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Research Article

SOCIO-ENVIRONMENTAL FACTORS THAT INFLUENCE THE INCIDENCE OF PARASITISM: *ENTAMOEBIA HISTOLYTICA* AND *GIARDIA LAMBLIA* IN COATAPA TOWN'S RESIDENTS, HIDALGO STATE, MEXICO

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ABSTRACT

Winslow in 1920, states that public health is the science and art of preventing disease, prolonging life and promoting health and efficiency through the efforts of the community, the responsibility involves the binomial government and society in their for common good. Environmental determinant factors and lifestyle in this community manifests disturbing health interact. The aim of this study is to describe socio- environmental determinant factors, educational and lifestyles associated with the incidence of parasitism by *Entamoeba histolytica* and *Giardia lamblia* in Coatapa community, Hidalgo. We conducted a descriptive study in 81 adults in Coatapa community, Hidalgo. The incidence of *Giardia lamblia* by gender is 1.28 % for female and 3.84 for male, *Entamoeba histolytica* is 2.56 and 6.41 respectively, 96 % of them excreta in latrines, defecation exists outdoors, generally lack of drinking water 72 % have ever been diagnosed parasitosis, not presented *Trichura trichuris* cases. The socio - environmental, educational and lifestyles are crucial to the health of the population, allowing the detection of parasitism *Entamoeba histolytica* and *Giardia lamblia*.

Keywords: socio-environmental determinant factors, lifestyles, parasite, *Entamoeba histolytica*, *Giardia lamblia*.

INTRODUCTION

In 1920, Winslow stated that public health is the science and art of preventing disease, prolonging life and promoting health and efficiency through the efforts of the community that somehow consists on having a link between education and culture (Winslow, 1923, Lopez, 1993; Martinez, 1998; Martinez, 2013; Lazcano, 2013 and Ruvalcaba, 2013) but also with the characteristics of the environment, particularly with respect to environmental or healthy environments. Stewardship involves the binomial government and society in their act for the common good (Cortés, 2011). The health factors involved in this social context are those linked to the environment and lifestyle, such as parasitic diseases, which were diagnosed in this community. A survey was designed in order to diagnose this kind of health problems, which involved exploring the possibilities of people's access to health services, their socio economic status and vulnerability, medical attention, being diagnosed with a health problem, among others. The aim of this research was to design strategies for health education considering socio - environmental factors, but also, to promote the use of those strategies for public health education, (Cortés, 2011; Ruvalcaba, 2013) regarding inhabitants' basic services, including drinking water, drainage and sewage, vermin and

garbage control, street lighting, school education and others. It is worth mentioning that in 1946, the WHO defined health as "a state of complete physical, mental, spiritual, emotional and social wellness, and not merely the absence of disease". Hence, talking about health implies that communities must have the basic hygiene requirements. It is estimated 10 to 25 % of people in the world are completely at a healthy level. In this social context, the ecological triad theory is a reality manifested in environmental and socio-economic situation in this community, are the ecological factors that influence health and disease (Ruvalcaba, 2013). The disease is the result of the interaction between the agent and the susceptible host aggressor in an enabling environment, puts them in touch with the existence of mechanisms of production, or transmission. Knowledge of the characteristics of these elements: host agent and environment, it is essential to understanding problems in observation and to propose the establishment of strategies and control systems more convenient (Lopez, 1993; Martinez, 1998; Martinez, 2013). In this environmental context, the habitants live in and interact with biological agents or other, but particularly with their culture, lifestyle, or social environment implicate in their economy, the cultural, social, political, religion, migration, overcrowding, health organization, but the object

of study is on the look regarding focus on microscopic parasites such as *Entamoeba histolytica*, *Giardia lamblia* and some parasites such as *Ascaris lumbricoides* case, *Enterobios vermicularis*, *Trichuris trichura* are a type of guest commonly associated health risks, especially in this type of social context.

Entamoeba histolytica

Entamoeba histolytica is the etiological agent of human amebiasis (Espinosa and Martínez, 2000). The life cycle of *Entamoeba histolytica* is manifested in ambient environments, where there is social vulnerability, limited education, lack of sanitation and excreta disposal, drainage, outdoor defecation and lack of drinking water and one of the reasons why it is important to study a disease at the community level such as amebiasis, is because, although some aspects have been considered no longer a cause of death, there are even cities or communities where style and quality of life are the ambient environment conducive to the development of this disease, but also can cause death if not cared for properly, it can even be the case that Asymptomatic Individuals with documented *E. histolytica* should be treated infection with a luminal agent to eradicate infection this recommendation is based on The Known Both risk for the development of invasive disease in such patients, and the fact individually that shedding *E. histolytica* cysts are a risk to public health (Gathiram and Jackson, 1987; Haque *et al.*, 2001) *E. dispar* infection does not require treatment but, alert the physician that should the infected person has been exposed to contaminated food or water faecally (Samuel L Stanley Jr, 2003). This condition is characteristic of this place and these findings allow to guide the search for medical care, which in itself represents a need for more, hence the importance of the health sector to enunciable this need, to find if the health sector has a program to be carried this population with few resources and even dabble with a program of health education. Amebiasis could be eradicated by the provision of adequate sanitation worldwide, but this situation is unlikely to happen in the foreseeable future. New diagnostic tests are showing a remarkably high prevalence of *E. histolytica* in some populations (Braga, *et al.*, 1998; Abd-Alla, 2002). In the University of Munich between 2005 and 2009, 103 laboratory-confirmed amebiasis cases were detected. The study compares the results of various diagnostic tests among these patients, analyzes data on co-infections and clinical symptoms, and determines the risk for acquiring amebiasis. Results initial screening tests (stool microscopy, coproantigen enzyme-linked immunosorbent assay (ELISA) were positive in 82.5 and 93.9 %, respectively. Fecal samples from patients with positive screening test results were subjected to polymerase chain reaction (PCR), which detected *E. histolytica* in 9.7 % and *E. dispar* in 88.3 % of cases. The majority of *E. histolytica* cases and more than half of the *E. dispar* cases had intestinal symptoms typical for amebiasis. In 53.4 % of the cases, intestinal confections were found, mostly *Blastocysts hominis* (39.8 %), *Giardia lamblia* (10.7 %), *Campylobacter spp.* (4.9 %), and *Salmonella typhi* (2.9 %). The risk for travelers to be infected with *E. histolytica* or *E. dispar* was highest for destinations in West Africa, East Africa, and South and South-East Asia (Herbinger *et al.*, 2011). The conduct research regarding amebiasis could even reduce unnecessary exposure to drugs: metronidazole in our country is still used as a treatment for amebiasis, since in the case of being

mistakenly diagnosed with this disease in the case of *E. histolytica* and *E. dispar* increase the costs to the patient and family, health institutions and the risks of exposure to drugs, as *E. dispar* is not parasitic amoeba (Ruvalcaba, *et al.*, 2013).

Giardia lamblia

The life cycle of *Giardia lamblia* includes two phases or stages: the trophozoite (vegetative form) whose habitat is the small intestine, responsible for the clinical manifestations and the cyst (a form of resistance and infectious) responsible for the transmission of the parasite. The trophozoites colonize primarily the jejunum, although some organisms can be found in the duodenum and rarely, in the ileum, bile ducts or gallbladder. Developing the optimum pH ranges from 6.4 to 7.2. This predilection for the jejunum trophozoites suggests that require a high concentration of nutrients for their survival and growth especially that the parasite is unable to synthesize *ex novo*, such as cholesterol, which is essential for the biogenesis of their membranes and the encystation process of trophozoites along the intestine. The pathogenic mechanism specific for the protozoan parasite *Giardia lamblia* that causes disease has not been identified. This research describes a multifactorial pathogenesis and dependent factors have implicated both the parasite and the host *G. lamblia* factors related First, certain histochemical alterations of the intestinal mucosa, due to T-cell activation by the presence of VSP (surface variant proteins), resulting in atrophy of the intestinal villi, which entails a loss or decreased activity of disaccharides (lactase, maltase, sucrose) decreased the absorption of vitamin B12, an impaired glucose- sodium transport and absorption of D-xylose and a reduction in the absorption of solute. Also known virulence factors related to the infectious clone, which depends largely on one hand, the VSP expressed by the parasite mediated intestinal proteases, and secondly, by the secretion of a cysteine protease by IgA1 trophozoites eliminating local secretory response (IgA) in the host. At the moment there described the presence of cytotoxins and enterotoxins (Ash / Orihel, 2010).

Host dependent factors

One of the most important factors is host dependent humoral immunodeficiency, and hypogammaglobulinemia (congenital, common variable X-linked), or selective IgA deficiency (affects 10 % of the population). Other factors are the histocompatibility antigens (HLA) HLA-A1, A2, B8 and B12. Protein-energy malnutrition increases the severity of giardiasis by decreased production of enterocytes in the intestinal villis. Finally, we should mention the intestinal micro flora, essential for the expression of the pathogenicity of *Giardia* (Ash / Orihel, 2010).

MATERIAL AND METHODS

An exploratory study was conducted by applying a survey to 81 people from the community known as Coatapa in Hidalgo, Mexico. A database was created in order to analyze the data collected in SPSS-21. It is worth mentioning that prior to apply the survey the instrument was piloted for data collection and validation, subsequently it was employed along with Kappa coefficient (80 %) held in Win-episcopo, 2.0 among families.

RESULTS

Contextual Description

Coatapa community has some length with 81 inhabitants, the site where the temperatures ranging from 20-25°C at night and 30-40°C during the day, most people are homemade and sticks only and ceiling otate tile, has privileged few adobe houses and rolled and only one person has unrevoled block house, all houses have no floor, there is no sewer service and potable water, water is extracted from a sediment that 10 years ago was a clean water source from the largest hill of that population, nowadays due to the use of detergents and lack of culture by deal developing a good community hygiene is contaminated, and still drink it, water from this, the well is located under a cedar tree, within this same fall leaves and stretches its roots to this, as mentioned above do not have drainage latrines relieve themselves in most of the population while a third of the population prefers to go to the mountain to do their business; pigs of all people are loose in the community and they have the facility to find out within delas houses, chickens and sheep are also loose and sometimes defecate within the house (especially chickens that are tucked into these to avoid being eaten by coyotes), this is bad because what is lost defecate in the land of the houses, and during the blizzard or heat flying or evaporate as the case and come virus, bacteria and parasites to them. They have electricity for two years and the preserved food by these means, but do not cook stoves in fireplace with firewood. Most of the population are women and children as most of the men migrate United States and leave their families for not returning, there is a primary consisting of two rooms, no kindergarten, high school or less school, most of children at age 5 years and go to the fields to carrying out planting and harvesting, do not look beyond themselves, but if they use artificial fertilizers, weed because people flat lands, fertility

declined by 45 % and females have between 3 and 8 children. Life expectancy is between 50-60 years.

Description of the survey

The results of the survey refer to 81 people living in this community, of which 55 % correspond to female and 45 % masculine, the minimum age was 2 years maximum of 101 years with a mean age of 40. Detected cases of *Giardia lamblia* correspond to 1.28 % in females and 3.84 % in the masculine, for cases of amebiasis 2.56 % and 6.41 % respectively (Table 1). With regard to waste disposal, we can see that in this community, the vast majority use latrines for excreta disposal 75 (92.7 %), 3 (3.7 %) performed outdoor defecation and 3 (3.7 %) have drainage points; this is a factor that favors the spread of parasites and promotes reproductive cycle (Table 2). The data on the sanitation of latrines used by people of the community for the disposal of excreta or stool, in some cases, poor hygiene is the single most important risk factor for parasitic diseases. The 57 % points make daily cleaning, never clean 2 % and 8 % once a month (Table 3). Regarding water intake, the majority of the population 75 (92.5 %) of this community take water from the well and that is not subject to quality standards for this population and are more susceptible to parasitic diseases (Table 4). Parasitoids cases show that 23.5 of people in the community have been cases of parasitic infections and who have been treated within Atlapexco's clinic in Hidalgo State (Table 5). Most people in this population (75 %) take alternative treatments against parasites (or as methods of preventing it), this reflects the lack of access to medical treatment and they see this as a way to avoid or to treat the disease, the effectiveness of the remedies mentioned is unproven, some might only exert a placebo effect or toxic in people who consume them (Table 6 and 7).

Table 1: Incidence of cases of protozoan *Giardia lamblia* and *Entamoeba histolytica* manifested in this population

Parasite	Female	Male
<i>Giardia lamblia</i>	1.28 %	3.84 %
<i>Entamoeba histolytica</i>	2.56 %	6.41 %

Source: Direct, Survey conducted among in habitants of the community known as Coatapa, Hidalgo, 2013

Table 2: Frequency and percentage in relation to the disposal of excreta

Disposal of excreta	Frequency	Percentage
Outdoor	3	3.7
Latrine	75	92.5
Drainage	3	3.7

Table 3: The use of latrines in the community as a risk factor for the development of parasitic diseases (If you use how often performs latrine cleaning and sanitation)

Frequency	Frequency	Percentage
Biweekly	7	8.6
Daily	57*	70.4
Never done	2	2.5
Weekly ohn	1	1.2
Weekly ohn	1	1.2
Ohn annually	4	4.9
Once a month ohn	1	1.2
Once a month ohn	8	9.9

Source: Direct* = these people are beneficiaries of the opportunities.

Table 4: Frequency and percentage of intake of untreated well water purification

Drink water from the well of the community	Frequency	Percentage
Not	6	7.4
Yes	75	92

Source: Direct, survey of 81 people in Coatapa, Hidalgo, Mexico.

Table 5: Frequency and percentage of medical diagnosis regarding parasitic disease

Ever been diagnosed with parasitic disease	Frequency	Percentage
Did not know	3	3.7
Not	59	72.8
Yes	19	23.5

Source: Direct, survey applied to 81 inhabitants in Coatapa, Hidalgo, Mexico.

Table 6: Have you used any alternative treatments against parasites?

Have you used any alternative treatments against parasites?	Frequency	Percentage
Not	20	23.7
Yes	61	75.3

Source: Direct, survey of 81 people in Coatapa, Hidalgo, Mexico.

Table 7: Frequency and percentage of the use of alternative treatment to parasite treatment

Alternative treatment type used for de worming	Frequency	Percentage
None	19	23.5
Epazote tea	6	7.4
Avocado leaf tea and chamomile	56	69.1
Total	81	100.0

Source: Direct, survey of 81 people in Coatapa, Hidalgo, Mexico.

DISCUSSION

The accuracy of the results obtained in this study reflect a way of exploring reality between the socio- environmental conditions of the Community “Coatapa”, where the presence of parasitic diseases is evident. The results show that communities where the economic and social status is lower, the hygiene conditions most of the time are limited, which impact their human health. Socio- environmental conditions can be highly associated with gastrointestinal diseases as well as parasitosis. It is important to say that the Community where the study was conducted an outbreak of cholera was detected, obviously associated with these socio- environmental conditions. The cholera outbreak was announced by the media on September 27th with 9 confirmed cases, by October 18th, the number of cases increased to 151 in Hidalgo and to 171 in the country. Therefore, it is necessary to improve life and hygienic conditions of people in general. In the state of Hidalgo and particularly in part of this area has presented an outbreak of cholera, obviously associated with these socio- environmental conditions. The cholera outbreak was announced by media on September 27 with 9 confirmed cases and on 18 October, the number of cases is 151 in Hidalgo and 171 national and, this representing a wakeup call to work in styles and quality of life and that anger like parasitic diseases indicator diseases of poverty.

CONCLUSION

Community “Coatapa, Hidalgo” there have been several cases of parasites in the last six months, combined with the lack of hygiene in some sectors of the population and lack of medical care in this community. In this area several cases of cholera were presented, as well as in the place known as Huasteca. A causative factor of these cases is that people still use latrines instead of drainage systems, especially in small communities which also suffer from pollutants of urbanized areas who also contaminate the water they drink. Public health in Mexico has not been able to reach the poorest sectors of the population, hygiene is not synonymous with wealth but style and quality of life and this is where the diseases of poverty occur, such as parasitic and anger denote an area of opportunity to apply strategies that could allow improving inhabitants’ quality of life, i.e. to implement sanitation programs and services to ensure positive changes in the socio- environmental situations that could help prevent diseases such as giardiasis, amoebas and cholera among others.

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Survey: This survey is confidential; the information obtained is intended to find alternatives or strategies to promote public health.

- Pollster: _____ Age: _____ Gender: _____ FOLIO _____
- 1) What used for waste disposal or feces?
 - a) drainage b) latrine a) outdoor
 - 2) If using latrine, how often cleaning and sanitizing makes this?
 - a) Once a week b) once a month c) once a year d) never made
 - 3) Drink water from the well of the community?
 - a) yes b) Not 3.1 What type of water used for drinking _____
 - 4) Boil water or sanitation will make any water you drink?
 - a) yes b) Not
 - 5) A filed vomiting or diarrhea?
 - a) yes b) Not
 - b) If yes, how often they occur?
 - a) 1-2 times a year b) 3-4 times a year c) more than 5 times a year
 - c) Have you been diagnosed parasitic disease ever?
 - a) yes b) Not
 - d) Have you been diagnosed *Giardia lamblia*?
 - a) yes b) Not
 - e) Have you been diagnosed parasitoidssuch as
 - f) Explain, mentioning names to remind people, e.g.: *Ascaris lumbricoides*, *Trichuris trichura*?
 - a) yes b) Not
 - g) Have you been diagnosed with some other parasite, amebiasis?
 - a) yes b) Not
 - h) If yes, what? _____
 - i) Each when you visit the doctor in charge of the community:
 - a) once a week b) once a month c) once a year d) never visit
 - j) Ever to wormed?
 - A) yes b) not
 - k) How often are de wormed?
 - a) twice a year b) biennially c) Never
 - l) Have you used any alternative treatments against parasites?
 - A) Yes b) Not
 - m) If yes, say what kind of treatment.
-

Figure 1: Simple survey to explore parasite *Entamoeba histolytica* and other parasites in people directly in community, as a strategy for community intervention design

Source: Direct, Kappa (0.80 or 80 %) suitable match for a small community, construction-validation Jesus Carlos Ruvalcaba Ledezma *et al*, 2013.

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