Preliminary data on serum thyroid hormones (thyroxine T_4, triiodothyronine T_3) and thyroid stimulating hormone (TSH) of Sudanese donkeys *(Equus asinus)*: normal level

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(With one table)

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دراسة تمهيدية المستوي الطبيعي لهرمونات الغدة الدرقية في مصل الدم (الثايرونين ثلاثي اليود و الثايروكسين) و الهرمون المنشط للدرقية في الحمير السودانية السليمة إكلينيكيا

يوسف حسين عبد الله المنصوري و هشام إسماعيل سري و حسنه محمد البشير و محمد محمد صالح و علي محمد عبد الماجد

في هذه الدراسة تم قياس مستوي هرمونات الغدة الدرقية و الفص الأمامي للغدة النخامية. حيث تم قياس تركيز T_3و T_4 ،و هرمون الغدة النخاميةTSH في مصل الدم في إناث و ذكور الحيوانات السليمة ظاهرياً و ذلك باستخدام تقنية المقايسة المناعية الشعاعية (RIA) و التي أظهرت أن الذكور تحتوي علي مستوي أقل من الإناث بالنسبة لهرمون الثايرونين ثلاثي اليود بينما الإناث لديها مستوي اقل من هرمون الثايروكسين مقارنة بالذكور. بيد أنه لا يوجد اختلاف بين الجنسين بالنسبة للهرمون المنشط للدرقية

Abstract

The objective of this study was to determine serum thyroid hormones (Thyroxine T_4, Triiodothyronine T_3) and the anterior pituitary secretion Thyroid

Stimulating Hormone (TSH) in normal healthy donkeys in Sudan. Detection of such hormones was done using Radio-immune assay (RIA) and immuno-radiometric assay (IRMA) techniques. The obtained values (mean ± standard deviation, SD) of male and female animals were comparable. The mean values for serum thyroxine (T_4) were 8.46 ± 7.19 (1.40 - 25.73) ng/ml, the serum triiodothyronine (T_3) 0.52 ± 0.21 (0.20 - 1.03) ng/ml, and thyroid stimulating hormone (TSH) were 0.86 ± 0.13 (0.64 - 1.15) mIU/L.

Key words: Thyroxine, triiodothyronine, Thyroid Stimulating Hormone, Radioimmunoassay, donkeys

Introduction:

The domestic donkey (*Equus asinus*) is a member of the horse family. The donkey has played an important role in most parts of the Sudan. They were estimated as 6.350.000 head, however they cost less and can tolerate dry conditions and live on poor feed rejected by other classes of livestock.

Before the release of the radioimmunoassay (RIA), thyroid function was evaluated on the basis of protein-bound iodine (Swenson, 1970). With the introduction of RIA came the ease and rapidity needed to facilitate routine thyroxine determinations in clinical studies; therefore, reference values must be established. Normal thyroid hormone concentrations reported for horses have a wide range of values (Kallfelz and Erali, 1973, Reap *et al*., 1978; Thomas and Adams, 1978). There were significant differences in the thyroid hormones concentration related to time of blood collection during the day (Duckett *et al*., 1989). The purpose of this study was to report a mean T_3, T_4 and TSH values in the serum of clinically donkeys (*Equus asinus*).

Materials and methods

Experimental animals:

Thirteen male and 13 female donkeys, 4-10 years were used in this study. The animals were housed in the premises of the Radioisotopes Department, Central Veterinary Research Laboratories (CVRL) Soba, Sudan. They were provided with water from tap and straw *ad libitum*. The animals were allowed to adapt for one month before the commencement of the experiment.

Blood samples of 5ml were collected from the jugular veins in plain vacutainer tubes, allowed to clot. Serum was then separated in sealed plastic containers and stored at -20^{o}C until analyzed

Hormones detection

Thyroxine (T_4) and triiodothyronine (T_3) were measured in donkey's serum using RIA Kit (Beijing Atom High-tech. Co. LTD). Thyroid Stimulating Hormone (TSH) was measured using the IRMA technique. The principal method of this IRMA kit utilizes two site sandwich immuno-radiometric assay for the measurement of TSH in serum. This involves the reaction of TSH present in serum with monoclonal and polyclonal antibody. The monoclonal antibody is labeled with I^{125} as tracer (I^{125}-McAb)and the polyclonal antibody is coupled to magnetic iron oxide particle (PcAb {M}) .the formed complex was separated using a magnetic separator.

Obtained values were expressed in ng/ml for T_3 and T_4 whereas for TSH in mIU/L.

Statistical analysis

Statistical analysis was made using SPSS 11.5 for windows, Student t- test and person correlation were used to compare means.

Results

Both methods used (RIA and IRMA) are able to detect the thyroid hormones with sensitivity of 0.08 ng/ml, 0.13 ng/ml, and 0.24 mIU/L for T_3, T_4 and TSH respectively.

Serum thyroxine (T_4), triiodothyronine (T_3), and thyroid stimulating hormone (TSH) concentrations T3 and T4 in normal male and female donkeys are shown in table (1).

The mean serum T_3 values of the male donkeys are almost the same as that of the female donkeys ($P > 0.05$) as shown in table (1). The individual values in both sexes was found to range between 0.2- 1.03 ng/ml.

Male donkeys showed higher concentration of serum Thyroxin (T_4) than female donkeys but this was not statistically different ($P>0.05$). This was found to range between 1.40 – 25.73 ng/ml. The mean value of TSH was similar in both sexes ($P > 0.05$). This found to range between 0.64-1.15 mIU/L.

Discussion

In this study, the normal values of the thyroid hormones, T_3 and T_4 as well as the anterior pituitary secretion TSH in donkeys, were measured. According to our knowledge, this is the first data baseline not only in Sudan but may be worldwide.

Although there is no available data for donkey's thyroid hormones, it was found that the results obtained in this study were comparable with that data reported for horses by other investigators.

Donkeys in this study were not in any training or exercise programme which avoided and possible influence of exercise on hormone levels. This study revealed that the T_3 values are in a close agreement with that of Duckett *et al*., (1989) in horses who reported a level of 54.06 ± 14.02 ng/dl and a range of 13.30 to 97.40 ng/dl; Sojka

et al., (1993) reported baseline values for horses ranging from 0.21 to 0.80 ng of T_3/ml. whereas Chen and Riley (1981) found that the mean value of T_3 192.9 µg/dl is for neonatal foals and 98.96 µg/dl for mature horses.

In the present study it was noticed that female donkeys had lower T_4 values as compared with that of males. The range values for T_4 in this study were in a close agreement with that of Sojka *et al*., (1993); however the mean ± SD for T_4 in all donkeys is lower than that found by Thomas and Adams (1978).

The present study also revealed no significant difference in the obtained values of T_3 and TSH in both sex. However, the thyroid hormone levels in horses were found to be lower in mares than in stallions (Reap *et al*., 1978), and lower in stallions and geldings than mares (Motley, 1972; Irvine, 1967). While other investigators have found no difference in thyroid hormones between sexes in horses (Kallfelz, 1982).

Acknowledgments

The generous financial support granted by the Central Veterinary Research Laboratory (CVRL) Soba and National Centre for Research (NCR), Sudan and German Academic Exchange Service (DAAD) was greatly acknowledged. Due thanks are also extended to the staff members of the Department of Radioisotopes (CVRL).

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Table 1. Mean ± SD, minimum and maximum values of T_3, T_4 and TSH concentration in donkeys' serum.

Hormone	Male	Female	All donkeys	Minimum	Maximum
T_3 (ng/ml)	0.50 ± 0.21	0.53 ± 0.21	0.52 ± 0.21	0.20	1.03
T_4 (ng/ml)	11.01 ± 7.94	6.28 ± 5.21	8.46 ± 7.19	1.40	25.73
TSH (mIU/L)	0.86 ± 0 .14	0.86 ± 0.14	0.86 ± 0.13	0.64	1.15