SEASONAL VARIATION OF SOME IMPORTANT SERUM ENZYMES ACTIVITIES IN SHEEP

A. Alkhayyat, D.A. Abbas, and A.M. Said, Department of Physiology, 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 esterase (ChE) enzyme activity was estimated colorimetrically while the values of glutamate-oxaloacetate transaminase (GOT), glutamate-pyruvate transaminase (GPT) and alkaline phosphatase (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 transaminase (GOT) and glutamate-pyruvate transaminase (GPT). Also, alkaline phosphatase (A Ph) and acetylcholinesterase (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 centrifugation 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 AP, GGT, 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, GGT, GPT and AP were presented in table 1 and figure 1. With exception of AP, the activities of the other three enzymes were significantly higher during winter season than that of summer season.

The value of GGT 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 23±2.1 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/1 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.

<table>
<thead>
<tr>
<th></th>
<th>Mean±SE</th>
<th>Range</th>
<th>No. of Animals</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE m mole/ml/hr.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>34±1.6</td>
<td>27-48</td>
<td>10</td>
</tr>
<tr>
<td>S</td>
<td>23±1.2</td>
<td>18-28</td>
<td>7</td>
</tr>
<tr>
<td>APH IU/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>75±8.7</td>
<td>42-119</td>
<td>8</td>
</tr>
<tr>
<td>S</td>
<td>55±8.8</td>
<td>21-100</td>
<td>8</td>
</tr>
<tr>
<td>GPT IU/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>20±3.2</td>
<td>9-30</td>
<td>9</td>
</tr>
<tr>
<td>S</td>
<td>10±2.1</td>
<td>5-23</td>
<td>8</td>
</tr>
<tr>
<td>GOT IU/1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>W</td>
<td>77±5.3</td>
<td>60-111</td>
<td>9</td>
</tr>
<tr>
<td>S</td>
<td>43±4.2</td>
<td>29-64</td>
<td>8</td>
</tr>
</tbody>
</table>

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 these enzymes 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 was evident from the data presented in Table -1-.
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 ChE 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 acetylcholinesterase activity in ewes. Topics in Veterinary Pharmacology. The Ohio State University, Columbus, Ohio.


التأثير الموسمي على فعالية بعض الخمائر المهمة
في المصل الدموي للفحص
علي عزيز الخياط، دريد عبد الهادي عباس وعروبة محمد سعيد, تسم
الفسلجة، كلية الطب البيطري، جامعة بغداد

الخلاصة
تم اخذ عينات مصل الدم من عشرة نعاج غير حوامل وقدرت
الفعالية الطبيعية ل الخمائر الاستيل كولين استراز (Hestrins، 1949، Che
كما قدرت فعالية (estrase، ChE الكلوتاميك أوكسالاستيك ترانسيناز (COT) والكلوتاميك بايروفيك
ترانسيناز (CPT) والفسفوراز القاعدي (APh) بواسطة المحلول
الذاتي (autoanalyzer) ودالت النتائج على تباعد ملحوظ في تيم
في فصل المصل،

Schmidt, E., and F.W. Schmidt (1975) b: Classification of acute and chronic liver diseases. Scand. J.
Gastron., 8 (suppl. 19), 13.