

## Effect of *Prednisolone* on the Histology and Histochemistry of Rabbits Liver and Kidney

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### ABSTRACT

Prednisolone and prednisone are synthetic corticosteroids used to treat different diseases. They are well known to be used for treating many conditions like asthma, autoimmune diseases, many skin conditions, and may help to prevent or at least to suppress inflammations and immune responses. It was proved previously the correlation between prednisolone and the function of liver in patients having liver problems. In patients with alcoholic hepatitis, for example, prednisolone was accompanied with a short-term reduction in the rates of mortality, but this effect was not clear after 2 years. This research was performed to study the possible effects of prednisolone on the histology and the enzyme histochemistry of the liver and kidney in healthy rabbits. Twelve females adult rabbits (Six animals considered as treated group and other six animals as control group) were used in this experiment. After two weeks of adaptation time, treatment by the drug began. Animals treated by prednisolone oral dose 20 mg daily by gavage. Animals sacrificed under anesthesia, then ordinary histological sections (stained with hematoxylin-eosin) and frozen sections (by freezing microtome for ALP activity) of liver and kidney were prepared. The histological results and the ALP activity in both liver and kidney were found to be normal in treated group in compare with the control group. Prednisolone has many various effects on the physiology, psychology, immunology, even the molecular and genetics, varied from beneficial effects to undesired side effects. In the field of hepatology, prednisolone treatment was found to ameliorate many symptoms and enhance many biochemical and histologic abnormal changes in many types of liver diseases like autoimmune hepatitis, liver cirrhosis, septic shock patients, and cases of liver transplantation. In conclusion; according to the results of this research there no any effects of prednisolone on histology of liver and kidney and the ALP activity in these organs.

**Keywords:** Prednisolone, Histology, ALP activity, Rabbits, Liver, Kidney.

### INTRODUCTION

Prednisolone represent a synthetic steroid which chemically known as 11b,17a,21-trihydroxypregna- 1,4-diene-3,20-dione<sup>1</sup>. Prednisolone and prednisone both are synthetic corticosteroids (which also may be named steroids for short). This type of synthetic corticosteroids are used to treat many inflammatory diseases like systemic lupus erythematosus (SLE/lupus), rheumatoid arthritis (RA), and many other inflammatory disease. They have an effective anti-inflammatory effects and reduces the swelling cases and pain in joints and other organs, but they do not fully cure the disease<sup>2,3</sup>.

Prednisone and prednisolone are well known to be used for treating many conditions like asthma, autoimmune diseases, many skin conditions, and may help to prevent or at least to suppress inflammations and immune responses. Furthermore, prednisone and prednisolone are given in a wide range of doses, depending on the treated condition<sup>4</sup>.

Also Prednisolone was accompanied with a reduction in 28-day mortality (in Patients which clinically diagnosed

as an alcoholic hepatitis) that did not reach significance and with no improvement in outcomes at 90 days or 1 year<sup>5</sup>.

As many references mentioned, the most common possible side effects of prednisolone may include:

-Body weight: One of the most common side effects is the weight gain which represented by face rounding and increased weight around the stomach. These changes may be related to the change of metabolism, increased appetite and salt retention.

-Effects on bones: Osteoporosis may be associated, high and moderate doses of prednisolone with long periods of use were found to cause thinning of the bones, but in the cases of very low doses of this drug; less than 5 mg/day ; are not so common to cause this problem.

-In diabetic field: Prednisolone may causes an increase in blood sugar in diabetic people. This may need a change in the medicine of their diabetes. All aspects of carbohydrate metabolism were acutely perturbed by low dose of prednisolone. Hepatic insulin resistance was induced by long-term low-dose of prednisolone, and the

peripheral nonoxidative glucose disposal was also reduced.

-Effect on blood pressure: Prednisolone can cause a rise

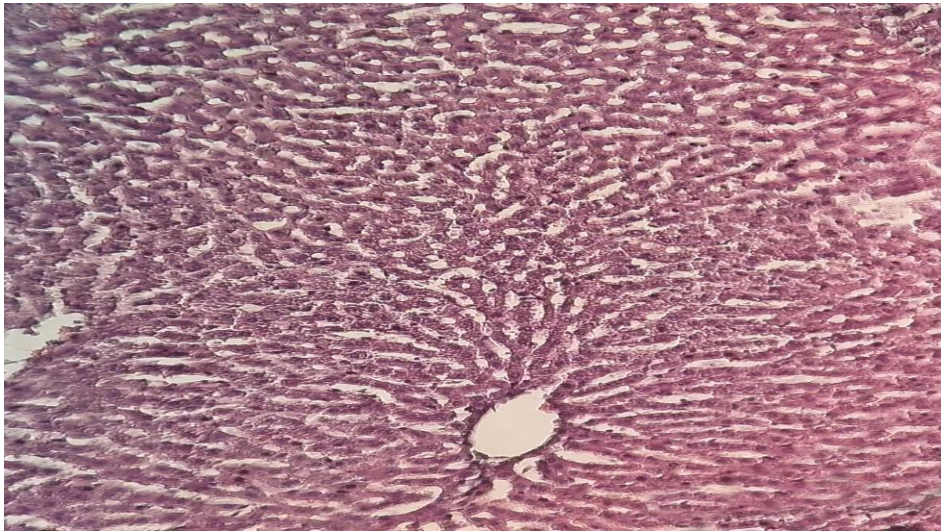


Figure 1: Histological section in the liver of normal animals (control), stained by H & E. 200X

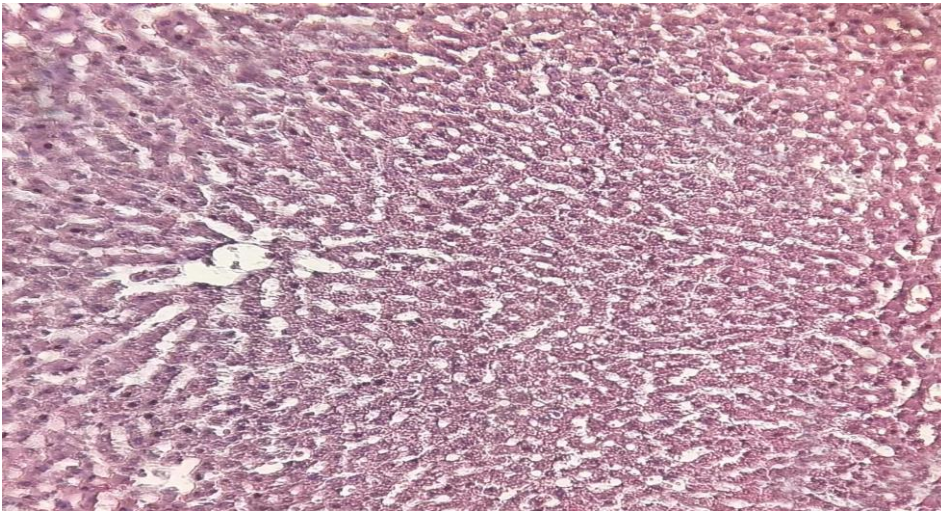


Figure 2: Histological section in the liver of treated animals, stained by H & E showing normal histology. 200X

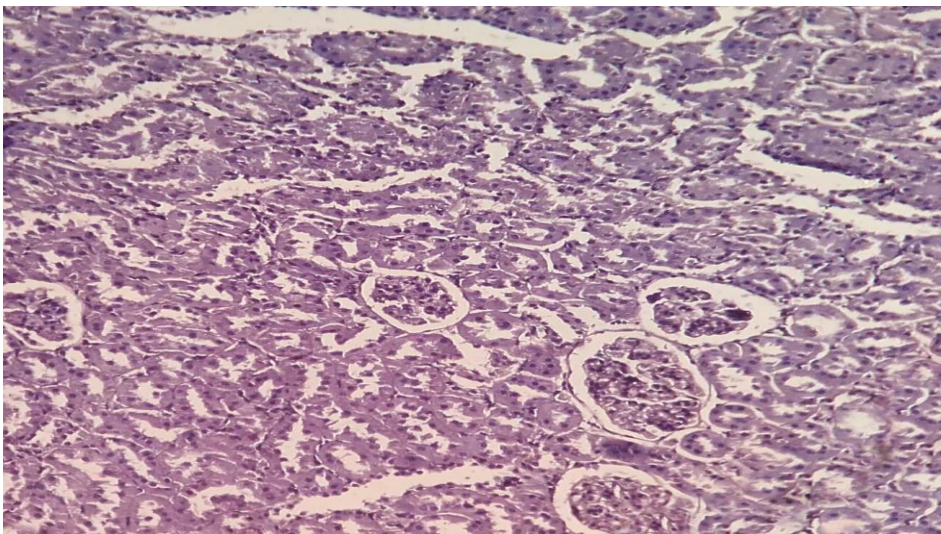


Figure 3: Histological section in the kidney of normal animals (control), stained by H & E. 200X

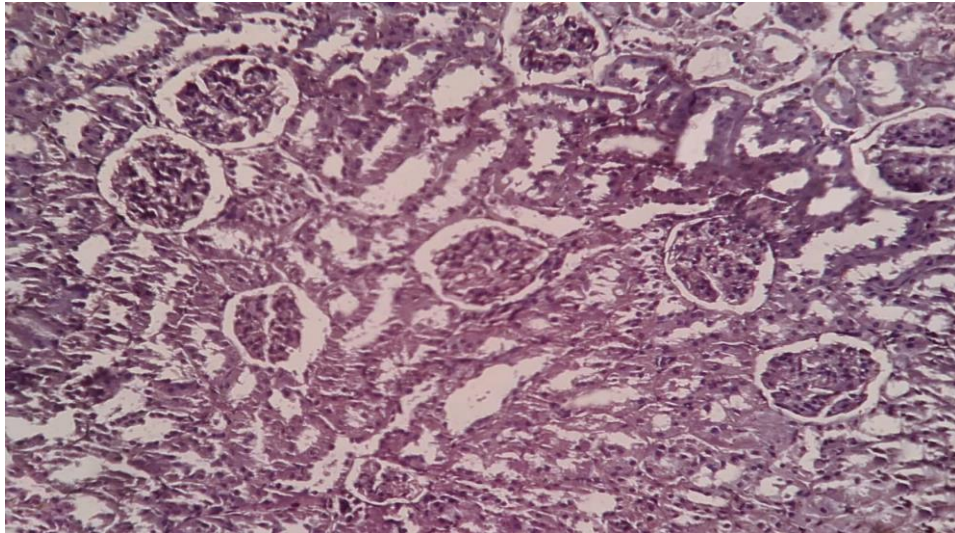


Figure 4: Histological section in the kidney of treated animals, stained by H & E showing normal histology. 200X

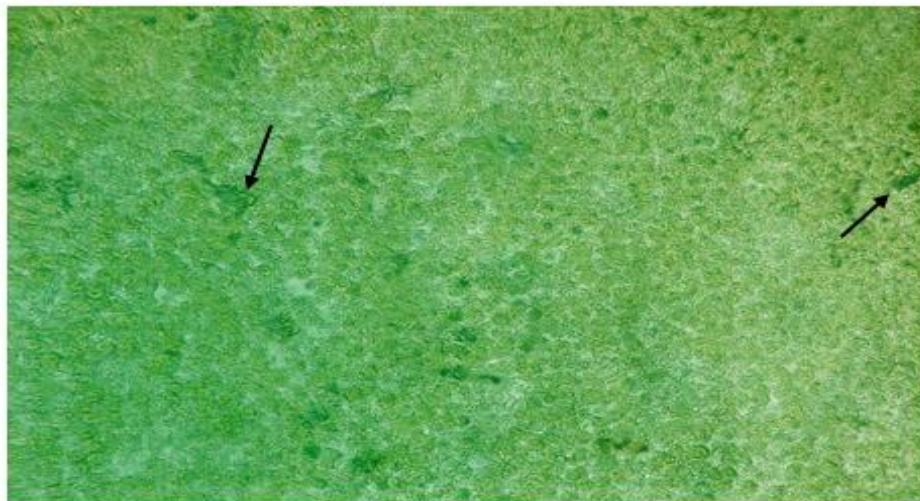


Figure 5: Frozen histological section in the liver of normal animal (control), stained with methyl green, showing dark colored Alp activity (black arrows). 200X

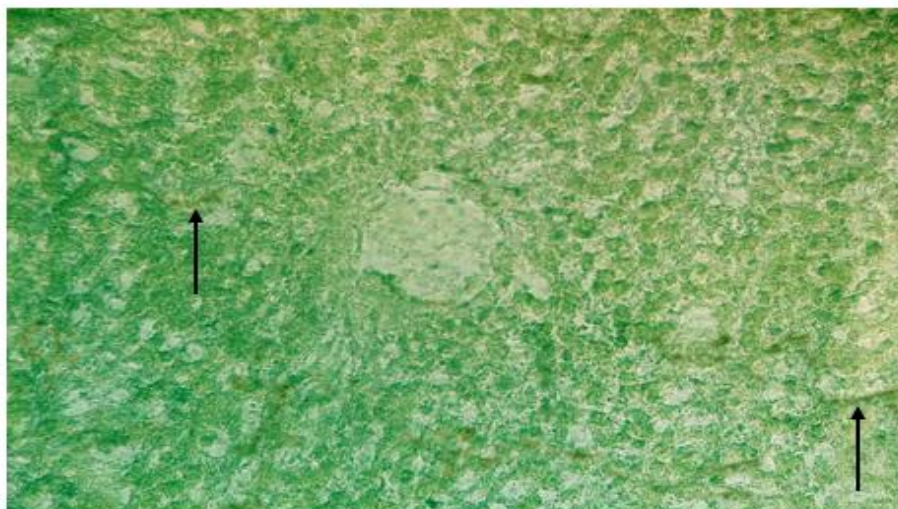


Figure 6: Frozen histological section in the liver of treated animal stained with methyl green, showing normal Alp activity (black arrows). 200X



Figure 7: Frozen histological section in the kidney of normal animal stained with methyl green, showing normal dark colored Alp activity (black arrows), gl: glomerulus. 200X

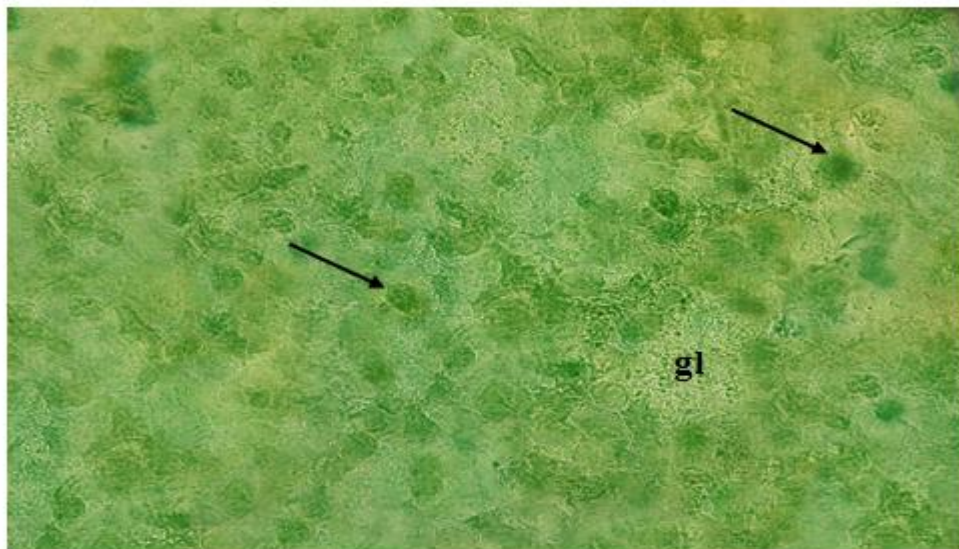


Figure 8: Frozen histological section in the kidney of treated animal stained with methyl green, showing normal dark colored Alp activity (black arrows), gl: glomerulus. 200X

in blood pressure or make it more complicated to control.  
-Cholesterol: Prednisolone can cause a rise in blood cholesterol.  
-Effect on psychology: Prednisolone may cause sense of euphoria (feeling high) and other changes of personality like irritability and agitation or depression.  
-Infections: Many references referred to an increased risk of some infections in patients treated by prednisolone. These infections may include lung infections, mouth infections (like thrush), and shingles.  
-Pregnancy: The chronic use of prednisone or prednisolone during pregnancy may be associated with an increased risk of early delivery of premature baby with a lower birth weight than expected (born before 37 weeks gestation)<sup>2,4,6,7</sup>.

In addition to the histology and physiology, enzyme histochemistry were found to be important in the drug efficacy researches<sup>6,8,9,10</sup>.

#### *Animals and methods*

In this experiment twelve females adult rabbits were used (six treated animals and other six animals as control group). These animals had been brought from the animals house (from the college of science/ University of Babylon). After two weeks of adaptation, treatment by the drug was began. Prednisolone dosage mimic the dose used for human (oral dose 20 mg daily for one month), regarding body weight differences, then animals were sacrificed for histological and histochemical studies.

#### *Histological examination*

Ordinary histological sections of paraffin-embedded liver and kidney (5 $\mu$  thick), stained with hematoxylin-eosin were performed according to Bancroft and Steven, 1982<sup>11</sup>.

#### Detection of Alp activity

Frozen sections were prepared for the study of Alp activity in the liver and kidney. Tissues were frozen immediately after sacrificing the animals, then thin sections were performed by freezing microtome. Finally, sections treated with the chemical solutions and stained with methyl green for the detection of enzyme activity.

Gomori-Calcium method, 1952 (modified) was depended to detect the activity of Alp, as it considered one of the most important depended methods in histochemical preparations<sup>11</sup>.

## RESULTS AND DISCUSSION

The histology of both liver and kidney, and the enzyme histochemistry of the ALP activity in these organs were found to be normal in treatment group in compare with the control group as shown in the figures 1, 2, 3, 4, 5, 6, 7 and 8. Prednisolone has a various effects on the physiology, psychology, immunology, even the molecular and genetics, varied from beneficial effects to undesired side effects<sup>2,12,13</sup>. In the field of hepatology, Prednisolone treatment has been shown to decrease symptoms and enhance both biochemical and histologic abnormal changes in many types of liver diseases, such as cases of autoimmune hepatitis, cirrhosis patients with septic shock, and liver transplantation<sup>14, 15</sup>, these studies may explain the normal histology and histochemistry of our results, but these are not absolute founding's because another study referred to different results of prednisolone. It shown that prednisolone treatments may inhibit macrophage- and neutrophil -mediated phagocytic and hepatic regenerative functions and exacerbate hepatotoxin-induced liver injury<sup>16</sup>. These wide range results may reflect a controversial effects of prednisolone, so the use of prednisolone have to be under accurate use regarding the dose, period of treatment, health status.

## CONCLUSIONS

From the normal results of the histology of liver and kidney, and the normal ALP activity, it was concluded that prednisolone is safe regarding these parameters.

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