Effect of corticosteroids cortisol hormone [hydrocortisone] on the of the blood parameter in pregnant and non-pregnant laboratory females mice.

Al-Maliki SJ, Al-Ali AA*, Kathim AS

Department of Biology, College of Education for Pure Sciences, University of Basrah, Basrah, Iraq

Abstract

The present study aimed to identify the effect of hydrocortisone on blood parameters in mice (Mus musculus). Adult female mice (n=144 mice) divided into two groups control group (CO group and treatment group T group per group (n=72 mice). Co group were injected with normal saline, whereas, T group i.p was injected with (0.21 mg/kg of body weight) hydrocortisone respectively for 10 days. Post completed 10 days, 6 females from per groups were taken and subjected for the purpose of studying the effect of the hormone on non-pregnant mice, and the remaining female mice were matched for the purpose of studying the effect of the hormone on female pregnant and dissected after 9 days of mating until 19 days. The hormone showed a significant increase in the number of white blood cells (WBC) count in non-pregnant female mice and Monocytes in female rats after 9 days of mating. The significant decrease in the number of granular cells in female rats after 10 and 15, 19 days of mating. The hormone showed a significant increase in the amount of hemoglobin in pregnant and non-pregnant female mice and red blood cells in pregnant females only.

Keywords: Hydrocortisone, Blood cell, Physiology, Glucocorticoids.

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Introduction

Glucocorticocids (Gc) are produced from the adrenal regain of the adrenal gland [1], Corticosteriods are produced from the bundle area, which regulated metabolism of carbohydrates, fats, and vitamins. These hormones are located under the control of adenoethycortropic (ACTH), is produced from the pituitary gland, which control the secretion of corticotrophin-releasing hormone ACTH Stimulated adrenal gland [2]. This effect makes it easier to use amine clotamic which inhibits the conversion of cholesterol to corticosteroids. The ACTH effect will increase the concentration of cholesterol in the adrenal gland [3].

The effect of hydrocortisone on the reproduction of esionphils and neutrophils, where explained that the use of corticosteroid in therapy, it explained the increase of the cells of neutralization and decrease Esionphil and study of the Physiological study of Pharmacokinetics of hydrocortisone on the proliferation Esionphils in Surpluses in peripheral blood and bone marrow in humans [4] .

Taby et al. [5] have inject 25 mg/kg of cortisone muscle for rats and rabbits daily for seven days, and noted cortisone causes a decrease in the number of small lymphocytes in the thymus region and atrophy in the skin cortex. It is explained that the cause was not exhaustion of lymphocytes; Ismael et al. [6] explained the effect of dexamethasone on the physiological and histological parameters of mice, showed that the use of dexamethasone had an effect and an effective role in the treatment of experimental bacterial infection.

It is clear that animals treated with dexamethasone after experimental bacteriological infection and after 24, 48 and 72 hours of infection, the researcher demonstrated an increase in the number of monocytes, blood and lymphocytes.

Materials and Methods

Hormone

Cortisol hormone is in the form of a small glass container of 2 mL capacity, containing 100 mg of hydrocortisone and added sodium succinate, supplied by A.D. Hemopharm, FARC, Sardia. The dose preparation was 0.21 mg dissolved in a normal saline solution of 0.9%.

Experimental animals and treatment protocol

Female and male *Mus musculus* mice (n=144), 10-12- week-old, weighting 22-25 g were utilized in this study and divided into two groups (n=72 per group). Animal housed in communal cages under controlled conditions interims of temperature of 20-25°C and provided with water and food ad libitum, cycle of lighting 12/12 hours light and dark throughout one year. Efforts were made to avoid any unnecessary distress to the animals. Further, Animal raised in the animal house at the Department of Life Sciences, Faculty of Education, University of Basra.

The animals were divided into two groups:

1. Injected female control group with 0.1 ml of physiological solution and 0.9% concentration for 10 days daily.
2. The treatment group was injected with 0.1 ml of corticosteroids and 0.21 mg/kg/day for 10 days daily.

On the eleventh day, a group of females is screened by six females for each group to study the effect of the hormone on the blood parameters of non-pregnant females. The animals are married after the eleventh day and the injection continues until the date of the autopsy. On the next day of mating, after sexual intercourse is confirmed by vaginal occlusion, the appearance of the vaginal plug is considered zero. The female is described as having zero days of pregnancy and consecutive periods starting from 8, 9, 10, 11, 12, 13, 14, 15 and 16, 17, 18 and 19 for the purpose of obtaining samples of blood.

Blood parameters of pregnant mice were measured during the consecutive pregnancy days (8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19) of the pregnancy and used a blood-measuring device Auto Hematology/Analyzer/animal.

Statistical analysis

The Results are analyzed statistically by the Analysis of variance [ANOVA-R.L.S.D] test. The results are expressed as Mean ± S.E. the statistical package for the social sciences [SPSS, V.11]. Significance was set at the level of $P \leq 0.05$.

Results

Effect of corticosteroids [hydrocortisone] on white blood cells (WBC)

The results of the statistical analysis in the tables blow showed the effect of the injected corticosteroids in pregnant and non-pregnant females on the count of white blood cells and the percentage of granular cells in non-pregnant female rats after 10 days of injection. The effect was significantly below the probability level $P \leq 0.05$ and represented a significant increase compared with control group (Table 1).

The current study revealed the significant effect of corticosteroids on the percentage of lymphocytes in female rats treated after 9 and 10 days of mating and was significantly higher below the $P \leq 0.05$ tolerance level compared with control group (Tables 2 and 3). Corticosteroids had an effect on total granular cells and percentage of the granule cells. The effect was significantly lower for the granule cells and significantly higher for the percentage of the same cells in the injected female after 11 days of mating (Tables 4-7). Hormone show significantly decreases in total granular cells of injected females after 15 to 16 days of mating (Tables 8-11).

Corticosteroids revealed a significant decrease on the count of white blood cells, total lymphocytes, monocytes, granulocytes and percentage of lymphocytes for injected females after 19 days of mating (Table 12).

The study showed t no significant effect of corticosteroids under the probability level $p \leq 0.05$ on the number of white blood cells and total lymphocytes for all periods (9, 10, 11, 12, 13, 14, 15, 16, 18, 19 and 20) on the day of mating.

Effect of corticosteroids cortisol hormone [hydrocortisone] on the red blood corpuscles of females white laboratory mice

The results of the present study, as shown in the following tables, showed that the effect of corticosteroids (hydrocortisone) on red blood cells in pregnant and non-pregnant mice. The hormone showed significant decrease in the rate of hemoglobin Hb, MCH and MCHC in non-pregnant mice after 10 days of injection below the probability level $P \leq 0.05$ and compared with control group (Table 13).

The hormone showed significant increase of Hb and PCV in females after 9 days of mating (Table 14) and Hb hemoglobin only in females treated after 10 days of mating (Table 15) and RBCs in females Treatment after 11 and 12 days of mating (Tables 16 and 17) compared to control group under probability ratio P00.05. The hormone had a significant effect on the rate

Table 1. *Effect of cortisol (hydrocortisone) on white blood cells of female non-pregnant laboratory mice after 10 days of treatment (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Samples
29.92^{a} ± 4.14	0.14^{a} ± 0.05	55.79^{a} ± 25.61	1.36^{b} ± 0.925	0.41^{a} ± 0.05	3.60^{a} ± 2.32	3.17^{a} ± 0.37	**Control Group**
48.01^{b} ± 7.79	0.137^{a} ± 0.51	46.15^{a} ± 8.55	5.67^{a} ± 5.48	3.46^{a} ± 1.59	3.46^{a} ± 1.59	7.48^{b} ± 2.92	**Treatment Group**
6.49	N.S	N.S	2.96	N.S	N.S	2.31	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 2. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 9 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood standards
29.03^{a} ± 7.2	7.80^{a} ± 5.97	63.166^{a} ± 12.49	1.0339^{a} ± 0.702	0.266^{a} ± 0.152	2.76^{a} ± 2.82	4.66^{a} ± 3.52	**Control Group**
32.50^{a} ± 2.15	2.00^{a} ± 0.10	65.50^{a} ± 2.05	1.80^{a} ± 0.519	1.33^{b} ± 1.15	3.569^{a} ± 1.09	5.50^{a} ± 1.66	**Treatment**
N.S	N.S	N.S	N.S	0.62	N.S	N.S	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 3*. Effect of cortisol (hydrocortisone) on white blood cells of female pregnant laboratory mice after 10 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
54.53^{a} ± 1.60	4.8^{a} ± 1.10	40.66^{a} ± 1.37	4.50^{a} ± 1.83	0.33^{a} ± 0.208	3.33^{a} ± 1.33	8.62^{a} ± 3.35	**Control Group**
39.50^{a} ± 4.70	4.96^{a} ± 3.15	65.53^{b} ± 6.39	2.00^{b} ± 0.40	0.966^{a} ± 0.115	3.163^{a} ± 0.115	6.40^{a} ± 1.73	**Treatment**
N.S	N.S	8.63	1.52	N.S	N.S	N.S	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 4. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 11 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
67.90[a] ± 7.97	5.86[a] ± 1.92	33.3[a] ± 9.13	6.30[a] ± 5.74	0.60[a] ± 0.529	2.73[a] ± 1.44	9.63[a] ± 7.72	**Control Group**
31.23[b] ± 7.06	4.00[a] ± 2.09	58.43[b] ± 8.77	2.80[b] ± 1.30	0.233[a] ± 0.152	2.900[a] ± 0.964	5.066[a] ± 2.69	**Treatment**
33.72	N.S	22.17	2.52	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 5. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 12 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
35.166[a] ± 7.67	4.56[a] ± 2.51	60.26[a] ± 10.16	1.033[a] ± 0.416	0.100[a] ± 0.00	1.70[a] ± 0.529	2.83[a] ± 0.87	**Control Group**
29.36[a] ± 13.25	3.56[a] ± 2.150	67.96[a] ± 14.25	1.866[a] ± 1.069	0.233[a] ± 0.152	4.200[a] ± 0.721	6.30[a] ± 1.46	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 6. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 13 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
38.16[a] ± 16.00	3.53[a] ± 1.45	58.34[a] ± 16.91	2.10[a] ± 0.366	0.233[a] ± 0.577	3.80[a] ± 2.007	6.13[a] ± 2.17	**Control Group**
43.33[a] ± 13.45	6.366[a] ± 0.52	50.30[a] ± 10.73	2.033[a] ± 2.136	0.23[a] ± 0.115	1.90[a] ± 0.964	4.166[a] ± 3.15	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 7. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 14 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
45.033[a] ± 14.90	4.53[a] ± 0.896	50.43[a] ± 15.76	1.80[a] ± 1.153	0.166[a] ±0.576	1.766[a] ± 0.404	3.73[a]± 1.50	**Control Group**
33.36[a] ± 10.11	2.966[a] ± 1.939	65.66[a] ± 12.01	1.33[a] ± 0.268	0.133[a] ± 0.577	3.93[a] ± 2.80	5.83[a] ± 3.75	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 8. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 15 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
40.90[a] ± 17.19	4.033[a] ± 1.289	55.06[a] ± 18.42	3.30[a] ± 1.56	0.333[a] ± 0.057	4.600[a] ± 2.42	8.23[a] ± 2.17	**Control Group**
33.100[a] ± 10.67	3.43[a] ± 1.91	63.43[a] ± 12.49	1.233[a] ± 0.251	0.100[a] ± 0.00	2.800[a] ± 1.907	4.133[a] ± 2.159	**Treatment Group**
N.S	N.S	N.S	0.52	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 9. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 16 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
49.06[a] ±14.49	4.800[a] ± 2.600	45.13[a] ± 16.86	3.83[a] ± 1.86	0.333[a] ± 0.208	3.400[a] ± 1.216	3.56[a] ± 2.37	**Control Group**
32.03[a] ± 3.26	26.00[a] ± 1.153	67.40[a] ± 4.40	1.86[a] ± 0.404	0.133[a] ± 0.571	3.833[a] ± 0.321	35.83[a] ± 0.66	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 10. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 17 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
45.43[a] ± 6.36	6.70[a] ± 1.05	47.86[a] ± 5.45	1.80[a] ± 1.15	0.566[a] ± 0.208	4.033[a] ± 1.09	8.36[a] ± 8.36	**Control Group**
40.300[a] ± 2.264	4.86[a] ± 2.152	54.83[a] ± 4.25	1.48[a] ± 0.23	0.200[a] ± 0.100	2.00[a] ± 0.10	3.66[a] ± 0.35	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 11. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 18 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
45.033^{a} ± 14.90	4.53^{a} ± 0.89	50.43^{a} ± 15.76	1.800^{a} ± 1.153	0.166^{a} ± 0.57	1.766^{a} ± 0.404	3.73^{a} ± 1.50	**Control Group**
31.73^{a} ± 7.78	2.200^{a} ± 0.360	66.06^{a} ± 7.73	1.100^{a} ± 0.200	0.100^{a} ± 0.00	2.00^{a} ± 0.624	3.60^{a} ± 0.608	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 12. *Effect of cortisol (hydrocortisone) on white blood cells of female laboratory mice pregnant after 19 days of mating (n=6 rate ± standard error).*

Gran %	Mon %	Lymph %	Gran x10³/mm³	Mon x10³/mm³	Lymph x10³/mm³	WBC x10³/mm³	Blood Standards
44.60^{a} ± 7.72	4.733^{a} ± 2.82	50.66^{a} ± 15.7	4.233^{a} ± 1.266	0.33^{a} ± 0.208	3.200^{a} ± 0.346	6.56^{a} ± 1.80	**Control Group**
33.43^{a} ± 3.153	3.800^{a} ± 1.99	60.76^{a} ±6.29	1.53^{b} ± 0.808	0.165^{a} ± 0.577	2.933^{a} ± 1.47	4.63^{a} ± 2.21	**Treatment Group**
N.S	N.S	N.S	0.52	N.S	N.S	N.S	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 13. *Effect of cortisol (hydrocortisone) on red blood cells of female non-pregnant laboratory mice after 10 days of treatment (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV Mm³	PCV %	Hb g/dl	RBC x10³/mm⁶	Blood Standards
34.02^{a} ±3.088	14.80^{a} ± 1.27	48.14^{a} ± 4.51	29.72^{a} ± 12.71	11.9^{a} ± 0.45	6.63$^{a \pm 0.37}$	**Control Group**
23.77^{b} ± 5.42	11.10^{b} ± 2.34	43.162^{a} ± 11.39	27.80^{a} ± 5.13	6.23^{b} ± 2.23	5.69^{a} ± 1.25	**Treatment Group**
4.61	2.06	N.S	N.S	1.98	N.S	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 14. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 9 days of mating (n=6average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC x10³/mm⁶	Blood Standards
32.90^{a} ± 0.69	15.43^{a} ± 0.208	45.91^{a} ± 1.40	25.33^{a} ± 10.69	7.00^{a} ± 0.00	6.77^{a} ± 0.468	**Control Group**
214.86^{a} ± 7.5	18.33^{a} ± 6.29	45.03^{a} ± 1.41	34.36^{b} ± 3.62	9.96^{b} ± 0.838	8.98^{a} ± 0.80	**Treatment Group**
N.S	N.S	N.S	9.60	1.62	N.S	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 15. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 10 days of mating (n=6average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
26.33^{a} ± 2.77	12.26^{a} ± 1.305	46.63^{a} ± 4.6	36.03^{a} ± 3.91	6.86^{a} ± 1.305	5.65^{a} ± 0.573	**Control Group**
29.43^{a} ± 0.472	13.900^{a} ± 0.500	47.26^{a} ± 0.929	26.86^{a} ± 2.25	8.93^{a} ± 0.763	5.69^{a} ± 0.459	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 16. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 11 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
24.04^{a} ± 2.77	11.20^{a} ± 0.69	46.60^{a} ± 2.30	25.00^{a} ± 2.88	6.433^{a} ± 1.37	5.53^{a} ± 0.478	**Control Group**
26.76^{a} ± 1.95	12.066^{a} ± 0.99	45.56^{a} ± 1.66	34.63^{a} ± 5.30	18.43^{a} ± 0.416	7.15^{b} ± 0.916	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	1.80	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

Table 17. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 12 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
25.30^{a} ± 6.26	11.60^{a} ± 2.05	35.43^{a} ± 17.16	28.933^{a} ± 2.31	6.46^{a} ± 1.56	2.83^{a} ± 0.87	**Control Group**
27.033^{a} ± 3.43	12.63^{a} ± 1.72	46.86^{a} ± 0.55	33.40^{a} ± 2.04	9.133^{b} ± 0.611	6.30^{b} ± 1.49	**Treatment Group**
N.S	N.S	N.S	N.S	2.15	0.75	**RLSD**

^{a,b}Mean value followed by the same letters does not differ significantly.

of hemolytic hemorrhage (MCH) in females after 13 days of mating (Table 18) and significant increase in hemoglobin Hb and MCH in females after 14 and 15 days of mating below the level Probability $P \leq 0.05$ and compared with control group (Tables 19-21).

The hormone showed a significant decrease in the rate of hemoglobin Hb and the rate of hemoglobin MCH in the female treatment after 17 days of mating (Table 22), and a significant increase in the count of red blood cells RBCs and the rate of hemoglobin Hb and quantity of hemoglobin MCH in the female treatment after 18, 19 Day of mating and volume of Tables 23 and 24 compressed blood after 18 and 20 days of mating (scales). The hormone showed no significant effect on RBCs for periods 9, 10, 13, 14, 15, and 17 days after mating, Hb hemorrhage in periods 10, 11, 13 and PCV in 10, 11, 12, 13, 14, 15, 16, 17, and 19 days of mating and MCH in the periods 9, 10, 11, 12, 16 and 19 days of mating [7].

Discussion and Conclusion

The results showed no significant differences in blood parameters in pregnant females as pregnant and non-pregnant women. The increase and decrease were within normal limits.

The difference in blood values was due to individual differences. The study showed the effect of the hormone on the number of white blood cells and the proportion of granule cells in female white laboratory mice. The effect was significantly increased, and this result was agreed upon with Reinhart [8] and Woodman et al. [9]. The increase in the number of white and granular blood cells when injecting rats was 0.25 mg/kg. The study agreed with Narimane et al. [10] and Peng et al. [11], in which white blood cells were increased in 24 hours after injection of mice with 1.52 mg/kg by dexamethasone. The use of dacametazone in preterm infants with acute lung disease was observed as increased in the number of white blood cells [12] and granule cells after

Table 18. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 13 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
25.26[a] ± 8.90	18.63[a] ± 8.22	45.73[a] ± 2.51	30.03[a] ± 1.32	8.96[a] ± 1.60	7.40[a] ± 0.92	**Control Group**
25.86[a] ± 6.20	8.93[b] ± 8.10	45.86[a] ± 1.30	26.133[a] ± 4.69	7.26[b] ± 2.15	5.7233[a] ± 1.15	**Treatment Group**
N.S	8.70	N.S	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 19. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 14 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
23.43[a] ± 4.83	8.100[a] ± 7.16	47.16[a] ± 1.56	27.60[a] ± 2.91	5.90[a] ± 0.17	5.723[a] ± 0.446	**Control Group**
18.70[a] ± 4.33	22.33[b] ± 9.64	45.83[a] ± 2.03	30.56[a] ± 3.59	9.63[b] ± 1.41	7.160[a] ± 0.227	**Treatment Group**
N.S	8.34	N.S	N.S	1.78	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 20. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 15 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
22.56[a] ± 4.87	10.43[a] ± 2.06	46.30[a] ± 0.88	27.30[a] ± 2.02	6.700[a] ± 0.984	5.69[b] ± 0.52	**Control Group**
18.43[a] ± 4.56	24.96[a] ± 11.26	48.36[a] ± 1.02	30.60[a] ± 3.73	10.90[a] ± 1.40	7.32[a] ± 0.650	**Treatment Group**
N.S	7.98	N.S	N.S	2.21	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 21. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 16 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
23.93[a] ± 4.54	10.93[a] ± 1.70	57.16[a] ± 24.08	25.40[a] ± 3.133	6.00[a] ± 1.044	5.013[a] ± 1.99	**Control Group**
25.40[a] ± 3.98	11.66[a] ± 2.13	58.46[a] ± 22.40	25.50[a] ± 2.25	7.783[a] ± 1.25	6.82[a] ± 0.306	**Treatment Group**
N.S	N.S	N.S	N.S	N.S	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 22. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 17 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
21.26[a] ± 8.69	25.76[a] ± 3.95	36.733[a] ± 15.96	33.83[a] ± 3.11	10.23[a] ± 1.25	6.64[a] ± 4.94	**Control Group**
25.13[a] ± 0.404	12.466[a] ± 0.404	50.53[a] ± 5.32	24.23[a] ± 3.15	5.07[b] ± 0.121	4.94[a] ± 0.843	**Treatment Group**
N.S	7.86	N.S	N.S	0.54	N.S	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 23. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 18 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
23.43[a] ± 4.83	11.10[b] ± 2.32	47.168[a] ± 1.82	27.60[b] ± 2.91	5.90[b ± 0.17]	5.72[b] ± 0.448	**Control Group**
15.83[a] ± 1.46	29.70[a] ± 3.70	47.10[a] ± 1.91	36.90[a] ± 2.36	10.86[a] ± 1.19	7.23[a] ± 0.817	**Treatment Group**
N.S	5.67	N.S	5.047	1.50	1.24	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

Table 24. *Effect of cortisol (hydrocortisone) on red blood cells of female laboratory mice pregnant after 19 days of mating (n=6 average ± standard error).*

MCHC g/dl	MCH Pg	MCV F1	PCV %	Hb g/dl	RBC X10³/mm⁶	Blood Standards
21.60[a] ± 6.33	10.60[a] ± 3.20	50.63[a] ± 5.15	28.26[a] ± 6.55	5.07[b] ± 0.121	4.76[a] ± 0.69	**Control Group**
22.43[a] ± 3.75	13.83[a] ± 3.70	48.53[a] ± 3.09	38.10[a] ± 4.60	8.36[a] ± 1.059	6.86[b] ± 1.17	**Treatment Group**
N.S	N.S	N.S	N.S	2.29	2.33	**RLSD**

[a,b]Mean value followed by the same letters does not differ significantly.

0.25 mg/kg in seven days and the results corresponded with Alani et al. [13] through the use of hydrocortisone in the treatment of neonates infected with neonatal sepsis, explaining the high number of white blood cells.

Results differed with Donatti et al. [14]. In his study, the reduction in the number of white blood cells during just eight hours of 1 mg/kg of dexamethasone injection, resulting in a decrease in the total number of white blood cells and granules, that dexamethasone caused a decrease in the number of white blood cells after Eight days of injection of mice and 0.1 mg/kg. Strevenon [15] that the hormone hydrocortisone had a inhibitory effect on white blood cells and decreased the number of white blood cells after 10.0 mg/kg of cortisone Hungerford et al. [16] and Oberholzer et al. [17].

The rise in white blood cells may be due to the effect of the hormone on the white blood cell count, the study showed that the effect of monocytes was significantly increased after 9 days of mating. The result was consistent with the results of Schwartzman [18] that hydrocortisone had a positive effect on white blood cells as it caused a rise in lymphocytes and only The results of the study differed with the Bjomson et al. [19] study, when using different doses of cortisol, explained that this hormone stimulates cellular death apoptosis of cells.

The study showed that the hormone caused the reduction of granular cells in laboratory mice pregnant after 10, 11, 15, 17 and 19 days of mating. The study was matched by studying the addition of hydrocortisone to cell cultures. The production of acid granular cells increases the formation of neutral granular cells [20]. Heiser et al. [21] observed that doses of dexamethasone caused a decrease in granular cells.

Hydrocortisone stimulates the programmed death of granular cells by inhibiting the effectiveness of the AP-1 transcription factor, as cortical hormones generally stop protein synthesis [22-24], which causes the use of Eosinopnia and stimulates the adhesion and migration of the granular cell when studied on, Hydrocortisone affects the generation of granular cells and may act on stop the reproduction of these cells. The results of the study showed the effect of corticosteroids on lymphocytes, and decreased significantly in laboratory mice pregnant after 10 and 11 days of mating, and were identical to those indicated by the use of sugar hormones in the treatment of inflammation and the use of different techniques after injection of 25 mg/kg intravenously, Hormone causes lymphocytes to decrease [25], Dexamethasone inhibits the reproduction of lymphocytes in humans [26,27]. Dexamethasone caused the reduction of lymphocytes in saline water injected into mice. Lund-pero et al. [28] and Ishmael et al. [6], results of the study differed with Obernolzer et al. [17] confirmed that hydrocortisone controls the high positive white blood cells in the B/C mice, and observed a significant reduction in the number of granular cells and lymphocytes and only.

The current study confirmed that there was a decrease in monocytes caused by corticosteroids in female white labs after 17 days of mating; Monocytes are the only ones that work to determine the effectiveness of Monocytes esterase, which is present in body organs such as the brain, stomach and colon and is found in the liver. This enzyme works to increase the effectiveness of monocytes [29]. The role of steroid hormones in apoptosis of single blood cells by studying the effect of these hormones on single cell cultures due to their effect on cytokines such as IL-1B and tumor necrosis TNF-a, which are regulated by these hormones By inhibiting immunity programmed by stimulating antioxidants.

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***Correspondence to:**

Al-ali AA
Department of Biology
College of Education for Pure Sciences
University of Basrah
Basrah, Iraq
Tel: 964 780 413 5932
E-mail: ali43.bas@gmail.com