

SOME PHYSIOLOGICAL AND BIOCHEMICAL STUDIES ON IMPORTED HORSES

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ABSTRACT

Six mature male Thoroughbred horses were imported from Holland and transported by airline to Egypt. Serum thyroxine (T_4) and 3,5,3'-triiodothyronine (T_3), total proteins, albumin, triglycerides and total cholesterol levels were estimated on arrival of animals to Egypt and two weeks later. Blood haemogram including RBCs, WBCs, PCV and Hb was also estimated. T_3 concentration significantly decreased after two weeks of arrival but not reach the level of hypothyroidism (compared with basal values), while T_4 , total proteins, albumin, triglycerides, total cholesterol concentrations and haemogram values did not show any significant change. Therefore transportation and temperature differences between countries have an important role in thyroid activity.

INTRODUCTION

Domestic animals have been transferred from one climatic zone to another with varying degrees of success. cattle, sheep, poultry and horses have been taken from the low temperature regions of Europe and the U.S.A. to the tropics and subtropics- including West Indies, Philippines and Egypt (Hammond, 1954 and Payne and Hancock, 1957). The transport of animals involves several potentially stressful factors; physiological factors, such as noise or vibrations, emotional factors; such as unfamiliar environment or social regrouping, and climatic factors, such as temperature, humidity or oxygen concentration (Stephens, 1982). Transport of horses has long been recognised as a stress predisposing to salmonellosis (SamcClintock, 1990) and increased the risk of respiratory diseases (Moberg, 1985). Moreover, the condition of "dry coat syndrome" is characterized by the loss of the ability to sweat in horses that have been imported into hot humid climates (such as exist in coastal areas

in Malaya and India) from cool less humid ones (Wright and Tull, 1925 and MacGregor, 1935).

The condition has been variously ascribed to infection with a specific organism (Wright and Tull, 1925), to use of arsenic as a tonic by trainers in India (Stewart, 1938) to thyroid deficiency (MacGregor, 1935) to lack of vitamin C or NaCl, to hypofunction of adrenal cortex (Wallace, 1938) and to disturbance of water balance (Arnold, 1950). The purpose of the present research was to determine the effect of transportation and adaptation of imported horses under local climatic condition on some of thyroids function tests, lipogram and haemogram.

MATERIAL AND METHODS

Six apparently healthy mature male Thoroughbred horses, aged from 4 to 6 years old and average body weight of 450.50 kgs. were imported from Holland. The horses were transported by airplane to Egypt at November, 1992 (Average atmospheric temperature 16.56 ± 3.98 °C and relative humidity 64.25 ± 4.86 %). The animals were gradually change their foods that previously accustomed to eat in Holland to feed barseem and barely. Blood samples were taken by jugular venipuncture immediatly after arrival of animals to quarantine (I) and 2 weeks later (II). No further blood samples at 4 weeks and 6 weeks would be taken where horses distributed in different localities in Egypt that made the sample were difficult to be obtained.

Blood samples were collected on EDTA for complete blood picture and other portion of blood was allowed to clot. The sera were separated by centrifugation and stored at - 20 °C untill analyzed for certain lipids parameters including (triglycerides and total cholesterol) and hormone analysis, including (T_3 and T_4) in addition to total proteins and albumin.

Haematological examination as RBCs and WBCs count, PCV were determined by microhematocrit method and haemoglobin was determined according to the method of (Schalm, 1975).

Serum T_3 and T_4 concentrations were determined by radioimmunoassays with a commercially available kit. (Diagnostic products

corporation, Los Angeles, cat. No., TKT 31 and TKT 41, respectively). Serum triglycerides, total cholesterol, total proteins and albumin (Axiom, West Germany) were estimated. Statistical analysis of the obtained results were carried out using the method of **Snedecor and Cochran (1967)**.

RESULTS

The value of serum T_3 concentration just arrival of horses quarentine (I) were decreased significantly ($P < 0.01$) in comparison with two weeks later level (II). While, the value of serum T_4 concentration showed a non-significant change in both of I and II periods (Table 1).

The mean values of serum total proteins, albumin, total cholesterol and triglycerides levels and haemogram values showed any significant change ($P > 0.05$) in I and II periods.

DISCUSSION

It was reported that, atmospheric temperature affect the thyroid gland activity, as cold produces clear-cut increases in circulating TSH in experimental animals and human infants and presume decrease in hot (**Ganong, 1983**).

In the present study, the T_3 activity was decreased while T_4 was not changed during the experimental period. So, T_3 level seems to be more sensitive to climatic change under Egyptian condition. This agrees with other direct measurements of thyrotropin releasing hormone (TRH)-induced TSH release in horses (**Thompson et al., 1983 and Thompson and Nett, 1984**). Apparently, there was a preferential secretion of T_3 after a frank stimulus with exogenous or endogenous TSH after TRH administration (**Morris and Garcia, 1983; Lauberg, 1984 and Lothrop and Nolan, 1986**). Although T_3 level recorded in this study (Table 1) was decreased significantly during the experimental period but not reach the level of hypothyroidism. The control value of T_3

Table (1): Effect of transportation and adaptation of imported horses on serum T₄, T₃, total proteins, albumin, triglycerides, total cholesterol and haemogram

	T ₄ ug/dl	T ₃ ng/dl	Total proteins g/l	Albumin g/l	T.G. mmol/L	T. Ch. mmol/L	RBCs 10 ¹² /L	WBCs 10 ⁹ /L	PCV %	Hb g/dl
I	4.37 ± 1.54	97.58 ± 7.18	71.50 ± 7.90	30.80 ± 2.00	0.95 ± 0.26	3.16 ± 0.36	7.33 ± 0.70	7.92 ± 2.54	35.41 ± 2.18	13.59 ± 1.06
II	4.33 ± 0.94	69.99** ± 8.17	75.70 ± 3.20	32.50 ± 4.20	1.06 ± 0.31	2.65 ± 0.63	6.72 ± 2.05	9.20 ± 1.54	40.21 ± 7.18	12.75 ± 1.92

n=6 Mean ± S.D. ** : Significant (P<0.01)

I Immediately after arrival of horses to quarantine

II After two weeks later.

T.G.= Triglycerides.

T.Ch. = Total cholesterol

concentration was 44 ± 18 ng/dl in Equines of foreign breed as recorded by Lothrop and Nolan, (1986).

The non-significant change in haemogram, lipogram and protein levels (Table, 1) explain that the decrease in thyroid gland activity (due to climatic difference) not reach the level at which the previous parameter changed significantly. Results indicate that imported horses to Egypt especially from cooler area (Europa) must put under specific program for acclimitization under local conditions (nutrition, system of training, housing as controled temperature and humidity). This, to avoid atmospheric temperature differences especially during summer season. Further decrease of thyroid hormones which may lead to general depression as a case of dry-coat syndrome.

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بعض الدراسات الفسيولوجية والبيوكيميائية للخيول المستوردة

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أستخدم في هذا البحث ستة خيول إنجليزية أصيلة السلالة ناصبه وفي حالة صبه ظاهرة جيدة تم إستيرادها مباشرة من هولندا إلى مصر . أحلت عينة من الدم من كل حيوان بمجرد وصول الخيول إلى الحجر الصحي بمصر وعينه أخرى بعد أسبوعان من وصولها و سنتت لدراسة تأثير مدى تأقلم الخيول المستوردة تحت الظروف الجوية والمعيشية المحلية واختلفة عن مكان إستيرادها من خلال دراسة بعض وظائف الأعضاء الدرقية (T_4 & T_3) وصورة دهون الدم (الكوليستيرول الكلي و ثلاثي الجليسريدات) وصورة الدم (عند كراتن شم - سراء والبيضاء - رسيه الهيموجلوبين والهيماتوكريت) والبروتين الكلي والألبومين . وأظهرت النتائج أن تركيز T_3 نقص بصورة معنوية بعد وصول الخيول بأسبوعين ولكن لم تصل إلى مرحلة القصور الدرقي بينما لم يطرأ على تركيزات كلاً من T_4 والبروتين الكلي والألبومين . وصورة الدم ودهون الدم أية تغيرات معنوية . ونستخلص من هذه الدراسة أن إنتقال الخيول إلى بيئات مختلفة واختلاف الظروف الجوية له أثر واضح على بعض وظائف الغدد الدرقية ويمكن أخذ ذلك في الإعتبار عند إستيراد خيول من الخارج لما لتعلمة الدرقية ومستوى هرمون (T_4 & T_3) من أهمية كبيرة لصحة الحيوان.