Avaliação da qualidade de vida de pacientes com enteroparasitoses atendidos em em um Hospital Universitário de João Pessoa (PB), utilizando um modelo de regressão logística.

Evaluation of quality of life of patients with enteroparasitosis treated at a university hospital of João Pessoa (PB), using a logistic regression model.

Evaluación de la calidad de vida de los pacientes con parásitos intestinales tratados en un hospital universitario de João Pessoa (PB), mediante un modelo de regresión logística.

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RESUMO: O presente artigo consiste em avaliar a qualidade de vida dos pacientes com enteroparasitoses atendidos no Laboratório de Análises Clínicas do Hospital Universitário Lauro Wanderley. Tais doenças são causadas por helmintos ou protozoários intestinais, e se dão pelas más condições encontradas em países em desenvolvimento e regiões de pobreza elevada, a exemplo do Brasil. Atualmente, têm afetado bilhões de pessoas, levando a óbito, anualmente, outras milhões. A estimativa é de que uma pessoa em cada quatro encontra-se infectada. A coleta de dados foi realizada diariamente, pela manhã, no laboratório do referido hospital. A amostra avaliada foi constituída por 40 pacientes de ambos os sexos, com idades entre 18 e 59 anos, e que apresentaram solicitações para exames de fezes. Todos foram convidados por meio de uma abordagem individual e, em seguida, receberam um questionário para ser respondido, o Medical Outcomes Study 36-Item Short-Form Health Survey (ou Questionário de Qualidade de Vida SF-36). Para a análise dos dados,

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utilizou-se um modelo de regressão logística, considerando como resposta a variável "resultado do exame", em que 1 seria positivo e 0, negativo. Ao analisar as variáveis, foi possível concluir que um indivíduo com bom estado geral de saúde, porém com sua saúde mental fragilizada, tende a ser mais suscetível a ter uma enteroparasitose.

Palavras-chave: Qualidade de Vida, Doenças Parasitárias, Saneamento Básico.

ABSTRACT: This article consists in to assess the quality of life of patients with enteroparasitosis treated at the Clinical Laboratory of the University Hospital Lauro Wanderley. Such diseases are caused by helminths and intestinal protozoa and take place due to the poor conditions found in developing countries and high poverty areas, such as Brazil. Currently, it has affected billions of people, leading to death, annually, another million. It is estimated that one in four people is infected. Data collection was performed daily, in the morning, at the laboratory of the mentioned hospital. The assessed sample consisted of 40 patients of both sexes, with ages between 18 and 59 years, and who presented requests for stool tests. All were invited through an individual approach, and then, given a questionnaire to be answered, the Medical Outcomes Study 36 – Item Short – Form Health Survey (or Quality of Life Questionnaire SF-36). For data analysis, a logistic regression model was used, taking into response the variable "test results", where 1 would be positive and 0, negative. By analyzing the variables, it was concluded that an individual with good general health, but with his fragile mental health, tends to be more susceptible to have a enteroparasitosis.

Keywords: Quality of Life, Parasitic Diseases, Basic Sanitation.

RESUMEN: Este artículo es evaluar la calidad de vida de los pacientes con parásitos intestinales tratados en el Laboratorio Clínico del Hospital Universitario Lauro Wanderley. Tales enfermedades son causadas por helmintos y protozoos intestinales y dan a las malas condiciones que se encuentran en los países en desarrollo y las zonas de alta pobreza, como Brasil. Actualmente se ha afectado a miles de millones de personas, lo que lleva a la muerte cada año millones más. Se estima que uno de cada cuatro personas está infectada. La recolección de datos se realizó diariamente por la mañana en el laboratorio del Hospital. La muestra del estudio consistió en 40 pacientes de ambos sexos, de edades comprendidas entre 18 y 59 años y que había pedido a las heces pruebas. Todos fueron invitados a través de un enfoque individual y luego dio un cuestionario para ser respondido, el Medical Outcomes Study 36 - Item Short - Form Health Survey (o Cuestionario de Calidad de Vida SF-36). Para el análisis de datos se utilizó un modelo de regresión logística teniendo en respuesta a "resultados de las pruebas de" variable, donde 1 sería positivo y 0 negativo. Mediante el análisis de las variables se concluyó que un individuo con buena salud en general, pero con su frágil salud mental tiende a ser más propensos a tener un enteroparasitosis.

Palabras clave: Calidad de Vida, Las Enfermedades Parasitarias, Saneamiento.

INTRODUCTION

Intestinal parasitosis or enteroparasitosis are diseases which etiological agents are helminths or intestinal protozoa[1], and they have a wide geographic distribution in Brazil. They can be found both in rural areas as urban areas. Their intensity varies according to the environment and the parasitic species.[2] The Northeastern region is the one the presents largest mortality numbers caused by diarrheal diseases, especially among children under 5 years of age, although some advances have been achieved in recent decades. The socioeconomic conditions, and the lack of basic sanitation, health education and cultural habits in Brazilian territory, are some of the problems that cause the enteroparasitosis to take great proportion.[3] There are various damages that parasites can cause to the health of disabled people, such as: changes in the nutritional balance, bleeding and intestinal obstruction, rectal prolapse and diarrhea, among others, being the clinical manifestations usually proportional to the parasite burden and may lead the individual to death.[4] With this, it is necessary to make improvements in basic sanitation of the cities associated with infrastructure works. Such resources are fundamental for improving the quality of life of needy populations.

Accordingly, government programs for the control of intestinal parasitosis have been implemented in different countries. In 2005, the National Program of Surveillance and Control of Enteroparasitosis was released in Brazil by the Ministry of Health – which did not go through subsequent assessments -, aiming at the reduction of the prevalence of enteroparasitosis and its consequent morbidity and mortality. This initiative came after a survey on the status of intestinal parasites in Brazil, from 1980 to 2001, which showed a small and dispersed quantity of work done addressing the said topic in this period, and the use of ill-defined sample population base. That's because the prevalence in that work presented many variations, ranging from 15% in a population of under 24 months of life to 80% in a group of food handlers. [5]

However, the implementation and sustainability of these interventions consider local contexts, that make them complex and variable, leading to low effectiveness of such initiatives. For the long-term control of enteroparasitosis, public health interventions are essential, such as health education activities, supply of drinking water, maintenance of sanitation system and food hygiene inspection.[3]

Basic sanitation is regarded as an indicator of environmental quality and therefore quality of life and health of people, especially in Brazil.[6] According to Ormond[7], sanitation is defined as measures that are designed to ensure sanitary conditions to the quality of life of a population, through distribution and treatment of water, and collection and treatment of sewage, in order to ensure public health and the preservation of the environment quality. Despite the relevance of intestinal parasites to public health, there are still no reports of studies that assess the quality of life of patients with enteroparasitosis in Brazil. The few studies found in the literature were conducted worldwide. [8-10]

As the foregoing, it is emphasized that knowledge of intestinal parasites epidemiology is crucial

factor in building and developing actions to improve sanitation and the quality of life of the population, of any place, where there are significant socioeconomic differences, among other factors. Thus, the objective of this study is to evaluate the quality of life of patients with enteroparasitosis through the analysis of the areas of the Medical Outcomes Study 36-Item Short-Form Health Survey (or Quality of Life Questionnaire SF-36).

METHODS

The survey was conducted in the Clinical Laboratory of the University Hospital Lauro Wanderley (HULW), from October to December 2014. The study included 40 individuals of both genders, aged between 18 and 59 years, who underwent parasitological stool tests by techniques adopted by the Hospital, as established in the daily routine of the laboratory, and who agreed to participate in the study by signing the Term of Consent. Patients using sleeping pills or antidepressants were excluded. Data collection was performed daily, in the morning, in the laboratory of the hospital. Patients with request for stool tests were invited through an individual approach.

Participants received a questionnaire to be answered, the already mentioned Quality of Life Questionnaire SF-36. For this study, because it is a first analysis in Brazil, we decided to evaluate the issues relating to the quality of life in the absence of other variables.

It is noteworthy that several studies conducted in Brazil and the world discuss the concept of quality of life and, therefore, make use of various tools that analyze this concept. Among them, there is the Medical Outcomes Study 36-Item Short-Form Health Survey, which was developed by the Ware and Sherbourne scholars, in 1992. The translation and validation of this instrument into Portuguese language were performed by Ciconelli, in 1999, following all the steps required by a committee of experts.[11] It consists of 36 items, intended to evaluate health concepts that represent basic human values, relevant to functionality and well-being, and they are divided into eight areas (Functional Capacity, Limitation for Physical Aspects, Pain, General Health Condition, Vitality, Social Aspects and Emotional Aspects), each with its own characteristic. [12]

Regarding the analysis of the variables related to the SF-36 instrument, six domains of quality of life were calculated: Functional Capacity, Pain, General Health Condition, Vitality, Social Aspects and Mental Health. Two of its domains - Limitation by Physical Aspects and Emotional Aspects - were not significant to the regression model and, therefore, were not considered. The values of each field vary from 0 to 100, where 0 indicates the worst state of the domain and 100 indicates the best state of the domain. Thus, after the calculation of the domains, a logistic regression model was accepted, considering the variable result as response, in which:

$$Y = \begin{cases} 1, & \text{se positivo} \\ 0, & \text{se negativo} \end{cases}$$

for which we want to calculate the probability of occurrence of enteroparasitosis based on the domains of quality of life. The explanatory variables considered were the six calculated fields. The probability of enteroparasitosis of i-th individual in a population of interest can be obtained by the logistic function given by:

$$P(Y = 1) = \frac{1}{1 + e^{-(\beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i})}},$$

in which, initially, it was considered a logistic regression model with all the present variables.

The result of the stool test was provided by the laboratory, being considered infected patients who were positive for eggs or larvae of helminths, cysts or trophozoites of protozoa. Data analysis was performed with the *R software*. In addition to the regression analysis, descriptive statistics were used and the *Hosmer-Lemeshow* Test, assuming $p < 0.10$ for statistical significance. The measure of association used was the *Odds Ratio*, with 90% confidence interval.

The Logistic Regression Model (MRL) has the ability to establish a relationship of dependency between a single binary response-variable and a set of independent variables, assisting in taking the decision on "test results" outcome. In logistic regression, there is a series of graphs, adjusting tests and other measurements to ensure the validity of the model. Among them, we highlight the already mentioned Hosmer-Lemeshow Test and the Odds Ratio.

The first one is a test that evaluates the adjusted model from the comparison between the observed and expected frequencies, and it also associates data to their estimated probabilities. For this, we use the Chi-square test in order to see if the observed frequencies were close to the expected frequencies.[13]

The second one corresponds to a measure of the strength of association between the exposure and the disease under study, and the probability that an event occurs divided by the probability that it doesn't happen. [14]Finally, we used the *Stepwise* method, from the *Wald* statistic. This method is used to select which variables most influence the output set, and may thus reduce the number of variables to compose the regression equation.[15]The purpose of *Wald* statistics is to verify if each of the model parameters is significantly different from 0.[16]

Regarding ethical principles, the project was approved by the Ethics and Research Committee of the HULW, in accordance with Resolution No. 466/2012 of National Health Council/Ministry of Health, which regulates the ethics of research involving humans (Certificate of Introduction to Ethics Assessment (CAAE): 37460314.6.0000.5183).

RESULTS

The sample evaluated consisted of 40 patients of both genders, aged between 18 and 59 years, and who presented requests for stool tests, from October to December 2014. It was found that 36 (90%) of them were from the micro-region of João Pessoa (PB); 2 (5%) of them were from the Northern coast of the Brazilian State of Paraíba; 1 (2.5%) was from Guarabira (PB); and 1 (2.5%) was from Cajazeiras (PB). As regards the level of education, 13 (32.5%) of them had incomplete primary education; 9 (22.5%) had complete high school; 6 (15%) were illiterate; 4 (10%) had incomplete high school; 3 (7.5%) had complete and incomplete higher education, each; and 2 (5%) had complete elementary school. Of the 40 results of parasitological stool analyzed by the laboratory, it was found that 20 were negative and 20 were positive. Among the species of enteroparasites that were found in the tests of the fecal samples of the surveyed individuals, they include the following totals: *Endolimax nana*, 8 (40%); *Entamoeba coli*, 5 (25%); *Ascaris lumbricoides*, 2 (10%); *Ancylostomidae*, 2 (10%); *Entamoeba coli* e *Endolimax nana*, 1 (5%); *Strongyloides stercoralis*, 1 (5%); e *Entamoeba coli*, *Entamoeba histolytica/Entamoeba dispar* e *Iodamoeba butschlii*, 1 (5%).

$Y \rightarrow$ Response variable

$\beta_0 \rightarrow$ Model intercept

$\beta_k \rightarrow$ Coefficient (parameter) of k-th domain of quality of life. It represents the impact of domain k in the calculation of the probability of enteroparasitosis ($k = 1,2,\ldots,6$)

$X_{ki} \rightarrow$ Domain information k for the i-th individual

The *Hosmer-Lemeshow* Test results, ate the level of 90% confidence level, presented in Table 3, provide evidence that the model is well adjusted (p-value greater than 0.10) and, therefore, the domains considered can be used to predict the chance of occurrence of enteroparasitosis. The choice of this level of trust is given by the small number of sample, which, because it is a first study on the subject and for the fact that data collection was in its early stages, this level would be more satisfying. However, this does not diminish the merit of the work, considering that the goal in this context is to point that there is evidence of effectiveness analysis.

Table 4 results show that the model is able to sort correctly 67.5% of the information considered in the sample. After checking the suitability of the model presented by the Tables 3 and 4, when looking at the signs of the estimates of the parameters, the closer to 100 is the General State of Health, the greater will be the chance of detecting enteroparasitosis, probably because the symptoms of certain types of parasites are more easily to be detected in an individual without any other symptoms.

By observing the signal related to the coefficient of the Mental Health field, it appears that the closer to 100 the value of mental health of the individual, the smaller the chance of this individual to present enteroparasitosis. The more this domain present value close to 0, the greater the chance

of detection of enteroparasitosis. To jointly analyze both variables, it is possible to show that an individual with good general health, but with weakness in his mental health, is more likely to have enteroparasitosis. The results point to new evidence about enteroparasitosis, just observing information related to quality of life indicators. By observing the results of odds ratios, it was observed that the general health increases up to 1.055 times the chance of an individual having enteroparasitosis detected, and that the mental health of the individual decreases to 0.957 times the chance of the individual having enteroparasitosis.

Table 3: Result of *Hosmer-Lemeshow* test, João Pessoa (PB), 2015

Chi-square statistic	*Degrees of freedom*	*p-value*
4.763	8	.783

Source: Field research.

Table 4: Classification of the chosen model, João Pessoa (PB), 2015

Observed		Predicted	
		Test results	% of correct classification
		negative positive	
Test results	Negative	15 5	75.0
	Positive	8 12	60.0
Overall percentage			67.5

Source: Field research.

DISCUSSION

The test results show that the protozoa were more frequent than the helminths in the studied sample. Although *Entamoeba coli*, *Endolimax nana* and *Iodamoeba butschlii* are commensal, as their transmissions occur through orofecal, they are indicators of socioeconomic and poor sanitary conditions, and signal the risk of infection by pathogens agents that have the same type of spread, such as *Ascaris Lumbricoides* and *Entamoeba histolytica/Entamoeba dispar*. The *Strongyloides stercoralis* and *Ancylostomidae* are dermal transmitted. In this context, it is estimated that there are about a billion individuals parasited by *Ascaris lumbricoides*, and a slightly smaller number also for *Trichuris trichiura*, in addition to the helminths of the family of Hookworms. In addition, about 200 million people would be infected by *Entamoeba histolytica/Entamoeba dispar*, protozoa pathogenic to man[17].

In relation to the educational level of respondents, the level of education that predominated was incomplete elementary school (32.5%). The importance of this variable is in fact the lower the

level of education, the lower the educational contribution to their families and to their own care. According to Castro et al[18] and Macedo[19], the higher the education level, the greater understanding of the importance of personal hygiene, in food preparation and control of parasitic infections, and the frequency of intestinal parasites are observed at higher rates in families with lower education. The high educational level of the family responsible help in stimulating and seeking prophylactic knowledge for intestinal parasites.

It was found that the domains of the Quality of Life Questionnaire SF-36, which are statistically significant to forecast if the individual has or do not have enteroparasitosis, were Mental Health and General Health. According to the relevant literature, several authors have notified[20-22] that, when it comes to people with mental disorders, especially in the period of exacerbation, the occurrence of psychomotor disorders, perversion of eating habits, apathy, attention deficit and deficiency of thought, among others, tied to the side effects caused by some drugs used in its treatment, incisively and significantly collaborate for the changes in physiological and behavioral normal activities, lacking these individuals of special care by all that relate to them.

In a study carried out with patients admitted in a closed institution in Cuba, a high prevalence of intestinal parasitic infections was shown among patients with mental disorders, in large developments. In 80.4% of individuals studied, there was the presence of a parasite, commensal or not, in their digestive tract. And 8.9% were defined as poly parasite.[23] As for the inpatients in mental disorders treatment institutions in Brazil, it was identified a shortage of data on the occurrence of enteroparasitosis. [24]

It is necessary to emphasize that, although most studies reveal the presence of intestinal parasitosis in patients who are in closed institutions or clinics, there are also those that return to their family environment, and yet continue showing inadequate hygiene habits and, therefore, remain infected. In this way, multidisciplinary participation would be relevant, through the implementation of a continuing education program focused on health, in order to raise awareness especially of family members of people with some kind of mental health problem, since these require special attention with regard to personal hygiene, food, household and peridomiciliary, as well as a policy of adequate sanitation in their family context, in addition to socioeconomic improvement by the Federal Government.[25]

Regarding the General Health domain, what can be checked with regard to intestinal parasites is its frequency in low-income individuals, with a lower educational level, decreasing gradually as the socioeconomic and educational conditions increase. The intestinal parasitism also presents a correlation with the degree of malnutrition, which carries losses especially in physical and psychosomatic development, and school social and population development.[26] We could say that there is a triad to the occurrence of enteroparasitosis[27], depending on the conditions of the host (nutritional status, immune status, exposure to risk factors, behavioral and social aspects, etc.), the parasite (the host's immune system resistance, pathogenicity etc.) and the environment (sanitation,

personal and community hygiene deficiency, and socioeconomic level of the site).[28]

In general, the parasitic diseases present themselves so asymptomatic and therefore end up being neglected by public health, thus contributing to the worsening of the clinical picture. For this reason, the current epidemiological and statistical systems should seek strengthen, especially in countries that are in development phase[29,30], having as main goal to bring improvements to the quality of life of their population.

Some studies have used other tools to assess the quality of life in different places, and few have evaluated the effect of the quality of life of patients with enteroparasitosis. Among the studies that have addressed the intestinal parasitosis, it was possible to check that these were made worldwide. We must cite the cross-sectional epidemiological study done with 137 schoolchildren in Côte d'Ivoire, in 2010, that used SF-36v2 questionnaire for the assessment of physical fitness and its relationship to parasitic infections. In children who performed the *Shuttle Run* Test and concluded it, no statistically significant relationship was identified between parasitic infection and physical fitness. However, the questionnaire was particularly useful in assessing the physical fitness of children unable to complete the test, reportedly due to parasitic infections.[8]

In another study, also conducted in Côte d'Ivoire, through a transverse epidemiological survey on demographic surveillance system of health, it sought to obtain new information about the disabilities caused by schistosomiasis and helminthiasis transmitted by soil, in addition to evaluating the risk factors, signs and symptoms related to neglected tropical diseases and malaria. The sample of the study consisted of 187 adults, in which the questionnaire of Quality of Life - BREF (WHOQOL-BREF) was applied. Results were consistent and significant about the negative effects of schistosomiasis and helminthiasis transmitted by the soil on the self-evaluation of the quality of life of adults, also when we take into account sociodemographic characteristics.[9]

In another research conducted with 252 students in two schools in Yunnan province (China), the prevalence and intensity of infection by helminthes transmitted by soil were assessed, as well as indicators of quality of life by means of EuroQoL-5 Dimensions (EQ-5D) and Short-Form-12 Health Survey (SF-12) questionnaires. It was found that there are clear differences observed between individuals with and without helminth infections, and discrepancies between the two schools. A multivariate logistic regression model revealed no differences between students with different levels of infection in the domains of the SF-12. In addition, no statistically significant differences were observed with regard to school notes when comparing with the state of helminth infection of the students: infected individuals had low grades in Chinese, English and mathematics, but not in sports.[10]

It is important to note the limitations of this study, which relate mainly to the difficulties in data collection and to achieve the optimal sample size, since the patients were addressed when receiving the result of their examination. However, many of these exams were received by relatives, neighbors

or friends, and it impeded the application of the questionnaires because the interview would have to be held with the person who performed the exam.

CONCLUSION

Thus, by statistical analysis of the six domains of Quality of Life SF-36 questionnaire, it was concluded that two domains - General Health and Mental Health - have statistical significance in evaluating the quality of life of patients with intestinal parasites, and in predicting their chances of whether they have intestinal parasites. When analyzing the variables, it was possible to conclude that an individual with good general health, but with weakness in his mental health, is more likely to have enteroparasitosis.

Given this finding, it is suggested to managers to assess the health conditions of these people, as this result makes it possible for institutions, such as CAPS, to care and prevent such infections. In addition, it is necessary to test other models of decision, since this research used only of the Logistic Regression Model for decision-making.

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