

## Estimation of Some Minerals and Biochemical Traits in Al-Janoubi Cows with Retained Placenta

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### Abstract

The study aimed to explore the cause of retained fetal membranes in cows after delivery. The studied cows divided into 2 groups, each group was (15) cows different in age and weight, the times of collection of serum (1-3) days after parturition. The first group suffered from retained placenta (RP) after delivery and the other group was normally delivered. The parameters that studied was serum blood sugar, calcium (Ca), sodium (Na), potassium (K), in addition to total protein, albumin and globulin. The result of this study was significant ( $p \leq 0.05$ ) increase of serum glucose, potassium (K), and sodium (Na) in (RP) group in comparison to control group and significant ( $p \leq 0.05$ ) decrease of serum calcium (Ca), total protein, albumin and globulin in (RP) group when compared with control group that mean retained placenta take place in cows suffers from decrease serum calcium (Ca), total protein, albumin and globulin.

**Keywords:** minerals trait, biochemical trait, fetal membranes

### Introduction

The retained of fetal membranes (placenta) of dairy cows is one of major problems influential on reproductive system of cows (Stephen, 2008). Retained placenta has direct effect on able of fertility and milk yielding of cow, retained placenta may result from various factors like delay gestation, forced labor, abortion, early parturition, reproductive infections, uterine atony and hormonal disorder (Sheetalet al., 2014). The well-known cause of retained placenta is decreases of several minerals and vitamins which predispose or induce placenta of cows to retained (Alacam, 2002). The normal coming down of placenta occur following parturition requires normal and regular contractions of uterus which need to adequate concentrations of prostaglandin F<sub>2</sub> $\alpha$ , oxytocin and calcium in cow serum (McDowell, 1992). There are some evidence indicates that low calcium (Zhang et al., 1992) and potassium (Stancioiu and Constantinescu, 1983) (Zhang et al., 1992) concentrations in serum has important function in occurrence of fetal membranes retention in cows. Other researchers study role of Zn (Akar and Yildiz, 2005), copper (Samal and Mishra, 2010) and inorganic phosphorus (Sheetalet al., 2014). (Bionzet al., 2007) mentioned that level of calcium and magnesium in serum reduced in cows with risk of retained placenta. The concentration of serum calcium, glucose and other biochemical parameters were lower after 12 hours post-partum and 7 days post-partum in cows suffer from fetal membranes retentions compared to normal calved cows. Also, lower concentration of serum total protein in pregnant cows may be responsible for retention of placenta (Rokdeet al., 2017). The concentration of serum albumin in cows with fetal membranes retention lowered significantly as mentioned by (Seifiet al., 2007, Semaca and Sevinç, 2005).

## Material and methods

### Study subject

Fifteen blood samples had been collected from cows after 1-3 days of birth were suffer from retained placenta, other samples collected from fifteen cows after same time of birth were the placenta is normally expelled. All samples collected randomly and different ages and weight. The samples are collected from jugular vein of cows transported to gel tub and the centrifugation of blood sample occur immediately to serum separation at (3000 rpm) for (10 minutes) and then stored at -20°C till used for analysis.

### Laboratory analysis

Seven parameters were monitored to detect the effect of these parameters in retained placenta. The minerals that tested are serum sodium (Na), serum potassium (K) and serum calcium (Ca) (Bold et al., 1965), Also the serum glucose, total protein (Doumas et al., 1981), albumin (Rosenfeld and Surgenor, 1952) and globulin (Doumas et al., 1981) tested.

### Statistical analysis

(T) test independent used in statistics. (Goulden, C. H. 1956)

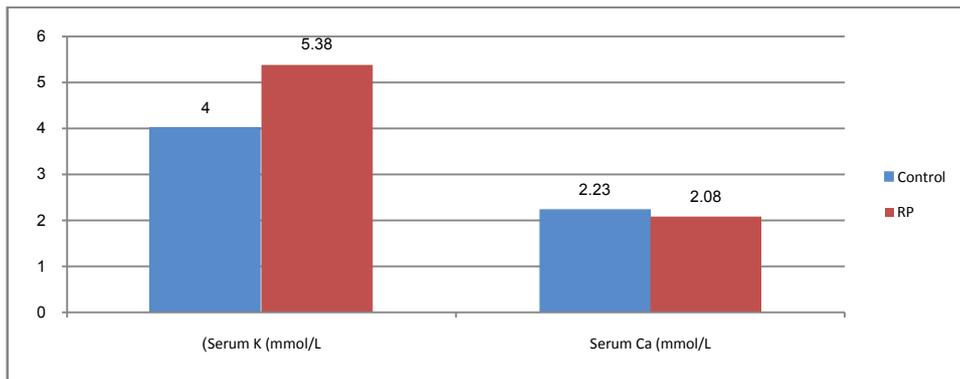
### Results

All studied parameters was mentioned in table 1, the serum concentration of potassium (K) was (4mmol/l) in control group and (5.38 mmol/l) in (RP) group as appeared in figure (1). The serum glucose concentration in control group was (62.66 mg/dl) while in retained placenta (RP) group was (78 mg/dl), figure (2), the serum sodium (Na) concentration was (132.66 mmol/l) in control group and its concentration was (138.2 mmol/l) in (RP) group, figure (2). The serum concentration of calcium (Ca) was (2.23 mmol/l) in control group but in (RP) group the serum of (Ca) concentration was (2.08 mmol/l) (figure 1). There's significant ( $p \leq 0.05$ ) increase of serum glucose, potassium (K), and sodium (Na) in (RP) groups when compared with control group. About the proteins concentration the total protein, albumin and globulin are tested in the two groups and the results revealed that the total protein concentration in control group is (7.63 g/l) and (4.28 g/l) in (RP) group. Also, serum albumin concentration of control group was (4.08 g/l) and in (RP) group was (3.28 g/l) finally, determination of serum globulin in control group and (RP) groups were (3.54 g/l) and (0.96 g/l) respectively. There's significant ( $p \leq 0.05$ ) decrease of serum calcium (Ca), total protein, albumin and globulin in (RP) group in comparison to control group.

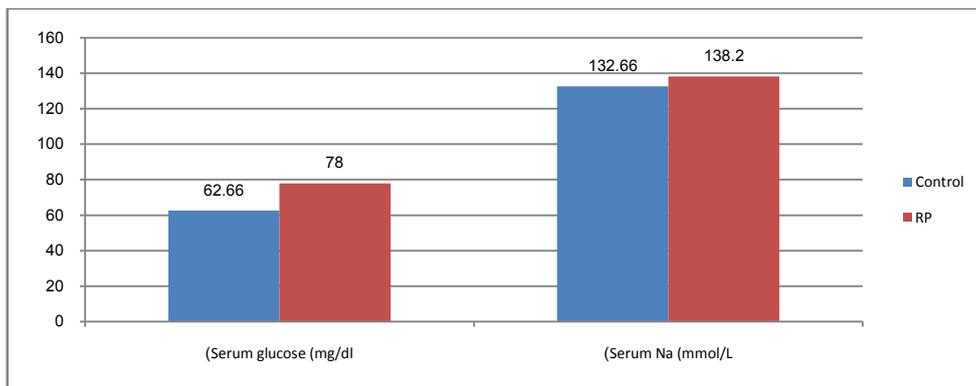
**Table (1): The concentrations of blood sugar, Na, K, Ca, total protein, albumin and globulin**

	sugar	Na	K	ca	T.P	Alb	Gl.
control	62.66±2.87b	132.66±2.35 b	4.00±0.40 b	2.23±0.20 a	7.63±0.22 a	4.08±0.28 a	3.54±0.30 a
RP	78.00±4.48a	138.20±1.20a	5.38±0.31a	2.08±0.08b	4.28±0.16b	3.28±0.12b	0.96±0.13b

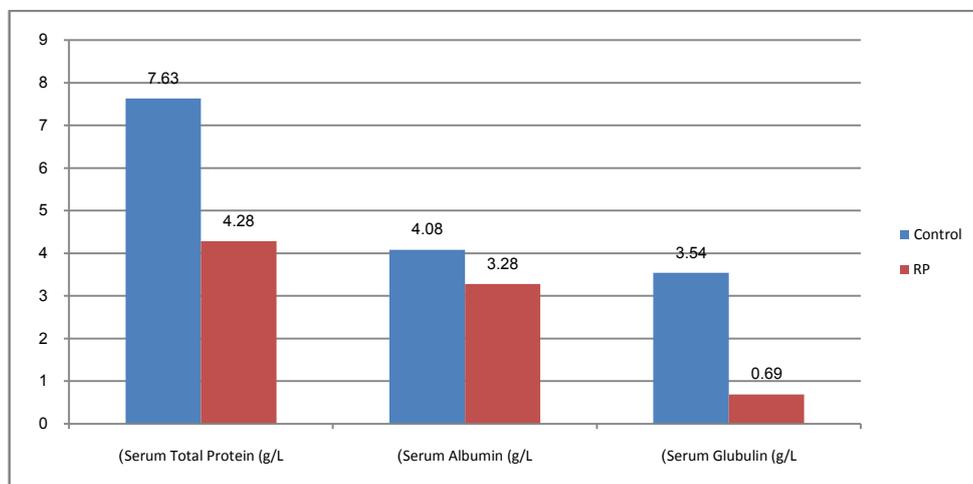
The mean differences are significant at the 0.05 level. Different letters refer to significant ( $p \leq 0.05$ ) differences between the control and retained placenta (RP) groups



**Figure (1):** represent to serum potassium (K) and calcium (Ca) concentration in control and (RP) group. The blue column is control group and the red color is (RP) group



**Figure (2):** discover the serum glucose and sodium (Na) concentration in control and (RP) group. The blue column is control group and the red color is (RP) group



**Figure (3):** reveal to serum total protein, serum albumin and serum globulin concentration in control and (RP) group. The blue column is control group and the red color is (RP) group

### Discussion

There is an important link between metabolism and puerperal disorders, and nutrition lack followed cow's parturition. Minerals like Calcium, Potassium and Sodium are taken from the feed and have an essential function in metabolism and physiological actions (McDowell, 1992). Significant ( $p \leq 0.05$ ) lowering in serum calcium may be revealed to loss of calcium during regular uterine contraction at time of parturition and hypocalcaemia result in decrease of tonicity of uterine muscles to propel the placenta after parturition causing inhibition of collagens activity

which led to incidence of retention of placenta and delays the involution of uterus as mentioned by (Sheetalet al., 2014) (Rokdeet al., 2017). The concentration of calcium reduction in cows with retained fetal membranes might be due to excessive calcium mobilization to the fetus in the last period of pregnancy lead to less availability of calcium to tissues of uterus (Mohantyet al., 1994). The decreasing in serum calcium concentration might have lead to uterus tony causing placenta retention (Arthur et al., 1992). However, prepartum supplementation of calcium prohibits placenta retention mainly developing health status and increase myometrial sensitiveness (Sosa and Nasr, 1995). Hyponatremia recorded in serum in retained placenta cows may be attributed to dehydration resulting in concentration of the extracellular fluid (Abdullah et al., 2014). The serum sodium and potassium concentration in retained placental cows increased in comparison to control group and these results agreed with (Akar and Yeldiz, 2005). Protein profile determination occurs by its structure, function and intensity of metabolism. Protein profile controlled by hormones, changing of general metabolism may be lead to vary in both protein quantity and quality. This change can be utilized as clinical sign of pathological status (Kankofer et al., 2014). Hypoproteinemia which occur after parturition as result of blood and tissues loss (Kumari et al., 2014) which indicate that these cows had poor health (Rokdeet al., 2017), hypoalbuminemia effect on calcium level (Beagley et al., 2010). Curtis et al., (1984) showed that decrease incidence rates of placenta retention in cows supplied a high-protein feed in the dry period. Total protein concentration in serum of retained placenta cows showed significant ( $p \leq 0.05$ ) decreasing in comparison to control group and this results agreed with (Kandeilet al., 2002, Al-Yasiri, 2017). As result of tissue destroying and inflammation in the time of placenta retention in try to repel the placenta, the synthesis of hepatic protein is partly changed in direction of elevation production of positive acute phase proteins and decrease of serum albumin which is considered a negative acute phase protein (Salehet al., 2008). Serum globulin concentration decreases because the immune system impaired during per parturient period as mentioned by (Mordak and Anthony, 2015). The cotyledon-carbuncle linkage breakdown occur as results of maternal immune system against the placenta which have important role to normally expelled placenta (Kimura et al., 2002) so, the decrease concentration of serum globulin may be indicated the fall of level of immunity in cows with fetal membranes retention. It was newly evidences that there is low immunoglobulin in cows colostrums suffer from fetal membranes retention than in cows colostrums from normal cows (Lona and Romero, 2001). Kimura et al., (2002) suggested that fetal membranes retention caused a inhibition of lymphocyte capability to synthesize immunoglobulin. However, it may be more probably that the loss of immunoglobulin in the fetal membranes retention cows colostrums caused by an combination between inhibition of immune role before parturition and the subsequent vulnerability to retained placenta case. Serum glucose level elevation in retained placenta cows may be due to insulin resistance (Hassan et al., 2020) or attributed to increase in cortisol concentration as results of stress from parturition and retention of placenta (Cheung et al., 2019). Hypocalcemia occur in retained placental animals may be other factor of hyperglycemia because the decrease of serum  $Ca^{2+}$  concentration blocks insulin production (Chen et al., 2016).

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