

PARASITIC INFECTION AMONG FOREIGN WORKERS: SEROLOGICAL FINDINGS

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ABSTRACT: We describe the results of serology for parasitic infection of 698 foreign workers. The 698 foreign workers participated included 115 Indonesians, 387 Bangladeshis, 101 Burmese, 81 Pakistanis, 6 Indians, 3 Thais, 3 Filipinos and 2 Others. Blood samples were taken from these workers and eight tests (Amoebiasis, Echinococcosis, Filariasis (bm and wb), Leishmaniasis, Malaria, Schistosomiasis and Trypanosomiasis) were performed on serum separated from the blood. Among the 698 sera tested, 38.1% were found to be positive for at least one parasitic infection. The most common antibody detected in the positive sera was antibody for amoebiasis (28.1%), followed by malaria (26.9%), echinococcosis (18.1%) and schistosomiasis (11.6%). Other tests showed a low percentage of infection with leishmaniasis (6.5%), filariasis (*Brugia malayi* (3%) and *Wuchereria bancrofti* (1%)) and trypanosomiasis (1%). (JUMMEC 2002; 1:70-76)

KEYWORDS: Parasitic infection, Amoebiasis, Echinococcosis, Filariasis, Leishmaniasis, Malaria, Schistosomiasis, Trypanosomiasis.

Introduction

Mass movement of people is not a new phenomenon. Modern communication and transportation makes it possible for people and their health problems to travel further and more quickly than ever before. It has been estimated that there are 125 million migrants worldwide. Malaysia is no exception in this matter because many migrant workers have entered the country since 1980's. Majority were job seekers who came to work in various sectors.

Employers and the Immigration Department of Malaysia require pre-employment medical examination for all foreign workers. Unfortunately, the examination does not include screening for parasitic infection. Therefore very little is known about the status of parasitic infection of these workers. Interestingly, the majority of these workers came from countries like Indonesia, Philippines and Bangladesh where parasitic diseases are known to be very prevalent.

Most parasitic diseases can be easily treated if detected at the early stage, but if untreated can cause severe complications or death. Some can be transmitted to the local population because of the presence of vectors which may transmit the infection around while those which appear not to pose any threat of transmission, should not be taken lightly because such diseases may require serious treatment and this will have an impact on our health services and facilities.

It was felt necessary to have these workers examined for parasitic infection based on studies done by researchers from other countries with similar experience. For example, a study carried out in the United States showed that 1000 cases of malaria detected each year was related to travellers (1). Hospital records in three different towns in Brazil showed that the number of malaria cases increased five fold from 1983-1987 following increased immigration (2). Other studies reported of cysticercosis causing appreciable morbidity and mortality among Latin American immigrants in the United States (3), intestinal parasites among refugees entering Canada (4), and intestinal parasites among Central American immigrants in the United States (5).

Parasitic Diseases

i. Amoebiasis

Incidence of Amoebiasis throughout the world varies from 0.2 % to 5 %. The infection is most prevalent among people living in crowded conditions with inadequate toilet and sanitary facilities. Clinically it can present as acute amoebic dysentery, chronic and non-dysenteric amoebiasis or hepatic and extra-intestinal amoebiasis. Treatment is not difficult but this disease is easily transmitted through food and water.

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ii. Echinococcosis

Echinococcosis does not occur in Malaysia. Man is an intermediate (dead end) host. An infected individual will harbour the cystic form known as hydatid cyst commonly found in the liver and lungs. Until recently, surgery was the only effective treatment.

iii. Filariasis

Billions of people live in areas of the world where filariasis is a common disease. Rarely life threatening, this disease however causes suffering and disability. The chronic stage may take a number of years to manifest. In the intervening period repeated attacks of acute lymphangitis may continue. The classical manifestations of this stage are elephantiasis, hydrocoele and chyluria. Malaysia has been very successful in controlling the infection (6) but the presence of unmonitored microfilariae carriers can reverse the situation especially in the case of urban bancroftian filariasis where it can be established in various centres with large numbers of foreign workers.

iv. Leishmaniasis

Leishmaniasis is a disease which generally causes disfiguring lesions. Epidemics of visceral forms of leishmaniasis however, have been responsible for many deaths world wide. It is not found in Malaysia but a few kala-azar cases have been diagnosed among the foreign workers admitted to University Malaya Medical Centre. (UMMC) Treatment of leishmaniasis with classical drugs is costly.

v. Malaria

Malaria remains to be the most important tropical disease in the world and continues to be a public health problem in Malaysia (7). Although the number of cases have been much reduced, treatment and control have become more difficult due to drug resistant strain of *Plasmodium falciparum* and insecticide resistant of the mosquito vectors.

vi. Schistosomiasis

Schistosomiasis is a disease that causes chronic debilitating illness. Schistosomiasis is particularly associated with water development projects simply because their intermediate host that is the snail, breeds in freshwater lakes and streams. Although it is not found in Malaysia there are many species of snails that may act as potential intermediate hosts and this can lead to local transmission.

vii. Trypanosomiasis

This is a disease which varies in severity ranging from acute stage to chronic sleeping sickness stage. Although

prognosis is favourable if treatment is instituted before occurrence of serious involvement of the nervous system, treatment of this disease has always been difficult and the available drugs are toxic to humans.

Objective

This study was conducted to determine the status of the parasitic infection among the migrant workers by using serological tests.

Materials and Methods

Blood/serum samples

The researcher received blood samples from the Centre of Immigrant Study (CIS) in clotted form. The blood were then kept at 4° C. Serum were then separated from the clotted blood and kept at -20° C until use.

Tests

Test kit used	Detection
1. Cellognost Combipack IHA	detects amoebiasis
2. Cellognost Combipack IHA	detects echinococcosis
3. In house ELISA	detects lymphatic filariasis (bm)
4. ICT card test	detects lymphatic filariasis (wb)
5. Cellognost Combipack IHA	detects leishmaniasis
6. IgG CELISA	detects malaria
7. Cellognost Combipack IHA	detects schistosomiasis
8. Cellognost	detects trypanosomiasis

A) Cellognost Combipack IHA

Principle: If specific antibodies were present in the serum sample, a cross-linking of erythrocytes was observed. If no antibodies were present the cells were deposited at the bottom of the reaction vessel in the form of buttons or rings.

Procedure: A volume of 5ml of test sera/control sera was placed into the V bottom microtitration plate followed by 100ml IHA reagent test sera and mixed well. The plate was incubated at room temperature for 3 hours.

Interpretation of results:

Positive result: presence of complete agglutination of the cells

Weak positive result : agglutination with ring formation

Negative result: formation of sedimented cells.

B) IgG CELISA

Principle: The indirect or sandwich ELISA principle was used. Microwells were coated with *P. falciparum* antigen. A conjugate of enzyme labelled anti-human globulin is incorporated into the kit.

Procedure: 100ml of diluted serum sample was added to the pre-coated wells and incubated for 1 hour at 37° C. The well was exposed to 4 times 5 minutes washing. 100ml of conjugate was then added to the well followed by another 1 hour of incubation at 37° C. The washing process was repeated following which 100ml of substrate was added to the well. The well was then incubated for 15 minutes. Stop solution was added. The absorbance was read at 450nm.

Interpretation of results:

Positive control: value of at least 0.8

Negative control: value under 0.15

C) 'In house' ELISA

Principle: Indirect ELISA. Antigen to be used for coating the plate was prepared and standardised in the Department of Parasitology.

Procedure: Plate was coated with 50ml of antigen. The plate was incubated overnight at 4° C. It was then exposed to 3 times 5 minutes washing and blocked with 200ml 0.5% BSA. The plate was left undisturbed at room temperature for 2 hours. The washing procedure was repeated. A volume of 50ml of test/control sera was introduced to the plate accordingly and left standing at room temperature for 1 hour. The plate was washed again as before, after which 50ml of conjugate was added to the plate and incubated at room temperature for another hour. The plate was again washed using the same procedure and subsequently 50ml of substrate was added. Finally the plate was left in the dark at room temperature for 15 minutes and the absorbance was read at 405nm.

Interpretation of result:

Positive result: values which were 2.5 times greater than that of the negative control.

Results

The author received a total of 809 serum samples from the Centre of Immigrant Study (CIS) of which 121 samples were from Indonesian workers, 393 from Bangladeshi workers, 112 were from Thai workers, 102 from Myanmar workers and 81 samples from Pakistani workers. However, we were unable to screen all samples due to shortage of test kits. Therefore, out of 809 samples received, only 284 were screened for amoebiasis, 512 for echinococcosis, 227 for filariasis (bm) (*Brugia malayi*), 52 for filariasis (wb) (*Wuchereria bancrofti*), 232 for leishmaniasis, 657 for malaria, 623 for schistosomiasis and 186 for trypanosomiasis. Table I shows the list of tests performed, the number of samples tested and the overall results.

Table I. Seropositive individual for each test by gender

Test	Gender					
	Male			Female		
	Total	Pos	%	Total	Pos	%
Echino coccusis	478	82	17.2	34	11	32.4
Amoebiasis	261	71	27.2	239	3	9.1
Filariasis (bm)	190	6	3.2	37	1	2.7
Filariasis (wb)	49	0	0	3	1	33.3
Leishmaniasis	210	14	6.7	22	1	4.5
Malaria	609	166	27.3	48	11	23.0
Schistosomiasis	582	68	11.7	41	4	9.8
Trypano somiasis	165	2	1.2	21	0	0

Pos = positive result

The author managed to screen 609 male samples for malaria, 582 for Schistosomiasis, 478 for echinococcosis, 261 for amoebiasis, 210 for leishmaniasis, 190 for *Brugia malayi* 165 for trypanosomiasis and 49 for *Wuchereria bancrofti*.

The number of female samples tested were far less compared to the male samples. For amoebiasis, the author only screened 23 samples, 34 were screened for echinococcosis, 37 for filariasis (bm), 3 were tested for filariasis (wb), 22 samples were tested for leishmaniasis, 48 for malaria, and 4 for schistosomiasis. None of the female samples provided were tested for trypanosomiasis.

Figure 1 shows the percentage of seropositive individuals for each test. It was found that 28% of the samples tested were found positive for amoebiasis followed by 27% found positive for malaria. Eighteen percent were tested positive for echinococcosis and 12% were seropositive for schistosomiasis. Other tests showed very low percentage of seropositive samples (< 10%).

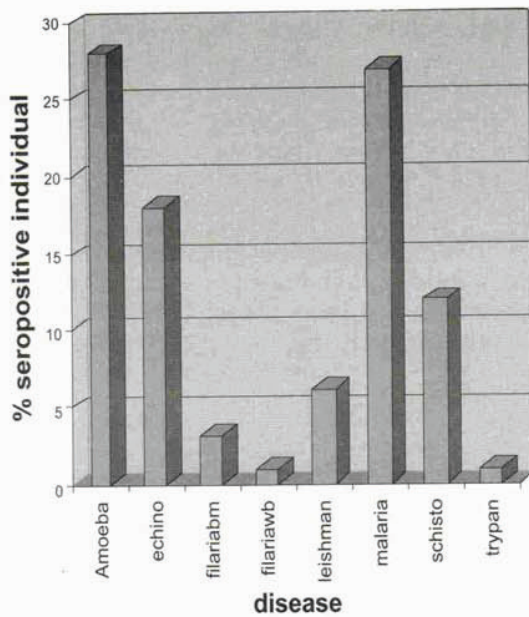


Figure 1. Percentage of seropositive individual for each test

The distribution of seropositive samples among tested workers from the different nationalities for each test performed showed that out of 80 samples found seropositive for amoebiasis, 22.5% were from Indonesia, 42.5% were from Bangladesh, 21% were from Myanmar and 14% from Pakistan. Only one serum sample from a Thai

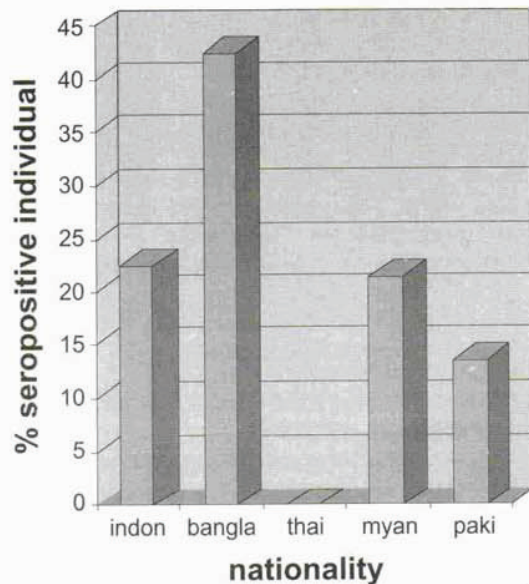


Figure 2. Percentage distribution of seropositive for each test by nationality
worker was tested and was found negative (Figure 2).

A total of 91 samples out of 512 sera were confirmed positive for echinococcosis. The highest number of se-

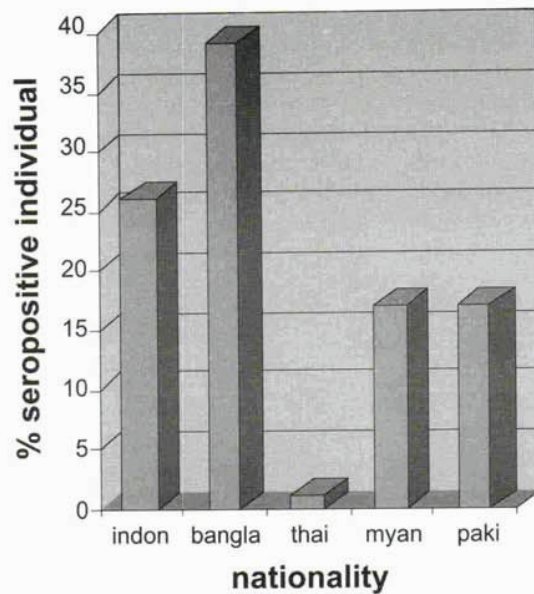


Figure 3. Percentage of seropositive for echinococcosis by nationality.

ropositive cases were from Bangladesh (39%), followed by Indonesia (26%). Myanmar and Pakistan both having 17% seropositive results and 1% from Thailand (Figure 3).

Out of 227 tested for *Brugia malayi*, only 7 samples were seropositive while 6 out of the 7 samples were from Indonesian workers and 1 from Bangladesh (Figure 4).

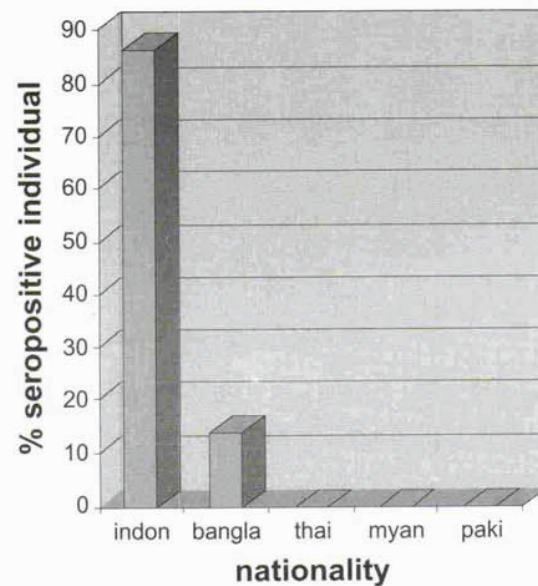


Figure 4. Percentage of seropositive for *Brugia malayi* by nationality.

Only 52 samples were tested for *Wuchereria bancrofti* and only one sample obtained from a Myanmar worker was found positive (Figure 5).

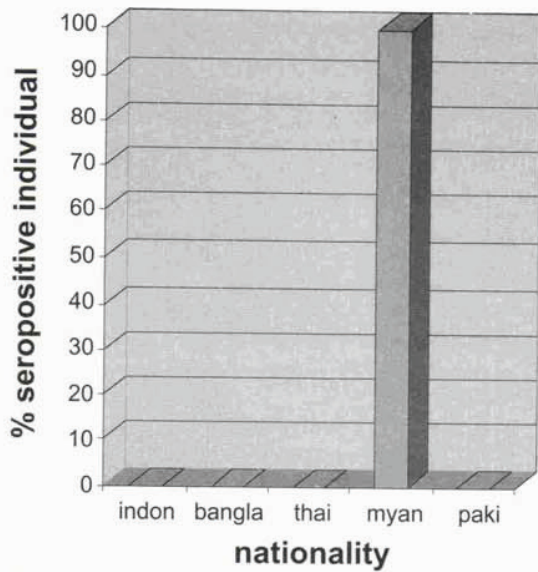


Figure 5. Percentage of seropositive for *Wucheria bancrofti* by nationality.

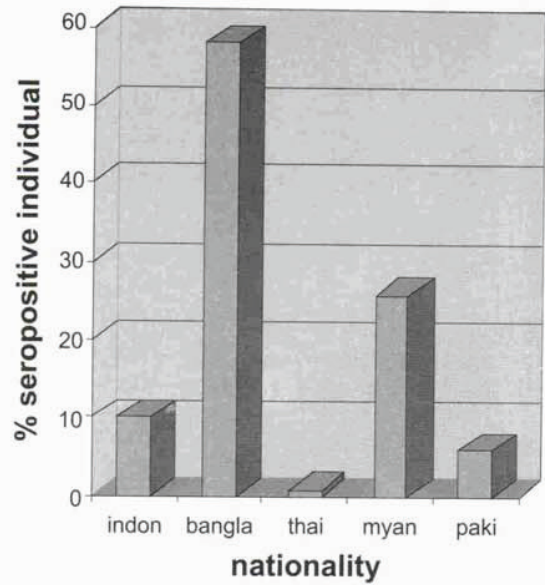


Figure 7. Percentage of seropositive for malaria by nationality.

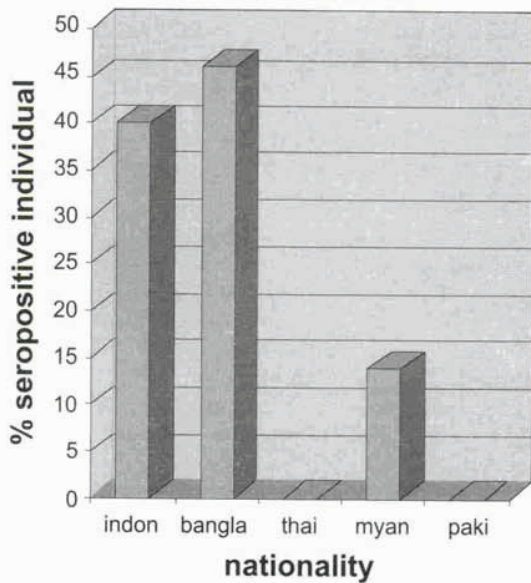


Figure 6. Percentage of seropositive for leishmaniasis by nationality.

There were 15 samples out of 232 which tested seropositive for leishmaniasis while 6 out of 15 (40%) were from Indonesians, 46% from Bangladesh and 14% from Myanmar (Figure 6).

For malaria, there were 657 samples and 177 were tested seropositive which 58% of the positive individuals were from Bangladesh, 26% were from Myanmar, 10% from Indonesia, 6% from Pakistan and 1% from Thailand (Figure 7).

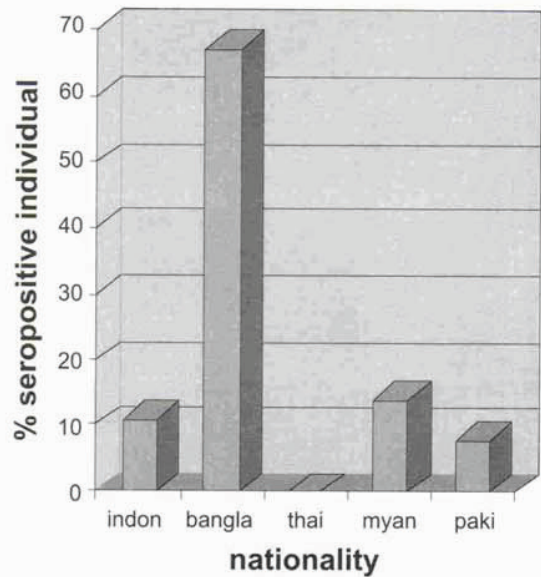


Figure 8. Percentage of seropositive for schistosomiasis by nationality.

Out of 623 samples tested for schistosomiasis, 72 were seropositive. Eleven percent of the seropositive samples were among the Indonesian workers, 67% among Bangladeshi workers, 14% among workers from Myanmar, and 8% were from Pakistani workers. Three samples from Thai workers were found negative (Figure 8).

Test to detect for trypanosomiasis was performed on 186 samples. Only 2 samples were found to be seropositive. One sample was from an Indonesian worker

and the other was from Bangladeshi worker (Figure 9). One sample from Thailand was found negative for trypanosomiasis. Out of 33 samples from Myanmar and 29 samples from Pakistan, all were negative for the trypanosome antibody.

Discussion

In the majority of cases, the diagnosis of parasitic disease is made based on the clinical laboratory examination through identification of the parasite itself in body fluids, tissues, or excreta. Clinical signs and symptoms, together with the

patient's travel history, may dictate what laboratory tests to employ and may suggest ancillary testing by other means such as radiography, ultrasonography, and magnetic resonance imaging.

In some cases, parasites may not be found in spite of careful search, and radiologic findings may be equivocal. In such cases, we may have to rely on immunodiagnostic methods to search for diagnosis on the basis of clues left either by the parasite itself (antigens) or by the body's response to parasitic invasion (antibodies).

In this study we were using serological method to detect the presence of antibodies to infections such as amoebiasis, echinococcosis, filariasis (*Brugia malayi*), filariasis (*Wuchereria bancrofti*), leishmaniasis, malaria, schistosomiasis and trypanosomiasis among migrant workers. Since workers were not screened for parasitic infection as part of the routine check up, this study will provide some new information about their parasitic infection status. Such information is important if diseases caused by parasites is to be prevented from being imported into the country.

Our findings showed that amoebiasis was the highest parasitic disease detected among the migrant workers with 28% of the samples tested positive, followed closely by malaria (27%). The third most common parasitic disease detected was echinococcosis (18%) followed by schistosomiasis (12%). The blood samples were seropositive for male workers: leishmaniasis (6%), filariasis (bm) (3%), filariasis (wb) 1% and trypanosomiasis (1%). Based on the female samples alone indicated that as much as 39.1% were found positive for amoebiasis. 33.3% were seropositive for filariasis (wb). Out of 34 tested, 11 (32.4%) were found positive for echinococcus antibody. For malaria, 11 out of 48 tested (23%) were seropositive. 9.8% were found positive for schistosomiasis, 4.5% were positive for leishmaniasis and 2.7% were positive for filariasis (bm). This data may suggest that a large population is not required to detect the presence of parasitic diseases among migrant workers. Therefore, any unscreened migrant workers entering

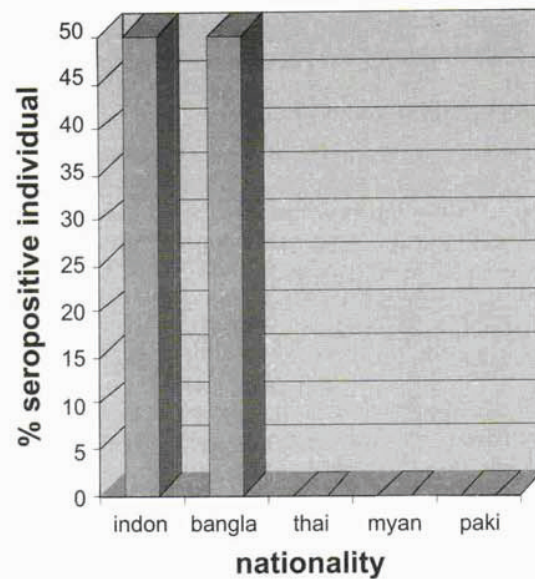


Figure 9. Percentage of seropositive for trypanosomiasis by nationality.

this country, should be considered as of potential parasitic disease carriers until confirmed negative.

Obviously, those harbouring a parasitic infection would be our main concern because they may act as a source of infection for transmission to the local population especially for diseases such as amoebiasis, malaria and filariasis. Those with 'non-transmittable' parasitic diseases (since vectors are not present in this country), may not be a threat to the local population, but if the parasitic disease is active, these workers may require medical attention.

It may be difficult however, to determine the infection status if we are to rely on serological methods alone especially when the test is based on antibody detection since the antibody may persist in circulation long after infection has gone. An individual who has been confirmed positive serologically for a parasitic disease, may not necessarily have an active infection after all. Therefore, those who were found positive serologically, need to be re-tested by employing other methods in order to determine their infection status. For malaria and filariasis, the test to be used is blood examination to look for the presence of parasite in the circulation.

However results obtained from blood examination, indicated that none of the malaria seropositive samples were positive on blood slide examination. In other words, no active infection was detected among the 27% malaria seropositives. This result may or may not be true. Most of the samples examined were actually obtained from those who were willing to participate in the study and majority of them who participated knew that they were healthy enough to take part. On the

other hand, these workers may be harbouring malaria parasites, but the number of parasites present were at a very low level and cannot be easily detected from a single blood examination.

In the case of filariasis, to detect the presence of microfilariae in circulation, blood samples need to be collected during night time. In this study however, all blood samples provided by the CIS were collected during day time, making it less suitable for microfilariae detection. Therefore, results obtained from blood examination were not reliable to be used to support the serological findings

Amoebiasis can be divided into intestinal and extra-intestinal/systemic infection. Serological technique is used to detect the extra-intestinal infection while the intestinal amoebiasis is detected using stool examination. Unlike the tests used in malaria and filaria infections, the two tests in the diagnosis of amoebiasis are independent. Once a person is found to have systemic amoebiasis, he/she seldom produces cystic forms which can be detected in the stools. Therefore, in order to determine the status of the systemic infection, tests that detect different levels of antibody titre need to be used. Unfortunately the test used in this study only provides qualitative results.

Conclusion

- Amoebiasis and malaria were the two major parasitic diseases detected among migrant workers.
- Workers from Bangladesh showed the highest

percentage on seropositive results: amoebiasis, echinococcosis, leishmaniasis, malaria and schistosomiasis.

- Female samples were seropositive for all the tests except for trypanosomiasis.
- Proper tests and proper sample collection need to be used for the detection of active parasitic disease among the seropositive individuals.

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