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Relationship between Levels of Some Physiological Parameters and Retained Placenta in Local Cows

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Abstract

The present study was carried out to investigate the effect of retained placenta in local cows on (zinc , Magnesium , calcium , β-carotene and vitamin A) and some hematological parameters. A total of forty cow were used in this study from fields in Al-Shirqat city, divided into two groups , the first group include thirty cows suffers from retained placenta and the second group include ten cows with normal parturition represent the control group. They were at age 3-5 years. Their body weight ranged between 150-180 Kgm. We noted in this study that (zinc, calcium, β-carotene and vitamin A) decreased significantly ($P \geq 0.05$) in group suffers from retained placenta in compare with healthy group, except Magnesium there is no significant difference between studied groups. Regarding hematological parameters (fibrinogen (Fb), packed cell volume (PCV), hemoglobin (Hgb), number of white blood cells (WBCs) and red blood cells (RBCs) , we noted that (WBCs) increased significantly in the infected group in compare with healthy group, while other hematological parameters decreased significantly in the infected group in compare with healthy group except that (PCV) don't different significantly between two studied groups. We conclude from this study that retained placenta (RP) has adverse effect on the level of some minerals and some hematological parameters .

Key words : retained placenta , local cows

Introduction

Retention of the fetal membranes (RFM) comprises of failure of dehiscence and a lack of expulsion of fetal membranes within the duration of physiological third stage of labour (1). Primary retention of fetal membranes results from a lack of detachment from the maternal caruncles whereas secondary retention is related to a mechanical difficulty in expelling already detached fetal membranes e.g. uterine atony (2). Retention of the fetal membranes (RFM) or Retention of Placenta (ROP) in the cow is normally defined as the condition in which the fetal membranes are not expelled within a period of 12 hours after expulsion of the fetus (3). Failure of the placenta to be expelled during the third stage of labour is a common postpartum complication in ruminants particularly in cattle which is due to failure of the fetal villi to detach themselves from the maternal crypts (4). Retention of fetal membranes is one of the most common conditions occurring in dairy cows following parturition. It is commonly followed by delayed involution of the uterus; drop in milk production and infertility resulting economic loss to the owner (5). Retention of placenta has been associated with a vast range of factors such as abortion, forced labor, delayed gestation, early parturition, uterine atony, infections, and seasonal and hormonal disorders. In addition, it is well known that deficiencies

of some vitamins and minerals induce or predispose animals to ROP (6) . Calcium concentration, which maintain adequate contraction of the uterus, may cause ROP, increase the risk of dystocia and delay the involution of the uterus (7). Metritis and pyometra are more common occurrences in such animals where the placenta is not removed manually. However, manual removal has been opposed as it may favor the entry of infection, which may be more harmful. Premature induction of parturition with glucocorticoids and prostaglandins increases the cases of placental retention. Moreover, it may be caused as a result of low plasma estrogen concentration. Deficiency in vitamin E and selenium also has an impact on retention of placenta (8). The Chemotactic activity of the placental tissue immediately after parturition determines placental expulsion and may even be a decisive factor. Major Histocompatibility Complex (MHC) incompatibility between dam and calf would facilitate the expulsion of placenta and accordingly MHC compatibility would be associated with retention (9). In order to study the relationship between levels of some physiological parameters and retained placenta in local Iraqi cows we designed this study .

Materials and methods

Blood samples were collected from (40) cow from fields in Al-Shirqat city, divided into two groups , the first group (30) cows suffers from retained placenta and the second group include (10) cows with normal parturition represent the control group . Blood was withdrawn from the Jugular vein by using sterile syringes (20 ml) after sterilization of the area well before blood withdrawing. Blood was divided into two parts the first part (10 ml) placed in test tubes that contain anti-coagulation factor in order to measure hematological parameters and another part placed in test tubes did not contain anti-coagulation factor and these samples were centrifuged at 2500 round/minute (rpm) for 15 minute and then serum sample were stored in freezer at -18c° until they were used for biochemical tests.

The study period lasted from 1/4/2021 until 1/6/2021 and the tests were conducted in the chemistry laboratory of Munther Mustafa.

Serum Ca, Zn and Mg concentrations were analyzed with an atomic absorption spectrophotometer (Perkin Elmer 370 Model) (10). vitamin A and β-carotene levels were measured using spectrophotometric method (Schimadzu UV-1208, UV- VIS spectrophotometer) (11). Blood samples were used for evaluating plasma fibrinogen (Fb) level and complete blood count (CBC). The data related to hematological indices of CBC, i.e., packed cell volume (PCV), hemoglobin (Hgb), number of white blood cells (WBCs) by using (vet Hema-screen 18, Hospitex Diagnostics, Italy).

Statistical analysis

The results were analyzed using the SPSS program for values representing the standard rate and error and analyzed the data using the ANOVA Analysis of variance One Way. The differences between the groups were determined using the Duncan multiple range test. At a probability level ($P \leq 0.05$).

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Results and discussion

Table (1) shows the affection of placenta retention on (zinc , Magnesium , calcium , β-carotene and vitamin A) level and comparing its level with normal parturition cows

Groups / Parameters	Healthy parturition **mean ±SE.**	Parturition with retained placenta **mean ±SE.**
zinc (mg\dl)	0.81 ± 0.04 a	0.32 ± 0.02 b
Mg (mg\dl)	2.14 ± 0.21 a	2.19 ± 0.13 a
Calcium (mg\dl)	9.78 ± 0.33 a	6.12 ± 0.32 b
β-carotene (mg\dl)	17.5±3.11 a	9.6±1.95 b
vitamin A (mg\dl)	52.2±2.44 a	42±3.71 b

- **Values represent mean ±SE.**
- **The difference between the values marked with various letters in the same line is significant (P≥0.05) .**

We noted from our study that the level of (zinc , calcium , β-carotene and vitamin A) increased significantly (P≥0.05) in the healthy parturition group in compare with Parturition with retained placenta group except the level of Magnesium (Mg) there is no significant difference between the two studied group . the differences among all studied minerals in both groups may be due to the relation between metabolic and puerperal disorders, and nutrition deficiencies after parturition in cows. Minerals such as Ca, Zn and Mg are obtained from the diet and play an essential role in metabolic and physiological activities (12). Zhang et al. (13) suggested that Zn and Mg concentrations of the blood serum in the RP group prior to parturition and after parturition were lower than those in the control animals. Other researchers (14) indicated that low levels of minerals lead to a predisposition to RP in cows. The reason for such a difference may be related to variations in feeding, breed and types of the dairy animals (15). It is well known that vitamin A and β-carotene deficiency causes negative impacts on fertility and increases RP incidence in cows. In addition, abortion, night blindness, increase in the birth of weak and sick calves, weakening the oestrus symptoms, and delay in ovulation are other negative outcomes related to deficiency of vitamin A and β-carotene (16). Ineba et al. (17) found that there was no significant difference in plasma vitamin A levels between Holstein cows with and without RP when measured on the day of parturition and one day postpartum, but the plasma β-carotene levels were significantly lower in cows with RP.

Table (2) shows the affection of placenta retention on hematological parameters level and comparing its level with normal parturition cows

Groups / Parameters	Healthy parturition **mean ±SE.**	Parturition with retained placenta **mean ±SE.**
RBC ($\times 10^6$ cell/ml^3)	6.15 ± 1.32 a	5.30 ± 1.22 b
PCV (%)	37.19 ± 1.11 a	36.10 ± 1.15 a
Hb (g\dl)	13.22 ± 1.23 a	11.10 ± 1.12 b
WBC ($\times 10^3$ cell/ml^3)	7.7 ± 1.44 b	9.5 ± 4.13 a
PLT × 10^6\ µl	395 ± 12.45 a	356 ± 13.02 b
Fb mg/dl	813 ± 15.13 a	463 ± 13.61 b

- **Values represent mean ±SE.**

- **The difference between the values marked with various letters in the same line is significant (P≥0.05) .**

In many studies, blood sampling uses for evaluating many criteria like total leukocyte count may be helpful to indicate infectious disease. However, using total leukocyte count to detect infection is not informative enough in cattle like many other species. The cows in two groups from each farm were selected as the same age, Blood samples were collected from the jugular vein of two groups to determine hematological indices of PCV, Hb, WBCs, RBCs, and PLT , In this study, we noted that cows with RP suffering from anemia as indicated by the significant decrease in the RBCs, Hb, PCV and other hematological profiles and also there is a leukocytosis. The condition may be attributed to inflammation and increase of monocytes for scavenging of cells debris as a revealing by (18). On the other hand, another researcher agreed with our results and he suggested that RP improves adhesion and antimicrobial capacity and enhances the inflammatory response, Neither was the increase in WBC counts as a response to any inflammation in the body (19). The mentioned indices in this study should be used with caution in the week after calving because it could be difficult to distinguish between the physiologic status of calving and a pathologic inflammatory process (20). In individual animals, blood sampling for evaluating e.g. the total leukocyte count may be helpful to indicate infectious disease. However, using total leukocyte count to detect infection is not informative enough in cattle like many other species and we noted that increase in the number of white blood cells in our study (21). Fb is involved in blood coagulation as a precursor to fibrin, binds to red cells, and reduces their surface charge leading to cell aggregation. It is also involved in tissue repair, providing a matrix for migration of inflammatory cells, fibroblasts, and endothelial cells (22). Fb has been used for many years as an indicator for inflammatory diseases such as RP as well as other inflammatory diseases in cattle (23). We noted that Fb decreased in the infected group in compare with control group and this case may be attributed to that Fb concentrations can remain unchanged or even decrease during an inflammatory condition. This may reflect consumption of the protein at the inflamed area (Uterine) in diseased cows which transiently can exceed the production. Measurement of Fb in cattle can be use to discriminate between acute and chronic inflammation, so the stage of disease can be evaluated better by monitoring more than one parameter (24).

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