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CHANGES IN SOME BLOOD CONSTITUENTS AND THEIR RELATION TO REPRODUCTIVE PERFORMANCE IN PRE AND POSTPARTUM PERIODS IN EGYPTIAN BUFFALOES

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ABSTRACT

Serum total proteins, albumin, globulin, A/G ratio, alkaline phosphatase (AP) aspartate transaminase (AST) alanine transaminase (ALT), cholesterol and total lipids were estimated in 23 multiparous Egyptian buffaloes aged 5-11 years from 60th days prepartum to 90th day postpartum at 15 days intervals. Total proteins and globulin were high at 60th day prepartum, then decreased gradually until parturition ($P< 0.05$) but increased again after parturition with fluctuation until 90th day postpartum. Albumin was slightly fluctuated throughout the experimental period. Albumin/gbbulin ratio was low at 60th day prepartum, then increased prior parturition until 90th day postpartum. Concentration of AP was high at 60th day prepartum then decreased towards parturition, statistically non-significant. AST, ALT, cholesterol and total lipids decreased ($P< 0.01$) from 60 days prepartum until parturition where they increased ($P<0.05$). The same parameters did not differ between the two groups. However, buffaloes which exhibited estrus (group1) showed a tendency to higher 0levels for all parameters than buffaloes which did not exhibit estrus (group2).

Keywords: Buffalo, prepartum, postpartum, total protein, albumin, globulin, enzymes, cholesterol and total lipids.

INTRODUCTION

Constituents of the blood during prepartum period can be utilized to find out deviation, if any, from normal, that may affect reproduction in postpartum period. Plasma total proteins as a constituent of plasma serve as indicator of amino acids pool for protein synthesis in the liver (Harper, *et.al.*, 1977). Blood serum proteins in buffaloes were depressed at parturition but rapidly increased to constant level after calving (Abdul Quayam, *et.al.,*1990). Patil and Deshpande (1979) observed that total protein values remained low after parturition in cows which did not show estrus within 90 days but increased significantly in those which estrus.

Pregnancy and parturition were considered as stress factors affecting dairy cows which increased the level of blood alkaline phosphatase (Amer, *et.al.,* 1977, Sahukar *et al.,* 1985 and Abd Ell-All *et al.,* 1990). The changes in serum transaminase had been reported during different reproductive stages in cattle (Bugalia *et al.,* 1996). Roussel and Stallcup (1967) observed significant ($P< 0.05$) differences in transaminase level between anestrus cows (lower) and normal cycling ones (higher).As Cholesterol being the precursor of steroid hormones,it varied during estrous cycle, pregnancy and postpartum periods. Hypercholestraemia was associated with elevated

circulatory estrogen profiles during estrus in cycling cows and in nymphomaniac cows (Kaushik and Bugalia 1999). The blood cholesterol and total lipids concentrations were high at 60 th day prepartum, declined steadily during the next period to reach the lowest level at the day of parturition. During postpartum period they increased gradually with in 60th day (Blum *et al.,* 1983). Singh *et al.* (1999) found that cholesterol level was slightly higher in cattle exhibitedestrus than those did not exhibited estrus. There are a few data available about the blood constituents in Egyptian buffalo specially during the pre and postpartum periods. This investigation aimed to study blood constituents during prepartum and postpartum periods and in buffaloes which exhibited estrus and those did not exhibited estrus and to link the changes to reproductive performance of the buffaloes.

MATERIAL AND METHODS

Animals and feeding: Twenty three healthy Egyptian buffaloes from the Experimental Farm of the Faculty of Agriculture Al-Azhar University, 5-11 years old with different parities were used for this experiment started at 60th day prepartum to day 90th postpartum. Animals were fed according to their live body weight and production, on concentrate mixture containing 17% crude protein, 2.5% fat and 15% crude fiber, in addition to rice straw or wheat straw and berseem hay. (Egyptian clover; *Trifolium alexandrinum*, which was offered at 20 to 25 kg/animal/day). At the end of 90 thday postpartum the buffaloes were divided into two groups according to their estrus behaviour. Those which exhibited estrus (Group 1) and (Group 2) for those which did not exhibited estrus. Buffaloes were detected for estrus sings three times daily, at morning, mid day and late afternoon using a fertile bull.

Blood sampling: Blood samples were collected from the jugular vein of pregnant buffaloes 60 days prepartum at 2 weeks (15 days) intervals until 90 days postpartum. The serum was separated and stored at – 20°C till determination of the blood constituents

Biochemical determinations of blood: Serum total protein, albumin, globulin, A/G ratio, alkaline phosphatase, aspartate transaminase (AST) alanine transaminase (ALT), cholesterol and total lipids were estimated. Total proteins were determined colorimetrically in serum based on the principle of the Biuret reaction following the method of Weichselbaum (1946). Serum albumin was estimated colorimetrically as described by Doumas, *et al.* (1971). Globulin was calculated by subtraction of albumin from total protein. The A/G ratio was calculated by dividing each albumin value by its corresponding globulin value. Alkaline phosphatase was determined colorimetrically by the method of Bessey, *et.al.,* (1946). Serum aspartate transaminase (AST) and alanine transaminase (ALT) activities were measured as described by Reitman and Frankel (1957). Serum cholesterol and total lipids were estimated colorimetrically as described by Watson (1960) and Frings *et al.* 1972.

Statistical Analysis: Statistical analysis was carried out to test the significant differences of blood constituents during prepartum and postpartum periods and between the two groups using GLM procedure of SAS (1988). Analysis of variance and Duncan;s multiple range test were used to compare means (Snedecor and Corchran, 1982).

RESULTS AND DISCUSSION

Total protein: The total protein values table (1) and figure (1) decreased from 60 days prepartum till parturition ($P<0.05$). From 15 to 90 days after parturition, serum total protein showed gradual increase. The same trend was noticed in buffaloes which exhibited estrus (group1) compared to buffaloes which did not exhibited estrus (group2), with non-significant differences.

Table (1): Means ± SE of serum concentration of total protein, albumin, globulin and A/G ratio in Egyptian buffaloes during pre and postpartum periods.

Blood values / Days	Total protein (mg %)	Albumin (mg %)	Globulin (mg %)	A/G ratio
Prepartum				
-60	9.13±0.16 a	4.53±0.11 a	4.61±0.09 a	0.98±0.02 a
-45	8.49±0.16 a	4.23±0.12 a	4.26±0.08 ab	0.99±0.02 a
-30	8.22±0.24 ab	4.14±0.15 a	4.08±0.14 ab	1.01±0.03 a
-15	8.03±0.18 ab	4.05±0.10 a	3.98±0.09 bc	1.02±0.01 a
Parturition	7.66±0.15 b	4.00±0.10 a	3.66±0.08 c	1.09±0.03 a
Postpartum				
15 Group 1	8.29±0.25	4.21±0.14	4.08±0.13	1.03±0.02
Group 2	8.18±0.18	4.18±0.16	4.00±0.13	1.05±0.05
Mean	8.23±0.14 ab	4.16±0.11 a	4.07±0.09 b	1.02±0.03 a
30 Group 1	8.43±0.22	4.29±0.16	4.14±0.16	1.03±0.06
Group 2	8.10±0.13	4.10±0.15	4.00±0.14	1.02±0.06
Mean	8.26±0.12 ab	4.20±0.11 a	4.06±0.10 ab	1.02±0.04 a
45 Group 1	8.56±0.20	4.36±0.16	4.20±0.09	1.03±0.04
Group 2	8.15±0.14	4.13±0.15	4.02±0.14	1.02±0.06
Mean	8.36±0.12 ab	4.24±0.11 a	4.10±0.08 ab	1.02±0.03 a
60 Group 1	8.57±0.19	4.27±0.10	4.30±0.12	0.99±0.03
Group 2	8.18±0.12	4.00±0.13	4.18±0.06	0.96±0.03
Mean	8.38±0.12 ab	4.13±0.07 a	4.35±0.09 ab	0.98±0.02 a
75 Group 1	8.61±0.20	4.28±0.09	4.33±0.13	0.98±0.02
Group 2	8.10±0.15	4.04±0.10	4.06±0.17	0.99±0.06
Mean	8.34±0.16 ab	4.16±0.09 a	4.19±0.11 ab	0.99±0.03 a
90 Group 1	8.69±0.23	4.84±0.14	4.91±0.12	0.97±0.02
Group 2	8.20±0.14	4.11±0.12	4.05±0.05	1.01±0.02
Mean	8.85±0.20 a	4.43±0.12 a	4.43±0.10 a	1.00±0.01 a

a, b, c Means with the same letter within each column are not significantly different.

Serum total protein found in the present study are close to those reported on cows and buffaloes (Rowland, *et.al.,* 1980, El-Baghdady, 1984 and Rajora and Pachauri, 1994). The decrease in serum total protein as the buffaloes approached parturition may be due to storage of proteins in the liver or other organs or being utilized under the stress of pregnancy (Larson and Kendall, 1957). The same authours reported that the drop in serum protein at parturition was caused by a loss of immune β_2 and $б_1$ globulins and some globulins from the blood. This coincided with the time the colostrum began formation in the mammary gland (Singh *et al.* 1999). Also, the utilization of maternal amino acids by the foetus to synthesize its tissue may reduce maternal serum protein (Jainudeen and Hafez, 1980).

El-Naggar and Abdel-Raouf (1971) reported that reduction in serum proteins in late gestation coincide with the rapid increase in the uterine weight and its contents, namely, the foetal fluids and the foetal membrane. Abdul-Quayam, *et al.* (1990), Mahmoud (1993) and Rajora and Pachauri (1994) reported that the reduction in serum protein in late pregnancy was attributed to the decrease in both serum albumin and globulin. Hewett (1974) and Rowlands *et al.* (1975) observed that the decline in serum total protein concentration during late pregnancy was mainly because of 15% decrease in the globulin concentration and the increased protein breakdown required for glyconeogenesis.

The same trend of increase in level of serum total proteins during postpartum period is in agreement with reports in goat (Hassanin, *et al.,* 1996, Abd El-Khalek, 1997 and Ashour 1998), in sheep (Abd El-Bary 1990 and Mahmoud 1993), in buffaloes (Abdul-Quayam 1990) and in cows (Hassan *et al.,* 1986 and Rajora and Pachauri, 1994). The increase in the blood total proteins at 60 to 90 days postpartum compared with parturition in this study ($P<0.01$) may be attributed to the reduction in milk yield during this period. Rowlands *et al.* (1975) and Hassan *et al.* (1986) reported that, high milk yield was associated with low total protein in the blood. Patil and Deshpande (1979) observed that total protein values remained low after parturition in cows which did not show estrus within 90 days but increased significantly in those which showed estrus. Enkia, *et al.* (1982) found that total protein level was higher in normal cows than in repeat breeders but the difference was not significant. The values of total protein recorded in the present study are close to those reported by Humana and Usui (1973) and Patil and Deshpande (1979) in cow. Also, Umesh, *et al.* (1995) and Singh, *et al.* (1999) reported that serum total protein was higher during normal cycling than in anestrus period. The nutritional status of the animal was reported to alter the bioactivity of LH molecule. Cows losing energy reserves compared to those maintaining body condition, had an enhanced metabolic state and pituitary function that shortened the interval to first estrus after calving (Umesh, *et al.* 1995). Saleh *et al.* (1994) reported significant correlation between blood composition during estrus and conception which involved serum total protein.

fig1

They recorded high total protein in buffaloes which conceived in contrast to those which failed to conceive.

Albumin: The results of the present study showed no significant differences in albumin levels during the experimental period. However, the albumin gradually decreased from 60th day prepartum until parturition then increased from 15 to 90 days postpartum (Table 1 and Figure 1), with slight differences between buffaloes which had estrus (high) and buffaloes which did not show estrus (low).

The values in the present work are in agreement with those found by Khalil, *et al.* (1986), Mahmoud (1993), Abd El-Khalek, (1997) and Ashour (1998) who reported that, blood albumin decreased with advance of pregnancy. The decrease in albumin with the advancement of gestation may be due to the acceleration in protein synthesis by the foetus (Jainudeen and Hafez, 1980), which cause a reduction in the amino acids available for liver to synthesize albumin. Larson and Kendall (1957) found little change in albumin concentration after calving. Hypoalbuminaemia in a dairy cow may be brought by other factors, such as elevated globulin level resulting from disease or inadequate protein intake (Manston, *et al.,* 1975). It has been shown (little, 1974 and Rowlands *et al.,* 1975) that serum albumin concentration tended to fall shortly after calving and then increased gradually for the first few months of lactation. Rowlands, *et al.* (1980) who found that cows which were better able to maintain stable albumin concentration were likely to have better fertility. Atallah and Abd-Alla (1998) found that buffaloes which failed to show cyclic activity till 210 days postpartum had persistently low level of albumin. Saleh, *et al.* (1994) however, found contrary results, although Rowlands *et al.* (1977), found correlation between fertility and albumin concentration, 40 to 100 days postpartum, since falls in albumin concentration occured at calving.

Globulin: Pregnancy had a significant influence ($P< 0.01$) on serum globulin at its late stage. The globulin concentration was relatively high at 60th day prepartum and decreased gradually reaching the lowest value at parturition. After parturition, the serum globulin level increased gradually; this increase was significant ($P< 0.05$) between 15 and 90 days postpartum. Globulin in buffaloes which had exhibited estrus was higher than those which did not exhibited estrus although the difference was not significant (Table1 and Figure1).

The results of the present study are in agreement with those reported by Larson and Kendall (1957), Abd El-Bary (1990), Mahmoud (1993) and Ashour, (1998), who indicated that amount of α-globulin in the blood reached a maximum at the onset of pregnancy and then it started to decrease. Larson and Kendall (1957) stated that β_2 and σ_1 globulins build up in the maternal blood stream of cows several weeks before parturition.During late pregnancy, noticeable quantities of immune globulins leave the maternal blood directly before parturition, when the globulin-rich-colostrum is being formed in the mammary gland. Gadhave, *et.al.,* (2000) reported that the decrease in serum globulin concentration towards calving may be due to selective uptake of

immunoglobulin by the mammary gland. The decrease which occur in globulin concentration during late pregnancy is well known and have been attributed to transfer to immunoglobulins (Rowlands, *et al.,* 1980).

The trend of increase in the level of serum globulin during lactation (postpartum) has been previously reported in goats (Hassanin, *et al.,* 1996 and Ashour, 1998); in ewes (Abd El-Bary, 1990 and Mahmoud, 1993); in cows (Rajora and Pachauri, 1994) and in buffaloes (Shrikhande, *et al.,* 1999). After parturition total globulin concentration increased quickly (Rowlands *et al.,*1975). The results of the present study are in good agreement with those attained by Gadhave, *et.al.,* (2000) who found that serum globulin level was lowest on the days of parturition in both "Gir" and Crossbred cows.

Saleh *et al.* (1994) found that the globulin level was high in buffaloes which conceived in comparison with those failed to conceive. Those buffaloes which became pregnant showed a significant ($P<0.01$) increase in serum globulin level during estrus. They found that globulin level during estrus was significantly related to conception. Also, Rowlands *et al.* (1980) found an increased globulin concentration in the 3 weeks following calving which was significantly related to conception rate. On the other hand Reynolds, 1953 and Degen, (1977) reported a decline in total protein and globulin with advancing lactation and in albumin at early lactation and referred that to an induced increase in total body water and in blood volume

Albumin/Globulin Ratio: No significant differences were found in A/G ratio throughout the experimental period. However, A/G ratio was increased from 60th day prepartum towards parturition. Also there was no significant differences between the two groups, of buffaloes; those which exhibited estrus and buffaloes which did not exhibit estrus (Table 1 and Figure 1). However, the increase in A/G ratio at parturition may be due to the lower globulin value. Abd El-Bary (1990) mentioned that the decrease in A/G ratio during early pregnancy was attributed to the high globulin during this period. This result agrees with that obtained by Rajora and Pachauri (1994) and Gadhave, *et.al.,* (2000) who found that A/G ratio increased during late pregnancy.

Alkaline Phosphatase (AP): Changes in serum AP concentration during prepartum and postpartum periods are shown in table (2) and figure (2). The level gradually decreased from 60 days prepartum towards parturition. After parturition, the AP concentration slightly increased from 15 to 90 days postpartum. However, the AP level was higher in buffaloes which exhibited estrus (Group 1) than those which did not exhibited estrus (Group 2), differences, however, were not significant.

The results of the present study are in accordance with those observed by Shaffer, *et al.* (1981), Kumar, *et al.* (1991) and Ashour (1998). Also, Sahukar, *et al.* (1985) indicated that in cows the AP activity increased from the second month of pregnancy to the seventh month, while it gradually declined thereafter, which may be due to skeletal tissue formation of the foetus. Kaneko and Cornellus (1970) attributed the hyper enzymatic activity

of AP noticed as pregnancy progressed to the hyper metabolic state of the mother and foetus.

The lower level of serum AP during postpartum period agree with the reports on ewes (Mahmoud, 1993), in goats (Ashour, 1998) and in cows (Sahukar, *et al.,* 1985). After parturition, the needs for the osteoblastic activity of foetal bones are largely reduced (Sahukar, *et al.,* 1985). Mahmoud, (1993) found that, in sheep, the reduction in AP level continued after parturition and reached the minimum at 7th weeks postpartum. However, the serum AP was found to be non-significantly higher in buffaloes which exhibited estrus than those which did not exhibited estrus. This result agrees with the finding of Kaneko and Cornellus (1970) and El-Naggar, *et al.* (1983). Also Roussel and Stallcup (1967) reported that serum AP showed no significant change during various stages of estrus cycle.

Table (2): Means ± SE of some blood constituents in Egyptian buffaloes during pre and postpartum periods.

Blood values / Days	Alkaline phospha-tase (U/L)	AST (U/L)	ALT (U/L)	Cholesterol (mg %)	Total lipids (mg %)
Prepartum					
-60	36.78±0.86 a	35.61±1.64 a	27.00±0.87 a	149.91±3.73 a	306.95±5.20 a
-45	36.52±0.64 a	34.61±1.51 ab	26.78±0.64 a	145.43±4.08 a	293.78±5.98 a
-30	35.43±0.54 ab	32.30±1.30 abc	27.65±0.36 a	139.13±4.74 ab	284.52±7.08 ab
-15	34.52±0.61 ab	32.26±1.56 abc	25.52±0.56 a	126.74±4.18 c	257.17±5.70 bc
Parturition	33.21±0.65 abc	29.04±1.72 c	21.91±0.72 b	127.61±5.31 c	223.36±5.20 d
Postpartum					
15 Group 1	31.80±1.04	31.20±2.84	22.30±0.80	134.60±6.58	257.80±7.34
Group 2	31.15±0.58	29.85±1.92	21.69±0.53	133.07±6.44	253.38±6.04
Mean	31.43±0.55 c	30.43±1.61 bc	21.95±0.45 b	133.74±4.53 bc	255.65±4.81 bc
30 Group 1	31.40±0.95	32.15±2.58	22.23±0.71	141.50±7.60	268.90±6.96
Group 2	30.30±0.65	30.20±1.79	21.20±0.45	134.69±6.16	254.61±6.23
Mean	30.78±0.55 c	31.30±1.49 bc	22.08±0.42 b	137.61±4.74 bc	260.82±4.78 bc
45 Group 1	30.90±1.01	31.90±2.70	21.92±0.73	146.61±7.59	269.30±6.94
Group 2	30.69±0.44	30.85±1.68	20.90±0.34	131.54±6.08	262.92±6.17
Mean	30.78±0.49 c	31.30±1.47 bc	21.47±0.38 b	138.08±4.91 ab	265.34±4.52 bc
60 Group 1	32.50±1.04	34.76±2.43	22.53±0.60	148.00±7.65	272.40±6.87
Group 2	32.23±0.53	31.50±1.85	21.10±0.47	134.61±5.84	266.15±5.96
Mean	32.34±0.49 bc	33.34±1.49 abc	21.91±0.39 b	140.43±4.78 ab	268.86±4.45 bc
75 Group 1	33.90±1.07	33.76±2.20	23.46±0.82	148.80±7.91	280.80±9.55
Group 2	31.61±0.46	30.50±1.84	20.90±0.52	134.23±6.04	264.76±5.80
Mean	32.60±0.57 bc	32.34±1.42 abc	22.34±0.45 b	140.56±4.88 ab	271.73±5.42 bc
90 Group 1	35.60±1.08	34.23±2.06	24.69±0.70	149.30±6.53	304.10±8.95
Group 2	31.23±0.45	29.10±1.88	21.30±0.58	135.00±6.60	263.38±6.02
Mean	33.13±0.69 bc	32.00±1.46 abc	23.21±0.56 b	141.22±4.82 ab	281.08±6.62 ab

a, b, c, d Means with the same letter within each column are not significantly different.

Aspartate Aminotransferase (AST) and Alanine Aminotransferase (ALT):

Data of table (2) and figure (2) indicated that serum AST and ALT were significantly ($P<0.01$ and $P<0.05$, respectively) higher at 60 days prepartum, then they decreased towards parturition. After parturition, the AST and ALT concentration fluctuated with differences being non-significant. Also, no-significant differences were found between buffaloes which exhibited estrus (group1) and buffaloes which did not exhibit estrus (group2).

The results of the present work are in agreement with those reported by Bugalia, *et al.* (1996) who found elevated AST level during prepartum

compared to postpartum period. They suggested that extended uterus, due to pregnancy and increased cellular permeability due to stress induced tissue for transfer of transaminases from uterine and placental tissues into circulation evidencing prepartum rise in plasma AST and ALT. In addition, elevated catecholamines during stress, due to pregnancy induced gluconeogenesis and raised AST level (Kaushik and Bugalia,1999). However, previous studies on cattle (Stallcup *et.al.,* 1967 and Boots *et.al.,* 1969) showed that GOT and GPT activities were decreased during late pregnancy. These findings were attributed to the increased protein demand during the last stages of pregnancy, where transaminase enzymes are necessary for accelerating the rate of metabolism and protein biosynthesis for foetal growth (Okab *et al*.1993). The results obtained in table (2) and figure (2) showed non-significant higher values in AST and ALT in buffaloes which exhibited estrus in comparison with those which did not exhibit estrus. Roussel and Stallcup (1967) found that serum AST activity reached a peak ($P<0.05$) at the estrus stage which was preceded by a depression at proestrus period, with the lowest level during estrus cycle appearing at diestrus. As previously reported by Davis *et al.* (1965) and Jose and Gergory (1965), ALT activity throughout the estrous cycle was fairly stable.

Cholesterol and Total lipids: The serum cholesterol and total lipids concentration decreased significantly ($P<0.01$) from 60 days prepartum towards parturition. During postpartum cholesterol level increased significantly ($P<0.05$), while total lipids increased but non-significantly from 15 to 90 days postpartum (Table 2 and Figure 2). The trend of changes in cholesterol and total lipids concentration in Egyptian buffaloes in the present study are in accordance with those reported on goats (Medway and Kronfeld 1958, El-Sayed 1986 and Ashour, 1998), in sheep (Okab, *et al.,* 1993) and in cattle (Sahukar *et al*., 1985). The fall in cholesterol level at parturition may not be attributed to a single factor since, hormonal influences play a major role (Sahukar, *et al.,* 1985). The lower values of serum cholesterol at parturition could be attributed to the concomitant increase in the level of thyroid hormones (Okab, *et al.,* 1993).

High cholesterol values during late pregnancy, was probably due to the high levels of gonadal steroids which have a relation with cholesterol metabolism (Sahukar, *et al.,* 1985). The decline in serum total lipids shortly before parturition and at the postpartum period may be attributed to the increased demands of mammary glands for fatty acids for the synthesis of triglycerides, since 50% butter fat in the cow are received from blood lipids (Schmidt 1971). It seams that a hormonal influence is involved, possibly from the thyroid which has an adverse effect on all plasma lipids (Long, *et al.,* 1953). Decrease in cholesterol level near parturition, as observed in the present study was probably due to the increasing stress of parturition (Singh *et al.,* 1999). Fadlallah, *et al.* (1999) reported that total cholesterol levels showed insignificant decrease in heat-stressed buffaloes. Capen and Martin (1989) suggested increased lipids metabolism and the conversion of cholesterol into bile acids and other substances and activation of lipoprotein lipase.

fig2 As shown in table (2) and figure (2), cholesterol and total lipids were higher in buffaloes which had exhibited estrus (group1) than those which did not exhibited estrus, (group2); differences were non-significant. The elevation of serum cholesterol and total lipids in group 1 (buffaloes which showed estrus) may be associated with development of the corpora lutea, since, cholesterol is the precursor of progesterone (Thorpe, *et al.,* 1964). Group1 which had ovarian activity and high level of progesterone during postpartum period (Badr, *et al.,* 2001). This result conforms with that obtained by Singh, *et al.* (1999) who found that cholesterol level was high in cattle with normal cycles than those which had anestrus. The result of the present work was not in harmony with that reported by Saleh *et al.* (1994). Rowlands, *et al.* (1980) found that poor fertility was not related to cholesterol level.

The findings of this study showed persistently low cholesterol among buffaloes that did not exhibit estrus during 90 days postpartum were in support to those obtained by Butler, *et al.* (1981) and Huszenicza *et.al.,* (1988) who found a harmful effect of the low energy balance as well as decreased cholesterol level on the ovarian activity.

From this study it could be concluded that certain blood parameters such as total protein, albumin, globulin, alkaline phosphatase, transaminase, cholestrol and total lipids can be measured and used as indication of the reproductive status of buffaloes during the postpartum stage.

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التغيرات في بعض مكونات الدم وعلاقتها بالأداء التناسلي لفترة ما قبل وبعد الولادة في الجاموس المصري

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اجري هذا البحث في مزرعة تجارب كلية الزراعة بجامعة الأزهر. استخدم في هذا البحث عدد ٢٣ جاموسة عشار أعمارها بين ٥-١١ سنة وذلك في الفترة ابتداء من ٦٠ يوم قبل ولادتها وحتى ٩٠ يوم بعد الولادة. وكان الهدف من هذا هو دراسة التغير في تركيز بعض مكونات سيرم الدم وعلاقتها بالأداء التناسلي في فترة الدراسة. تم اخذ عينات دم من الحيوانات كل ١٥ يوم خلال فترة الدراسة وتم الحصول على سيرم الدم وحفظه حتى إجراء التقديرات المختلفة. أظهرت الدراسة أن جميع تركيزات المكونات التي تمت دراستها وهى البروتين الكلى و الالبيومين و الجلوبيولين وإنزيم الفوسفاتيز القاعدي والإنزيمات الناقلة لمجموعة الأمين والكولسترول والدهون الكلية في سيرم الدم تكون عالية قبل الولادة بحوالي ٦٠ يوم ثم تنخفض حتى ميعاد الولادة ثم تتجه الزيادة تدريجيا وحتى ٦٠ يوم بعد الولادة وكانت هذه الزيادة بعضها معنوي وبعضها غير معنوي كما كان تركيز هذه المكونات في سيرم دم الجاموس التي ظهرت عليه علامات الشياع أعلى منها في الجاموس الذي لم يظهر الشياع ثم حدث زيادة واضحة بدءا من ٦٠ يوم وحتى ٩٠ يوم بعد الولادة. نستنتج من هذا البحث انه يمكن استخدام بعض القياسات في الدم في فترة ما بعد الولادة التي تعطى مؤشرا للحالة التناسلية في الجاموس في تلك الفترة.