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EPIDEMIOLOGY OF HUMAN FASCIOLOSIS IN RURAL AREAS OF LAHORE, PAKISTAN*

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Abstract: Epidemiological aspects of fasciolosis in human beings were investigated by faecal examination in six different areas of Lahore i.e., Bhutto colony, Siddiquia colony, Scheme no.2, Sheikhupura road, Khairdin park and Misri shah from April 2003 - March 2005. The epidemiological data showed overall infection of 0.31%. Highest infection was observed in Scheme no. 2 i.e., 0,58% followed by Bhutto colony and Sheikhupura road (0.33%), and lowest in Khairdin Park, Misri Shah and Siddiquia colony (0.167%). In month wise, over all, prevalence was highest in August and January (0.667%) and lowest in March (0.0%). Season wise data revealed highest infection in summer (0.42%) followed by winter (0.33%) and lowest in spring and autumn (0.167%). Sex wise prevalence showed higher infection in females (0.30%) than in males (0.28%). All infected persons were below the age of 20 years and showed significantly higher infection ($P < 0.05$).

Key words: Epidemiology, fasciolosis and human helminthic disease.

INTRODUCTION

Fasciolosis is a chronic helminthic disease predominant in domestic ruminants. It is now emerging as an important chronic disease of humans due to consumption of raw and undercooked vegetables to retain the natural taste (Slifko *et al*., 2000; Mulcahy and Dalton, 2001; Curtale *et al.,* 2005). Man is an accidental host, but depending on dietary habits, there can be very high prevalence in populations of particular areas. Infection results from eating uncooked and unwashed aquatic vegetables on which larval parasites are encysted. Majority of human infections (fasciolosis) have been reported from rural communities (Harrison, 1996; Sanchez-Sosa *et al.*, 2000; Rondelaud *et al*., 2001; Dobrucali *et al.,* 2004).

Fasciolosis is endemic in five continents and has become a food borne infection of public health importance in many parts of the world such as the Andean highlands of Bolivia, Ecuador and Peru, the Nile delta of Egypt, Turkey and northern Iran (Hassan *et al.,* 1995; Hurtrez-Bousses *et al.,* 2001; Mas-coma *et al.,* 2001; Dobrucali *et al.,* 2004).

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In the past, fasciolosis was limited to populations within well-defined watershed boundaries; however, recent environmental changes and modifications in human behaviour are defining new geographical limits and increasing the populations at risk. Global sourcing of food, coupled with changing consumer vogues, including the consumption of raw vegetables and undercooking to retain the natural taste and preserve heat-labile nutrients, have increased the risk of food borne transmission (Slifko *et al.,* 2000; Yilmaz and Godekmerdan, 2004).

The appearance of symptoms of fasciolosis as well as the severity of the disease will depend on the intensity of infection. Symptoms may appear a few days after ingestion of larvae, when the immature worms reach the abdominal cavity and begin migrating across or in the liver. These symptoms may be related to lesions in the abdominal cavity and during the acute phase may include fever, abdominal pain, other gastrointestinal disturbances and urticaria. There may be also hepatomegaly (enlarged liver), anemia and jaundice. There may be a latent phase when the worms reach the bile ducts, mature and begin to produce eggs. Eosinophilia is the only prominent symptom (Martinez *et al.,* 2000; El-Shazly *et al.,* 2002; van Daele *et al.,* 2001; Echenique-Elizondo *et al.,* 2005).

In the developed countries as an aid to combat infections more efficiently, the data on epidimiology of various helminthiasis are worked out in an efficient manner on the contrary, in the developing countries to which Pakistan in no exception, there exists, no published information and data on the epidemiological aspects of helminthiasis, particularly fasciolosis in humans.

The proposed study was designed to investigate certain epidemiological aspects of fasciolosis in humans of Lahore area. The relationship of meteorological factors such as mean temperature, relative humidity, rainfall and pan evaporation rate with the occurrence of disease was studied. This study will highlight some epidemiological aspects of disease in human in Pakistan.

MATERIALS AND METHODS

Area of the study

Study was conducted for epidemiology of fasciolosis in humans in six different sites of Lahore *i.e.,* Bhutto Colony, Siddiquia Colony, Scheme No. 2, Sheikhupura road, Khairdin park and Misri shah.

Prevalence

To record the prevalence of fasciolosis in humans above mentioned sites were visited from April 2003-March 2005. From each area a total of 50 human faecal samples were collected per month. These samples were examined by direct microscopic

examination for the presence of *Fasciola* eggs (Urquhart *et al.*, 2001). Prevalence of infection was recorded month wise and season wise. The age, sex and area were also furnished.

Meteorological data

Meteorological data including mean temperature, relative humidity, rainfall and pan evaporation in two years, was obtained from meteorological station, Lahore and their relation with the disease was worked out. Data was analyzed statistically by using computer software Microsoft SPSS 6.0 (Student t-test).

RESULTS

Overall prevalence

Human fasciolosis was analyzed in different areas of Lahore, from April 2003 to March 2005. These areas were Bhutto colony, Siddiquia Colony, Scheme No. 2, Sheikhupura road, Khairdin Park and Misri shah. Out of 7200 faecal samples observed during 2 years only 21 samples (0.31% ± 0.18) showed presence of *Fasciola* eggs.

Area-wise prevalence

From each area 1200 samples were examined for the presence *of Fasciola* eggs in two years. In Scheme No. 2 highest infection rate was noted i.e., (0.58% ± 0.19), followed by Bhutto colony and Sheikhupura Road (0.33% ± 0.16), and lowest in Khairdin Park, Misiri Shah and Siddiquia colony (0.167% ± 0.12), (Fig. l). Statistical analysis showed overall infection was significantly higher in Scheme No. 2 (PO.001; C.I.=95%), Bhutto Colony and Sheikhupura Road (P<0.05; C.I.=95%) while non-significant in Khairdin Park, Misiri Shah and Siddiquia Colony (Fig. 1).

Month-wise prevalence

In each month total of 600 samples were examined and over all highest infection was noted in August and January (0.67% ± 0.28) and lowest in March (0.0% ± 0.0). In April, May, July and November same prevalence (0.33% ± 0.22) was noted. Similarly in June, September, October, December and February prevalence was found 0.167% (±0.167). Statistical analysis showed infection in August and January was significantly higher (P<0.05; C.I=95%), (Fig. 5).

Season wise prevalence

Season wise data showed highest infection in summer (0.42% ± 0.14) followed by winter (0.33% ± 0.09) and lowest in spring and autumn season (0.167% + 0.112). Statistically infection in summer was significantly higher (P<0.05; C.I=95%), (Fig. 2).

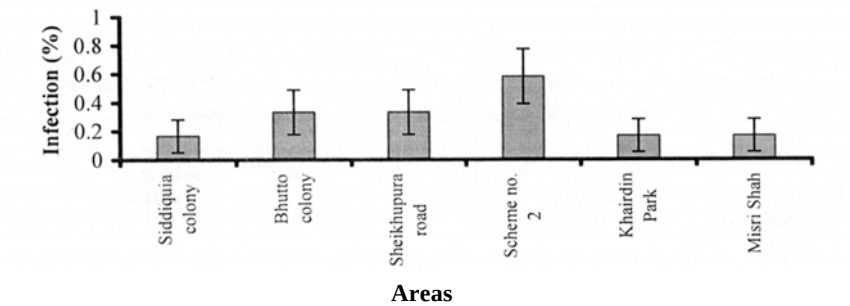

Fig. 1: Area wise prevalence (Mean±SEM) of human fasciolosis in Lahore for two years (Apr. 2003 – Mar. 2005)

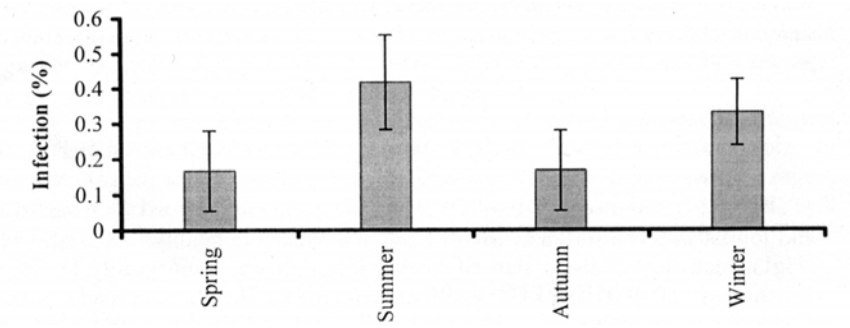

Fig. 2: Season wise prevalence (Mean±SEM) of human fasciolosis in Lahore for two years (Apr. 2003 – Mar. 2005)

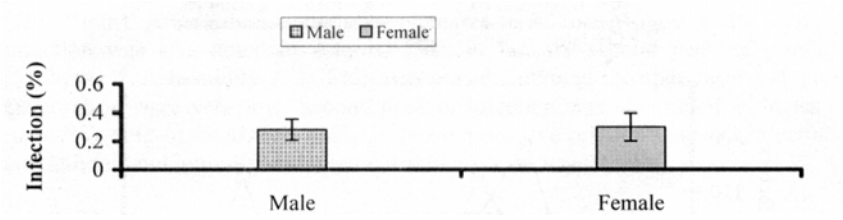

Fig. 3: Sex wise prevalence (Mean±SEM) of human fasciolosis in Lahore for two years (Apr. 2003 – Mar. 2005)

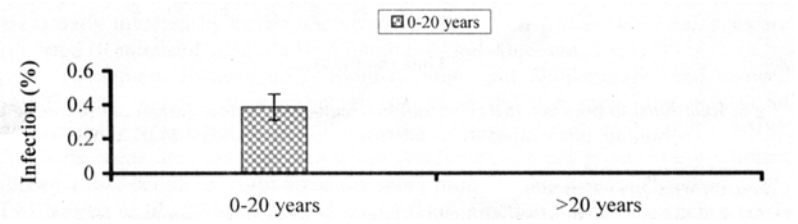

Fig. 4: Age wise prevalence (Mean±SEM) of human fasciolosis in Lahore for two years (Apr. 2003 – Mar. 2005)

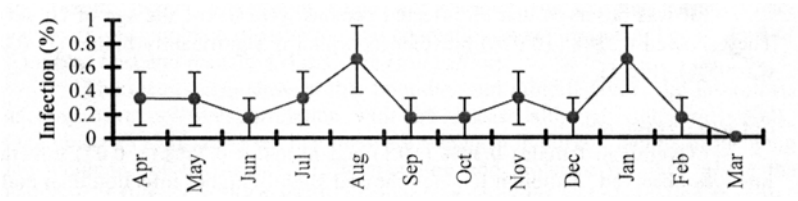

Fig. 5: Month wise prevalence (Mean±SEM) of human fasciolosis in Lahore for two years (Apr. 2003 – Mar. 2005)

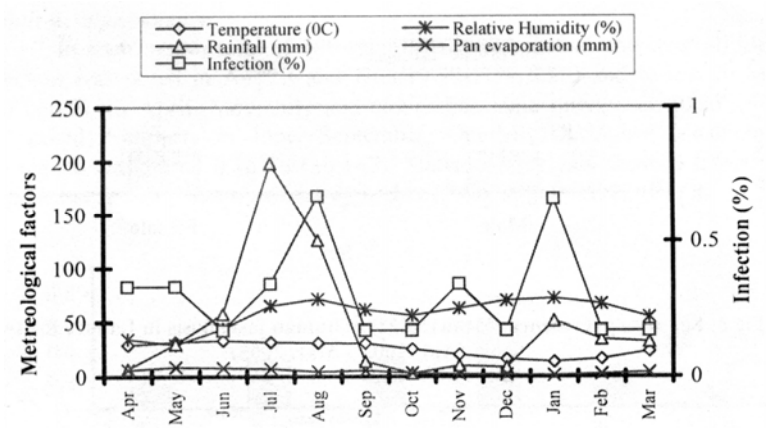

Fig 6: Relationship between infection and metreological factors (mean temp, humidity, rainfall, pan evaporation) for two years (Apr. 2003 - Mar. 2005)

Age-wise prevalence

It was observed that all infected persons were below the age of 20 years. They showed 0.38% (± 0.076) prevalence, which is significantly higher (P<0.05; C.I.=95%), (Fig. 4).

Sex-wise prevalence

Overall in females 0.30% (± 0.1) and in males 0.28% (± 0.07) infection rate was observed. Although females showed slightly higher infection than males but not at significant level (Fig. 3).

Relationship between infection and meteorological factors

Metrological data revealed that increase in temp in May (31.95°C) and June (33.15°C) cause maximum pan evaporation in May (8.8mm) and June (8.1mm), which resulted in maximum rainfall in July (198.15mm) and August (125.75mm). After rainfall, humidity increases to 71% in August while highest infection was also noted in August. Then in January second peak of rainfall (51.2mm) and humidity (71.75%) was noted, although temperature and pan evaporation were very low. Second peak of infection was also noted in January (0.667%), (Fig. 6). Statistical analysis showed positive relation between infection and, rainfall and humidity although not at significant level.

DISCUSSION

Coprological examination from six different sites of Lahore (Bhutto colony, Siddiquia Colony, Scheme No. 2, Sheikhupura road, Khairdin Park and Misri shah) showed the overall prevalence of fasciolosis 0.30% (± 0.18 SEM). It is the first report considering human fasciolosis from Lahore (Pakistan). Humans are usually infected by eating uncooked vegetables on which larval parasites are encysted (Rondelaud *et al*., 2001; Yilmaz and Godekmerdan, 2004).

Although Scheme No. 2, Bhutto colony and Sheikhupura road showed significantly higher infection but all six areas did not show any significant difference in prevalence of the disease when compared with each other (P=NS). All these areas are rural and sanitation conditions are not good. Many workers reported that people of rural areas are more prone to this disease (Esteban *et al.*, 1997; Ortiz *et al*., 2000). The major source of infection for man in such areas is consumption of raw vegetables such as lettuce that are either eaten unwashed or frequently soaked and washed with contaminated water (Bargues *et al.*, 1996).

In month wise prevalence significantly higher infection was noted in August while in season wise data significantly higher infection was noted in summer (0.38%). Farag *et al.* (1993) and El-Bhay (1997) in Egypt also reported significantly higher

infection in August and summer. But seasonal variation may vary with geographical distribution and adaptation to environmental conditions of lymnaeid host and parasite (Mas-Coma *et al*., 1999).

The results also showed that humidity and rainfall favors the fasciolosis as they have positive correlation with the disease although not significantly. Ollerenshaw (1958) reported that there are two most important factors influencing the incidence of fasciolosis *i.e.* temperature and moisture for they affect the hatching of fluke ova, the viability of encysting cercariae and population of snails. Usually rainy season, in our country (Pakistan), starts in the month of July and changes the environmental temperature and humidity so as to favor the emergence of cercariea from snails (Maqbool *et al.,* 1994). Metacercariea (next larval stage) may show their existence in July and if are ingested by human thereby cause fasciolosis. That's why after rainfall highest infection was noted. Rains and incidence of fasciolosis were also recorded during the month of January at low temperature. This may be due to availability of temporary water bodies after rainfall for Lymnaeid host population, which can tolerate severe conditions of cold (Tanveer and Khan, 1989; Farag *et al.,* 1993; Valero *et al.,* 2002; Mas-Coma *et al.,* 2003).

Overall sex wise data showed females had slightly higher infection (0.31%) than males (0.28%) but statistically not at significant level. Aal *et al.* (1999) and Curtale *et al.* (2003) also reported non-significant higher infection in females than males. This may be due to females are associated more with the washing of clothes and kitchen utensils and meal preparation in houses and management of freshwater plants that potentially carry attached metacercariae (Estebane *et al.,* 2003).

In overall age wise data it was observed that all infected individuals were below 20 years. Curtale *et al.* (2003) also found that individuals below 19 years were more susceptible while Aal *et al.* (1999) and Moghaddam *et al.* (2004) reported that all age groups were equally susceptible for fasciolosis. This may be due to difference in living habits and hygienic conditions in a particular area.

From the study it was concluded that Lahore is not free from fasciolosis. Although stool examination showed very low infection rate (0.3%) but as raw vegetables (such as salad) are commonly used as food, there will be much greater infection in these areas. Extensive serological examination is needed to predict true prevalence of the disease.

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