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THYROIDAL RADIOIODINE UPTAKES IN HEPATOSPLENIC SCHISTOSOMIASIS

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SUMMARY

Twenty four patients with hepatosplenic schistosomiasis were studied for evidence of thyroid deficiency as determined by twentyfour hour radioiodine uptake and serum determinations and by clinical evaluation. Of the 24 patients, 84% had normal uptakes, 86% of the patients with short stature had normal uptakes and all the patients will infantilism had normal uptakes. The endocrine disturbance of schistosomiasis is apparently not due to thyrotropin deficiency although isolated deficiencies of gonadotrophin and or somatotrophin have not been excluded.

INTRODUCTION

In conjunction with hepatosplenomegaly, short stature and lack of secondary sexual characteristics have been observed in Schistosomiasis [1, 3, 9]. The latter features are reported to occur in about 10 percent of patients [9]. The problem of growth and development in hepatosplenic schistosomiasis has been variously ascribed to panhypopituitarism [3, 5] or to a specific deficiency of gonadotrophins [1]. In order to evaluate the role a possible thyrotropic hormone deficiency or hypothyroidism may play in these defects of maturation, thyroidal radioiodine uptakes as an indication of thyrotropin activity were performed on 24 patients with hepatosplenic schistosomiasis.

MATERIAL AND METHODS

The present study group consisted of 24 patients from the medical and surgical services of the Hospital Prof. Edgard Santos, Salvador, Bahia, Brasil. All patients had proven schistosomiasis based on stool examinations demonstrating viable eggs of *S. mansoni* as well as hepatosplenomegaly. Schistosomiasis was presumed to be the underlying basis of the enlarged liver and spleen after exclusion of other causes. In addition, liver biopsy in six cases revealed periportal fibrosis characteristic of schistosomiasis. Clinical and ancillary laboratory information was obtained by a review of the patients' hospital records, and where possible by direct physical examination at the time of radioiodine uptakes.

Twenty four hour thyroidal radioiodine uptakes as well as 24 hour total and serum protein-bound radioactivity were determined on all patients employing the standard techniques currently in rotine use at The New York Hospital radioisotope laboratory. Thyroid counting was performed with a 2 × 2 inch sodium iodide crystal and flat field collimator * positioned 35 cm from crystal to patient. Serum was counted with a 2 × 2 sodium iodide well counter *. All counts were recorded with a spectrometer [1] using a wide window (275 to 425 mev) and counting was to a statistical accuracy of

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* Picker Instrument Company

greater than 95 percent. The normal range of radioiodine uptakes was found to be 20% to 55%.

Data were analyzed with acceptable statistical methods [11].

RESULTS

The 17 males and seven females ranged in age from 12 to 47 years, with 14 under 21 years of age (adolescents). Cases 1, 4, 7, 11 and 13 (Table I, II) clearly fell below the expected values for height and weight for children of comparable age living in northeastern Brasil [9]. In addition, four of the seven growth retarded patients, cases 3, 4, 11 and 13 (Table II), appeared much younger than their stated age and presented a failure of development of secondary sexual characteristics (infantilism).

The thyroidal radioiodine uptakes for patients with normal stature ranged from 3% to 47% with a mean value of 33% ± 2.1%. When the uptakes of cases 14 and 18, with clinical and other laboratory evidence of hypothyroidism are excluded, the uptakes of the 22 remaining patients ranged from 20% to 47% with a mean of 35% ± 1.7%.

The thyroidal uptakes of the seven patients with deficient stature are listed in Table II. The mean value for this group was 34% ± 4.0% and for the four patients with infantilism, 38% ± 4.0%. There was no statistical difference between the groups with growth retardation and the group with normal stature or between the patients with infantilism and those with normal stature. All groups fell within the expected range of normal (20-55%).

TABLE I

Case	Sex	Age	Thyroid Uptake %	Serum Proteins			Organ Size		Hct. %	WBC $10^3/mm^3$
				Total	Alb.	Glob.	Liver *	Spleen *		
1	♂	12	37	6.9	2.8	4.1	1	10	42	4.4
2	♂	14	37	5.1	1.9	3.2	2	4	29	—
3	♀	14	27	...	...	...	4	9	..	8.8
4	♂	14	41	8.1	3.7	4.4	3	19	30	4.0
5	♂	14	35	7.4	4.0	3.4	2	17	32	4.4
6	♂	14	29	6.6	3.1	3.5	3	12	34	4.5
7	♂	15	20	7.3	2.8	4.5	4	10	31	9.0
8	♂	16	46	8.3	3.4	4.9	3	7	38	4.0
9	♂	17	46	7.1	4.0	3.1	3	6	39	3.5
10	♂	17	25	7.0	3.2	3.8	1	15	..	4.0
11	♀	17	47	8.6	4.3	4.3	4	9	25	4.0
12	♀	19	38	6.9	3.2	3.7	1	9	17	1.5
13	♂	19	32	6.5	3.5	3.0	4	12	29	2.5
14	♀	19	17	8.1	3.8	4.3	2	2	32	3.0
15	♂	22	30	8.4	3.6	4.8	4	18	40	1.5
16	♀	25	38	6.6	3.2	3.4	3	18	34	3.9
17	♂	29	25	6.1	4.3	1.8	4	20	38	1.9
18	♂	32	3	7.9	2.7	5.2	3	8	26	4.5
19	♂	33	24	...	...	...	2	..	44	—
20	♀	33	31	6.5	3.6	2.9	2	7	35	3.5
21	♂	35	31	7.1	3.9	3.2	2	7	19	4.1
22	♂	36	22	...	...	...	1	1	..	..
23	♂	42	34	8.9	4.4	4.5	4	5	43	3.0
24	♀	47	33	6.5	2.6	3.9	4	10	34	15.0

* Spleen size estimated in cm below left costal margin
Liver size estimated from 1+ to 4+

The degree of splenomegaly as quantitated by spleen measurements in centimeters below the left costal margin was compared to growth and development. As noted in Table III the spleen size in the adolescent group was slightly smaller (mean 7.8 cm ± 0.8 cm) than the spleen size in the four patients with infantilism (mean 12.0 cm ± 2.5 cm).

No significant difference between patient groups could be defined when growth and development was compared to serum proteins, globulins, hematocrit or white blood cell count, although the four patients with infantilism had both the largest spleens and the highest serum globulin levels.

DISCUSSION

In a study of retardation of growth and lack of secondary sexual development associated with hepatosplenic schistosomiasis, RACHEB [9] reported growth retardation in 12% of 125 children, and deficiency of secondary sexual development in 8% to 10%. MEIRA [6] noted that patients suffering from advanced helminthiasis had an "endocrine appearance characteristic of a disturbance of the glands of internal secretion" and described absence of facial, pubic and axillary hair as well as failure of breast development, menarche, or penile growth. In addition to these observations, loss of libido,

TABLE II

Patients with Short Stature

Case	Sex	Height (cm)	Chronological Age (years)	Statural Age * (years)	Thyroid Uptake (%)
1	♂	129	12	10.5	37
2	♂	134	14	12	37
3	♀	129	14	10	27
4	♂	119	14	8.5	41
7	♂	135	15	13	20
11	♀	133	17	12	47
13	♂	137	19	13	32

* Nutrition Survey [9]

TABLE III

Comparison of Patient Stature with Other Laboratory Data

	Normal Stature $\bar{x}$ ± 1 S.D.	N *	Short Stature $\bar{x}$ ± 1 S.D.	N *	Infantilism $\bar{x}$ ± 1 S.D.	N *
Spleen (estimated cm below costal margin)	9.8 ± 1.5 7.8 ± 0.8 **	16 7	11.3 ± 1.8	7	12.0 ± 2.5	4
Total serum protein (gm%)	7.3 ± 0.2	15	7.1 ± 0.5	6	7.9 ± 0.7	4
Serum Globulin (gm%)	3.8 ± 0.2	15	3.9 ± 0.9	6	4.2 ± 0.1	4
Hematocrit (%)	34 ± 2	15	31 ± 2	6	31 ± 7	4
White blood count (10^3/mm^3)	4.2 ± 0.8	15	5.5 ± 1.1	6	5.3 ± 1.2	4

* Number of patients
** Patients under 21 (adolescents) with normal stature

sexual impotency, and secondary amenorrhea have also been reported [1, 7]. In the study of MAHDI & BASALY [5] there was no evidence of clinical or laboratory hypothyroidism but excretion of 17 ketosteroids was low, and in addition, the younger age group of patients did not develop eosinopoenia in response to epinephrine, but did respond to ACTH. These findings led to the conclusion that hypopituitarism may have been the cause of sexual immaturity.

NABAWY et al. [7] noted a general delay in skeletal maturation, but concluded that the reduced stature was not of pituitary origin since the upper to lower body segment ratios were not infantile.

FERREIRA [1] studied urinary gonadotrophin and 17 ketosteroid excretion in 28 patients with hepatosplenic schistosomiasis and found the values to be low normal or low in all. Serum phosphate as an index of growth hormone activity was high, however, and there was an eosinopoenia after epinephrine injection. In addition, radioiodine uptake was high or high normal in the two cases studied. Poor nutrition was present in almost all cases, but was not thought severe enough to cause the clinical picture. Three of eight patients grew and developed markedly after splenectomy, and in one of these urinary gonadotrophins rose to normal two months after surgery. FERREIRA [1] concluded that there was "a direct relationship between splenomegaly and the decreased activity of gonadotrophins".

In the present study thyroid function as measured by radioiodine uptake and serum and protein-bound radioactivity at 24 hours was normal in 84% of the 24 patients studied. These findings confirmed the clinical evaluation. Thyroid function was also normal in all four patients with infantilism and in 86% of the patients with short stature. The data herein reported suggest that the "endocrinopathy" associated with hepatosplenic schistosomiasis is not the result of thyrotropic hormone deficiency or thyroid gland hypofunction. Since the nutritional state of the patients was generally good it is unlikely that the defect in growth and sexual maturation was secondary to malnutrition, a conclusion similar to that of FERREIRA [1].

The role of the spleen in this disorder is not clear. FERREIRA suggested a relationship between decreased gonadotrophin activity and splenomegaly and cited supporting observations in the rat [2], although these studies were performed using exogenous and impure chorionic gonadotrophin. Furthermore, splenectomy in the rat did not accelerate endogenous pituitary gonadotrophin activity [11], thus casting doubt on the role of the spleen in gonadotrophin metabolism *in vivo*. In the present study no significant relationship could be established between spleen size and statural or sexual immaturity.

With the advent of sensitive radio-immunoassays for the analysis of pituitary hormones in the plasma it may be possible to more clearly define a defect in gonadotrophin secretion and or metabolism in hepatosplenic schistosomiasis. The evidence at hand, however, suggests that the defects in maturation seen in hepatosplenic schistosomiasis are certainly not secondary to panhypopituitarism.

RESUMO

Captação de iôdo rádio-ativo na esquistossomose hepatesplênica

Baixa estatura e ausência dos caracteres sexuais secundários têm sido observadas na esquistossomose hepatesplênica. Êstes achados têm sido atribuídos ou a panhipopituitarismo e/ou a deficiências específicas de gonadotrofinas. Para estudar a função tireoideana como índice de secreção TSH na esquistossomose hepatesplênica, captação de 131-I em 24 horas assim como PB 131-I foram realizados em 24 pacientes. Captação de 131-I pela tireóide e relação de conversão oscilou em média de 33% ± 3% em 17 pacientes com estatura normal, 34% ± 4% em 7 pacientes com deficit de estatura e 38% ± 4% em 4 pacientes com infantilismo. Não houve significante correlação entre estatura e outros parâmetros clínicos, tais como proteínas do sôro, leucograma ou volume de baço.

MAHDI & BASALY [5] observaram baixos níveis urinários de 17 cetosteróides e insuficiência de desenvolver eosinopenia após injeção de epinefrina, concluindo que baixa

estatura e imaturidade sexual fôssem devidas a panhipopituitarismo. NABAWY & col. [7] baseados na relação entre os segmentos superior e inferior do corpo, concluiram que estatura reduzida e imaturidade sexual não eram de origem pituitária. FERREIRA [1], estudando gonadotrofinas urinárias, 17 cetosteróides e resposta a epinefrina, concluiu que o defeito do desenvolvimento era secundário a uma atividade diminuida das gonadotrofinas devido a esplenomegalia. No presente estudo não houve significante diferença nos resultados entre pacientes com estatura normal e aquêles com deficit de estatura. Êstes achados sugerem que a endocrinopatia da esquistossomose hepatesplênica não é devida a um deficit de tireotropina, conquanto defeitos isolados na secreção ou resposta celular às gonadotrofinas ou somatrofinas não possam ser excluídos.

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