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SOME HEMATIMETRIC FINDINGS IN HUMAN *GIARDIA LAMBLIA* INFECTION

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SUMMARY

Up to now few reports about haematological alterations induced by *Giardia lamblia* infection have been described. Because there are questions on this matter still not answered, we carried out a study to evaluate some erythrometric and leucometric parameters in a sample that consisted of 55 patients exclusively infected with *G. lamblia* and of 55 sex and age matched parasite-free individuals. The haematological parameters evaluated were: mean corpuscular volume (MCV), hemoglobin concentration, and relative and absolute number of eosinophils and lymphocytes. No significant differences in the mean values of MCV, hemoglobin levels and absolute relative lymphocyte numbers between the two groups could be detected. When the giardiasis and control groups were separated by pediatric (0-18 years old) and adult (older than 18 years) classes, a very significant difference in both relative and absolute number of eosinophils in the adult class was observed. With respect of the pediatric class, no differences, either in relative and absolute number of eosinophils, could be observed. Our findings suggest that, during *G. lamblia* infection, some kind of parasite allergen(s) could be secreted and be responsible for the increasing of eosinophil counts in peripheral blood of adults.

KEYWORDS: *Giardia lamblia*; Giardiasis; Eosinophilia; Hematimetric parameters.

INTRODUCTION

Giardia lamblia is a flagellate protozoan parasite that infects the upper intestinal tract of humans and some other animal species[1], and whose transmission to its host, strongly enhanced by poor hygiene and sanitary conditions, occurs by predominantly fecal-oral route[2].

The clinical manifestations of giardiasis includes a wide variety of clinical signs, with a spectrum of asymptomatic to acute and/or chronic symptoms, characterized by diarrhoea, foul-smelling stools, malabsorption syndromes, weight loss and failure to thrive[3]. Some authors have reported that giardiasis could induce haematological alterations like anaemia along with malabsorption of folate and vitamin B_{12}[4,5], which, however, has not been confirmed so far[6].

Recently, SOTILLOS et al.[7] reported two adult giardiasis cases, in which the patients presented a remarkable eosinophilia. Since the eosinophil counts returned to normal levels soon after metronidazol treatment, the authors suggested that *G. lamblia* infection could have been the responsible for such eosinophilia.

Therefore, because there are still questions on this matter to be clarified, we carried out a study on giardiasis patients to evaluate some erythrometric and leucometric parameters, including eosinophil counting, and compared it with data obtained from a sex and age-matched parasite-free control group.

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MATERIAL AND METHODS

Samples

From February 1994 to August 1995, we evaluated 1,213 ambulatory patients who sought the Federal University of Santa Catarina Hospital services. Of these, we selected a total of 110 patients for the study. These patients were selected on basis of age, sex and if they had performed simultaneously fecal parasitological and haematological laboratory evaluations. Patients with signs of any pathological disorder were excluded of the study. The sample consisted of 55 patients exclusively infected with *G. lamblia* (giardiasis group, 26 female and 29 male, with ages varying from 1 to 57 years) and of 55 parasite-free patients (control group, 26 female and 29 male, with ages varying from 11 months to 53 years). The latter group was chosen to match the giardiasis group by age and sex.

Laboratory procedures

The hematological parameters evaluated were: mean corpuscular volume (MCV), hemoglobin concentration, and relative and absolute number of eosinophils and lymphocytes. Leucocyte number, hemoglobin concentration and MCV were evaluated on an Automatic Haematological Analyser (PHA-1, Medicor Münek, Hungary). Differential evaluation of leucocytes was performed on May-Grünwald-Giemsa-stained blood smears[8]. The parasitological evaluation was routinely made by Ritchie, Hoffman and Baerman-Moraes methods[9].

Statistical analysis

The giardiasis and control group data were compared and analysed by the Student's T, Proportional T and Mann-Whitney tests with 5% significance, with the aid of the Instat-2 software. To classify the patients as having eosinophilia, the upper limit of confidence interval of each control group for a given age group was used as cut-off[10].

RESULTS

The giardiasis and control groups were similar with respect to age and sex distribution. The ages of the giardiasis group varied from 1 to 57 years old, with a mean value of 11.15 years ± 1.55, while the ages of the control group varied from 11 months to 53 years old, with a mean value of 11.25 years ± 1.55.

To verify possible changes in erythrometric (MCV and hemoglobin levels) and leucometric (eosinophil and lymphocyte counts) parameters induced by *G. lamblia* infection, we compared the two groups. As shown in Table 1, no differences in the mean values of MCV and hemoglobin levels between them were observed (P=0.6125 and t=0.5080 for MCV and P=0.4754 and t=0.7163 for hemoglobin levels).

When lymphocyyte counts were evaluated, no differences, in the relative and absolute numbers, could be detected between giardiasis and control groups (Table 2, P=0.9642 and U=1,520 for relative number of lymphocytes and P=0.2881 and t=0.1068 for absolute number of lymphocytes).

When eosinophil count parameters were compared, a significant difference, in both relative and absolute numbers, was observed between two groups (Table 3, P=0.0166 and t=2,4320 for relative number of eosinophils and P=0.0670 and t=1,8800 for absolute number of eosinophils).

The two groups were then separated in two age classes: pediatric class (0-18 years old) and adult class (older than 18 years) and once again compared. As shown in Table 4, a significant difference in both relative and absolute number of eosinophils in adult class was observed (P=0.0042, U=30,000for relative number of eosinophils and P=0.0120, U=36,000 for absolute number of eosinophils). On the other hand, no differences in the relative and absolute number of eosinophils could be observed for pediatric class (P=0.1655, t=1,4040 for relative number of eosinophils and P=0.1292, t=1,4460 for absolute number of eosinophils). In another approach, when we evaluated the groups of the two classes in terms of percentage of eosinophilia once again a significant difference could be observed for adult class but not in pediatric class (Table 5).

DISCUSSION

The pathogenesis of giardiasis remains incompletely understood so far, but certainly involves induction of abnormalities in intestinal physiology and alterations of humoral and cellular immune responses[1].

Although a correlation between some intestinal helminthiasis and eosinophilia and anemia has been established long ago, little reports about similar pathologies induced by *G. lamblia* has been reported[3,7].

When we compared MCV and hemoglobin levels in giardiasis and control groups, no statistical differences between them could be detected, suggesting in this way that giardiasis does not induce erythrometric abnormalities, as already observed in similar study, in which concentrations of vitamin B_{12}, folic acid seric iron in *Giardia*-infected patients were evaluated[6].

TABLE 1
Erythrometric values in giardiasis and control patients of all ages (55)*

	MCV (μ^3)		Hemoglobin levels (g/dl)	
	giardiasis	controls	giardiasis	controls
Range	57.3-94.2	61.1-96.3	7.2-15.9	8.1-16.9
Mean ± SE	81.6±1.2	82.4±1.1	12.5±0.2	12.7±0.2
P Value	0.6125		0.4754	
Unpaired T test	0.5080		0.7163	

* Sample number for each group

TABLE 2
Lymphocyte values in giardiasis and control patients of all ages (55)*

	relative (%)		absolute (mm^3)	
	giardiasis group	control group	giardiasis group	control group
Range	16-83	13-83	1,495-10,873	845-7,676
Mean ± SE	41.9±1.6	42.1±2.2	3,766±231	3,425±220
P Value	0.9642		0.2881	
Unpaired T test	-		0.1068	
Mann-Whitney test	U=1,5200			

* Sample number for each group

TABLE 3
Eosinophil values in giardiasis and control patients of all ages (55)*

	relative (%)		absolute (mm^3)	
	giardiasis group	control group	giardiasis group	control group
Range	1-25	0-27	1,495-10,873	845-7,676
Mean ± SE	8.1±0.6	5.6±0.8	3,766±231	3,425±220
P Value	0.0166		0.0670	
Unpaired T test	2,4320**		1,8800**	

* Sample number for each group; ** Statistically significant

TABLE 4
Eosinophil values in pediatric and adult giardiasis and control patients

	relative (%)		absolute (mm3)	
	giardiasis group	control group	giardiasis group	control group
Pediatric* (n=42)				
Confidence interval	6.4-9.7	4.4-8.3	563-912	334-752
Mean	8.1	6.3	738	543
P value	0.1655		0.1292	
Unpaired T test	1,404		1,446	
Adult** (n=13)				
Confidence interval	4.8-11.2	1.8-4.3	388-830	146-368
Mean	8.1	3.1	609	257
P value	0.0042		0.0120	
Mann-Whitney test	U=30,000***		U=36,000***	

* Pediatric group: 0-18 years old; ** Adult group: older than 18 years; *** Statistically significant

TABLE 5
Percentage of patients with relative and absolute eosinophilia* in pediatric and adult groups

	Pediatric (n=42)			Adult (n=13)		
	Upper IC limit	giardiasis group	control group	Upper IC limit	giardiasis group	control group
Relative number of eosinophilis	8.3	33%**	19%	4.3	77%	31%
Absolute number of eosinophils	752	31%	16%	368	69%	31%
Proportional t test		1,4500			2,3500***	

* Eosinophilia is defined as any value above the upper limit of internal confidence (IC) for each group
** Percentage of patients with eosinophilia
*** P > 0.05 = Statistically significant

In our study, a statistically significant high number of eosinophils was detected in *Giardia*-parasitized adult patients. On the other hand, in pediatric patients, no such differences could be observed, since the eosinophil counts were high in *Giardia*-parasitized as well as in parasite-free groups. To confirm the eosinophilia results for pediatric and adult classes, we evaluated a percentage of patients with eosinophilia, which was defined as any value above the confidence interval upper limit of parasite-free, control patients, since the population from which we obtained the samples did not represent the general population. Although the sample utilized in this study was chosen ramdomly, some unidentified eosinophilia-inducing factor could have interfered and masqueraded any increase in the number of eosinophils in the pediatric class. Since helminthiasis-induced eosinophilia was excluded in our study, other pathologies such as allergic disorder dermatitis, hypereosinophilia syndromes and tumours, could have accounted for the disparity in the eosinophilia counts in some patients[11]. Unfortunately, a more detailed clinical evaluation of these patients was lacking, to exclude any of these eosinophilia-inducing disorders.

Considering our hematologic findings, and comparing them with data of other authors[7,12,13], we suggest that *G. lamblia* could produce some kind of allergen(s), which could reach a deeper layer of intestinal mucosa during infection, and thus cause an increase in the number of eosinophils, at least in adults. Some textbook authors[11, 14] do not consider *G. lamblia* as a cause of eosinophilia. We think that in unexplained eosinophilia, a possible infection by *G. lamblia* should not be ruled out.

RESUMO

Valores hematimétricos na infecção humana causada por *Giardia lamblia*.

Até este momento poucos relatos de alterações hematológicas causadas pela *Giardia lamblia* têm sido descritos. Procuramos então avaliar alguns parâmetros hematológicos em pacientes infectados exclusivamente com *G. lamblia* (n=55), provenientes do Hospital Universitário, comparando-os com pacientes, pareados por sexo e idade, sem nenhum parasitismo (n=55). Foram avaliados: volume corpuscular médio (VCM), níveis de hemoglobina e contagem absoluta e relativa de eosinófilos e linfócitos. Não foram observadas diferenças significativas entre os valores médios de VCM, níveis de hemoglobina e contagem absoluta e relativa de linfócitos para os dois grupos estudados. No caso dos eosinófilos, tanto as contagens relativas quanto as absolutas diferiram significativamente nas faixas etárias acima de 18 anos (percentagem média de eosinófilos de 8,1 para pacientes com giardíase, e de 3,1 para pacientes não-parasitados, com P=0,0042; e contagens absolutas com média de 609 para pacientes com giardíase, comparado com média de 257, para pacientes-controle, com P=0,0120). No caso de faixas etárias abaixo de 18 anos não foram encontradas diferenças significantes entre os dois grupos. Diante disto, nossos achados sugerem que a *G. lamblia* poderia secretar um ou mais alérgenos, que seriam responsáveis pelo aumento do número de eosinófilos no sangue periférico de pessoas adultas, e que tal fenômeno deva ser melhor avaliado em crianças.

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