قسم الولادة والجراحة
كلية الطب البيطري - جامعة القاهرة
رئيس القسم : أ٠د/ كمال زكي

تأثير الحمل على بعض مكونات الدم العضوية في الجمال

محمد البليلي ، مصطفى أبوأحمد ، نبيل حميدة ، يحيى البغدادي

نظرا لندرة المعلومات الخاصة بالعلاقة بين صورة مكونات الدم ومراحل الحمل المختلفة في نوق الجمال والتى تمثل أهمية كبرى فى القاء الضوء على فسيولوجية الحمل في هـــــذه الحيوانات فلقد كان لزاما تبيان هذه العلاقة ٠

أجري هذا البحث على ٦١ ناقة اشتملت على جميع مراحل الحمل المختلفة ٠ تم تحليـــل المكونات العضوية المختلفة فى الدم وهي البروتين الكلي ، الزلال ، البولينا ، حمض البوليك الكرياتينين ، سكر الجلوكوز ، الدهون الكلية ، خميرة الجلوتاميك اوكسالواستيك ترانساميناز وكانت القيم المناظرة لهذه المكونات على التوالي كالاتي : ٤٣ر٩جم٪ ، ٤٨ر٣ جم٪ ، ٣٢ر٥٠ مجم٪ ، ٥٤ر مجم٪ ، ٦٢ر٣مجم٪ ، ١١ر٩١ مجم٪ ، ٨ر٢٨٠ مجم٪ ، ٥٥ر١٠٠ وحدة /لتر ٠

أثبتت التحاليل الاحصائية أن الحمل له تأثير معنوي عال على مستويات كل هذه المكونات ما عدا حمض البوليك مع ملاحظة اختلاف مدى هذا التأثير بين مراحل الحمل المختلفة ٠ مـــع تقدم مراحل الحمل لوحظ نقص حاد في مستوى كل من البروتين الكلي ، الزلال ، سكر الجلوكوز ، البولينا مع زيادة مستويات كل من الكرياتينين ، الخميرة سالفة الذكر ٠ ولقد تحملت مراحـل الحمل الأخيرة (≤ ٣٦٠ يوم) النصيب الاكبر من هذه التغيرات ٠

اشتملت الدراسة أيضا على التحاليل الاحصائية الخاصة بالانحدار وكذلك الارتباط بين مراحل الحمل المختلفة وهذه المكونات ومناقشة هذه العلاقات من الناحية الفسيولوجية ٠

Dept. of Surgery & Theriogenology,
Faculty of Vet. Med., Cairo University,
Head of Dept. Prof. Dr. K. Zaki.

THE EFFECT OF PREGNANCY ON CERTAIN SERUM ORGANIC CONSTITUENTS IN THE CAMEL

(With 3 Tables & 2 Figs.)

By
M.S. EL-BELELY; M.M. ABOU-AHMED; N.A. HEMEIDA and Y.R.M. EL-BAGHDADY
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SUMMARY

Literature are lacking any studies on the blood metabolic profiles of the pregnant camel. Such values would be of great importance in the prevention of the clinical expression of major metabolic disorders, therefore, ensuring normal pregnancy.

Blood samples, taken from 61 camels throughout pregnancy, were analysed for total protein, albumin, urea, uric acid, creatinine, glucose, total lipid and glutamic oxaloacetic transaminase (GOT). The respective mean concentrations were 9.43 g/dl, 3.84 g/dl, 50.32 mg/dl, 0.54 mg/dl, 3.62 mg/dl, 91.11 mg/dl, 280.80 mg/dl and 100.55 U/L.

Pregnancy had a significant effect ($P \leq 0.01$) on all serum components, except uric acid; the magnitude of this effect varied among pregnancy stages. Marked decreases in the serum totla protein, albumin, glucose and urea and increases in the serum creatinine and GOT were found with the advancement of gestation. The most significant changes in serum concentrations were confined to the late pregnancy periods (> 360 days).

The data were also analysed for regression analysis and correlation coefficients between pregnancy and serum concentrations. Concepts relevant to the physiological significance of these events were discussed. In addition, interrelationships among all serum components were investigated.

INTRODUCTION

Pregnancy, parturition as well as lactation constitute physiological strains which predispose the animal to certain metabolic and reproductive disorders. Assessment of certain blood components serves as a safe guideline for ensuring normal pregnancy and uncomplicated puerperium (SOMMER, 1970; PAYNE, et al. 1973; HEWETT, 1974).

In camels, the influence of age, season, nutrition and transportation stress on blood composition has been fully described (BARAKAT and ABDEL-FATTAH, 1970; ISMAIL, et al. 1979; SALAH EL-DIN, et al. 1979; MAJEED, et al. 1980; KOUIDER and KOLB, 1982; BIAGI and SALUTINI, 1983; ATEEQ, et al. 1984; ABDEL-SAMEE, 1987).

However, no similar attention has been and paid to the variation of blood composition with respect to stages of pregnancy despite the detailed studies devoted to this subject in most farm animals.

The present investigation, therefore, deals with the changes in certain blood serum organic constituents throughout pregnancy in the camel, with particular reference to the interpretation of metabolic profiles.

MATERIAL and METHODS

Animals:

A total number of apparently healthy 61 pregnant she-camels were chosen from Cairo abbatoir during the period February to December, 1986. Selection of the pregnant animals was made by rectal palpation. The stage of pregnancy was estimated using formulae on foetal biometries proposed by EL-WISHY, et al. (1981).

Blood Sampling:

Animals were restraint in the sitting position for pregnancy diagnosis and blood sampling. About 24-48 hours before slaughtering, blood was drawn by jugular venipuncture. Blood samples were allowed to clot at room temperature for about 6-8 hours. Serum was obtained by centrifugation at 2000 g for one hour and then stored at 20°C until analysed.

Analytical Methods:

The determination of serum total protein depends upon the reaction between peptide bonds of proteins and cupper ions in a moderately alkaline medium following the method of WEICHSELBAUM (1946). Serum albumin was estimated by the bromocresol method as recorded by DOUMAS, et al. (1971). The method described for estimation of serum urea (WYBENGA, et al. 1971) is based on a preliminary hydrolysis of urea with urease. The enzymatic method reported by HAECKEL (1976) was employed for the determination of serum uric acid. Creatinine was estimated in a protein-free supernatent of serum following the procedure of OWEN, et al. (1954). Glucose was measured calorometrically using the glucose oxidase method of HUGGETT and NIXON (1957). Total lipid was assessed in the serum by the phosphovanillin method described by FRINGS, et al. (1972). Serum glutamic oxaloacetic transaminase (GOT) was determined by the method of KARMEN (1955) utilizing the oxidation of $NADH_2$.

Statistical Analyses:

The data, grouped according to pregnancy stages, were analysed using the analysis of variance. The interactions among the studied parameters were estimated by correlation coefficients. Regression analysis of serum components on stages of pregnancy was also performed. All statistical methods were done according to SNEDECOR and COCHRAN (1976).

RESULTS

The range and overall mean (± SD) values for the serum total protein, albumin, urea, uric acid, creatinine, glucose, total lipid and GOT are given in Table 1.

The changes in mean concentrations of the eight serum constituents throughout pregnancy are shown in Table 2 and illustrated graphically in Fig. 1. Pregnancy was found to have a

highly significant effect ($P/ 0.01$) on all serum components, except uric acid and creatinine. The magnitude of this effect varied among the different pregnancy stages.

Regression analysis of the serum constituents on pregnancy periods revealed a statistically significant ($P/ 0.01$) decrease in the concentrations of total protein, urea and glucose and increase in the creatinine and GOT values as pregnancy progresses (Fig. 2).

The most significant changes in concentrations were confined to the late pregnancy period and to a lesser extent in early pregnancy (Fig. 1.). Variations in the concentrations of blood components were small during mid-pregnancy.

Coefficients of correlation between stages of pregnancy and each of the studied serum components showed significant negative associations for the total protein, urea and glucose and positive relationship for creatinine and GOT (Table 3). Interactions among all serum constituents revealed significant correlations for total protein/albumin, total protein/urea, albumin/urin, albumin/glucose, glucose/total lipid, glucose/GOT and total lipid/GOT.

DISCUSSION

A review of literature on some of the normal ranges of camel's total protein, urea, glucose (BARAKAT and ABDEL-FATTAH, 1970; ISMAIL, et al. 1979; KOUIDER and KOLB, 1982; BIAGI and SALUTINI, 1983; ATEAQ, et al. 1984; HIGGINS and KOCK, 1984), creatinine and GOT (BIAGI and SALUTINI, 1983; HIGGINS and KOCK, 1984) indicated that the values for these components in camels, as reported herein, were within the accepted limits.

Mean concentration of serum albumin (3.84 g/dl) was on the upper limit of the range (2.5-3.8 g/dl) given in the camel by BUCCIL, et al. (1979), SALAH EL-DIN, et al. (1979); BIAGI and SALUTINI (1983) and ABDEL-SAMEE (1987).

Available literature are lacking any figures on the blood concentrations of uric and total lipid in camels. This study presents their respective range and mean concentration (0.39-0.85, 0.54 ± 0.10 mg/dl and 200-350, 280.80 ± 19.73 mg/dl).

Throughout pregnancy, serum total protein concentrations were found to decrease significantly with the advancement of gestation. Similar observations were reported in cows especially during the last 2 months (HOJOVCOVA and PRAVDA, 1967; HEWETT, 1974; ROWLANDS, et al. 1975; SZULC, 1975; ROWLANDS, 1980). Such finding was attributed to the decrease (15-16%) in both serum albumin (HOJOVCOVA and PRAVDA, 1967; DALE, et al. 1979; ROWLANDS and MANSTON, 1983) and globulin (SZULC, 1975; ROWLANDS, et al. 1980).

The significant decline in serum urea concentrations during the course of pregnancy agreed with the pattern reported in cows (ROWLAND, et al. 1975; ROBERTS, et al. 1978; HARASZTI, et al. 1980), with a notable exception that urea values given here (50.23 mg/dl) were much higher than those found in cows (6-27 mg/dl). The difference may be due to the ability of camels to reutilize urinary nitrogen at times of poor grazing or water deprivation (HIGGINS and KOCK, 1984).

The serum glucose levels recorded in the present study disagreed with the conflicting reports on glucose levels in cows; concentrations have been found to decrease during pregnancy especially in the last trimester (ROBERTS, et al. 1978; LEBED, 1983; HAY, et al. 1983), to decrease from the seventh month of pregnancy, followed by an abrupt rise at calving (HUHN and LUPK, 1962; SOMMER, 1970; LOTTHAMMER, et al. 1971), to decrease between the last

month of pregnancy and the first month of lactation (HARASZTI, et al. 1980; ROULANDS, 1980), or not to change during different pregnancy periods (HEWETT, 1974; KITCHENHAM, et al. 1975). Some of these discrepancies could be due in part to the level of energy intake (McCLURE, 1977; ROBERTS, et al. 1978), lactation number or animal's age (PAYNE, et al. 1973; HEWETT, 1974) and milk yield (HEWETT, 1974; AVIDAR, et al. 1981; BOGIN, et al. 1982).

The values obtained here for total lipid throughout pregnancy accorded well with the results reported in cows by HENRICSON, et al. (1977), ROBERTS, et al. (1978), DALE, et al. (1979); PRAKASH and TANDON (1979) and VASSILEV (1979). The profound decrease in the concentrations of serum total lipid at the last period of pregnancy is mainly due to decreases in phospholipids and cholesterol esters, which comprise about 80-90% of the plasma lipids at all stages of pregnancy (REMOND, 1973). In the prepartal weeks, estrogens coupled with thyroxin might be principally instrumental in reducing cholesterol and phospholipids concentrations (DALE, et al. 1979; PRAKASH and TANDON, 1979).

The present serum GOT pattern conflicts with the findings of other workers reported in cows who noted decreases in GOT values with advancing pregnancy (SURYNEK and TOMSIK, 1977; HARASZTI, et al. 1980; TREUDE and FULLING, 1982), or negligible changes in the activity of this enzyme among the individual pregnancy months (STALLCUP, et al. 1967; ROWLANDS, 1980). However, a pattern similar to serum GOT concentrations in camel has been found in cows by other workers (BRODY, 1964; BOOTS and LUDWICK, 1970; TREACHER and COLLIS, 1977).

In this study, no definite trend in serum uric acid levels was observed, except for a slight increase after the tenth month of pregnancy which might be attributed to its overproduction at this time (SHEHAB, 1967).

The literature is surprisingly sparse as regards the effect of pregnancy on creatinine values. However, the work of HEYNS (1971) showed slight increase in serum creatinine levels throughout pregnancy in cows. In this study, creatinine values markedly increased with pregnancy advancement.

The coefficients of correlation calculated among the different serum constituents revealed some metabolic and physiological interrelationships, while other correlations were difficult to explain. As suspected, significant positive correlations were noted among total protein, albumin and urea. NOMANI and EVANS (1972) and HEWETT (1974) found that serum urea, albumin and total protein levels rose with increasing dietary protein in steers and dairy cows. EGGUM (1974) and MARINOV (1981) reported that blood albumin was not a very sensetive indicator of protein adequacy, but that blood urea levels can give good indirect measurements of protein adequacy. These observations would generally agree with the present results. The significant inverse relationship between glucose and total lipid agrees with the rule stated by HOVE (1974) and DALE, et al. (1979) that the lowered blood glucose leads to reduced insulin levels which facilitates a change over from fat degradation to fat synthesis in adipose tissues.

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Table (1): Range and overall mean values for serum organic constituents in pregnant camels.

Serum components	Range	Overall mean ± S.D.
Total protein (g /dl)	8.1 - 12.8	9.43 ± 0.65
Albumin (g /dl)	3.0 - 4.4	3.84 ± 0.30
Urea (mg/dl)	40.0 - 62.0	50.32 ± 3.41
Uric acid (mg/dl)	0.39- 0.85	0.54 ± 0.10
Creatinine (mg/dl)	2.8 - 4.4	3.62 ± 0.22
Glucose (mg/dl)	80.0 - 110.0	91.11 ± 3.50
Total lipid (mg/dl)	200.0 - 350.0	280.80 ± 19.73
GOT (U /L)	79.0 - 173.0	100.55 ± 6.96

Table (2): Mean concentrations of serun components throughout pregnancy in camels. (± S.D.)

Pregnancy stages (days)	No.of anim.	T.Protein (g /dl)	Albumin (g /dl)	Urea (mg/dl)	Uric acid (mg/dl)	Creati-nine (mg/dl)	Glucose (mg/dl)	T.lipid (mg/dl)	GOT (U/L
90	5	10.29 ± 1.59	4.24 ±0.15	58.21 ± 2.60	0.58 ±0.04	3.29 ±0.15	99.06 ± 6.14	293.81 ± 21.13	92.55 ± 5.45
91-180	16	9.68 ± 0.84	3.85 ±0.36	52.36 ± 2.40	0.48 ±0.11	3.28 ±0.24	94.16 ± 3.27	276.20 ± 32.27	91.63 ± 4.94
181-270	16	9.43 ± 0.56	3.81 ±0.34	50.28 ± 4.06	0.50 ±0.11	3.84 ±0.34	86.10 ± 4.23	248.41 ± 26.60	92.46 ± 8.54
271-360	19	9.18 ± 0.56	3.90 ±0.37	47.27 ± 5.42	0.58 ±0.14	3.84 ±0.30	87.70 ± 3.51	318.40 ± 23.25	101.87 ± 7.16
⩾360	5	8.46 ± 0.31	3.38 ±0.25	42.08 ± 2.16	0.58 ±0.08	3.70 ±0.32	94.04 ± 4.05	268.11 ± 32.76	158.12 ±10.55
F Ratio	P	0.01	0.01	0.01	-	-	0.01	0.01	0.01

Table (3): Coefficients of correlation between pregnancy and serum components. (n = 61).

	T.protein	Albumin	Urea	Uric acid	Creatinine	Glucose	T.lipid	GOT
Albumin	+0.298*							
Urea	+0.663**	+0.253*						
Uric acid	+0.109	+0.125	+0.034					
Creatinine	-0.196	-0.063	-0.082	+0.036				
Glucose	+0.087	-0.262*	+0.156	-0.016	-0.213			
T.lipid	-0.142	-0.075	-0.102	+0.021	-0.111	-0.478**		
GOT	-0.205	+0.066	-0.141	+0.115	+0.101	-0.271*	+0.263*	
Pregnancy	-0.445**	-0.239	-0.651**	+0.243	+0.538**	-0.466**	+0.241	+0.582**

* Significant at 5 % level. & ** Significant at 1 % level.

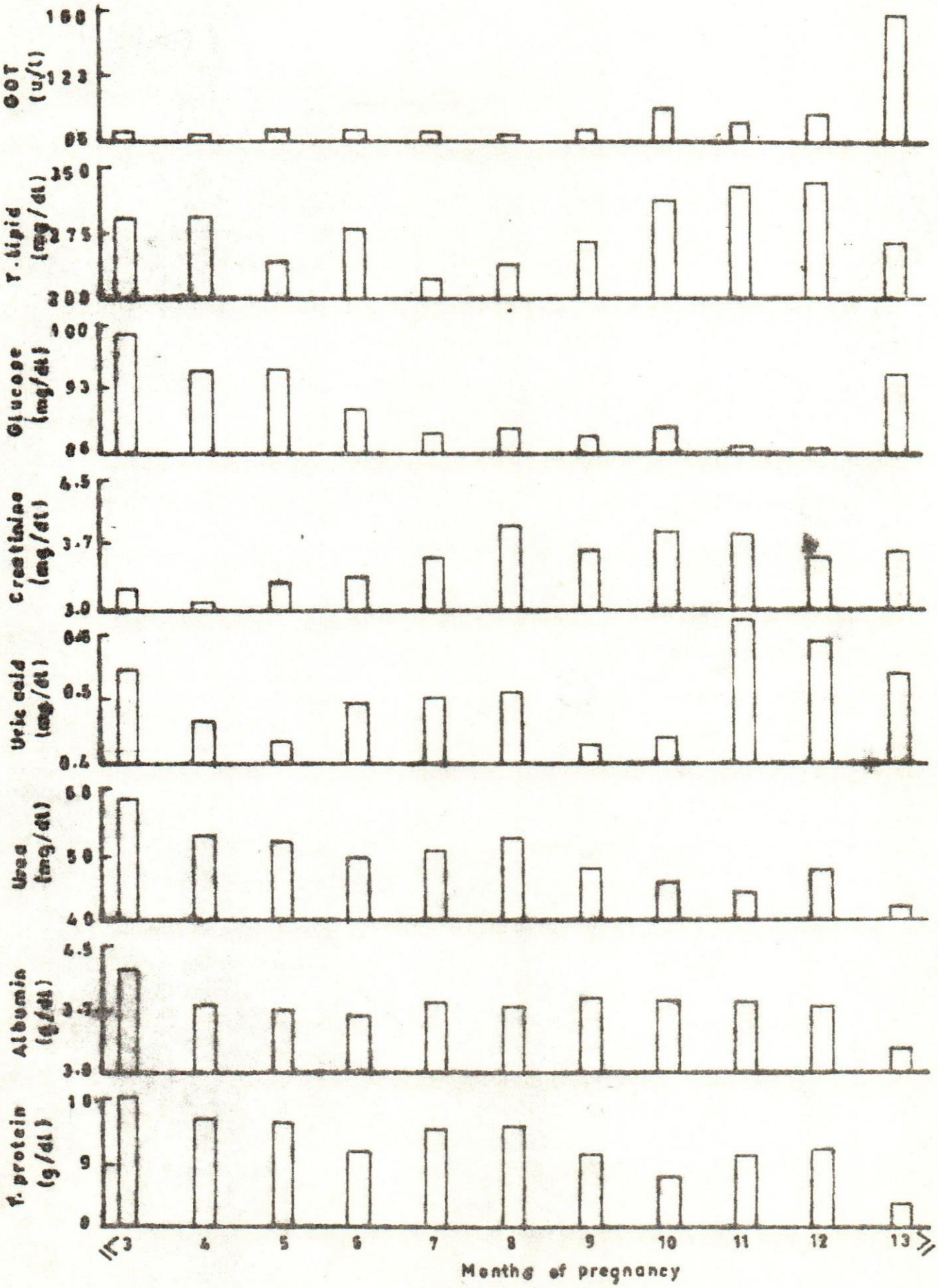

Fig.1 : Mean serum concentrations of organic constituents throughout pregnancy in camels.

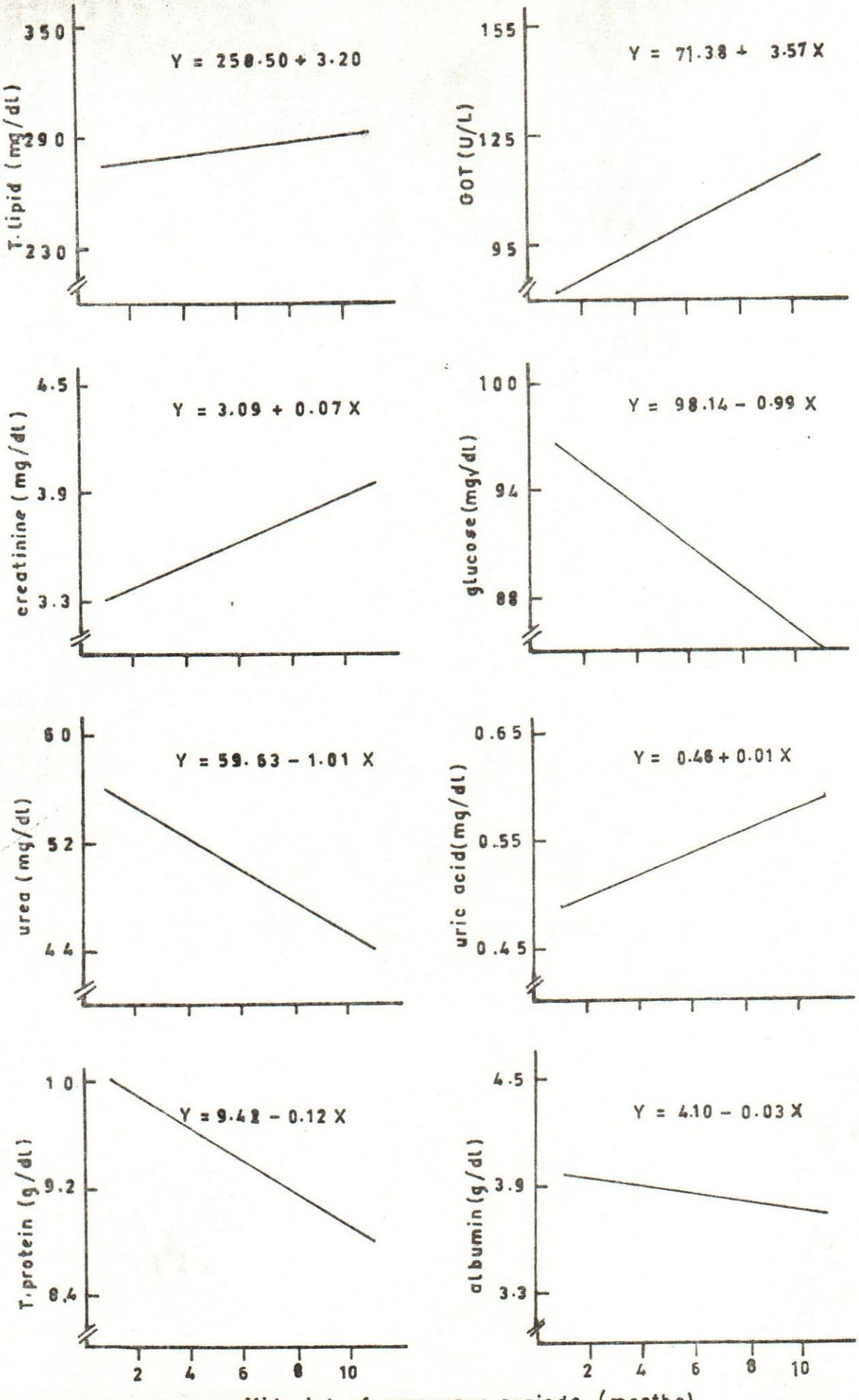

Fig. 2 : Regression analysis of serum constituents on pregnancy in camels.