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Hematological Measurements in Mice after Injection with B Subtilis Extract

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Abstract

A number of special blood parameters (red blood cells, white blood cells, and platelets) were studied in the blood of mice exposed to the effect of organic extract of B. subtilis because it is rich in chemical compounds and is more effective against gram-negative and gram-positive bacteria. The recorded results are shown in Table (1). The hematological parameters of the blood of mice when treated with bacterial extract of B. subtilis at the rate of ml (5) per 1 kg of weight of mice decreased in relation to red blood cell count (R.B.C), platelet count (PLT). While the number of white blood cells (W.B.C) increased after one day of injection compared to the control group, it was observed that the blood parameters of the mice returned to their normal limits after a week of treating the mice with the bacterial extract compared to the control group.

Keywords: ***red blood cell count, white blood cell, platelet count.***

Introduction

Some blood standards can be identified in living organisms by detecting constituent or suspended elements such as red and white blood cells and platelets, and knowing their numbers and characteristics. Others can also be reached by biochemical standards that appear clearly in blood plasma [2,4]. A study of blood parameters in multiple strains of mice showed a wide range of variance in values. This may be due to group differences in age and sex, or to differences in values, sampling purification, and testing methodology. As such, the range limits are not fixed limits [7] Reference studies showed different values of blood parameters with different strains of experimental animals. Researchers' studies showed different numbers of red and white blood cells and platelets [2].

Hematological parameters in mice

Mice blood tests

In this study, the effect of organic extracts of bacterial species isolated from marine sediments on the blood parameters of mice was investigated. Where the current study was conducted on 6 individuals of white male mice, at the age of (3-4) months, their weight ranged between (30-25 g). These were obtained from the Atomic Energy Authority, and these mice were placed in the animal biology laboratories - Tishreen University - for a period of (1-2) weeks.

Before starting the experiment, in order to adapt to the appropriate conditions such as light and temperature (18-20) degrees Celsius, the mice were given water and diet for that. The experimental animals were divided into two groups with two individuals in each group and they were treated as follows:

Group (1) (Control Group): which were dosed with normal drinking water throughout the experiment period of one week. During this period, they were monitored daily and their movement and nutrition were observed.

Group (2) (Treatment Group): It was treated with the organic extract of B. subtilis with a basic concentration of 5 ml per 1 kg of mouse weight by intravenous injection.

The change in the biological and chemical parameters of the blood of rats was studied after one day and one week after they were injected with the organic extract of B. subtilis [1,3].

Collecting blood samples

Blood samples were taken using a medical syringe with a capacity of 5 ml, where the blood was placed in special tubes free of anticoagulant and the other section containing an anticoagulant (EDTA), where the blood sample was centrifuged with a centrifuge (Eppendorf 5810r, German-made) at a centrifugation speed of 4000 rpm for a period of time. 10 minutes, according to previous studies [4,6]. Blood samples were separated from the serum and placed in glass tubes designated for this purpose to conduct blood vital tests (erythrocyte count (R.B.C), platelet count (PLT), white blood cell

count (W.B.C) using the sysme X 300 automated blood count. Tishreen University Hospital laboratories, then the results were measured using a calibration kit from the Spanish company Biosys and the Syrian company Medichem.

Efficacy of organic extracts on the blood of experimental animals (mice)

Red blood cell count (R.B.C)

The results showed that the arithmetic mean of the red blood cell count was 106 × 4.9 cells/mm3 for the control group, and a day after they were injected with 5 ml of organic extract, the mean of the red blood cell count was about 106 × 3.78 cells/mm3. However, after a week of treatment with the bacterial extract, the mean cell/mm3 was 106 × 4.4 compared to the control group (**Table 1**).

The reason for the decrease in the numbers of red blood cells after a day of treatment with the bacterial extract is due to the effect of the chemical compounds of this extract on the membranes of red blood cells. Some bacterial extracts can cause a decrease in antioxidants, which leads to an increase in the production of free radicals, which in turn causes a decrease in the number of red blood cells [2,4].

White blood cell count (WBC)

The results showed that the arithmetic mean of white blood cell count in the blood of mice was 6.4 x 3103 cell/mm for the control group. One day after injecting them with 5 ml of the bacterial extract, the arithmetic mean of WBC cell/ was 103 × 12.6. As for a week after treatment with the bacterial extract, the mean of WBC cell/mm3103 × 6.36 **Table 1**.

The elevated white blood cell count 1 day after treatment with the bacterial extract could be attributed to the hemolysis of the extract, the occurrence of some infections, and the activation of the circulatory system [5,6].

Platelet count (PLT)

The results showed that the arithmetic mean of the PLT count was about 103 x 328 cells/mm3 for the control group. One day after treatment with the bacterial extract of B. subtilis, the mean PLT cell/mm3 count was 103 × 375 when injected with 5 ml of the bacterial extract. Whereas, after a week of treatment with the bacterial extract, the mean of the PLT cell/mm3 count was 103 × 315 (Table 1).

The reason for the increase in the blood platelet count (PLT) a day after the treatment with the bacterial extract is due to the effect of the bacterial extract on the adrenal medulla, the narrowing of the endothelial cells of the blood vessels and the raising of the adrenaline level, thus stimulating the contraction of the spleen and then releasing a number of platelets into the bloodstream [2,5].

It was observed from the previous results that the recorded values of the blood analyzes of the mice were within the normal limits and were close to the results of previous studies [1,6].

Table 1: Hematological parameters of the erythrocytes of mice after dosed with B. subtilis extract for one day and one week.

PLT	R.B.C	WBC	Hematological parameters of blood cells
cell/ 10^3× mm^3	**cell/ 10^6× mm^3**	**cell/ 10^3× mm^3**	the one
328	4.9	6.4	Witness
375	3.78	12.6	One day after treatment with the bacterial extract
315	4.4	6.36	After one week of treatment with the bacterial extract
328	4.9	6.4	Witness

Declarations

Data Availability

The authors confirm that the data supporting the findings of this article are available with the authors.

Conflicts of Interest

No conflicts of interest.

Ethical Approval and Consent to participate

Not Applicable

Consent for publication

Not Applicable

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