

قسم : طب الحيوان وأمراض الدواجن .
كلية : الطب البيطري - جامعة أسيوط .
رئيس القسم : أد . ابراهيم سـ كـ ر .

مشاهدات على المنحنى التعادلي للجلوكوز ومستوى الجلوكوز في دم الحمير المعدة تجريبيا بملاريا الخيول

ثروت نافع ، محمد سمير ، أحمد عامر ، طه العلاوى

لقد سجل الجلوكوز انخفاضا ملحوظا اثناء عدوى الحمير
تجريبيا بطفيل الملاريا . وقد لوحظ أن قيمة جلوكوز الدم
بلغت أقصى انخفاض لها بعد العدوى بأربعة الى خمسة
أسابيع حيث بلغت ٥٠ مجم/دل و ٦٠.٠٩/دل على
التوالي في الحيوانات المحصنة بمادة الـ (B. C. G.)
وبلغت ٣٣٣ مجم/دل بعد ازالة الطحال وظهور الطفيل
بتركيز عالى في الدم في هذه المجموعة أيضا . بينما كانت
القيمة ٦٩٦ مجم/دل ، ٥٣٨ مجم/دل في الحيوانات
المعالجة بمادة الـ الايميزول والمزالة الطحال منها على
التوالي .

أما المنحنى التعادلي للجلوكوز فلم يتأثر تأثيرا معنوياً
خلال التجارب الأربعة .

Dept. of Medicine & Poultry Diseases,
Faculty of Vet. Med., Assiut Univ.
Head of Dept. Prof. Dr. I.H. Sokkar.

**OBSERVATIONS ON GLUCOSE TOLERANCE TEST AND BLOOD
GLUCOSE LEVELS IN DONKEYS EXPERIMENTALLY INFECTED
WITH BABESIA equi
(With 4 Tables and 8 Figures)**

By
TH. NAFIE; M.S. HASSAN; A.A. AMER and T.A. EL-ALLAWY
(Received at 9/4/1983)

SUMMARY

Hypoglycaemia was recorded in an experimental study on equine piroplasmiasis caused by Babesia equi. A significant dropping in blood glucose level was observed post-infection allover the experimental period. The main glucose level at the 4th. and 5th. weeks post-injection in BCG vaccinated animals were 50.0 & 60.9 mg./dl., 33.3 mg/dl. for BCG vaccinated splenectomized animals and 69.6, 53.8 mg./dl. for Imizol treated and Imizol splenectomized groups respectively. Higher consumption of glucose was observed post-splenectomy that may be related to high parasitaemia. However the blood glucose tolerance test was not apparently altered.

INTRODUCTION

Babesias have a wide range of disease manifestations partly due to variability of the virulence and partly to other characteristics of strains within each species.

Blood serum glucose level was one of the most important parameters attracted the attention especially in relation to babesial infections. Under anaerobic conditions both infected erythrocytes and free-parasites metabolized glucose at a rate of 129% of that under aerobic conditions " RICKARD (1969), (1970 a) and BRYANT, et al. (1964) ". In another study on Trypanosoma evansi, as a protozoal disease, MALLICK and DWIVEDI (1981) noticed a marked hypoglycaemia in 3 out of 12 infected calves.

The blood glucose level in these animals ranged from 10 - 25 mg.%. The available literature lacks much about the extent of in vivo glucose metabolism under babesial infection. The present study so deals with the blood glucose level and the intravenous blood glucose tolerance (I.V.G.T.T) in an experimental work on equine piroplasmiasis (Babesi equi).

MATERIALS and METHODS

Study was carried out on 15 donkeys of the same age and wieght. Animals were classified into three groups. The 1st. and 2nd. were consisted of 6 animals for each and were used for carrying out the experimental infection while the third group (control one) was consisted of 3 donkeys. The 1st. group was injected with BCG at dose rate 0.3 ml./intradermally and then injected with 98% infected blood. Four weeks after BCG injections 3 animals were splenectomized. The 2nd. group was infected with 98% infected blood then treated with Imizol at a dose rate 2 mg./Kg. B.wt. Two doses with 72 hr. interval were injected I/M. Thereafter 3 out of this group were splenectomized 4 weeks post-treatment. Blood glucose level and

intravenous glucose tolerance test (I.V.G.T.T.) were estimated in all instances. Glucose tolerance test was applied by injection of 0.5 gm. glucose/kg. B.wt. using a sterile 50% glucose solution and adjusting the rate of flow to require 5 minutes for its administration. Blood samples were taken before injection and 5, 60 and 120 minutes post-injection from which the serum was obtained for colorimetric estimation of glucose level " BAUER, et al.; (1974) ". The method applied depended on the principle that glucose is converted to gluconic acid in the presence of glucose oxidase (GOD). Hydrogen peroxide formed reacts with the reduced chromogen in the presence of peroxidase. The intensity of the colour produced is proportional to the amount of glucose present in the solution. " The results were expressed in mg./dl.

Statistical analysis was carried out on collected data using the method of SNEDECOR (1956).

RESULTS

Statistical analysis of the results (Tables 1, 2, 3 and 4) revealed that glucose tolerance test proved normal curves along the experimental period either in BCG, BCG-splenectomized or Imizol and Imizol-splenectomized donkeys (Fig. 1-8). However a hypoglycaemic conditions were evidently present at a late stages of BCG injected animals 4 and 5 weeks post-infection. In BCG splenectomized animals there were also a high consumption of glucose 10 days post splenectomy. (Tables 1,2,3, & 4).

DISCUSSION

Hypoglycaemia has been ascribed to be an important condition of the host by the presence of the parasites " RICKARD (1969) ". In present study it was noticed that glucose tolerance curves were run in a normal manner (Fig. 1 - 8) indicated that the endocrine function of pancreas was not affected. The obtained results were in agreement with that reported by HASSAN (1980) in cattle and buffalo. The author stated that the I.V.G.T.T. was affected in case of pancreatic dysfunction. However hypoglycaemia was observed at the late stages of BCG injected animals 4 and 5 weeks post-infection (50.0 and 60.9 mg./dl respectively). In BCG splenectomized animals there was also a higher consumption of glucose 10 days post splenectomy (33.3 mg./dl blood). It is important to indicate that the glucose consumption ran normally on Imizol treated and Imizol splenectomized animals where it ranged from 69.6 to 141.7 and from 53.8 to 111.8 mg./dl respectively. These results corresponded to those previously obtained by RICKARD (1969, 1970 a & 1970 b). The author found in a study on Babesia rodhaini in rats that the utilization of glucose was increased rapidly in proportion to the number of parasitized R.B.Cs. However FOWLER et al.; (1972) in another study on calves, reported a normal glucose values all over the post-infection period. In Egypt EL-ALLAWY (1973) however in a study on blood glucose level in Babesia bovis and B. bigemina. in buffalo calves reported a significant decrease in blood glucose level. In another study on blood glucose level in clinical cases of bovine Surra (caused by Trypanosoma evansi) MALLICK and DWIVEDI (1981) reported hypoglycaemia in 3 animals from 12 recorded cases.

It could be concluded that acute or chronic infestation with B. equi affected glucose level in infected donkeys leading to a state of hypoglycaemia. The observed hypoglycaemia could not be attributed to pancreatic dysfunction rather than increased consumption of body sugars. The study revealed also that glucose tolerance test ran normally without delaying in return to the normal. Blood glucose level in contrast was rapidly returned to normal and even to the sub-normal state (Hypoglycaemia) in some cases.

GLUCOSE TOLERANCE IN DONKEYS

REFERENCES

- Bauer, J.D.; Ackermann, P.G. and Toro, G. (1974): Clinical Laboratory Methodes. 8th. ed. By The C.V. Mosby Com. Saint-louis.
- Bryant, C. Voller, A. and Smith, M.J.H. (1964): The incorporation of radioactivity from (C14) glucose into the soluble metabolic intermediates of malaria parasites. Am. J. Trop. Med. Hyg. 18, 515-519.
- El-Allawy, T. (1973): Some studies on Bovine piroplasmosis in Assiut Ph.D. Thesis, Fac. of Vet. Med., Assiut Univ., Egypt.
- Fowler, J.L.; Ruff, M.D.; Fernau, R.C. and Ferguson, D.E. (1972): Biochemical parameters of Dogs infected with Babesia gibsoni. Cornell, Vet. J. 62, pp. 412 - 425.
- Hassan, M.S. (1980): Some studies on pancreatic function in cattle and buffaloe in Assiut. Thesis, Fac. of Vet. Med. Assiut. Univ., Egypt.
- Mallick, K.P. and Dwivedi, S.K. (1981): A note on Blood Glucose Level in Clinical Cases of Bovine Surra. Indian Vet. J. (58). 162-163.
- Rickard, M.D. (1969): Carbohydrate Metabolism in Babesia rodhaini: Differences in the Metabolism of Normal and infected Rat Erythrocytes. Exp. Parasit., 25, 16 - 31.
- Rickard, M.D. (1970 a): Babesia rodhaini: Carbohydrate Metabolism and Infectivity for Rats of Cells freed from host-Erythrocytes. Exp. Parasit. 27, 136 - 142.
- Rickard, M.D. (1970 b): Carbohydrate Metabolism in Babesia rodhaini Infection with C14 -Labled Substrate and Enzyme Assays. Exp. Parasit. 261, 512 - 520.
- Snedecore, G.M. (1956): Statistical methods 4th. Ed. The Iowa state College press Ames. Iowa.

Table (1): Glucose Tolerance Values Before and After BCG Injection (mg/Dl):

Group	Period	Time	Before BCG injection	Days post BCG injection				
				15	30	45	60	75
Experimental group (Six animals) 3 are representative	Ref.		106.7	97.4	57.8	87.5	88.3	63.1
	5		380.2	282.0	333.3	300.0	261.8	195.7
	60		156.2	89.7	148.9	154.0	126.5	56.5
	120		97.4	51.3	108.9	109.3	50.0	60.9
Control group (3 animal) One representative	Ref.		92.3	76.9	73.4	112.5	70.6	52.2
	5		342.0	323.1	979.9	350.0	258.8	160.9
	60		147.4	92.3	146.7	175.0	11.8	69.6
	120		94.7	69.2	119.9	137.5	88.2	47.8

Table (2): Glucose Tolerance Values Before and After BCG Splenectomy (mg/DL):

Group	Period Time	Before splenectomy	Days post splenectomy			
			5	10	15	18
Splenectomized group (3 animals) one is representative	Bef.	62.5	85.3	50.6	115.4	115.4
	5	337.5	225.5	255.6	384.6	480.8
	60	150.0	110.5	116.7	103.8	180.8
	120	125.0	104.0	33.3	69.2	115.4
Control group (3 animals) One representative	Bef.	50.6	69.2	92.3	157.7	73.4
	5	211.1	196.2	380.8	480.8	279.3
	60	172.2	123.1	126.9	300.0	146.7
	120	100.0	103.8	73.1	203.8	119.9

Table (3): Glucose Tolerance Values Before and After Imizol Treatment (mg/DL):

Group	Period Time	Before infection	Days post infection					
			4	8	12	16	20	24
Experimental group (Six animals) 3 are representative	B	97.4	129.2	64.3	95.5	95.5	70.6	68.1
	5	282.0	354.2	274.5	309.1	309.1	264.7	214.5
	60	89.7	158.3	201.9	157.6	157.6	123.3	101.5
	120	78.5	141.7	129.4	121.2	121.2	82.4	69.6
Control group (3 animals) 1 is representative	B	76.9	100.0	76.9	86.4	70.6	76.5	52.2
	5	323.1	250.0	323.1	263.6	258.8	270.6	160.9
	60	92.3	150.0	92.3	145.5	111.8	94.1	96.6
	120	69.2	137.5	69.2	90.9	88.2	56.5	47.8

GLUCOSE TOLERANCE IN DONKEYS

199

Table (4): Glucose Tolerance Values of Inizol Splenectomized Group (mg/DL):

Group	Time	Before Infection	Days post splenectomy									
			2	4	8	12	16	20	24	28	32	
Splenectomized Group (3 donkeys) One is representative	2	69.6	65.3	117.6	23.5	44.1	50.0	53.8	57.7	15.4	22.4	
	5	234.8	226.5	235.3	152.9	129.4	272.2	307.7	315.4	192.3	154.1	
	60	100.0	111.8	111.6	76.5	82.4	61.1	115.5	111.5	100.0	76.1	
	120	69.6	105.9	111.8	76.5	56.8	100.0	96.2	53.8	100.0	70.1	
Control group (3 animals) Is representative	2	50.6	69.2	92.3	157.7	73.4	112.5	76.5	62.5	92.3	69.2	
	5	211.1	196.2	360.8	450.8	279.3	350.0	264.7	337.5	291.5	169.2	
	60	172.2	123.1	126.9	300.0	146.7	175.0	129.4	150.0	83.6	69.2	
	120	100.0	103.8	73.1	73.1	103.8	119.9	137.5	56.8	124.0	46.5	56.8







