

Epidemiological Comparative Study of *Giardia lamblia* Between Human and Cow in Basrah, Iraq

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ABSTRACT: *Objective:* study was conducted to determine the prevalence and incidence of *Giardia lamblia* parasite between human and cows in Basrah province with comparatives.

Design: During research collected 1344 stool samples from human and 1049 stool samples from cows from September 2012 to May 2013. All samples collected in sterilized cups, then examined under microscope by conventional microscopic methods and concentration methods.

Results: In human, 405 cases were infected 30.1% and 322 positive cases have been recorded in cattle 30.6%. The study was shown that all age groups are susceptible to the disease. Also in this study recorded different ratios of giardiasis during months of year.

Conclusion: The study recorded high prevalence of giardiasis in Basrah province. Giardiasis was widely distributed throughout the months of study. Many factors could affect prevalence of giardiasis in human as socio-economic status, overcrowding, level of education, sanitation, contact with animals and types of water source.

KEYWORDS: *Giardia*, Diarrhea, Epidemiology, Enteric Disease, prevalence.

1 INTRODUCTION

Antony Van Leeuwenhoek was the first one described *Giardia* in his own stool in 1681 [1]. The name was chosen in order to honor the work of the French Professor, A. Giard, as well as Dr. V. Lambl [2]. *Giardia* was single celled microscopic protozoan parasites that cause enteric disease in human and other mammals [3]. *G. lamblia* was a binucleate flagellated protozoan parasite that infected the upper intestinal tract of human and many animal species [4]. In Asia, Africa, and Latin America, about 200 million people have symptomatic giardiasis with some 500,000 new cases reported each year [5]. It was also a frequently encountered parasite of domestic animals, especially livestock, dogs, cats, numerous species of wild mammals, birds, and even fish have been documented as hosts of *Giardia* [6]. Because of the impact on socio-economic development, especially in developing countries, it was included in the "Neglected Disease Initiative" of the World Health Organization [7], [8]. Livestock can play a potential role to act as a reservoir for human outbreaks of giardiasis [9], [10]. The infection spreads via the fecal oral route, it is generally caused by contaminated drinking water and only 10 cysts are enough to cause infection [6], [11]. The life cycle of *G. intestinalis* can be divided into infective cysts and vegetative growing trophozoites [7], [8]. It was a cosmopolitan parasite and classified by the WHO as a zoonosis [12]. This intestinal protozoan has been found in a wide range of mammals and has been accepted as a zoonotic agent [13], [14].

2 METHODS

About 1344 stool samples were collected from human cases for different age, sex, address, economic state and service level and 1049 fecal samples of cows were collected from different age, sex and health status, from areas of urban and rural locations of Al-Qurnah and Al-Medina and those samples collected from patients who attended to Al-Qurnah General Hospital, Centers of Al-Qurnah sector for P H C, Al-Medinah General Hospital and Centers of Al-Medinah sector for P H C, during period from September 2012 to May 2013. All samples collected in sterilized cups and taken up to laboratory of above centers, then examined under microscope by conventional microscopic methods which are direct smear with normal saline [15], [16] and direct smear with Lugol's iodine [6], [15]. The results transported to laboratory of Parasitology / Veterinary Medicine College for confirmed diagnosis by using concentration methods which are floatation techniques by Zinc Sulphate Centrifugal Flotation and sedimentation techniques by Formol-Ether (Ethyl Acetate) concentration [17].

3 RESULTS

3.1 OVERALL PREVALENCE

In human the overall prevalence of giardiasis was found to be 30.1% in Northern Basrah from September 2012 to June 2013. In cow the overall prevalence of giardiasis in cow was found to be 30.6% in Northern Basrah in the same period, it was of no significant when analyzed by chi square, table (1).

3.2 PREVALENCE AMONG MONTHS

In human the result data was analyzed monthly for the purpose of tracing out the specific period of the year with the highest prevalence, which showed the highly significant differences ($p < 0.05$) in the prevalence of giardiasis among difference months in human, tables (2) and (3).

3.3 PREVALENCE BY AGE

In human there was an evident that prevalence higher in human aged groups 1-4 years and 4-15 years, while the lower prevalence rate was in child aged group less than one year and in aged group 15 year and more this results show a highly significant differences ($P < 0.05$), table (4). In cow, according to animal ages results were shown highly significant differences ($p < 0.05$) in the prevalence rate of giardiasis as highest prevalence rates recorded in extremes aged group less than 1 year and more than 5 years respectively, whereas lowest prevalence rate recorded in animals aged 1-4 year, table (5).

3.4 PREVALENCE BY SEX

In both human and cows there was no significance differences in the prevalence of giardiasis among sex group, table (6) and (7).

3.5 GIARDIASIS AND METEOROLOGICAL FACTORS

These climate factors include mean temperature, precipitation amount and mean humidity table (8). In both hosts there were non-significant correlation differences among giardiasis in human and cows in association with mean temperature, precipitation amount and humidity.

4 DISCUSSION

The findings in this study identified that Basrah province is an endemic region for giardiasis especially rural areas, farms and poor hygienic regions. The prevalence rate was 30.1% in human in north of Basrah. These results nearly agreement to other studies in different places of Iraq and with studies in other parts of the world conducted by [18], [19], [20], [21], [22], [23]. The prevalence rate of study among cows was 30.6%, these resampling results of many studies throughout the world mentioned by [24],[25], [26], [27].

The prevalence of giardiasis throughout temperate and tropical locations varies between 2% to 5% in the industrialized world and up to 20% to 40% in the developing world [28]. Living in rural area because children in rural areas are likely to live in large size family, relative crowded conditions, low sanitation and socioeconomic status and poor personal health habits

where defecation occur in the open area (very common practice in rural which lead to higher level of contamination of the environment) , low education level of mothers, drinking raw or municipal water , hot seasons and living with four or more house hold children were significantly associated with *G. lamblia* infection [19].

In this study the prevalence rates among months of year show a highly significant differences ($P < 0.05$) in both hosts. In human the highest prevalence was recorded in November 36.8%, while the lowest prevalence was recorded in March 15.4%, while in cows the highest rate was 48.6% recorded in April, however lowest rate was 19.7% seen in September. These results agreement with studies in Iraq by [29], [30]. According to aged groups the findings recorded a highly significant differences ($P < 0.05$) among different ages in both hosts. In man prevalence higher in aged groups 1-4 years and 4-15 years, the prevalence rates were 36.9 % , 37.1 % respectively, while the lower prevalence rate was in child aged group less than one year was 15.2 % and in human aged group 15 year and more the rate was 23.6%. These similarly with the results of [18], [19]. The present study prevalence of giardiasis was recorded in cows as highest rates 34% and 44.7% were recorded in extremes aged group less than 1 year and more than 5 years respectively, whereas lowest prevalence rate 22.8% was recorded in animals aged 1-4 year. These results were similar to [9], [30], [31], [32].

No significant differences were found in the prevalence rates between males and females in present study in both hosts. Similarly with [29], [34], [35] in different places of Iraq. There were a non-significant correlation differences among giardiasis in both human and cows in association with the climate factors. This agrees with [26], [36].

5 TABLES

Table 1. Percentage of infection in Human and cow

Host	No. of samples	No. of positive samples	Percentage of infection
Human	1344	405	30.1
Cow	1049	322	30.6
$\chi^2 = 0.01187$; $P = \text{Non-significant}$, $df = 1$			

Table 2. Percentage of infection according to months of study in human

Months of year	No. of samples	No. of infected samples	Percentage of infection
September	138	31	22.4
October	153	50	32.6
November	160	56	36.8
December	149	47	31.5
January	148	50	33.7
February	143	44	30.7
March	142	22	15.4
April	145	42	28.9
May	166	60	36.1
Total	1344	405	30.1
$\chi^2 = 12.59$, $df = 8$, $P < 0.05$.			

Table 3. Percentage of infection according months of study in cows

Months of year	No. of cows	No. of infected cows	Percentage of infection
September	96	19	19.7
October	128	28	21.8
November	130	27	20.7
December	164	52	31.7
January	100	40	40
February	110	31	28.1
March	108	32	29.6
April	111	54	48.6
May	102	39	38.2
Total	1049	322	30.6
$\chi^2=25.256$, $df = 8$, $P < 0.05$.			

Table 4. Prevalence of giardiasis according human ages

ages	Examined samples	Positive samples	Prevalence Rates
Less than 1 year	46	7	15.2
1 - 4 year	295	109	36.9
5 - 14 year	382	142	37.1
15 year and above	621	147	23.6
Total	1344	405	30.1
$\chi^2=11.94$, $df= 3$, $P < 0.05$			

Table 5. Prevalence of giardiasis according cows ages

Ages	Examined samples	Positive samples	Prevalence Rates
Less than 1 year	396	135	34
1 year - 4 year	481	110	22.8
More than 5 years	172	77	44.7
Total	1049	322	30.6
$\chi^2=10.865$, $df=2$, $P < 0.05$			

Table 6. Relation between sex and percentage of infection in human

Sex of cases	No. of samples	No. of infected samples	Percentage of infection
Male	637	181	28.4
Female	707	224	31.6
	1344	405	
$\chi^2=0.17$, $df=1$, $P= ns$			

Table 7. Relation between sex and percentage of infection in cows

Sex of cow	No. of samples	No. of infected samples	Percentage of infection
Male	386	120	31.08
Female	663	202	30.46
	1049	322	
X²= 0.0048, df=1, P= ns			

Table 8. Distribution of infection according to months of study and climate

Months of study	Percentage of infection		Mean temperature (C°)	Precipitation amount (mm)	Mean humidity (%)
	Infected man	Infected cow			
September 2012	22.4	19.7	34.7	0	23.9
October 2012	32.6	21.8	29.6	0.6	44.2
November 2012	36.8	20.7	21.0	46	62.8
December 2012	31.5	31.7	15.3	27.9	71.1
January 2013	33.7	40	13.6	6.1	67.1
February 2013	30.7	28.1	17.4	0.5	56.3
March 2013	15.4	29.6	21.6	42	41.3
April 2013	28.9	48.6	26.5	0	31.2
May 2013	36.1	38.2	31.3	41	34.8
From Weather Station Qurnah, Basra, Iraq 1/9/2012 to 31/5/2013.					

6 CONCLUSION

According to data of the study were concluded that the North of Basrah is an endemic area for giardiasis. Giardiasis was widely distributed throughout the months of study, however there was no strongly effect of climate factors on the prevalence of giardiasis of this study. Giardiasis presented among all aged groups in both human and cows. There were no differences among *Giardia* infection in relation with sex in both hosts. Many factors could effected the distribution and prevalence of giardiasis either in human or among cows as socio-economic status, overcrowding, level of education, sanitation, contact with animals and types of water source.

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