The Iraqi J. Vet. Med., 11 (1987)

SEASONAL VARIATION OF SOME IMPORTANT SERUM ENZYMES ACTIVITIES IN SHEEP

A. Alkhayyat, D.A. Abbas, and A.M. Said, Department of Phsiology, College of Veterinary Medicine, University of Baghdad, Baghdad, Iraq.

SUMMARY

Blood serum samples were obtained from ten normal nonpregnant ewes at mid January and mid August. The level of acetylcholine estrease (ChE) enzyme activity was estimated colorimetrically while the values of glutamete-oxaloacetate transaminase (COT), glutamate-pyruvate transaminase (GPT) and alkaline phosphatease (A Ph) were estimated by an autoanalyzer. The results indicated significant depression in the normal values of ChE, GOT and GPT in summer season.

INTRODUCTION

Diagnosis of animal diseases which are accompanied by vital organ damage are based on a number of parameters including the estimation of enzyme activities (El-Hawary and El-Hadithi, 1976; Collis and Stark, 1977). Among the important enzymes used for such diagnosis are the transaminases like glutamate-oxaloacetate transaminease (GOT) and glutamate-pyruvate transaminase (GPT). Also, alkaline phosphatase (APh) and acetylcholinestrase (CHE) (Schmidt and Schmidt, 1973 a and b). In addition to diseases, a number of factors can interfere with the above mentioned enzyme activities such as, individual variations, species variations (Coles,

1974; Medway et.al., 1974), sex (Moursi *et al*, 1980; Moursi and Alkhayyat, 1981) and physiologic status like pregnancy (Andrew and Heaver, 1980). The aim of the present investigation was initiated to evaluate the seasonal weather effect on the activities of some diagnostic enzymes as a new factor.

MATERIALS AND METHODS

Blood samples were taken from ten healthy Awassi ewes weighing 35-45 Kg with an average age of 1.5 year at mid January. The process was similarly repeated at mid August. Each time blood serum samples was taken by cetrifugation and kept frozen at -20 C until analysis.

The activity of ChE was estimated by employing the colorimetric method described by Hestrins (1949). The results are expressed as micromole acetylcholine hydrolysed by the enzyme in one milliliter of serum in one hour at 37 C°. The activities of serum APh, GOT, and GPT were estimated by an autoanalyzer (Astra-8-Automatal State, Routine analyzer-Reckman) at Al-Rashid Military Hospital. The activities are expressed as international units per liter.

Statistical calculations were carried out by Student-t-test method and the results are given as mean ± standard error.

RESULTS

The means and ranges of normal values of blood serum ChE, GOT, GPT and APh are presented in table 1 and figure 1. With exception of APh, the activities of the other three enzymes were significantly higher during winter season than that of summer season.

The value of GOT in winter was 7725.3 IU and in summer was 4324.2 IU, of GPT was in winter 2023.2 and in

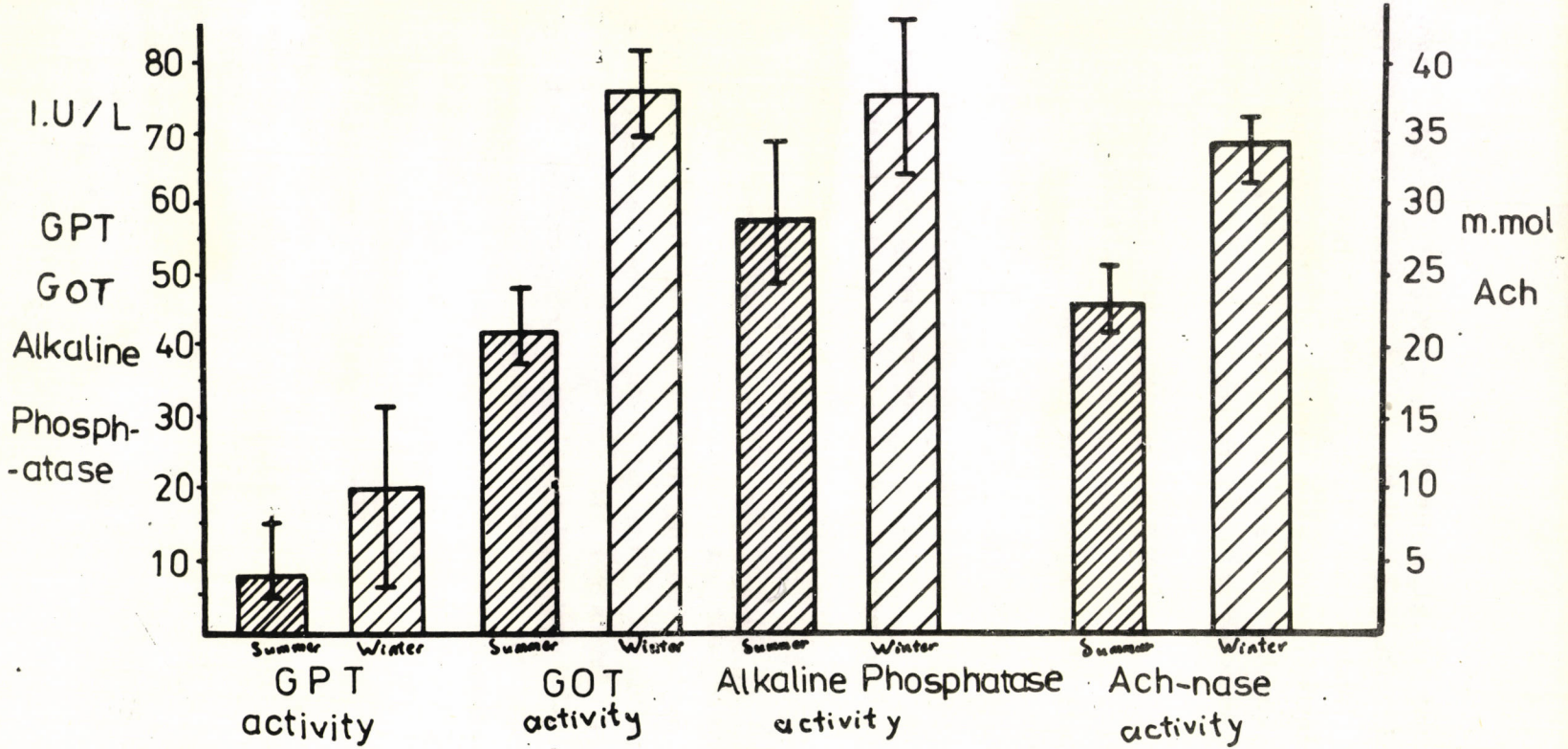

Figure 1: The values of normal blood enzymes activity in winter and summer in ewes in Iraq.

summer 10±2.1 IU, and of ChE the value in winter was 34±1.6 mmole/ml/hr and in summer was 2321.2 m mole/ml/hr. However, the activity of APh was not significantly different in the two seasons. The value in winter was 75±8.7 IU/l and 55±8.8 IU in summer.

Table -1- The values of normal blood enzymes activity during winter (W) and summer (S) seasons in ewes in Iraq.

	Mean2SE	Range	No. of Animals
ChE m mole/ ml/hr.	W 34±1.6	27-48	10
	S 23±1.2	18-28	7
APh IU/l	W 75±8.7	42-119	8
	S 55±8.8	21-100	8
GPT IU/l	W 20±3.2	9-30	9
	S 10±2.1	5-23	8
GOT IU/l	W 77±5.3	60-111	9
	S 43±4.2	29-64	8

DISCUSSION

The present investigation estimated the normal values of four serum enzymes in ewes during mid January and mid August (representing winter and summer seasons in Iraq, respectively). The activity of them are routinely used as aid in the diagnosis of diseases accompanied by destruction of vital tissues, such as the liver. The effect of seasonal weather on the activities of these

enzymes indicated significant depression ($P<0.05$) of GOT, GPT and ChE in summer season as compared to winter season. The observed depression in the activities of GOT, GPT and GhE in summer season is probably due to physiological changes that take place according to season. In Iraq where a drastic difference in weather temperature are seen between the two seasons (The range of maximum temperature in summer is 40-45 C° in the shade while in winter the minimum temperature goes as low as zero C°). Thus, such a clear difference in the activities of these enzymes are expected.

Other workers have reported factors that can interfere with normal activities of serum enzymes which are attributed to physiological change. Andrew and Heaver (1982) noticed variation in the activity of ChE during pregnancy. Moursi *et al* (1980) reported species and sex variation activity of serum GOT and GPT in horses, goats and sheep. Also, Moursi and Alkhayyat (1981) observed species and sex difference in the activity of ChE in horses and goats. Most references, in addition, reported a wide range of values in most species indicating individual variation and differences in the values among species indicating species variation (Coles, 1974; Medway *et al*, 1974).

The factors in addition to those reported in this paper, must be taken into account when employing the enzymes as parameters for diagnosis. The present study suggests a concurrent control to assess the diagnosis and to minimize the error. It is also suggested that a simultaneous determination of several enzymes provides better information than does the determination of individual one.

REFERENCES

Andrew, M.P. and J.E. Heaver (1982). Seasonal variation of acetylcholinestraso activity in ewes. Topics in Veterinary Pharmacology. The Ohio State University, Columbus, Ohaio.

Coles, E.H. (1974). Veterinary Clinical Pathology 2nd. ed., W.B. Saunders Company, Philadelphia, London, Torento.

Collis, K.A. and Stark A.J. (1977). Enzyme activities in tissue of clinically normal large white pigs; variation with age and sex. Res. Vet. Sci., 23, 326.

El-Hawary, M.F.S., and F.A. Al-Hadithi, (1976). The importance of the enzyme measurements activity in medicine, diagnosis, following the course, control of therapy and prognosis. Iraqi Med. J., 23 and 24; 30.

Medway, W., J.E. Prier and J.S. Wilkinson (1974). Veterinary Clinical Pathology. The Williams and Wilkins Co. Baltimore.

Hestrins S. (1949). The reaction of acetylcholine and other carboxylic derivatives with hydroxylamine and its analytical application. J. Biol. Chem. 180: 249-261.

Moursi, H.A.S. and A. Alkhayyat (1981). Determination of the activity of cholinestrase in plasma of some farm animals. Proceedings.The First Scientific Conference of the General Federation of the Arab Veterinarians: 3-8.

Moursi H.S.A., S.Zafer, A. Alkhayyat and I.M. Alkhatib. (1980) Assay of serum transaminases of some farm animals in Iraq by using optimal conditions. J. Soll. Vet. Med., Mosul Vol.1, No.2.81.

Schmidt, E. and F.W. Schmidt (1973) a: glutamyl-trans peptidase. special reprint, Boehringer, Mannhiem.
Schmidt, E., and F.W. Schmidt (1975) b: Classification of acute and chronic liver diseases. Scand. J. Gasrtroent., 8 (suppl. 19), 13.

التأثير الموسمي على فعالية بعض الخمائر المهمة في المصل الدموي للاغنام

علي عزيز الخياط، دريد عبد الهادي عباس وعروبة محمد سعيد، قسم الفسلجة، كلية الطب البيطري، جامعة بغداد

الخلاصة

تم اخذ عينات مصل الدم من عشرة نعاج غير حوامل وقدرت الفعالية الطبيعية لخمائر الاستيل كولين استراز (Acetylcholine estrase، ChE) بواسطة طريقة (Hestrins، 1949) كما قدرت فعالية الكلوتاميك اوكسالواستيك ترانسيناز (COT) والكلوتاميك بايروفيك ترانسيناز (CPT) والفوسفوتاز القاعدي (APh) بواسطة المحلل الذاتي (autoanalyzer) ودللت النتائج على هبوط ملحوظ في قيم الـ (ChE، COT and CPT) في فصل الصيف.