

## **Effect of rifampicin in some blood characteristics in rabbits**

### ***Oryctolagus Cuniculus***

### **تأثير عقار الريفامبسين في بعض معايير الدم في الأرانب**

### ***Oryctolagus Cuniculus***

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#### **Abstract**

The aim of this study was intend to study the effect of rifampicin in some blood characteristics (albumin, globulin, Hb, PCV, platelets count, WBCs count and differential WBCs count) in rabbits.

Eight rabbits divided in to two groups, first group was used as treated group and we treated with rifampicin drug 15mg/kg /day for 35 days, while the second group treated with 15mg/ml/day normal saline for 35 days and used as a control group.

The results showed that there were a significant decrease ( $p \leq 0.05$ ) in level of albumin in rifampicin treated group compared with control group, while there were no significant differences in all other blood characteristics.

#### **الخلاصة**

استهدفت الدراسة الحالية دراسة تأثير عقار الريفامبسين في بعض معايير الدم (بروتين الالبومين وبروتين الغلوبولين والنسبة المئوية للهيموغلوبين (Hb) وحجم الخلايا المضغوطة (PCV) وعدد الصفيحات الدموية وعدد خلايا الدم البيض والعدد التمييزي لخلايا الدم البيض) في الارانب *Oryctolagus Cuniculus*.

تم استخدام ثمانية أرانب في هذه التجربة وقد قسمت الى مجموعتين , جرعت المجموعة الاولى (مجموعة السيطرة) 15 ملغم/مليتر/يوم محلولاً ملحياً فسيولوجياً لمدة 35 يوم, بينما المجموعة الثانية (المجموعة المعاملة) تم معاملة بقية الارانب الريفامبسين بجرعة 15 ملغم /كيلو غرام/يوم لمدة 35 يوم.

أظهرت النتائج وجود انخفاض معنوي ( $p \leq 0.05$ ) في تركيز الالبومين في المجموعة المعاملة مقارنة مع مجموعة السيطرة, ففي حين لا توجد اختلافات معنوية في كل معايير الدم الأخرى قيد الدراسة.

#### **Introduction**

The blood consists of three types of specialized cellular elements: red blood cells (RBCs), white blood cells (WBCs) and platelets, suspended in the complex liquid plasma. RBCs and WBCs are both whole cells, whereas platelets are cell fragments (1).The general role of blood is the transport of gases and other nutrients and wastes (2).

RBCs are specialized for their primary function of O<sub>2</sub> transport in the blood.

WBCs are the mobile units of the body's immune defense system, they attack foreign invaders, destroy cancer cells that arise in the body

and clean up cellular. There are five different types of WBCs\_ neutrophils, eosinophils, basophils, monocytes and lymphocytes\_ each with a characteristic structure and function(1).

The circulating platelets are colorless cell fragments, they are produced when portions of large bone marrow cells, termed megakaryocytes, become pinched off and enter the circulation(3), they a role in hemostasis, the arrest of bleeding from an injured vessel(1).

The plasma proteins can be classified according to certain physical and chemical reactions in to three broad groups: the albumins, globulins (alpha, beta and gamma) and fibrinogen (3). Albumins transport many substances; contribute most to colloid osmotic pressure. Alpha and beta globulins transport many water insoluble substance; clotting factors; inactive precursor molecules. Gamma globulins are the immunoglobulins (antibodies) which are crucial to the body's defense mechanism. Fibrinogen is a key factor in blood clotting (1). Serum is plasma from which fibrinogen and other proteins involved in clotting have been removed as a result of clotting (3). Plasma protein are synthesized by the liver with the exception of gamma globulins which are produced by lymphocytes (1).

Rifampicin is a semisynthetic antibiotic which selectively inhibits the RNA \_ polymerase of *mycobacterium tuberculosis*, which is similar to the RNA \_ polymerase of the mitochondria of higher animals (4). It's a commonly used antituberculosis agent with reported adverse effect (5, 6 and7). It should always be prescribed with another antibiotic, in order to prevent bacterial resistance, which can develop rapidly if is used alone. The aim of this study was intend to study the effect of rifampicin in some blood characteristics (albumin, globulin, Hb, PCV, platelets count, WBCs count and differential WBCs count) in rabbits.

## **Material and Methods**

Eight mature male rabbits aged one year, weighting about (1300-1600) gm were used in this study. They were kept under standard laboratory conditions were given food and water.

The animals were divided in to two groups (4 rabbits for each group). First group treated with a single oral dose (15 mg/kg/day) from rifampicin capsule 300mg (Mumbai, ajanta) for 35 days and served as a treated group, while the second group served as a control group treated with (15mg /ml/day) normal saline for 35 days. After 24 hr from last injection, albumin, globulin, Hb, PCV, platelets count, WBCs count and differential WBCs count were measured in the peripheral blood of the rabbits for each group.

Albumin was measured by using kit from (BioElite, France) we took three tubes (test, standard and blank), in each tube put 1 ml from bromocresol green reagent plus 10 $\mu$  from serum in test tube, 10 $\mu$  from bovine serum albumin in standard tube and 10 $\mu$  from distilled water in blank tube thin mixed and read the optical density (after a 5 minute incubation at 37°C) in spectrophotometer in 628 nm.

Globulin amount was counted by: (total protein amount - albumin amount). Total protein was measured by the same procedure of albumin from (BioElite, France) unless using Biuret reagent instead of bromocresol green reagent then mixed and read the optical density (after a 10 minute incubation at 37°C) in spectrophotometer in 550 nm .

Hemoglobin (Hb), packed cell volume (PCV) , platelets count , WBCs count and differential WBCs count were measured according to(8).

The statistical analysis which used to compare between treated and control group in this study was student's t- test (9).

## **Results and discussion**

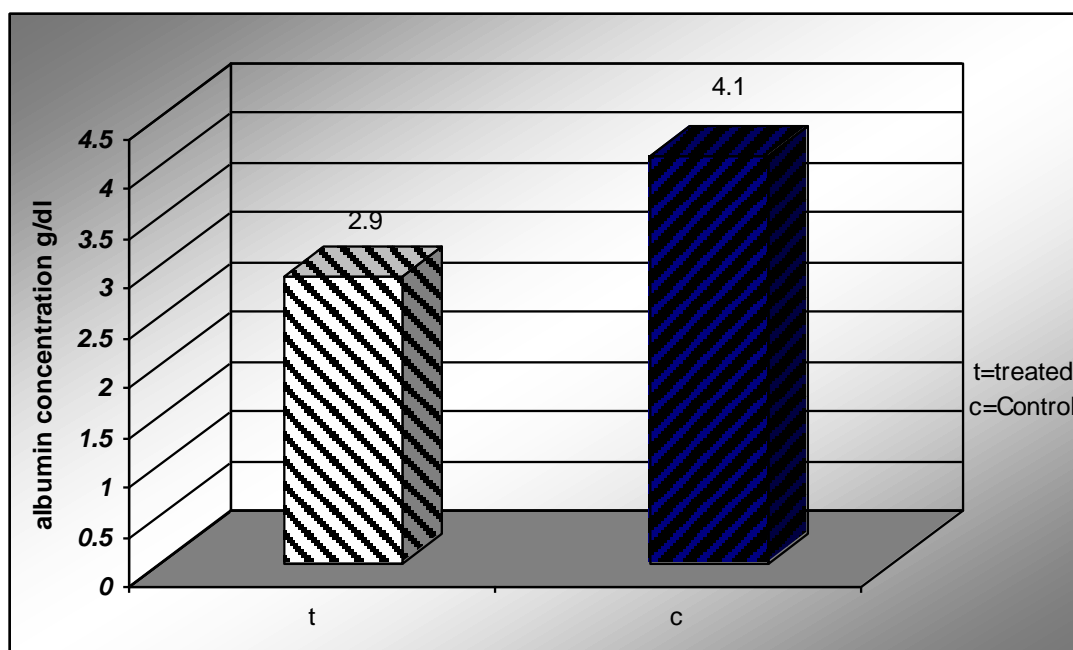
The results of statistical analysis showed significant decrease ( $p \leq 0.05$ ) in albumin concentration in treated group ( $2.9 \pm 0.28$  g/dl) compared with control group ( $4.1 \pm 0.13$  g/dl) (figure1), while there were no significant differences in the mean concentration of globulin (table1).

The decrease in albumin concentration due to the effect of rifampicin drug, which selectively inhibits the RNA\_ polymerase (4 and 10), and also caused liver dysfunction (11) that may be effected on the synthesis of protein lead to decreasing in albumin concentration in the blood, which agree with (5), whereas (12) found an increasing in the concentration of serum albumin.

The results of globulin concentration test showed that the level of serum globulin in treated group was lower ( $2.9 \pm 0.47$  g/dl) than it's level in the control group ( $3.1 \pm 0.73$  g/dl) with no significance, this low different in the change may due to the short period of the treatment with rifampicin.

Also, the results showed that there were no significant differences in Hb%, PCV, WBCs count, platelets count and differential WBCs count in the treated group compared with control group (table 2 and table 3), which agree with (5) and (13).

The low different in the change of present study may due to the short period of the treatment with rifampicin because other researchers found that rifampicin effect on some blood characteristics and caused significant decrease in Hb concentration (14 and 15), haemolysis (15), thrombocytopenia (14 and 16), Neutropenia (16), Eosinophilia (17), anemia (16and 18) and Hepatitis (13 and 14), especially when it used in the treatment for 9 months (16 and 19), therefore, if regular blood counts had been performed during the first month of therapy, and the results had been complied with, abnormalities could have been detected earlier (16).



**Fig.(1):Effect of rifampicin (15mg/kg/day) on albumin concentration in rabbits serum (mean  $\pm$  S.E.)**

**Table (1): Effect of rifampicin (15mg/kg/day) on albumin and globulin concentration in rabbits serum.**

| Treatment                | Albumin g/dl    | Globulin g/dl  |
|--------------------------|-----------------|----------------|
|                          | Mean $\pm$ S.E. |                |
| Rifampicin (15mg/kg/day) | 2.9 $\pm$ 0.28  | 2.9 $\pm$ 0.47 |
| Control                  | 4.1 $\pm$ 0.13  | 3.1 $\pm$ 0.73 |

**Table (2): Effect of rifampicin (15mg/kg/day) on Hb%, PCV, WBCs count and platelets count in rabbits serum.**

| Treatment                | Hb gm/100ml     | PCV%           | WBCs *10 <sup>9</sup> /L | platelets count/mm <sup>3</sup> |
|--------------------------|-----------------|----------------|--------------------------|---------------------------------|
|                          | Mean $\pm$ S.E. |                |                          |                                 |
| Rifampicin (15mg/kg/day) | 11.4 $\pm$ 0.76 | 36.0 $\pm$ 2.4 | 1633 $\pm$ 133           | 350000 $\pm$ 50000              |
| Control                  | 10.9 $\pm$ 0.97 | 35.3 $\pm$ 2.7 | 2033 $\pm$ 260           | 356666 $\pm$ 47000              |

**Table (3): Effect of rifampicin (15mg/kg/day) on differential WBCs count in rabbits serum.**

| Treatment                | Eosinophil /mm <sup>3</sup> | Basophil /mm <sup>3</sup> | Neutrophil /mm <sup>3</sup> | Monocyte /mm <sup>3</sup> | Lymphocyte /mm <sup>3</sup> |
|--------------------------|-----------------------------|---------------------------|-----------------------------|---------------------------|-----------------------------|
|                          | Mean $\pm$ S.E.             |                           |                             |                           |                             |
| Rifampicin (15mg/kg/day) | 2.5 $\pm$ 1.2               | 0.0 $\pm$ 0.0             | 44 $\pm$ 2.3                | 3.7 $\pm$ 2.3             | 48 $\pm$ 4.6                |
| Control                  | 3.7 $\pm$ 0.33              | 0.33 $\pm$ 0.33           | 50 $\pm$ 5.3                | 4 $\pm$ 0.0               | 42 $\pm$ 5.3                |

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