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PATIENTS' PROFILES AND THE FACTORS RELATED TO INTESTINAL PARASITES

PERFIL DOS PACIENTES E OS FATORES RELACIONADOS À ENTEROPARASITOSES

PERFIL DE LOS PACIENTES Y LOS FACTORES RELACIONADOS CON LAS ENTEROPARASITOSIS

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ABSTRACT

Objective: to analyze the patients' profile and the factors related to intestinal parasites. ***Method:*** case-control study about intestinal parasites, with a Logistic Regression model, promoting associations between clinical conditions, identified parasites, laboratory data and medications used in patients treated at the Gastroenterology Clinic of the University Hospital Lauro Wanderley/HULW, João Pessoa/PB. 34 medical records were analyzed. A descriptive and associative analysis between the variables was performed, along with the Logistic Regression. ***Results:*** the women presented more parasites and the average age was 56 years. Helminthes were the most prevalent, predominantly *Schistosoma mansoni*. The methods used for parasitological examinations were Hoffman and Kato-katz. Protective factors between gastrointestinal symptoms, diabetes, SAH, diuretic and gastrointestinal comorbidity risk factors, anti-parasitic and gastroprotective drugs were observed. ***Conclusion:*** pathogenic parasites are relevant in outpatients. The identified factors allowed characterizing the susceptible patients, interventions for prevention and control of intestinal parasites. ***Descriptors:*** Helminthes; Intestinal Parasites; Protozoa.

RESUMO

***Objetivo*:** traçar o perfil de pacientes e os fatores relacionados à enteroparasitoses. ***Método*:** estudo caso-controle sobre enteroparasitoses, com modelo de Regressão Logística, promovendo associações entre quadro clínico, parasitoses identificadas, dados laboratoriais e medicamentos em uso, em pacientes atendidos no ambulatório de Gastroenterologia do Hospital Universitário Lauro Wanderley/HULW, João Pessoa/PB. Foram analisados 34 prontuários. Realizou-se análise descritiva e associativa entre as variáveis e a Regressão Logística. ***Resultados*:** as mulheres foram mais parasitadas e a faixa etária média foi de 56 anos. Os helmintos foram mais prevalentes, sendo predominantemente *Schistosoma mansoni*. Os métodos mais utilizados para exames coproparasitológicos foram o Hoffman e Kato-katz. Observaram-se fatores de proteção entre os sintomas gastrointestinais, diabetes, HAS, e diurético e fatores de risco comorbidades gastrointestinais, medicamento antiparasitário e gastroprotetor. ***Conclusão*:** parasitas patogênicos são relevantes em pacientes ambulatoriais. Os fatores identificados permitiram caracterizar os pacientes susceptíveis as intervenções de prevenção e controle de enteroparasitas. ***Descritores*:** Helmintos; Parasitoses Intestinais; Protozoários.

RESUMEN

Objetivo: describir el perfil de los pacientes y los factores relacionados con las enteroparasitosis. ***Método:*** estudio de los parásitos intestinales de casos y controles, con el modelo de Regresión Logística, promoviendo asociaciones entre el clínico, parásitos identificados, datos de laboratorio y medicamentos que se usan en los pacientes tratados en la clínica de Gastroenterología del Hospital Universitario Lauro Wanderley/HULW, João Pessoa/PB. Se analizaron 34 registros. Se realizaron el análisis descriptivo y asociativo entre las variables y la Regresión Logística. ***Resultados:*** las mujeres presentaron más parásitos y la edad media fue de 56 años. Los helmintos fueron más prevalentes, predominantemente con *Schistosoma mansoni*. Los métodos utilizados para los análisis parasitológicos eran Hoffman y Kato-Katz. Se observaron los factores de protección entre los síntomas gastrointestinales, la diabetes, la hipertensión, diuréticos y los factores de riesgo de comorbilidad gastrointestinal, medicamentos antiparasitarios y gastroprotectores. ***Conclusión:*** los parásitos patógenos son relevantes en pacientes ambulatorios. Los factores identificados permiten caracterizar los pacientes susceptibles, intervenciones para la prevención y el control de los enteropárasitos. ***Descriptores:*** Helmintos; Parásitos intestinales; Protozoos.

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INTRODUCTION

The "neglected diseases" refer to generally transmitted diseases that occur the most in developing countries, whereas the "most neglected" ones are those present only in developing countries.[1,2] The parasitic diseases are one of the most important neglected diseases.[3]

The problems related to parasitic diseases, in Brazil, reveal to be concerning, due to the inadequate socioeconomic conditions, such as the lack of basic sanitation, health education, cultural habits and, especially, the absence of serious health education policies.[4-5]

Among the parasites, the Helminthes' species are very important, especially the ones pertaining to the following phyla: *Platyhelminthes* (*Taenia solium, Taenia saginata* e *Hymenolepis nana, Schistosoma mansoni*) and *Nematode* (*Trichuris trichiura, Strongyloides stercolaris, Enterobius vermicularis, Ascaris lumbricoides, Ancylostoma duodenale* e *Necator americanos)*; and, with equal importance, the pathogenic (*Giardia lamblia* e *Entamoeba histolytica)* and commensal *(Endolimax nana, Entamoeba coli, Iodamoeba butschlii)*.[6]

The intestinal pathogenic parasites are, generally, orally transmitted, by ingesting water or food contaminated by the parasites coming from human or animal feces.[7-8] Another way of transmission is the contact of the parasite with the host's mucosa.[9]

According to IBGE, in 2012, about 70% of the Brazilian houses had basic sanitation, but, when considering the income, only 51.7% of those with a monthly income up to half of the minimum wage had basic sanitation, and regarding the ones with a monthly income higher than two minimum wages, the percentage was 83.6%.[10]

There are various studies showing children as the main target of parasitic infections, due to poor hygiene habits and the immaturity of their immune system. In this age group these parasitic diseases can initiate severe physiological changes.[1]

Due to the lack of studies about intestinal parasites in adults and about the patients treated at the gastroenterology clinic, this research became relevant in order to comprehend the intestinal parasites in the mentioned individuals. Thereby, this study's objective is to describe the patients' profile and the factors related to intestinal parasites.

METHOD

This study was conducted at the gastroenterology clinic of the University Hospital Lauro Wanderley - HULW, João Pessoa/PB, case-control type, in which 370 medical records were identified, and in accordance with the inclusion and exclusion criteria, only 34 medical records were appropriate for analysis.

The following medical records were included: adult patients who underwent the parasitological stool examination, older than 16 years old, both genders, whose treatment took place in the adopted period. Illegible or incomplete medical records and patients who did not have all the necessary assessments to the study's objectives were excluded.

The research was conducted from October 2014 to June 2015 by analyzing the medical records. The data collecting occurred daily at the clinic, during the shift when the attendance was made. After medical consultation, the medical records were delivered to the researcher to be evaluated. Simultaneously, the SAME (Service of Medical Archive and Statistics), where the records are stored, medical records were recovered, daily, in alternating shifts to the gastroenterology clinic, in which the data analysis and collecting were performed.

The analyzed dependent variables were the responses to intestinal parasitosis defined according to the examination requested by the physician and written down on the record. If the patient is infected, he/she is considered positive; if not, negative. The independent variables were: gender, age, origin (according to the place of the patient's residence), symptoms (reported by the patient and described in the chart), comorbidities (reported the patient and described in the chart), hematological and biochemical examinations (tests results, when done, and defined as being within or outside the standards of normality according to the type of examination and its reference values) and medicines in use (reported by the patient and described in medical records).

The Term of Free Consent and Informed (resolution nº 466/12) was not necessary for the study was retrospective and the researcher did not have to contact with the patient whose medical record was analyzed. The project was submitted to the Research Ethics Committee of the University Hospital Lauro Wanderley and approved under the number 835.247.

The medical records of 370 patients treated in the period of the research were

analyzed. After applying the inclusion and exclusion criteria, 34 medical records were finally analyzed.

For the statistical analysis, the free software R was used, along with the Chi-square Test, with a significance level of 5%. For the development of the model of the parasitogical stool examination, the Model of Logistical Regression (MLR) was used. For the diagnosis analysis, the analysis of waste graphics was used; whereas for verifying the adequacy of the model, the area under the ROC curve and the Hosmr and Lemeshow tests were used. The conclusions of the model were presented as Probabilities and *Odds ratio*.

RESULTS

From 34 medical records, 17 had positive results for the parasitological stool examination, with more women (10/17 – 58.8%) than men (7/17 – 41.2%). Most of the patients with positive results came from João Pessoa (22/34 – 64.7%). Associations between positive results and gender (CI $_{95\%:}$ 0.71-2.85; p-value=0.49), as well as positive results and origin (CI $_{95\%:}$ 0.41-1.16; p-value=0.15) were not statistically significant, since the p-value was higher than the established one (Table 1).

Table 1. Distribution of the parasitic samples regarding gender and the origin of the patients attended at the Gastroenterology Clinic of the HULW/UFPB, from October 2014 to May 2015.

	Positive samples	Negative samples	RR	$CI_{95\%}$	p-value
Gender					
Female	10	7	1.43	0.71-2.85	0.49
Male	7	10			
Origin					
João Pessoa	9	13	0.69	0.41-1.16	0.15
Other cities (PB)	8	4			

Concerning the relationship between age group and having parasites, or not, the most affected age group was between 61 and 77 years old (eight patients), and the one that did not have any case of parasitic disease was between 16 and 31 years old. The average age was 56.7 years old, with 16 years as the lowest value, and 77 years, the highest one.

From the 17 (50%) of positive samples, 15 (86.6%) had one parasite, and two 2 (13.4%), two parasites. There was no case of multi parasites. The helminthes and protozoa prevailed, with 66.6% (12/18) and 33.4% (06/18), respectively. As for the parasites species, there were commensal and pathogenic types (Table 2).

Table 2. Prevalence of pathogenic and commensal parasites in patients attended at the Gastroenterology Clinic of the HULW/UFPB, from October 2014 to May 2015.

Parasite species	Prevalence%	Total of parasites(n)
Helminthes	66.6%	12
Schistosoma mansoni	27.8%	05
Ancylostomatidae	16.7%	03
Ascaris lumbricoides	11.1%	02
Trichuris trichiura	5.5%	01
Strongyloides stercoralis	5.5%	01
Protozoa	33.4%	06
Endolimax nana	22.4%	04
Entamoeba coli	5.5%	01
Entamoeba histolytica/Entamoeba díspar	5.5%	01

No statistically significant association between gastro-intestinal symptoms reported by the patients and the presence of a parasite was found (p-value=0.71; RR 0.92; $CI_{95\%}$: 0.57-1.46).

Some comorbidities were reported among the patients with positive samples: gastro-intestinal diseases, with five (14.7%); diabetes, with three (8.8%); and Systemic Arterial Hypertension, with four (11.76%). Regarding the results, there was no statistically significant association between parasitic disease and gastro-intestinal diseases, diabetes and Systemic Arterial Hypertension (SAH) (p-value > 0.05).

It is possible to notice that the patients with positive samples were using some drugs, especially: anti-parasitic (four – 11.7%); diuretic (seven – 20.6%); anti-diabetic (two – 5.9%); psychotropic (five – 14.7%); and gastro-protective (seven – 20.6%). No statistical association between drugs and the presence of a parasite was found.

The hematological parameters, such as hemoglobin, leukocytes and platelets, were analyzed, as well as the biochemical parameters, such as creatinine and albumin. The values were considered normal when within the parameters established by the Hospital. There was no statistically significant association between the parameters and

having a parasite, or not (Table 3).

Table 3. Relationship between the parasitological exam and the hematological and biochemical parameters of the patients attended at the Gastroenterology Clinic of HULW/UFPB, from October 2014 to May 2015.

Hemoglobin Reference value: Male (13.5 to 18) and Female (12 to 16) g/dl					
	Normal	Nonstandard	RR	$IC_{95\%}$	p-value
Parasitosis					
Yes	11	6	0.84	0.54-1.31	0.45
No	13	4			
Leukocytes Reference value: Male (4,500 to 10,000) and Female (4,500 to 10,000) mm^3					
	Normal	Nonstandard	RR	$IC_{95\%}$	p-value
Parasitosis					
Yes	6	11	0.68	0.47-0.99	0.08
No	1	16			
Platelets Reference value: Male (150 to 450) and Female (150 to 450) $10^3/mm^3$					
	Normal	Nonstandard	RR	$IC_{95\%}$	p-value
Parasitosis					
Yes	10	7	1.25	0.65-2.37	0.49
No	8	9			
Creatinine Reference value: Male (0.7 to 1.2) and Female (0.5 to 1.1) mg/dl					
	Normal	Nonstandard	RR	$IC_{95\%}$	p-value
Parasitosis					
Yes	13	4	0.87	0.63-1.18	0.37
No	15	2			
Albumin Reference value: Male (3.5 to 5.0) and Female (3.5 to 5.0) g/dl					
	Normal	Nonstandard	RR	$IC_{95\%}$	p-value
Parasitosis					
Yes	11	6	0.91	0.57-1.46	0.71
No	12	5			

In the analyzed records, the methods used for the parasitological stool examination were the Hoffman one (32) and Kato-Katz (two), prevailing the first one. Other techniques are used only in specific cases.

This study used the setting of the logistic regression model in order to better explain the relationship between the independent variables and their power of association in relation to the result, having, or not, parasitosis.

A priori, several models were developed so that their variables were statistically significant (p-value < 0.05) and responsible for building the final model. Only four were statistically significant and composed the best model. The age variable was significant at 10%. The gastro-protective variable has the highest odds ratio, which means that this variable influences the most on increasing the chances of having positive parasitological examination, that is, patients who use gastro-protective are 24 times more likely to have a positive parasitological examination compared to those who do not use. As for the interaction between the leukocytes and age variables, the chances of a positive parasitological examination increase in 54%, as shown in Table 4.

Table 4. Approximation and interval with 95% of confidence to ODDS RATIO.

Variables	Odds ratio	Confidence Interval(95%)
Systemic Arterial Hypertension	0.068	0.005-0.864
Leukocytes	0.000	0.000-0.026
Gastro-protective	24.360	1.417-418.687
Age	0.703	0.492-1.003
Leukocytes*age	1.543	1.036-2.299

The model adequacy test had p-value 0.535. Since it is higher than the level of significance of 5%, the model passed the adequacy test.

By calculating the deviation function, the observed result was that, in accordance to the desired confidence level (95%), there was proof that the model was adjusted. The Nagelkerke R2 measure was 57.5% of explanatory power for this model. The area under the ROC curve was 0.867 (86.7%), so the proposed model presents an excellent discrimination power.

DISCUSSION

The research was conducted at the University Hospital Lauro Wanderley, in the city of João Pessoa. This hospital-school is a referral center for clinical care and attention throughout the state, and provides its services not only to Paraíba, but also to cities of other states near to Paraíba. The patients' attendance is done exclusively based on the Unified Health System (SUS).

By analyzing the medical records, it was possible to verify that the profile of patients attending the gastroenterology clinic of HULW has an average age of 56 years and that the age group between 61 and 77 years has the highest prevalence of infected patients. As it is a hospital reference for the state of Paraiba, there are several age groups. In a study conducted at the same hospital, the age of patients studied ranged from 21 to 86 years old.[11]

Among the methods used by the HULW for the parasitological stool examinations, there are the Hoffman (or spontaneous sedimentation method), the Kato-Katz and MIF; Hoffman is used more frequently. For clinical diagnostic of laboratory routine, the most requested methods are the Baermann-Moraes and Spontaneous Sedimentation, as their main objective is to look for helminthes larvae and protozoan cysts/helminthes eggs, respectively.[12-13]

A study conducted at the University Hospital Professor Edgar Santos (HUPES) of the Federal University of Bahia (UFBA), in 2007, reported infection by only one parasite as prevalent.[14] The research also reports that patients using the private health system have a lower prevalence of *Strongyloides stercoralis* than patients who use the public health system.

The analyzed medical records described clinical manifestations such as ascites, diarrhea, hepatic encephalopathy and dyspeptic phenomena, which are closely linked to high parasite load of *S. mansoni*.[15-17]

In this study, other helminthes were also found, such as Ancilostomatidae, *Ascaris lumbricoides*, *Trichuris trichiura* and *Strongyloides stercoralis*, with the first two as the most prevalent, with rates smaller than *S. mansoni*.

In Brazil, the parasites *Entamoeba coli*, *Trichuris trichiura*, *Ascaris lumbricoides*, Hookworm, *Endolimax nana* and *Entamoeba hystolitica* are considered the most prevalent.[17] The presence or absence and the prevalence of certain pathogenic parasites are related to the regions, health and climate conditions, as well as educational factors.[18] In Minas Gerais (MG) and Rio Grande do Sul (RS), *A. lumbricoides* are the most common, whereas in Mato Grosso (MT), Giardia lamblia was the most found in human beings.[19-21]

The protozoa identified in the study were *Entamoeba histolytica/Entamoeba dispar* as pathogenic forms and *E. nana* and *E. coli* as nonpathogenic forms. According to WHO (2015), more than 10% of the world's population is infected with the complex *E. histolytica/E. dispar*, with 50 million estimated cases each year.[22] In some states in Brazil, it has been evident the presence of *E. histolytica/dispar*. In the city of Manaus (AM), according to Benetton (2005), the infection by this parasite affects 6.8% of the population.[23] In Fortaleza (CE), this infection affects roughly 14.9% of the low income population, and, in Belém (PA), 29.5% of the residents in the metropolitan area.[24]

Concerning the prevalence of non-pathogenic protozoa, *E. nana* was present in 22.4% of the patients, which is important, since its presence reveals the contamination of water and food for fecal matter. The identification of non-pathogenic protozoa is relevant, since it represents failures of social and health measures, even not affecting the health of the infected individual.[25] This high number of cases of non-pathogenic protozoa can also be observed in the study of Santos (2013), where 197 children of the city of Santo Ângelo - MG were infected by this parasite.[26]

It is not possible to identify the existence of statistically significant associations between gastrointestinal symptoms and the presence of parasitosis (p-value = 0.71), considering the results of this study. However, when analyzing the relative risk in relation to the outcome variable (RR = 0.92), it was observed the existence of a protective factor.

Among the most common gastro-intestinal symptoms, there are: diarrhea, abdominal pain, gas, loss of appetite, vomiting, nausea, reflux and heartburn, cough, iron deficiency anemia, mucus and blood in the feces. Some of these symptoms might lead to faster biological cycle of the parasite. Diarrhea is characterized by an increase in the secretion of fluid and electrolytes, decreased absorption of fluids and electrolytes, increased osmolality and motility disorders. When these factors are associated, it promotes the release of watery feces, where, depending on the parasites, the cysts/eggs cannot survive for that long, when in the

environment, discontinuing its biological cycle.[27]

The data resulting from this study demonstrated no statistically significant association between gastro-intestinal comorbidities and the presence of parasites (p-value=0.2). However, when verifying the relative risk regarding the outcome variable (RR=2.5), one notices the existence of a risk factor.

Regarding the association between the presence of parasitic disease and diabetes, this study demonstrated no statistical significance (p-value=0.24). When analyzing the relative risk and the response variable (RR = 0.5), it is observed the existence of a protection factor.

The study about patients attended in the community and in outpatient clinics, affected by diabetes mellitus types 1 and 2, in order to determine the existence of a relationship between glycemic control and gastro-intestinal symptoms, and also the relationship between DM complications and gastro-intestinal symptoms, showed that, among the surveyed patients, 57% reported at least one type of complication of the disease. Therefore, the authors concluded that gastro-intestinal symptoms may be associated with complications of diabetes mellitus, both type 1 and type 2.[28]

Among the gastro-intestinal symptoms found in this study, diarrhea can be mentioned, and also explained in DM patients of both types due to different causes, such as intestinal motility disorders and vomiting.[28] These results confirm the previous results reporting that gastro-intestinal symptoms act as a protection factor.

This study showed no statistical significance between infected patients and systemic arterial hypertension (p-value=0.16). As for the relative risk of the dependent variable (RR=0.44), it was observed that hypertension is a protective factor. From the final model, it was also noticed that hypertensive patients have 14.7 times less chances of having parasites. Studies proving this relationship were not found in the literature, which leads a need for other researches to better explain the relationship parasitosis and Systemic Arterial Hypertension.

No statistically significant associations between parasitosis and the drugs used were found. When observing the relative risk of parasitosis along with the use of anti-parasitic drug (RR=4.0), it is noticed that, other than expected, there is a risk factor, in which the patient using anti-parasitic drugs is more likely to be parasitized. Other study reported that even the individuals who used anti-parasitic and had a high supply of these drugs were infected, probably due to reinfection by parasites.[29]

This suggests that the basic sanitation as well as the health education of the region are inadequate and precarious, because, even using anti-parasitic drugs, the prevalence levels of the parasites remained high due to reinfection, then the individuals may be residing in risk areas and in a situation of infection-cure-reinfection. Therefore, it is necessary to control the cure in order to prove the negativity of the parasitological examination.

When analyzing the relative risk of parasitosis with the diuretic (RR=0.71) and the relative risk of parasitosis with anti-diabetic (RR=0.40), the results show that both drugs work as a protective factor.

The first chosen drug for the treatment of type 2 diabetes is metformin, a very common oral hypoglycemic agent with high clinical efficacy and low toxicity. The reduced glucose absorption in the digestive tract may lead to diarrhea, one of the most important adverse effects of this drug. The high glucose amount that is not absorbed by the intestine causes the amount of water in the feces to also increase, which, in turn, is also not absorbed, leading to diarrhea.[30]

It was also possible to observe, as a result of this study, that there is no association between the presence of the parasite and the use of gastro-protective. The relative risk (RR=3.5) shows the presence of a risk factor, in which the use of gastro-protective increases by 24 times the chance of having parasites when compared to those who do not use. This study also denotes the association between leukocytes and age increases the chances of a positive parasitological stool examination by 54%.

No statistically significant associations were found, in the performed analysis, between the hematological and biochemical parameters and the presence of parasitosis. The relationship between platelet and the presence of parasites showed a relative risk of 1.25, representing a risk factor.

CONCLUSION

The design used in this study enabled identifying characteristics of the profile of the surveyed sample. Most of the patients come from the city of João Pessoa, the average age was 56 years, and the women presented more parasites than men.

Most of the positive analyzed samples presented only one parasite. The helminthes were the most found in this study, regarding protozoa, with *S. Mansoni* as the most representative in patients.

The used methods for parasitological examinations were Hoffman and Kato-katz. However, it is important to implement other techniques more appropriate and effective, such as Baermann-Moraes and immunoassays.

Among the results of biochemical analyzes, only leukocytes had values higher than the reference levels considered in the medical records.

It was possible to observe the following protective factors: gastrointestinal symptoms, diabetes, SAH, and diuretic, considering the presence of the parasite, and the following risk factors: gastrointestinal comorbidities, anti-parasitic and gastro-protective drugs.

This research may help health professionals for it found relevant results for decision-making, promoting actions focused on controlling and preventing parasitic diseases in outpatients.

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