BIOCHEMICAL ANALYSIS OF SOME BLOOD CONSTITUENTS IN FEMALE BUFFALOES DURING LATE PREGNANCY AND PUERPERIUM

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ABSTRACT

The present study was designed to estimate the changes of some biochemical constituents in the blood of apparently healthy pregnant buffaloes during late pregnancy, parturition, early puerperium as well as during estrous and the diestrous phases. A total number of 137 blood plasma samples collected from 16 female buffaloes, 5 control (non pregnant) and II pregnant at late stage were investigated for biochemical analysis of total proteins, creatinine, total lipids, phospholipids, total cholesterol and inorganic phosphorus.

The obtained data showed a significant decrease of plasma total proteins during the late month of pregnancy, followed by an increase postpartum and throughout puerperium. The data also revealed a significant decrease of plasma creatinine level throughout the late months of pregnancy and the first month postpartum. Plasma total lipids revealed a significant decrease during the late month of pregnancy, followed by an increase after calving. A significant decrease was recorded for plasma phospholipids during late month of pregnancy. The phospholipids level showed a significant increase during the first month and at the fourth week postpartum, followed by a significant increase during oestrus. The plasma total cholesterol level decreased significantly throughout the late month of pregnancy. A significant increase of total cholesterol level was observed at the fourth week post-partum and at oestrus. Plasma inorganic phosphorus increased significantly during late month of pregnancy.

INTRODUCTION

Pregnancy imposes a large demand upon the female animal. Pregnancy and parturition are physiological conditions which may be accompanied with some alterations in the biochemical constituents of the blood (Soliman et al., 1966).

Since the blood acts as the carrier for nutrients from the pregnant animal to its developing foetus, analysis of blood may reflect the nutritional status for the foetus. It also throws some light upon the food requirements of the dam during this critical
period of reproduction (El-Naggar, 1975).

Pregnancy imposed a large demand upon mother minerals, and after parturition for the formation of colostrum, and the beginning of lactation which constituted heavy load upon mother minerals (El-Hariri et al., 1986).

Davis and Vincent, (1983), reported that, pregnancy and oestrogen contraception produced changes in the plasma concentration of trace elements in concomitant with the alteration in circulating plasma proteins.

The aim of the present study is to follow up the alteration of total proteins, creatinine, total lipids, phospholipids, total cholesterol and inorganic phosphorus in the blood plasma of pregnant buffaloes, throughout the last month of pregnancy, early puerperium as well as at parturition. Hence the reproductive potential of buffaloes can be assessed.

MATERIAL AND METHODS

The present study was carried out on a total number of 11 sexually mature and pregnant buffaloes and 5 control (non pregnant) kept at the experimental farm, belonging to the faculty of Agriculture Science (Moshtohor), Zagazig University (Benza branch). They were clinically normal and proved to be free from the infectious and coital diseases as well as external and internal parasites.

Approximately ten ml of blood were collected from the jugular vein on EDTA as anticoagulant, every week during the last month of pregnancy, three successive days from the onset of parturition, then every week throughout the first month of the postpartum period and at the day of the first postpartum heat. Blood samples were also taken from another five non pregnant buffalo-cows clinically proved to be in the dioestrus or luteal phase, used as control group. Blood plasma was separated and kept at -2°C till the biochemical analysis performed.

Plasma total proteins, creatinine, total lipids and total cholesterol were determined colorimetrically by using kits-produced by Egyptian American Co. for laboratory services according to the technique adopted by Gornall et al. (1949), Schimester (1964), Zollner and Kirk (1962) and Ratliff and Hall (1973), respectively. Whereas plasma phospholipids were determined according to Zilversmit and Davis (1958) and plasma inorganic phosphorus was determined according to Drekh and Jung (1970).

The data obtained were statistically analysed according to the methods described by Denenberg (1976).

RESULTS

The results of the present study (Table 1), showed that, there was a significant decrease of plasma total proteins during the late month of pregnancy, followed by an increase at postpartum and throughout puerperium. Table (1) also showed a significant decrease of plasma creatinine level throughout the first three days postpartum, but it was significant throughout the first month postpartum.

Plasma total lipids showed a significant decrease during the late month of pregnancy, followed by an increase after calving.

Plasma phospholipids revealed a significant decrease during the late month of pregnancy but not during the first three days postpartum. There was a increase in
plasma phospholipids during the first month postpartum but it was significant at the fourth week in postpartum. A significant increase of plasma phospholipids level was recorded at oestrus (Table 2).

A significant decrease of plasma total cholesterol level throughout the late month of pregnancy. There was a non significant increase in plasma cholesterol level during the first three days of the postpartum period which became significant at the fourth week. There was a significant increase in the level of cholesterol at oestrus. (table 2)

Plasma inorganic phosphorus increased significantly during the late month of pregnancy and then decreased (but not significantly), throughout the first three days in postpartum. There was a non significant increase in the level of inorganic phosphorus during the first month of postpartum. A non significant variation in plasma total proteins and total lipids level between estrous and the dioestrus phases was observed whereas, there was a significant variation in the level of inorganic phosphorus between oestrus and dioestrus phases (Table 2).

DISCUSSION

During pregnancy, it has been emphasized that the plasma total proteins decline as the animal approaches time of birth (Larson and Kendall, 1957; Schalm, 1975; El- Baghdady, 1984; Abdel-Maksoud, 1991). This finding came in consistent with that shown in the present study where the total proteins steadily decreased from the fourth to the first week before parturition (Table 1). Such decrease in the plasma total proteins was attributed to the great exchange in globulins from blood to mammary glands as colostrum (Larson and Kendall, 1957 and More et al., 1971) and to the rapid progress in the uterus and its contents (Mourad et al., 1983).

Immediately and throughout the first three days after parturition, the present study revealed a non significant increase in the plasma total proteins, a finding which came in accordance with some previous studies (El-Baghday, 1984). The increase in the plasma total proteins level although it was non significant might be attributed to increasing the feeding intake which possibly surpasses the maintenance and productive capacity of the animal.

Following the first three days after parturition, the present study monitored a significant increase in the plasma total proteins from the first to the fourth week postpartum. This postparturient increase in the plasma total proteins, was observed in buffaloes (El-Naggar, 1975), cows (Larson et al., 1960) and the camels (Shehata, 1987). The significant increase in the plasma total proteins could be attributed to increasing the globulins in blood as a squelae of invading the uterus by mild infection after parturition without clinical signs of mucometra or pyometra, but with prolongation in the clinical uterine involution (Roberts, 1971).

Parallel to the decline in the total proteins, the plasma creatinine, which is the catabolic product of the total nitrogenous compounds (Bath et al., 1985), appeared to decrease remarkably from the fourth to the first week before parturition. The present value came nearly in consistent within the range reported earlierly (Salah et al., 1976). Since creatinine has a positive relationship to protein metabolism (Marshal and
Hughes, 1980), thus increasing plasma creatinine is used as indication to excessive protein metabolism and vice versa. This finding could be anticipated in association with the progress in pregnancy (Salem, 1980; Kaldas and Henin, 1992). However, the decline in plasma creatinine, can be explained in two ways. First, the decrease in plasma total proteins is mainly anabolic and not catabolic due to the great exchange in globulin from blood into the mammary glands as colostrum. Second, the protein metabolism in its anabolism runs at low steady rate during the last month of pregnancy where the foetal growth is completed and the body metabolism is maintained.

After parturition and throughout the first month of postpartum, the plasma creatinine still showed a decline in its level contrary to that observed in case of the plasma total proteins. This finding might support the positive relationship between plasma creatinine and protein metabolism (Salem, 1980; Kaldas and Henin, 1992).

The present study showed, a decrease in level of the total lipids during late pregnancy, such decrease during late pregnancy came in accordance with that shown in some reports (Duncan and Garton, 1963; Prakash and Tandon, 1979; Raphael et al., 1973 and Issa, 1988). The decline in total lipids is related mainly to the gradual exchange of fatty acids containing lipids from the blood into the mammary glands. The lowest level of plasma total lipids appeared at the zero day of parturition after which they began to increase, a finding which came in support with some previous studies (Raphael et al., 1973).

Throughout the first month of puerperium the present study indicated an increase in the plasma total lipids, a finding came in consistent with some of previous studies (Avidar et al., 1981 and Prakash and Tandon, 1979).

The present study revealed a significant decline in level of cholesterol throughout the last month of pregnancy, a finding which came in accordance with (Shehata, 1987; Salem, 1980 and Rowlands et al., 1980). The decline in level of total cholesterol throughout the last month of pregnancy might came in association with the gradual increase in level of oestrogen as a predisposing factor initiating the mechanism of parturition (Hafez, 1986). It has been reported that oestrogen has significant relationship to the plasma total cholesterol (Glowset and Williams, 1963; Purohit and Kohli, 1977).

At parturition the present study showed a remarkable decline in level of plasma cholesterol on the zero day of parturition followed by a non appreciable increase throughout the first three days after parturition. This finding came in agreement with that mentioned in some previous reports (Duncan and Garton, 1963; Jadhav et al., 1971 and Sohukar et al., 1985).

Throughout the first month of the postpartum period there is a prominent increase in the level of blood cholesterol, a finding which came in consistent with some previous investigations (Avidar et al., 1981; Shehata, 1987 and Issa, 1988), it has been indicated that cholesterol increased during early puerperium as the level of circulating and thyroid hormones decreased (Prakash and Tandon, 1979).

The present study indicated that the cholesterol level was significantly lower during the oestus phase than during the dioestrus phase. (Table 2). This finding came in
consistent to that reported by Hassan et al. (1980) where cholesterol is higher in the luteal than the follicular phase, but differs from others (Purohit and Kohli, 1977) where cholesterol is high during the follicular phase. Thus the cholesterol may be lowered due to the effect of estrogen during oestrus and may be higher by the effect of progesterone during dioestrus.

In the present study, a highly significant decline was observed in phospholipids during the last stage of pregnancy, a finding which came in agreement with that reported by Holtenius et al. (1986) and Eissa (1988). Immediately after and throughout the first three days of parturition the level of phospholipids is still at its lowest particularly at the third day of puerperium. The remarkable decrease in phospholipids might be attributed to the great exchange of phospholipids into the mammary glands to be utilized in milk fat synthesis (Yang et al., 1976). On the other hand the level of phospholipids in blood begins to increase following the third day after parturition, a finding which came in consistent with Holtenius et al., (1986), who indicated that level of phospholipids appeared much lower immediately after calving followed by an upward increase. However, Eissa (1988) noticed an increase in the level of phospholipids in buffalo cows following the third week of puerperium. Nevertheless, in the current study the level of phospholipids appeared significantly higher in blood of buffalo cows during the dioestrus phase when compared to those during the oestrous phase (table 2) this findings suggested that the level of phospholipids might have a significant relationships to the effect of progesterone during dioestrus rather than the effect of oestrogen during oestrus.

The plasma inorganic phosphorus increased in its level particularly during the last week of pregnancy. The increased level of inorganic phosphorus with progress of pregnancy is usually associated with the great demand for phosphorus either in foetus development or in carbohydrate metabolism especially during late pregnancy (Best and Talyer, 1950 and Ismail and Hussein, 1988), whereas, a significant decrease in the plasma inorganic phosphorus was observed at the end of the third trimester (Mohamed, 1989). However, the plasma inorganic phosphorus did not differ between the different stage of pregnancy (Shenata and Zaghloul, 1990). Such difference in plasma inorganic phosphorus estimates is not paramount as the phosphorus supplied in the diet is enough to meet the requirements at pregnancy due to the involvement of plasma inorganic phosphorus in the active transport mechanism across the placenta (Wafaa et al., 1991).

Immediately and throughout the first three days after parturition, there is a decline in the plasma inorganic phosphorus, such fall in the phosphorus level may be related to increasing its utilization with the enhanced carbohydrate metabolism and its flow to the udder (Pathak and Jankiraman, 1987).

Throughout the first month of puerperium, the present study revealed a non significant increase in the plasma inorganic phosphorus, a finding which might be related to increasing the feeding intake of phosphorus particularly for lactating buffalo cows. However, the plasma inorganic phosphorus is significantly higher during the oestrus than that during the dioestrus. A finding which came in accordance with some
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Note: The table above shows the forecast versus the realized values over a 5-year period.
previous studies (Gerry, 1991; El-Shafie, 1984; Dhobie and Gupta, 1986 and Sheratif and Zaghlool, 1990). Such differences were attributed mainly to increasing the metabolic activity of the liver during the follicular phase (Cowan et al., 1979). From the present study it can be concluded that in order to attain normal parturition, stopping of the fetal membranes at its actual time, enhancement of the uterine involution and shortening the interval from calving to the first observed heat, attention should be paid to increase the rate of some elements in the diet especially the total proteins, total lipids, phospholipids and inorganic phosphorus.

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التحليل النوبي كيميائي لمصبات مكونات الدم في إناث الجاموس أثناء فترة نهاية الحمل والتموين

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ه. ف. ب. "عرض عن استعمال جديدة في التحليل الكيميائي

يمكننا أن نلاحظ أن هذه المكونات تحتوي على نسبة عالية من السكريات، والتي يمكن أن تساعد في تحسين صحة النسل.

وقد أجريت دراسة في عدد من مناطق البلاد، حيث تم استخدام تقنيات الكيمياء الحيوية لمسح مكونات الدم في إناث الجاموس.

وقد تم الحصول على عينات ضخمة من إناث الحمل في ثلاثة أسابيع من الحمل الأول، وتم استخدام تقنيات الكيمياء الحيوية لمسح مكونات الدم.

وقد أظهرت النتائج أن نسبة مكونات الدم في إناث الحمل الأولى كانت أعلى من المعدل الطبيعي، وهذا قد ينعكس على صحة النسل.

وقد تم استخدام تقنيات الكيمياء الحيوية لمسح مكونات الدم في إناث الحمل في ثلاثة أسابيع من الحمل الأول، وتم استخدام تقنيات الكيمياء الحيوية لمسح مكونات الدم.

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