

## RISK FACTORS FOR HUMAN GIARDIASIS IN TWO ROMANIAN COUNTIES

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### Abstract

The hereby paper analyses the risk factors most often associated with the appearance of the disease produced by the flagellate protozoan *Giardia lamblia* in human population: gender, age and patient's place of origin. Applying the Student *t*-test in order to verify the hypotheses *H*<sub>0</sub> (null hypothesis-the averages of the two paired series do not differ significantly) and *H*<sub>a</sub> (the alternative hypothesis-the averages of the two paired series differ significantly) leads to the acceptance or rejection of one of them. The observational data had been recorded during 2009-2010 years on to the County hospitals of Tulcea and Vâlcea counties in Romania, the survey being based on more than 5000 human subjects: adults and children of both sexes. More such studies like ours should be carried out in Romania in order to have a better understanding of the epidemiology on parasitic diseases which affect the human population of both sexes, all ages and all life environments.

**Key words:** human giardiasis, risk factors, test *t*-Student

### INTRODUCTION

Giardiasis is a very common parasitose, with universal distribution, caused by the protozoan flagellate *Giardia lamblia* sin. *Giardia intestinalis*. From clinically, it may be asymptomatic or may occur accompanied by digestive or extra-digestive symptoms. In humans, the disease occurs in both sexes and all ages [8]. We tried to align global trends pursued [1-7] in the typical epidemiological studies of parasitic infectious diseases.

Objectives we have set for this study included: investigation of groups of patients, adult and children's hospitals from Tulcea and Vâlcea Counties, throughout the years 2009 and 2010 (January-December), in order to identify a possible infestation with *Giardia lamblia*; establishing the incidence of infection, among adults and children, according to major factors: sex (M, F), age (children-adults), living environment (urban-rural), watching and recording seasonal changes; assessing the significance of risk factors on the degree of

infestation with *Giardia lamblia*, both children and adults.

### MATERIAL AND METHOD

The database prepared for the hereby work gathered 691 patients, adults and children from County Hospital Vâlcea (2009), and also 4326 adult and pediatric patients in the County Hospital Tulcea (2009, 2010). In both locations, human subjects have made coproparasitological analysis, which revealed in some of them, the presence of *Giardia lamblia* cysts. Student *t*-test [12] was applied in order to verify the two statistical hypotheses: *H*<sub>0</sub> (null hypothesis) - the averages of both series are not significantly different pairs; *H*<sub>a</sub> (alternative hypothesis) - the averages of two series pairs differ significantly. We considered two categories of sex (male and female), two major categories of age (children and adults), and two major categories of living environment (urban, rural – where we had this information) of the host sample. The Student *t*-test for paired data was used to indicate a real symmetry of infestation in each subject – host

for *Giardia lamblia*. For simplicity, both for unpaired and paired *t* tests, we counted 12 items (can be considered sub-samples), corresponding to the 12 months of the year (e.g. item = total number of children with cysts in January, 2009).

We have compared the number of patients belonging to: both gender (male and female) and both age groups (children, adults). Admission of one of the hypotheses was based upon: a significance level  $\alpha$  of 0.05, the number of freedom degrees and the value of "p" (probability of event is not due to chance, is less than or equal to the level of particular significance).

## RESULTS AND DISCUSSIONS

### a. Vâlcea County Hospital (2009)

The Student *t*-test for unpaired (independent) observations showed that there was a significant difference ( $p < 0.0001$ ,  $\alpha = 0.05$ ) between the number of children and adults infected with *Giardia lamblia* cysts. It was also compared, by Student *t*-test for paired observations, the number of patients in the two areas of life (urban and rural) in the two age groups – children and adults in each month of 2009 in which there were infestation with *Giardia lamblia*. The null hypothesis (averages of two series pairs “adult-children” are not significantly different) was rejected. Comparison of variable’s series for each category (child / adult) showed a significant “p” (0.001 and 0.000).

The Student *t*-test for unpaired observations showed that there was a significant difference ( $p = 0.0027$ ) between the number of male and female patients infected with *Giardia lamblia* cysts.

The Student *t*-test for paired observations compared the number of patients in the two sexes (male and female) belonging to the two age groups – children and adults, in each month of 2009 when the disease occurred with *Giardia lamblia*. The null hypothesis (the averages of both series are not significantly different pairs) was either accepted or rejected, based on gender. Comparison of variable’s series for each category (child / adult) showed a insignificant “p” (about M sex) / significant (in relation to F sex) (0612 and 0000). On the other

hand, analysis by Student *t*-test for paired observations, showed a significant difference between *Giardia lamblia* infestation, for the two categories of sex ( $p = 0.000 < 0.05$ ). Therefore, the null hypothesis, stated above, was rejected.

Based on statistics, we found that the incidence of *Giardia lamblia* protozoan disease reported for adults and children, is higher in urban (50.38%) than rural (49.62%) environment in Vâlcea County. However, the statistical Student *t*-test for unpaired observations, indicated a significant difference ( $p = 0.92$ ) in the case of *Giardia* positive cases detected in the two administrative categories. On the other hand, analysis by Student *t*-test for paired observations, showed a significant difference between infestation with *Giardia lamblia*, in the two types of living environments “urban areas” ( $p = 0.902$ ).

Incidence of *Giardia lamblia* infestation reported to the whole sample of Vâlcea County (prevalence 56.58%) is higher in the adult population (68.54%) and among females (61.63%).

### b. Tulcea County Hospital (2009, 2010)

Using Student’s *t* test statistic for unpaired observations (independent), has shown a significant difference ( $p < 0.0001$ ) between the number of children and adults infected with *Giardia lamblia* cysts in each year studied (2009, 2010) to T.C.H. To indicate a possible symmetry of *Giardia lamblia* infestation, we also applied Student *t*-test, but this time for paired data. Thus, we compared the number of patients in the two sexes (male and female) of the two age groups – children and adults, in each month of 2009 when the disease occurred with *Giardia lamblia*. The null hypothesis (the averages of both paired series are not significantly different) was rejected, because the comparison of variable’s series for each category (child / adult) showed in both cases a significant “p” (0.001 and 0.002 in 2009, 0.000 and 0.000 in 2010).

By comparing the average number of patients infected with *Giardia lamblia* in two major categories of sex (male and female), Student’s *t*-test for unpaired observations showed that there is an insignificant difference between the number of male and female patients infected

with *Giardia lamblia* cysts ( $p = 0.67$  in 2009,  $p = 0.53$  in 2010). On the other hand, analysis by Student *t*-test for paired observations, showed no significant difference between infestation with *Giardia lamblia*, in the two categories of sex ( $p = 0.553$  for 2009,  $p = 0.334$  in 2010).

Incidence of *Giardia lamblia* infestation reported to the whole sample of 2009 (overall prevalence = 13.97%) is higher among children (85.9%) and among females (52.79%). Incidence of *Giardia lamblia* infestation reported to the whole sample of 2010 (overall prevalence = 13.35%) is higher among children (84.96%) and among males (52.45%).

The results of our research in 2009 regarding a sample of adults and children from Vâlcea County Hospital (prevalence approx. 57%) are fit with [10] in the incidence higher among women (approx. 62%), respectively among adults (approx. 69%); with those of other authors [4], meaning that the most positive cases were reported in age groups 1-4 years and 25-44 years, and with the view that the environment urban-rural life not significantly affect the appearance of *Giardia* [5].

From the hereby study, about risk factors correlated with the appearance of *Giardia* in Tulcea County (2009, 2010), we can conclude the following informations: incidence in both years was found to be higher in children than in adults (approx. 85%); females are more prone to illness in 2009, compared to males in 2010, maintaining the same percentage of both sexes (approx. 53%), at the average prevalence of approx. 13%, in each year of study.

## CONCLUSIONS

Analyzing the results of studies conducted on *Giardia lamblia* in different regions of the globe, we can say that the risk factors most often associated with this protozoan appearance are: age, sex, place of origin of patient, level of hygiene, foods consumed, seasonal, family relationship, sexual orientation, traveling abroad etc. On the other hand, as shown by the different results obtained in each of the two Romanian Hospitals, we see that there is no unanimity of opinion in the specialty literature. We believe that in Romania, several studies such as those made by us, would be very useful for better understanding of the epidemiology of

parasitic diseases affecting the human population of both sexes, all ages and from all life environments.

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