EFFECT OF POX VACCINE ON BLOOD PICTURE IN ADULT EWES

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ABSTRACT

Sheep pox is an enzootic disease in Iraq and the regional countries. A huge amount of money either spent on vaccines or lost due to the morbidities every year. For unknown reason, sometimes vaccination is not efficient enough to provide the required protection. We conducted this study to investigate the effect of the most popular pox vaccine on some physiological parameters, which may reflect any adverse effect on the body. We used twelve adult ewes, divided into two groups (6/each); the first group is the control, injected with normal saline (0.9% NaCl) intradermal, whereas the vaccine was injected similarly in the animals of the other group. Blood samples were obtained weekly before and after the treatment onset. Results revealed that there are changes in blood count parameters, starting from the vaccination time (the second week). Interestingly, RBC count was decreased just after the vaccination, whereas, a significant ($p \leq 0.05$) decreased in the WBC was also observed, with consequent significant changes in the differential leukocytes count (DLC), These changes were accompanied with signs of re-elevation after two weeks of vaccination. In conclusion, there are unexpected changes in the RBC count result from pox vaccination. Furthermore, the developing of immunity starts with a decrease in the WBCs, which needs more than two weeks to restore the normal value.

INTRODUCTION

Sheep pox is an acute highly contagious viral disease, infects sheep. Sheep pox is characterized with fever and pustules on mucous membranes (1), in addition to rhinitis and conjunctivitis which lead to respiratory symptoms.(2) Sheep pox is the most virulent type of pox amongst animals, which represents a challenge for countries with high animal production due to the high mortality rate (30-60%) as well as the decreased productivity. Sheep pox has been classified according to the world diseases organization in the list A. Historically, it is an ancient disease, when infectivity has been identified since 1763. Sheep pox is an endemic

disease in Africa and middle east in addition to India and some sporadic diseases in the south east of Europe (3) .

The causative agent of sheep pox is Capri pox virus, a member in poxviridae (4, 5). This virus is within the largest viruses in size, having antigenicity with Neethling virus. Sheep pox virus is highly resistant to the environmental conditions. The virus can stay alive in the skin scabs for up to three months, and up to two years in cold-dark places. The virus may die within few minutes in the sunlight, and the infectivity is diminished to a fret extent by disinfectants such as iodine and chlorine compounds. Lesions fluids and dry scabs are the sources of infection. The virus can be isolated from saliva, lacrimal fluid and nasal secretions in addition, the virus can be identified in skin, wool, hair and expiratory air (6).

Different effects of pox immunization have immunologically and pathologically been studied in different sheep breeds. Whereas the effects of immunization on physiological levels have not yet been studied in local breeds. This study is an integration of previous studies about sheep pox, which aims to investigate the impacts of sheep immunization with sheep pox vaccine on the levels of complete blood profile.

MATERIALS AND METHODS

Animals:

Twelve adult Away ewes were used, and divided into two groups. Annals were used to figure out the experimental animals, were animals previously diagnosed with pox and / or resaved the vaccine were excluded. Groups are divided as follows:

1- Control group: Treated with normal saline intradermal (id).
2- Treatment group: Vaccinated with sheep pox vaccine, the Turkish strain, Al-Kindey Co. id at the second week of the experiment .

Selected animals were kept in barns, separating a groups from the other. Temperature was adjusted to 23±2ºC , ration and water ware given *ad libitum*.

Samples collection:

Blood samples were collected from the jugular vein every week. Samples were taken in EDTA-contain tubes, mixed and subjected to analysis (7, 8).

Laboratory tests:

Blood profile was measured according to (7, 9).

Statistical analysis:

Data were subjected to unpaired t- test at $p \leq 0.05$. Differences between means were calculated using one way analysis of variance, the Duncan test was used(10) to determine the significance at $p \leq 0.05$.

RESULTS

Table 1 shows no significant difference between the studied groups in terms of PCV, Hb concentration, RBC count, WBC count and blood profile indices.

Table 1 : Blood profile of ewes before Vaccination.

Parameter / groups	MCHC g/dl	MCH pg	MCV fl	WBC*10^3 Cells/cu.mm	RBC *10^6 Cells/cu.mm	Hb g/dl	PCV %
Control group	30.40 ±0.74	5.63 ±0.30	18.53 ±0.80	8.65 ±0.19	12.9 ±0.59	7.18 ±0.13	23.67 ±0.42
Group prepare to Vaccinate	29.73 ±0.95	6.08 ±0.16	20.45 ±0.38	8.85 ±0.26	11.83 ±0.36	7.16 ±0.18	24.17 ±0.61
p- value	0.594	0.218	0.057	0.556	0.159	0.944	0.511

The values are Mean ± S.E. .
* significant at ($p \leq 0.05$).

As shown in table 2, both RBC and WBC counts are decreased just after vaccination compared to the control. An elevation in the MCV was also observed in the treated group, whereas no significance was observed in other parameters.

Table 2: blood profile of ewe at vaccination, the control ewes not vaccinated.

Parameter / groups	MCHC g/dl	MCH pg	MCV fl	WBC *10^3 Cells/cu.mm	RBC *10^6 Cells/cu.mm	Hb g/dl	PCV %
Control group	31.21 ±1.25	5.60 ±0.18	18.01 ±0.56	9.38 ±0.14	12.90 ±0.32	7.20 ±0.17	23.17 ±0.47
Vaccinated group	28.96 ±0.96	6.15 ±0.34	21.11* ±0.79	6.51* ±0.06	11.58* ±0.45	7.03 ±0.19	24.33 ±0.55
p- Value	0.186	0.191	0.010	0.000	0.042	0.536	0.143

The values are Mean ± S.E. .
* significant at ($p \leq 0.05$).

The only significant difference in blood profile is that of the WBC count. WBC decreased compared to the control while no significance was observed in other parameters (Tables 3 & 4).

Table 3: Blood profile of ewes during week three of the Vaccination.

Parameter / groups	MCHC g/dl	MCH pg	MCV fl	WBC $*10^3$ Cells/cu.mm	RBC $*10^6$ Cells/cu.mm	Hb g/dl	PCV %
Control group	31.20 ±0.60	5.53 ±0.31	17.53 ±0.86	9.07 ±0.27	13.06 ±0.63	7.06 ±0.11	22.67 ±0.33
Vaccinated group	28.88 ±1.06	5.33 ±0.09	18.43 ±0.46	5.68* ±0.17	13.10 ±0.08	6.95 ±0.12	24.17 ±0.60
p- Value	0.089	0.559	0.380	0.000	0.960	0.493	0.054

The values are Mean ± S.D. .
* significant at ($p \leq 0.05$).

Table 4: Blood profile of ewes during week four of the Vaccination.

Parameter / groups	MCHC g/dl	MCH pg	MCV fl	WBC $*10^3$ Cells/cu.mm	RBC $*10^6$ Cells/cu.mm	Hb g/dl	PCV %
Control group	31.08 ±0.70	5.93 ±0.32	19.21 ±1.34	9.90 ±0.28	12.06 ±0.55	7.08 ±0.11	22.83 ±0.47
Vaccinated group	30.08 ±0.85	6.16 ±٠.30	20.71 ±1.28	7.41* ±0.51	11.51 ±0.63	7.05 ±0.10	23.50 ±0.50
p- Value	0.389	0.615	0.439	0.002	0.528	0.834	0.358

The values are Mean ± S.D. .
* significant at ($p \leq 0.05$).

Table 5 presents a statistical comparison for the blood profile values over the four weeks of the study duration in the vaccinated group. Significant difference was observed in values corresponding to RBC and WBC counts in addition to MCV and MCHB. RBC count has elevated during week 3 of the treatment compared to weeks 1 and 2. Then, the value restored the basal level in week 4. WBC count showed a sharp decrease in weeks 2 and 3 compared to week 1, then, the value has elevated in week 4 compared to weeks 2 and 3 however, it is still below the value obtained in week 1. MCV and MCHB have shown a significant decrease in week 3 compared to other times, however, the value has restored the initial level during week 4. Finally, both Hb and PCV did not show any significant change during the study period.

Table 5: Blood profile of vaccinated ewes over four weeks of the experiment .

Parameter / weeks	MCHC g/dl	MCH pg	MCV Fl	WBC *10^3 Cells/cu.mm	RBC *10^6 Cells/cu.mm	Hb g/dl	PCV %
First week	29.73 ±0.95 a	6.08 ±0.16 a	20.45 ±0.38 ab	8.85 ±0.26 a	11.83 ±0.36 ab	7.16 ±0.18 a	24.17 ±0.6 a
Second week	28.96 ±0.96 a	6.15 ±0.34 a	21.11 ±0.79 a	6.51 ±0.06 c	11.58 ±0.45 b	7.03 ±0.19 a	24.33 ±0.55 a
Third week	28.88 ±1.06 a	5.33 ±0.09 b	18.43 ±0.46 b	5.68 ±0.17 c	13.10 ±0.08 a	6.95 ±0.12 a	24.17 ±0.60 a
Fourth week	30.08 ±0.85 a	6.16 ±٠.30 a	20.71 ±1.28 ab	7.41 ±0.51 b	11.51 ±0.63 b	7.05 ±0.10 a	23.50 ±0.50 a
p-Value	0.776	0.081	0.126	0.00	0.059	0.80	0.73

-The values are Mean ± S.D. .
- Different letters refer to significance ($p \leq 0.05$).

Table 6 : differential leuckocytes count of Vaccinated ewes over four weeks of the experiment .

cells / weeks	Neutrophils %	Lymphocytes %	Monocytes %	Basophils %	Eosinophils %
First week	20±2.25 d	76±1.78 a	2±0.56 a	1±0.49 a	1±0.4 b
Second week	60±2.58 a	36±3.18 c	1±0.47 a	1±0.40 a	2±0.56 b
Third week	35±2.49 c	60±1.6 b	2±0.77 a	1±0.42 a	2±0.33 a
Fourth week	42±2.48 b	55±1.78 b	1±0.25 a	1±0.47 a	1±0.47 b

-The values are Mean ± S.D. .
- Different letters refer to significance ($p \leq 0.05$).

Table 6 shows significant differences in the differential leukocytes count (DLC) over the four weeks of the experiment. Neutrophils showed the highest level in the second week, then dropped to the lowest level in week three however, it returned to elevate significantly over week three in week four. Lymphocytes significantly decreased in week two compared to week one, but started to elevate in weeks three and four compared to week two. Both monocytes and basophils did not show significant changes during the four weeks of the

experiment. Finally, the eosinophil revealed the highest level in week three, whereas no significant differences observed among weeks one, two and four.

DISCUSSION

The current study had evaluated the effects of vaccinating adult ewes with sheep pox vaccine. Blood profile is one of the indicators of the general body health. Many diseases can be diagnosed through estimation of blood profile, which is rapidly changed in response of diseases.Both RBCs and WBCs have been decreased in the vaccinated group, while MCV has increased before vaccination (table 2). It is unexpected to have this result, however more investigations are required to identify reasons behind this.

The first impact of vaccination identified during the first week is the decrease in WBC count. WBCs are the most important immune indicator in the body, functioning in defense and developing immunity against antigens. The decreased WBC count in this study refers to the incomplete immune response for the vaccination, which may a range of time depending on the antigen, the host and the general body conditions(11).

It has been observed in week four an elevation in WBCs compared to week three. However, the level still below that of the control (table 4).

Regarding to RBCs, an elevation has been detected in week three, accompanied with a decrease in WBC count compared to the starting time of the experiment.

The significant change in RBC count might be attributed to a compensatory mechanism in the body, which was developing immune response against the vaccine. This response is a kind of stress. The changes both MCH and MCV are results of changes occurred in RBCs.

As seen in table 6, the elevation in neutrophil during week two might be attributed to the instance response of the body to the vaccination. However, the percentage of neutrophils decrease in week four, which is a kind of body adaptation. The main indicator of the body immunity is the lymphocytes, which was for unknown reason decreasing starting from week two but elevated in week three and four. This is an expected result as lymphocyte depict a clear idea about the antibodies level, therefore we can say that the body in this point started the formation of antibodies. The results of the DLC confirm that the antibodies formation against sheep pox vaccine mostly start after a week of the vaccination (12). This result has

been observe depending of blood parameters estimated, more investigations are require in this context four deeper insight on the body physiological changes of the body accompanying vaccination with sheep pox.

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