal tubular degeneration (RTD, arrow) with focal early necrotic changes, also histopathology examination of chicken liver revealed dilated blood vessels (PBV) portal round cell aggregation (RCA) and biliary proliferation hyperplasia (BP) marked interstitial round cell aggregations. Hepatocellular degeneration (HCD) and individual cellular apoptosis (HCA), in chicken treated with albendazole.

KEYWORDS: Albendazole, broiler chicken, biochemical, histopathology, kidney, liver

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I. INTRODUCTION

The first Benzimidazole to be developed and licensed for human use, was thiabendazole in 1962. Though thiabendazole was very effective. It was also moderately toxic, which led to huge investigation by animal companies to find better and safer compounds and thiabendazole carben carbamate were discovered. A number of veterinary anthelmintic were developed and marked including parbendazole carbamate to make it into humans mebendazole following by flubendazole both fassen product simisth kline and French animals health were working on albendazole which was a first marked as albendazole valbenzole animal anthelmintic in UK in November 1997.

Albendazole was found to be considerably more active than other bendazole. This was because it was metabolized while almost all the other BZE were metabolized to inactive compounds. It was evenly approved for human use and marketing in 1987(Horton et al 1999).

II. MATERIALS AND METHODS

Material:

- A) Drugs:
Chemical name Albendazole

Chemical formal

B) Animal

Fifteen broiler chickens twenty one day old weighing about (400gm) used in this study. All chickens were maintained under similar conditions; the chickens were housed in batteries in a post graduate research laboratory in the faculty of Veterinary Medicine Zagazig University and fed a balanced ration with free access to water. Chicken were kept for one week to accommodate laboratory conditions for the beginning of the experiment.

2-1 Experimental design

Chicken were classified into three groups, each one group 5 chickens.

1. First group served as control non-tread.
 - a. Second group received the therapeutic dose of albendazole 0.25mg/kg oral for 21 successive days following the manufactory company.
2. The third group reserved albendazole in combination with vitamin E in therapeutic dose 0.01mg/kg orally for 21 successive days.

2-2 Preparation of serum sample and tissue sample.

At the end of the experiment 12 hrs after the last dose.

Chicken were sacrificed; Blood was collected and the following samples were collected and allowed to clot for 30 minutes at 25C. Therefore, they were centrifuged at 3000 rpm for 10 min, and top yellow layers of serum were pipetted off without distributing the white butt layer. Serum was stored at 20c and thawed just before use for the kidney of each chicken were isolated and kept in 10% phosphate, buffered formalin for histopathological evaluation.

2-3 Biochemical markers of liver and kidney injur

Determination of serum alanine aminotransferase (ALT), aspartate aminotransferase (AST) activities was established according to the principles mentioned before (10). Evaluation of creatinine urea and uric A has been done according to the method described previously (11). Determination of these parameters was carried out through commercial kites from Spectrum Diagnostics (Cairo, Egypt).

2-4 Hepatic and nephron histopathological evaluation

Liver and kidney tissues were fixed in 10% neutral buffered formalin solution for 24hrs. Then, tissue processing and paraffin blocks preparation were done. Masson's trachoma and hematoxylin. Eosin stains were used to evaluate fibrotic areas and necro inflammation activity according to the method of I shak et al.(12).

2-5 Statistics Analysis

The data were analyzed using prism version 6. Statistical evaluation of the result, except the histopathological results, were done by using methods as one way and two-way analysis of variance (AOVA).

3 -Results:

Effective of albendazole 0.25mg/kg orally, once daily on biochemical markers of liver injury.

Effective albendazole on AIT, results in increase in serum AIT level (62.36;6.47) UIL compared with (37-60;2.70 UIL) for the control group.

Effect of albendazole on AST: resulted in increase in serum AST level (75.33; 11.40) UIL compared with 35.33; 1.2 UIL) for the control group.

Effect of albendazole on AIP:increase in serum AIP level 44.7;2.51UIL compared with (33.3;2.20UIL for the control group.

Effect of albendazole on protein: resulted in increase in serum protein level (8.72; 0.63g IDL) group.

Effect of albendazole on Albumin: resulted in increased albumin level (5.31;0.21) g IDL compared with 4.10;32 g IDL) for the control group.

Effect of albendazole on globulin: resulted in increased globulin level (4.10; 0.21 g dl) compared with (3.21; 0.22 g IDL).

Effect of the albendazole on alpha globulin result in decrease in alpha globulin level $0.034=0.08\text{gm}/100\text{ml}$ compared with $0.79=0.033$ for control group

Effect of albendazole on beta globulin =resulted in decrease in Beta globulin level $0.82=0.04\text{mg}/100\text{ml}$ compared with $0.91=0.038$ for control group

Effect of albendazole on Gamma globulin =resulted in decrease in Gamma globulin level 2.56=0.034gm/100mgcompared with 2.56= for 1.054 0.014 mg/100ml compared with 2.56=0.034 for control group

Effect of albendazole 0.25 mg/kg. Once daily on biochemical markers of kidney injury.

Effect of albendazole on uric acid = resulted increase in uric acid level 4.87=0.63mg/dl compared with 3.9=0.32mg/dl for control group

Effect of albendazole on creatinine= resulted increase in creatinine level 1.56=0.03mg/dl compared with 0.79=0.07mg/dl for control

3-1 Table (1): Effect of oral administration of albendazole and its combination with vitamin E once daily for 21 successive days on erythrocytic count, hemoglobin concentration, PCV and leukocyte count in broiler chickens post treatment (mean \pm SE) n = 5

Groups	RBCs (106/ μ l)	Hb (g/dl)	PCV (%)	WBC (103/ μ l)
Control	4.29 \pm 0.24c	8.13 \pm 0.22c	47.0 \pm 0.31 c	152.0 \pm 4.2c
Albendazol	4.00 \pm 0.36 b	7.00 \pm 0.18b	42.00 \pm 0.35b	149.00 \pm 7.9b

Means with the same column carrying different superscripts are significantly different at $P < 0.05$

3-1 Table (2): Effect of oral administration of albendazole and its combination with vitamin E once daily for 21 successive days on serum AST, ALT and ALP in broiler chickens post treatment (mean \pm SE) n = 5

Groups	AST (U/L)	ALT (U/L)	ALP (U/L)
Control	35.33 \pm 1.58c	37.60 \pm 2.70c	33.00 \pm 2.20b
Albendazol	75.33 \pm 11.40a	62.36 \pm 6.47a	44.70 \pm 2.51a

Means with the same column carrying different superscripts are sign significantly different at $P < 0.05$

3-3 Table (3): Effect of oral administration of albendazole and its combination with vitamin E once daily for 21 successive days on serum creatinine and uric acid in broiler chickens post treatment (mean \pm SE) n = 5

Groups	Creatinine (mg/dl)	Uric acid (mg/dl)
Control	0.79 \pm 0.07b	3.900 \pm 0.32b
Albendazol	1.52 \pm 0.07a	4.87 \pm 0.63a

Means with the same column carrying different superscripts are significantly different at P < 0.05

3-4 Table (4): Effect of oral administration of albendazole and its combination with vitamin E once daily for 21 successive days on serum total proteins, albumin and globulins in broiler chickens post treatment (mean \pm SE) n = 5

Groups	Total proteins (g/dl)	Albumin (g/ dl)	Globulins (g/dl)
Control	7.73 \pm 0.39c	4.10 \pm 0.35c	3.21 \pm 0.22c
Albendazol	8.72 \pm 0.63a	5.30 \pm 0.51a	4.10 \pm 0.21a

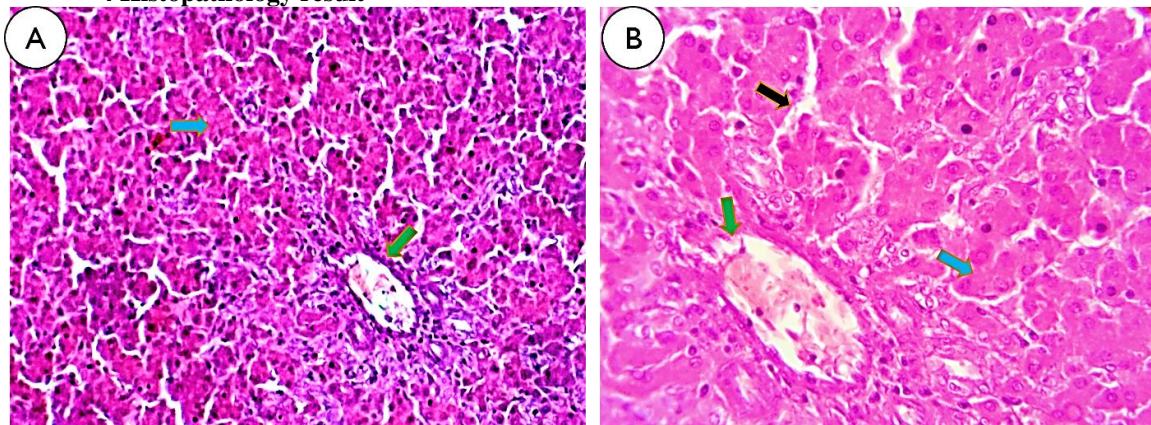
Means with the same column carrying different superscripts are significantly different at P < 0.05

3-5 Table (5): Effect of oral administration of albendazole and its combination with vitamin E once daily for 21 successive days on serum α , β and γ globulins in broiler chickens post treatment (mean \pm SE) n = 5

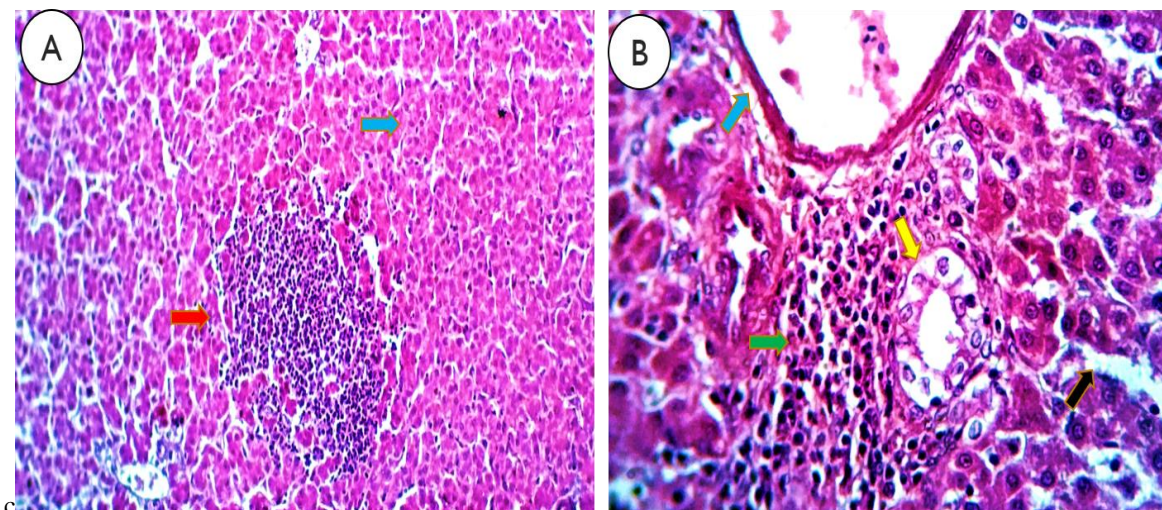
Groups	α -globulins (g/100 ml)	β - globulins (g/100 ml)	γ globulins (g/100 ml)
Control	0.79 \pm 0.033c	0.91 \pm 0.038c	7.56 \pm 0.034a

Means with the same column carrying different superscripts are significantly different at $P < 0.05$

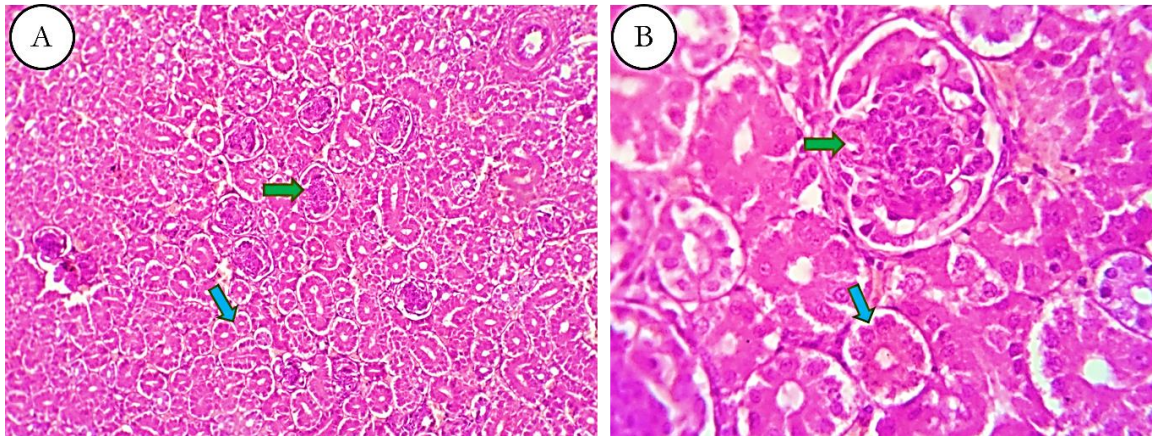
4 Histopathology result



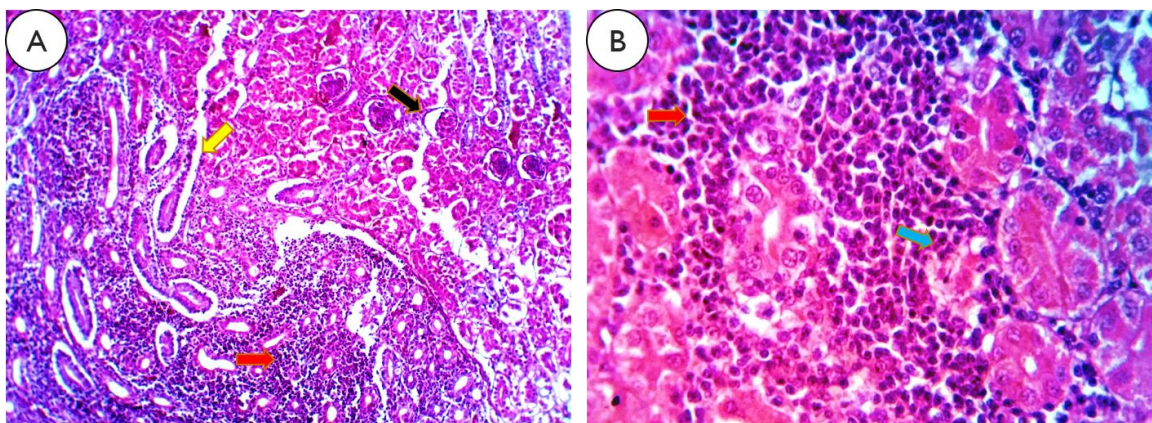
4-1 1-fig 2.photomicrograph of liver (A,B).GI showing normal histological characterization of different structures, including portal area (triads)(PA,arrow),hepatocytes(HC,arrow)which are seen as small masses around *200,400the central veins. A few round cells are seen as a natural immune response around the portal area (PA,arrow)H&E



4-2 2-fig.3.photomicrograph of liver (A,B).(G 2)showing dilated blood vessel (PBV),portal round cells aggregation (RCA) and biliary proliferative hyperplasia (BP).marked interstitial round cells aggregations, hepatocellular degeneration (HCD)and individual cellular apoptosis(HC A).H&E 200,400



4-3-fig.2.photomicrograph of kidney(A,B).(G 1)showing normal histo-morphology of the nephron unites, including the tubular structures(RT, arrow),uri-nephric duct and avian glomeruli(GL,arrow)..H&E*100,400



4-4fig.4.photomicrograph of kidney(A,B).(G2)showing peritubular edema (PTE,arrow).interstitial round cell aggregation (RCA, arrow)and renal tubular degeneration (RTD, arrow)with focal early necrotic changes

5- Discussion

The present study was conducted to investigate the effect of albendazole on broiler chicken and evaluate its impact on liver and kidney function and histopathology changes. The study result reported that the level of AIT, ATP, AST were significantly increase in serum of treated chicken with albendazole compared control group, The study results reported that the level of urea and creatinine were significantly increase in serum of treated chicken with albendazole compared with control group the study finding were in agreement Rotimi Arise 2008) who reported that the treatment with Albendazole caused an increase in the concentration of serum uric Acid the study was also correlated closely with histopathological changes in the kidney.

Histopathological changes were marked in this group, there were perivascular and peritubular edema (PVE PTE), marked glomerular lobulation and atrophy (GA), focal intestinal hemorrhages, perivascular round cell aggregations (RCA) and renal tubular degeneration (RTD) with focal early necrotic changes.H&EX100,400, histopathological of liver showing dilated portal blood vessels (PBV) portal round cells aggregation (RCA) and biliary proliferative hyperplasia (BP) marked interstitial round cells aggregation, hepatocellular degeneration (HCD) and individual cellular apoptosis (HCA) H&EX200,400

The present results have clearly demonstrated the ability of albendazole to induce oxidative stress in chicken liver and kidney, this finding was confirmed by histopathological findings which showed kidney and liver damage.

Conclusion

It could be concluded that the albendazole has the ability to induce oxidative stress in chicken and causes disturbance in renal and liver function

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