

REPORT

PREVALENCE OF *ENTAMOEBIA HISTOLYTICA* IN HUMANS

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ABSTRACT

The present survey was carried out to determine the prevalence of human amebiasis. During the study, 1360 fecal samples were examined from February 2007 to December 2007 at Nishtar Hospital, Multan. Out of 1360 hosts examined, 295 were infected with *E. histolytica*. The overall prevalence of *E. histolytica* was (21.69%). Relationship between sex and *E. histolytica* in humans showed that the infection of *E. histolytica* was more prevalent in male hosts (22.36%) as compared to female hosts (20.9%). However the difference was statistically non-significant ($P>0.05$). Results regarding the relationship between age and *E. histolytica* revealed that the parasite had highest prevalence (30.82%) in age group of 1 day to 15 years and lowest prevalence (17.34%) in age group of 31 to 45 years. The difference was statistically significant ($P<0.05$).

Keywords: *Entamoeba histolytica*, age, sex, humans, prevalence.

INTRODUCTION

Amoebiasis is caused by the intestinal protozoan parasite *E. histolytica* and is the third leading parasitic cause of death in humans after malaria and schistosomiasis. Globally, it is responsible for 40000–100000 deaths a year (Sebastiaan *et al.*, 2007). It is distributed worldwide and poses an especially serious health threat in tropical and subtropical developing areas (Ohnishi *et al.*, 2004) and it is also a problem in the developed world in travelers, immigrants, and men who have sex with men (Haque *et al.*, 2006). The prevalence of *E. histolytica* infection differs from one geographic area to another, and severity varies from one case to another (Roche and Benito, 1999). The prevalence of amebiasis varies with the population of individuals affected, differing between countries and between areas with different socioeconomic conditions. Some up to 50% of the population is affected in regions with poor sanitary conditions (Al-Harthi and Jamjoom, 2007).

The genus *Entamoeba* contains many species, six of which (*E. histolytica*, *E. dispar*, *E. moshkovskii*, *E. polecki*, *E. coli*, and *E. hartmanni*) reside in the human intestinal lumen (Fotedar, 2007). *E. histolytica* was initially thought to be a single species, but isoenzyme and molecular studies have led to the reclassification of *E. histolytica* into two morphologically identical species: the pathogenic *E. histolytica* and the non-pathogenic *E. dispar*. *E. moshkovskii* is morphologically identical to *E. histolytica* and *E. dispar* but biochemically and genetically it is different (Stark *et al.*, 2007).

Although considerable work has been done in various

parts of the world (Chandrashekhar *et al.*, 2005; Sayyari *et al.*, 2005; Oguntibeju, 2006; Zeyrek *et al.*, 2006; Barnawi *et al.*, 2007; Hien *et al.*, 2007; Nohynkova *et al.*, 2007; Ozyurt *et al.*, 2007) and in Pakistan (Ashok *et al.*, 1995; Hussain *et al.*, 1997; Siddiqui *et al.*, 2002; Waqar *et al.*, 2003; Chaudhry *et al.*, 2004), there are no published reports on the prevalence of *E. histolytica* from Multan. So keeping in view the importance of this parasite, the project was designed with aims to study the overall prevalence, relationship between sex, age and *E. histolytica* in humans.

MATERIALS AND METHODS

Human fecal samples (n=1360) were obtained from patients visiting urine and stool section in central laboratory of Nishtar Hospital, Multan during February, 2007 to December 2007. The specimen bottles collected from the patients were labeled with host name, age and sex. The collected samples were mostly examined freshly but some times they were preserved by transferring to the bottles containing 5% formalin. Temporary mounts were made in order to diagnose the parasite (Cable, 1985).

Preparation of temporary mounts of fecal samples

The preserved stool sample was mixed with an applicator and a small drop of it was placed on the slide and one drop of iodine solution was added to the fecal material to stain the parasite, thoroughly mixed, covered with cover slip and examined under the microscope.

Temporary mounts of fresh fecal samples were made by two ways: if stool was loose, a drop of stool was placed on the slide covered with cover slip and observed under the microscope. If stool was solid or semi solid then a drop of lugol's iodine or normal saline was placed on the

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slide, 1mg of stool sample was mixed in it on the slide covered it with the cover slip and examined under the microscope. The results are expressed in percentages and the values between different groups are compared by Chi Square test (Chaudhry and Kamal, 2000).

RESULTS AND DISCUSSION

The overall prevalence of E. histolytica in humans

According to the results of the present study *E. histolytica* had an overall prevalence of 21.69% (Table 1). Ashok *et al.* (1995) conducted a survey to examine the prevalence of *E. histolytica* in Pakistan Institute of Medical Sciences; Islamabad and prevalence was 1.4%. Hussain *et al.* (1997) studied the prevalence of various intestinal parasites in Northern areas of Pakistan, 8% were positive for the *E. histolytica*. Siddiqui *et al.* (2002) reported 48.86% prevalence of human intestinal pathogenic parasites in Konkor, Gadap, District East, Karachi. Chaudhry *et al.* (2004) conducted a survey to study the prevalence of gastro-intestinal parasites in <15 years old children in Muzaffarabad city and found that the overall prevalence of *E. histolytica* was 5.9%.

Kaur *et al.* (2002) recorded 11% prevalence of *E. histolytica* in children of Delhi, India. Aza *et al.* (2003) reported 21.0% prevalence of intestinal parasites in seven villages of Malaysia. Ali *et al.* (2003) reported 15.6% prevalence of *E. histolytica* from preschool children in Bangladesh. Heidari and Rokni (2003) carried out a survey to study the prevalence of parasitic intestinal infections in children resident in day-care centers in Damghan city, Semnan province, Iran and recorded the overall prevalence of *E. histolytica* as 2.4%. Blessmann *et al.* (2003) examined the prevalence of *E. histolytica* over an observation period of 15 months with a group of 383 randomly selected adult individuals (mean age, 38.5 years) living in an area of amebiasis endemicity in central Vietnam. The results showed 11.2% prevalence of *E. histolytica*. Silva *et al.* (2005) reported 29.35% prevalence of *E. histolytica* in stool samples from residents of Belem, Para State, Brazil. Al-Hindi *et al.* (2005) reported 69.6% prevalence of *E. histolytica* in Gaza. Ogunlesi *et al.* (2006) studied the prevalence of parasitic agents among under-five children with diarrhea in Ilesa, Nigeria. Out of 300 under-five children the overall prevalence of *E. histolytica* was 46; 65.7%. Barnawi *et al.* (2007) reported 2.7% prevalence of *E. histolytica* in patients attending three hospitals in Jeddah, Saudi Arabia Kasseem *et al.* (2007) carried out a survey to examine the prevalence of intestinal parasites among children and neonates admitted to Ibn-Sina Hospital, Sirt, Libya. The prevalence was 36.57%

The prevalence of amebiasis depends on many factors. The risk factors include ignorance, overcrowding, inadequate and contaminated water supplies (quality of

water consumed) and poor sanitation (Espinosa-Cantellano and Espinosa-Cantellano, 2000), toilet habit (Oyerinde *et al.*, 1979), low socio-economic status (Chacin-Bonilla *et al.*, 1992), absence of adequate urban services, inadequate hygiene practices, place of residence, age, ingestion of raw vegetables, number of rooms and bedrooms per house, and having other protozoan infections (Benetton *et al.*, 2005). The incidence of intestinal parasites is also closely related to climate, environmental conditions, infrastructure and degree of literacy (Karaman *et al.*, 2006). Prevalence of *E. histolytica* is high among families who eat together from the same plate, among those who eat with their fingers, among those who eat away from home (Oyerinde *et al.*, 1979) in municipal sanitary workers (Karaman *et al.*, 2006), workers with high occupational interaction (Oyerinde *et al.*, 1979), infants, pregnant women, and patients who take immunosuppressive medicines. HIV-infected patients are at significantly higher risk of amebiasis than patients from other risk groups (Hung *et al.*, 2008).

Relationship between sex and E. histolytica in humans

Results of the present study indicated non-significant difference ($P>0.05$) of *E. histolytica* prevalence between male hosts 22.36% and female hosts 20.90% (Table 2). Okafor and Azubike (1992) determined the prevalence of intestinal parasites in rural areas of Nigeria. The overall infection was 22.7% for the males and 19.7% for the females. The infection rate was slightly higher in males 31.9% than females 27.5% in Sudan (Magambo *et al.*, 1998). Shakya *et al.* (2006) evaluated the prevalence of intestinal parasites among the elderly people >60 years of age. Males (43.8%) had slightly higher infection rate than females (40.4%) Ozyurt *et al.* (2007) reported 67% prevalence in males and 33% in females. There was non-significant difference in the sex distribution of *E. histolytica* in 14 communities in the northern Philippines (Rivera *et al.*, 1998). Similar results have been reported by Sharma *et al.* (2004) and Hamze *et al.* (2004) Ozgumus and Efe (2007) reported 64% (16/25) prevalence of *E. histolytica* for females, and 36% (9/25) for males.

The higher prevalence of *E. histolytica* in males could be explained on the following basis; Males are more susceptible than females to infections caused by parasites, fungi, bacteria, and viruses because males generally exhibit reduced immune responses and increased intensity of infection compared to females (Klein, 2000a and b). These differences are usually attributed to: (1) ecological (sociological in humans); and (2) physiological, usually hormonal in origin. Ecological factors include differential exposure to pathogens because of sex-specific behavior or morphology (Zuk and McKean, 2000). Other proximate cause of sex differences in infection is differences in endocrine-immune interactions (Klein, 2000a). Sexually

Table 1: The overall prevalence of *E. histolytica* in humans at central laboratory of Nishtar Hospital Multan

Name of Parasite	No. of hosts examined	No. of hosts infected	Prevalence %
<i>E. histolytica</i>	1360	295	21.69

Table 2: Relationship between sex and *E. histolytica* in humans at central laboratory of Nishtar Hospital Multan

Name of Parasite	Male hosts			Female hosts		
	Examined	Infected	Prevalence%	Examined	Infected	Prevalence %
<i>Entamoeba histolytica</i>	738	165	22.36	622	130	20.90

The difference was statistically non significant ($P>0.05$)

Table 3: Relationship between age and *E. histolytica* in humans at central laboratory of Nishtar Hospital Multan

Name of Parasite	No. of hosts examined	Age (years)			
		1-15	16-30	31-45	>46
<i>E. histolytica</i>	1360	n=331	n=403	n=369	n=257
		102(30.82%)	72(17.87%)	64(17.34%)	57(22.18%)

The difference was statistically significant ($P<0.05$)

mature male vertebrates are often more susceptible to infection and carry higher parasite burdens (Zuk and McKean, 2000), because sex steroids, specifically androgens in males and estrogens in females, modulate several aspects of host immunity. In addition to affecting host immunity, sex steroid hormones also alter genes and behaviors that influence susceptibility and resistance to infection. Thus, males may be more susceptible to infection than females not only because androgens reduce immunocompetence, but because sex steroid hormones affect disease resistance genes and behaviors that make males more susceptible to infection (Klein, 2000a).

Relationship between age and *E. histolytica* in humans

During present study *E. histolytica* had highest prevalence (30.82%) in age group of 1 day to 15 years followed by (17.87%) in age group of 16 to 30 years, (17.34%) in age group of 31 to 45 years and (22.18%) in age group of >46 years (table 3). Subbannayya *et al.* (1989) recorded higher (41%) prevalence of *E. histolytica* in age group of 6-14 years in South Kanara district, Karnataka. Similarly high prevalence was seen in the 0-6 month (12.5%) and 7-12 month (20.3%) age groups in a southern Indian population (Shetty *et al.*, 1990). Waqar *et al.* (2003) reported 27% prevalence of *E. histolytica* in children < 15 years in Northern Pakistan. Sayyari *et al.*, 2005 reported 33% prevalence of *E. histolytica* in age group of 0- 2 years and followed by 27% in 20-29 years. Noor Azian *et al.* (2007) studied the prevalence of *Entamoeba histolytica* was highest in 0-19 age group as 52% and lowest in the age above 60 years (3.8%) in Malaysia.

According to all these studies *E. histolytica* infection is more prevalent in younger age groups. This could be explained on the basis that the younger people have lower

resistance as compared to adults and because many of the crucial defense systems that help protect adults from disease are not fully developed in children, they are much more sensitive to parasites than adults. Other reasons could be that children are more exposed to overcrowded conditions (schools, nurseries, playgrounds etc). Parasitic infection among school children may be due to the poor sanitary conditions in the schools (Oguntibeju, 2006). They do not take care of their personal hygiene, such as playing in contaminated outdoor environments, in and around disposal sites (which can certainly cause serious health problems), lack of fecal hygiene (Abu Mourad, 2004) and lack of washing hands before meals (Nematian *et al.*, 2004). Several studies have shown a reduced risk for intestinal diseases among children who wash their hands (Day *et al.*, 1993; Borghi *et al.*, 2002 and Haque, 2003). Educational level of the parents is also an important factor influencing the parasitic infection (Nematian *et al.*, 2004).

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