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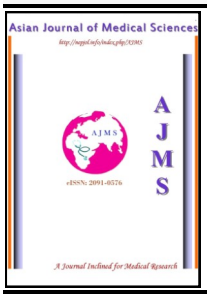

A Community Based Epidemiological Study on Intestinal Amoebiasis in Rural West Bengal, India

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Abstract

Objective: To assess the magnitude of *Entamoeba histolytica/ Entamoeba dispar* infestation and to study some socio-demographic correlates in relation to parasitic infestation in the study subjects.

Material & Methods: A cross sectional epidemiological study was carried out in West Bengal, India among rural population of two districts. Stool samples from selected study subjects of all age groups were tested for presence of parasitic infestation by standard diagnostic procedures and data were collected to get information on socio demographic correlates of *E. histolytica /E. dispar* infestation.

Results: Total 402 stool samples were tested. 23.4% of stool samples were positive for parasitic infestation. Major types were *E. histolytica/E. dispar* (17.7%), *G. lambia* (3.23%), *B. hominis* (2.23%), *A. lumbricoidis* (0.99%) and Hook-worm (0.76%). Six samples were positive for mixed infection (1.49%). Among those infected with *E. histolytica/E. dispar*, majority were female (63.4%), middle aged 21-60yrs (53.5%). Magnitude was highest among geriatric people (26.7%) and children aged 6-10yrs (22.7%) and least among <5yrs age (9.1%). Majority of the infested persons were asymptomatic (52.1%). Participant's self perception, self medication & water used for washing utensils were found to be significantly associated with parasitic infestation.

Conclusion: Result reiterates the need for organized efforts for improvement of basic sanitation needs in the area to curb the parasitic morbidities.

Key Words: *E. histolytica/E. dispar; epidemiology; socio demographic factors; amoebiasis; gastrointestinal disease*

1. Introduction

About 4013000 disability-adjusted life year (DALY) is lost due to intestinal parasitic infestation globally of which 26.8% is contributed by South Eastern Asian region.[1] In India about 610000 DALY is lost due to this intestinal nematode infestation.[2] Intestinal parasites are widely prevalent in developing countries, probably due to poor sanitation and inadequate personal hygiene.[3] It is estimated that as much as 60% of the world's population is infected with gut parasites which may play a role in morbidity due to intestinal infections. Reports from different studies over last four decades showed a wide variation in magnitude of intestinal parasitic infestation, ranging from 25.2% in India to 98.9% in adolescents of Ecuador.[4,5]

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The term 'amoebiasis' depicts a condition of harboring protozoa *E. histolytica/ E. dispar* with or without clinical manifestation. Symptomatic disease usually occurs in 10% of infected individuals.[6] India is a mosaic of myriad geographical, socio-cultural & political distribution. Disease distribution, its determinants are also varying in nature, leading to differential intervention need in the same country. West Bengal is a densely populated state of India located in the north-eastern part bordering with Himalaya in the north & Bay of Bengal in the southern part. We now report a detailed analysis of the prevalence of amoebiasis in a rural community of West Bengal including some socio-economic correlates. The specific objectives were: a). to assess the magnitude of *E. histolytica/ E. dispar* infestation in the study area; b) to study some socio-demographic correlates in relation to parasitic infestation in the study subjects.

2. Material and Methods

It was a community based cross sectional epidemiological study.

Study area: Two districts of West Bengal, Howrah & Hooghly out of 19 districts were selected. One block each and nine hamlets were selected based on sampling design. Districts are in the south eastern part of state of West Bengal, India. The selected districts are densely populated (Howrah-2913/Km^2 and Hooghly 1601/ Km^2).Total population of these two districts were 9315075 in census 2001 which is about 11.6% of total population of the state occupying only 5.2% of the state's land area. The blocks selected were Jagatballavpur from Howrah and Singur from Hooghly. The blocks are inhabited by people principally involved in agriculture linked occupation and business.[7,8,9] Majority of the study population were residing in riverside areas.

Table1: Relation between parasitic infestation and some socio-demographic correlates

Socio-demographic variables	Present (94)	Absent (308)	p-value
Sex			
Male	43.60% (41)	45.80% (141)	0.712
Female	56.40% (53)	54.20% (167)	
Age (year)			
<5	5.3%(5)	9.1%(28)	0.0655
6-10	17.0%(16)	9.1%(28)	
11-20	22.3%(21)	17.2%(53)	
21-60	50%(47)	61.4%(189)	
>60	5.3%(5)	3.2%(10)	
Patient's complaint			
None	53.20% (50)	71.10% (219)	0.001
Abdominal discomfort	30.90% (29)	22.70% (70)	
Frequent amoebiasis	16.00% (15)	6.20% (19)	
Place of defecation			
Open field	47.90% (45)	42.50% (131)	0.406
Sanitary latrine	52.10% (49)	57.50% (177)	
Water for utensil washing			
Pond	63.80% (60)	52.60% (162)	0.040
River	18.10% (17)	15.90% (49)	
Tube-well	18.10% (17)	31.50% (97)	
Water for cooking			
Pond	2.10% (2)	1.90% (6)	0.963
River	2.10% (2)	2.60% (8)	
Tube-well	95.70% (90)	95.50% (294)	
Literacy (self/ mother)			
Illiterate	42.60% (40)	43.50% (134)	0.483
Literate	57.40% (54)	56.50% (174)	
Health care seeking behaviour			
Self medication	44.70% (42)	33.80% (104)	0.036
Doctor	55.30% (52)	66.20% (204)	
Soap/soil usage			
Soap	30.90% (29)	39.60% (122)	0.145
Soil	69.10% (65)	60.40% (186)	
Pets in house			
Present	27.70% (26)	25.00% (77)	0.348
Absent	72.30% (68)	75.00% (231)	

Study population: Persons of all age group residing in the study area were considered as study subjects. From the two districts two blocks were randomly selected and villages named as Mandalpara, Adakpara, Samantapara, Saihati from Jagatballavpur block, Howrah district and Jolaghata, Modhupati, Modhapara Telipukur from Singur block, Hooghly district were selected.

Sample size was calculated based on a previous study conducted in southern part of the country and prevalence of *E. histolytica/ E. dispar* was estimated to be 47.4%. Considering the above with 95% CI and 10% allowable error, sample size calculated was 426.

Household list from the panchayat office was obtained and samples were selected by simple random sampling from the villages at the rate of 55 households/village. From each household Kish sampling method was followed to select one person for the purpose of individual sample. For children 0-5yrs, mother or immediate care- giver in absence of mother was considered as key informant. All sample subjects were thus interviewed with a pre designed, pre-tested semi structured pro-forma. They were supplied with a stool-container and sample was collected next day for analysis. Total number of stool samples actually obtained from eight villages was 402 . Pre-designed pre-tested semi-structured pro-forma was used to collect data on socio demographic variables. The study was conducted from April 2007 to March 2008.

Collection and processing of stool samples: Each participant was provided with fecal collection clean plastic containers with cap and labels were used. Because of the fragile nature of the many intestinal parasites and to maintain the morphology for accurate identification, the samples were collected within two hours after passage and were processed. Those samples which were not processed immediately were stored in refrigerator and processed later. Approximately 10 gm of each participant's stool were collected and stool samples contaminated with water or urine were rejected. Samples containing blood and mucus were examined first followed by liquid specimens. 5 to 10 mg stool sample was smeared for direct microscopic detection by wet mounting. The saline (0.9%) wet mount was used for initial microscopic observation of the stools followed by iodine wet mount for identification of *Entamoeba* cysts specifically.[10] When amoebic trophozoites were seen or their presence were suspected buffered methylene blue (BMB) wet mount were carried out.

Analysis: Data analysis was done by Epi-info statistical software, version 3.2, June 2008 and data presentation (map) was done by Map Window GIS, open source

4.6.602. Chi square test was applied for testing the significance of difference between different groups. For continuous variables unpaired t-test was used for significance testing.

3. Results

Detailed data from 402 study subjects were available for analysis. Age range was 6 months to 75 yrs and mean age was 27.45 yrs (± 16.82).

Majority of the subjects were female (57.7%). 11.9% were from extremes of age with 8.2% in 0-5yrs and 3.7% in >60yrs age. Other than being housewives (29.6%) and students (27.1%) majority of the study subjects were involved in unskilled/agricultural activity (15.7%) or small business (3.2%) or skilled labour (13.2%).

Table2: Relation between *E. histolytica*/*E. dispar* infestation and some socio-demographic correlates

Socio-demographic variables	Present (71)	Absent (331)	p-value
Sex			
Male	36.60% (26)	47.10% (156)	0.116
Female	63.40% (45)	52.90% (175)	
Age (year)			
<5	4.1%3	9.1%30	0.3458
6-10	14.1%10	10.3%34	
11-20	22.5%16	17.5%58	
21-60	53.5%38	59.8%198	
>60	5.6%4	3.3%11	
Patient's complaint			
None	52.10% (37)	70.10% (232)	<0.0001
Abdominal discomfort	26.80% (19)	24.20% (80)	
Frequent amoebiasis	21.10% (15)	5.70% (19)	
Place of defecation			
Open field	42.30% (30)	44.10% (146)	0.794
Sanitary latrine	57.70% (41)	54.90% (185)	
Water for utensil washing			
Pond	67.60% (48)	52.60% (174)	0.040
River	15.50% (11)	16.60% (55)	
Tube-well	16.90% (12)	30.80% (102)	
Water for cooking			
Pond	2.80% (2)	1.80% (6)	0.705
River	1.40% (1)	2.70% (9)	
Tube-well	95.80% (68)	95.50% (316)	
Literacy of mother			
Illiterate	49.30% (35)	42.00% (139)	0.159
Literate	50.70% (36)	58.00% (192)	
Health care seeking behaviour			
Self medication	47.90% (34)	33.80% (112)	0.0189
Doctor	52.10% (37)	66.20% (219)	
Soap/soil usage			
Soap	36.60% (26)	37.80% (125)	0.893
Soil	63.40% (45)	62.20% (206)	
Pets in house			
Present	31.00% (22)	24.50% (81)	0.161
Absent	69.00% (49)	75.50% (250)	

23.4% of stool samples were positive for parasitic infestation and 17.7% was positive for *E. histolytica*/ *E .dispar*. Other than *E. histolytica* /*E. dispar*, *G. lambia* (3.23%), *B. hominis* (2.23%), *A. lumbricoidis* (0.99%), Hookworm (0.76%) were detected. 6 samples were tested for mixed infection (1.49%).

In table 1 we have tried to find out the correlations between the different co-factors with the parasitic infestation in the study area. 94 stool samples (23.40%) were positive for parasitic infestation. Among the infected people majority were female (56.40%), middle aged of 21-60yrs (50.00%). People from all age groups were affected. Majority of the affected person were asymptomatic (53.20%). Interestingly, infestation rate was highest among those who complained of suffering from 'frequent amoebiasis' (44.10%). It is lowest in asymptomatic group (18.6%), followed by complaint of abdominal discomfort (29.30%). This finding probably reveals awareness of the community for parasitic infestation.

Place of defecation, literacy of mother/self, ablution practices, pets in the house were not found as important statistically associated factor. The source of water used for washing utensils was important statistically with pond water (27.0%) being major determinant of parasitic infestation, compared to river water (25.8%) and tube well (14.9%).

In table 2 we specifically tried to find out the important determinants of amoebiasis in the community as major parasitic load was due to *E. histolytica*/*E. dispar* infestation.

71 stool samples (17.7%) were positive for *E. histolytica*/ *E. dispar* infestation. Among the infected people majority were female (63.4%), middle aged 21-60yrs (53.5%). People from all age groups were affected. Among the geriatric people (26.70%) and children aged 6 -10yrs (22.70%) the prevalence was highest. It is least among the under five age (9.1%). This may be due to more attention for under-fives at home, compared to young kids going to school and exposed to unhygienic practices. However no statistical association could be established from the result.

Majority of the affected persons were asymptomatic (52.10%). Like previous finding, infestation was highest among those who complained of suffering from 'frequent amoebiasis' (44.12%). It was lowest in asymptomatic group (13.75%), followed by complaint of abdominal discomfort (19.20%). This finding was statistically significant and it reveals awareness of the community for amoebiasis.

Place of defecation, literacy of mother/self, ablution

practices, pets in the house were not found as important statistically associated factor for *E. histolytica*/*E. dispar* infection. Whereas the different sources of water used for washing utensils were found to be statistically significant [pond water (21.6%), being, compared to river water (16.7%) and tube well (10.5%)].

4. Discussion

The community based study spread over 2 blocks of 2 districts finally achieved to investigate 402 samples. Calculated sample size was 426. Initially 440 subjects were registered for the study. Informed consent was available for 429 subjects. 402 of them could provide stool sample in suitable condition for microscopic examination. The result from examination was correlated with socio demographic variables. Information about those variables was obtained by pre-designed, pre-tested, semi-structured proforma.

Intestinal parasitic infestation rate varies across the globe and over the years. In 1993 to 2006, magnitude varied from 25.2% in India to 98.9% in adolescents of Ecuador.[4,5] The magnitude of *E. histolytica*/ *E. dispar* infestation also varied from 0.16% in west China to 72% in Nigeria.[11,12]

Open field defecation was found to be important determinant in Nigeria, Gaza strip, Vellore in India for *E histolytica*/ *E. dispar* infestation which is comparable to our finding.

Source of drinking water was significantly associated with *E. histolytica*/ *E. dispar* infestation in Vellore[3], Mexico[13] and Belize[14]. In our study it was more closely associated with type of water used for washing utensil rather than water used for cooking purpose. It may be due to effect of cooking or boiling which is able to destroy the organism.

Mostly it was seen that children were predominantly affected though reports were there for involvement of extremes of age group. In our study extremes of age was affected more.

Educational status either for parents'/care givers of under five children or for other study subjects themselves was significantly associated with parasitic infestation in Saudi Arabia however we failed to find any significant association between socio economic strata and *E. histolytica*/ *E. dispar* infestation.[15] No association was also found to be existed between *E. histolytica*/ *E. dispar* infestation and ablution practices or place of defecation.

After completing the cross sectional study it was clear that water source is very important factor along with the people's health care seeking behaviour. For intestinal parasitic infestation self medication is causing more harm than good. It may be due to their life style or they are more prone to infection. It has been found that the persons who undergo self-medication do not complete the full course of drugs, therefore the infection relapse. However patients' perception about their symptoms seems to be quite satisfactory and a linkage should be established for availability & accessibility of a proper health care delivery system rather than wide array of over the counter (OTC) drugs. A follow-up study to find out the trend in *E. histolytica*/ *E. dispar* magnitude in the same area along with seasonal pattern of time distribution would be important adjunct for policy makers. Still in India, improvement of sanitary condition remains an unfinished task and this remains the key issue to tackle the age old cause of major disease burden in this region of the world.

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