

PREVALENCE OF GASTROINTESTINAL PROTOZOA IN SCHOOL CHILDREN FROM MENGGATAL, SABAH

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ABSTRACT

A study had been carried out in Sekolah Kebangsaan Darau, Menggatal, Sabah to determine the prevalence of gastrointestinal protozoa in 150 school children of ages seven, eight and nine. Fecal samples were examined by three techniques which are direct examination, concentration technique and Kato-Katz technique. The total percentages for the gastrointestinal protozoa infections were 30 cases (20%). The 30 cases of infection were divided into four categories which are 21 cases of single infection, 6 cases of double infections, 2 cases of triple infections and 1 case of fourfold infections. The frequency of infection was *Entamoeba coli* : 13 (43.33%); *E. nana* : 8 (26.67%); *E. histolytica* : 5 (16.67%); *E. hartmanni* : 4 (13.33%); *Isospora belli* : 4 (13.33%); *Balantidium coli* : 4 (13.33%); *Giardia lamblia* : 3 (10%) and *Iodomoeba butschlii* : 2 (6.67%). There were no significant differences which the p-value greater than 0.05 in prevalence rates between child's fitness and demographic with infections.



PREVALENS PROTOZOA GASTROUSUS DI KALANGAN KANAK-KANAK DAERAH MENGGATAL, KOTA KINABALU, SABAH.

ABSTRAK

Kajian ini dijalankan untuk mengetahui prevelasi protozoa gastrousus yang hadir di kalangan 150 orang kanak-kanak dengan umur tujuh, lapan dan sembilan di Sekolah Kebangsaan Darau, Menggatal, Sabah. Tiga teknik telah digunakan dalam kajian ini iaitu; Kaedah Calitan Secara Langsung, kaedah pengapungan Formal-eter dan Teknik kato-katz. Peratusan terinfeksi oleh protozoa bagi kanak-kanak Sekolah Kebangsaan Darau, Menggatal, Sabah adalah sebanyak 20%, iaitu 30 kes. Dalam 30 kes tersebut, 21 kes adalah infeksi tunggal, 6 kes infeksi ganda dua, 2 kes infeksi ganda tiga dan 1 kes infeksi ganda empat. Kadar terinfeksi oleh protozoa gastrousus ialah *Entamoeba coli* : 13 (43.33%) ; *E. nana* : 8 (26.67%) ; *E. histolytica* : 5 (16.67%) ; *E. hartmanni* : 4 (13.33%) ; *Isospora belli* : 4 (13.33%) ; *Balantidium coli* : 4 (13.33%) ; *Giardia lamblia* : 3 (10%) and *Iodomoeba butschlii* : 2 (6.67%). Daripada kajian ini, didapati tiada hubungan di mana nilai p lebih daripada 0.05 antara kecergasan kanak-kanak dan faktor demografi dengan kadar terinfeksi.



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LIST OF ABBREVIATION

- °C degree of Celsius
- km kilometer
- rpm rotary per minute
- min minute
- egp egg per gram
- mm millimeter
- μm micrometer
- H₀ hypothesis null
- H₁ hypothesis alternatif



CHAPTER 1

INTRODUCTION

1.1 An Overview of the Parasitic Disease

The impact of parasitic disease on the peoples of this world is truly enormous. The protozoan organisms which cause these diseases are ubiquitous and are particularly prevalent in the vast tropical regions. Particularly hard hit by these infections agents are children: 75% of the global population is in the developing world and approximately 50% of these more than 3 billion people are under 15 years of age; 15% are in the age group 0-4. 97% of all infant and child deaths occur in this latter group and most of these fatalities are due to infectious diseases (Liss, 1988).

Malaysia is considered as developing countries with the rural communities comprising about 80% of the population. In these rural areas, there are many important endemic parasitic diseases affecting the health and well-being of the people. They include malaria, intestinal amoebiasis and amoebic liver abscess and giardiasis (Warren and Bowers, 1982). For many of these diseases diagnosis is complex and difficult and treatment is inadequate; vaccines are not now available for any human parasitic disease.



While these parasites tend to be found in greatest numbers in the tropics, their distribution may be cosmopolitan (Liss, 1988).

Dientamoeba fragilis is a pathogenic protozoan that has a worldwide cosmopolitan distribution. The prevalence of this organism varies widely occurring in up to 8.8% of fecal specimens from patients with diarrhea (Stark *et al.*, 2005).

Giardia lamblia is the most prevalent intestinal parasite in humans and found in drinking water. *G. lamblia* resides in the smaller intestine and at times in the gall bladder. Millions of these organisms will coat the intestinal walls, prevent the absorption of nutrients and later causing illness. Symptoms are mild to moderate abdominal cramps, intestinal gas, light colored stools, bad absorption, weakness, chills, stomach bloating and diarrhea (Pakeer, 1991).

Infection of the gastrointestinal tract with parasites was almost universal in the past and still remains widespread in some parts of the world. The patterns of intestinal infection vary widely with the type of parasite, the site of infection, the duration of infection, the number of parasites present and the host response. Among the clues to the presence of parasites are unexplained chronic diarrhea, weight loss and iron deficiency, often accompanied by increased eosinophils in the peripheral blood. In some cases, patients are infested with multiple different species of parasites simultaneously (Nelson, 1972).



A variety of conditions contribute to the prevalence of parasitic disease in the tropics and subtropics are unsanitary living conditions, inadequate funding for disease control and treatment, poor nutrition, lack of health education, regional and ethnic customs conducive to infection by parasites, climatic conditions and compromised immune system (Bogitsh and Cheng, 1998).

People with intestinal parasite infections are usually under-nourished and weak, infected with viral, fungal or bacteria and have various types of chemical and metal poisoning. Human intestinal parasites can be present in any disease, in any person, at any age (Cameron, 1956).

The world-wide distribution of parasites is determined by geographic factors, socioeconomic factors, age and crowding with poor food preparation and a break in the standard of water and personal sanitation being the major factors. While the impact of parasitic diseases on people remains relatively undiminished, the impact of modern science on parasitic diseases should soon enable us drastically to decrease the predations of these parasites on mankind (Liss, 1988).



1.2 Justification of the Study

Gastrointestinal infection is very common in Malaysia especially among the children from rural areas (Sinniah and Rajeswari, 1988).

According to Arbain (1992), infections of *Entamoebe histolytica* is apparently more prevalent in children than in adults. Besides, Thomas (1985) stated that children are easily infected by *Giardia lamblia* if compared with adults. Moreover, infections of *Isospora belli* and *Isospora hominis* are frequently happen among children compare to adults and majority of the infections are categorized as short-term infections.

Although the rate of gastrointestinal infections among the children in Malaysia is high but there are lack of the information about the prevalence of gastrointestinal protozoa in Malaysia (Hamimah *et al.*, 1982). Its shows that there are not enough study on gastrointestinal protozoa among the children in Malaysia especially Sabah.

Children are an important asset for a country. The status of their health will be effect the ability of one child to gain their knowledge and study well (Hanafiah, 2002). Therefore, the study is to analyze the prevalence gastrointestinal protozoa in school children from Menggatal, Sabah where the residents in Menggatal are those who are categorized as low income and the awareness of hygiene is low.



1.3 Objectives of the Study

The objectives of this study are:

- a. to determine the prevalence of gastrointestinal protozoa among school children from Menggatal, Sabah.
- b. to determine the relation between demographic (age, gender, religion, race, category of housing area, total household, resources of drinking water, preparation of water before drinking, types of toilet and natural disaster) and gastrointestinal infections.
- c. to determine the relation between child's fitness (body mass index) and gastrointestinal infections.

1.4 Scope of the Study

The subjects were the school children from Sekolah Kebangsaan Darau, Menggatal, P.O.Box 88820, Kota Kinabalu, Sabah. The ages of the children range from seven to nine years old with the average age of eight years old. Prior approval for the study was obtained from the headmaster of the school and the parents of the children. The parents were requested to sign a consent form agreeing or disagreeing to have their children participate in the study. They were also requested to indicate whether their children had received any anti-protozoan medicine during the last three months.



CHAPTER 2

LITERATURE REVIEW

2.1 Parasitology

The separation of parasitology from the study of bacteria and viruses which has been characterized as the field of microbiology has had negative consequences. While departments of microbiology have flourished in medical schools and in research institutes throughout the world, parasitology became immured in the relatively few schools of public health and tropical medicine. It is stricking to note that microbiology-immunology and molecular biology and also provided effective means of treatment (antibiotics) and control (vaccines). In contrast, parasitology produced no breakthroughs in basic science and is still plagued by the lack of effective and nontoxic drugs (Liss, 1988).

Human Parasitology is designed to know the fundamentals of diagnosis, treatment, pathology, transmission, and control of human parasites. A large portion of the above is learned simply by knowing the life cycles of the parasites and, thus, how to break the chain of infection. Therefore, much of this will concentrate on the basic life-cycles of parasites (Roberts and Janovy, 2005).



Parasitology is an important specialist field covering the latest advances in the subject. It focus on all aspects of parasitology and host-parasite relationships, ranging from the latest discoveries in biochemical and molecular biology to ecology and epidemiology in the context of the medical, veterinary and biological sciences (Phillips, 2005).

2.1.1 Gastrointestinal Diseases in Malaysia

Gastrointestinal diseases such as amebiasis and giardiasis was known as the enemy to the residents at rural areas in Malaysia which causes malnutrition, poor and others (Pakeer, 1991). In Malaysia, prevalence of amebiasis are 16% in local inhabitant and it may reach 6% at the surroundings villages (Pakeer, 1991).

There are a few surveys about the prevalence of gastrointestinal diseases been held out in Malaysia. Those surveys conclude that the rate of prevalence of gastrointestinal parasites is high and it is very common to have a few types of parasites in one's body. In those surveys had show that both children and adults have the same infection rate but the rate of prevalence increase when the ages increase (Hamimah *et al.*, 1982). *Giardia lamblia* is endemic in Malaysia as well as the neighboring countries. Anyway, there are not much information about the gastrointestinal protozoa in Malaysia (Hamimah *et al.*,1982).



2.1.2 Factors Influencing Prevalence of Gastrointestinal Infections

The likelihood of acquiring intestinal parasites depends on several factors. The presence of the specific infectious agent, an appropriate vector or mode of transmission and a host who is susceptible to the infectious agent (Mandell, 2000).

There are few factors shown below which have a profound overall influence on the prevalence of parasitic disease in tropical countries.

a. Unsanitary Living Conditions

In most tropical and subtropical countries, construction of modern sewage systems is still in the planning or preliminary stages. Consequently, raw sewage contaminating open trenches and streams remains very common. In rural Southeast Asia, for example, shacks built on stilts overhang streams polluted with human and animal excreta and vegetation growing in these stream is often gathered for human consumption. Such scenarios create ideal environment for the transmission of parasitic and other diseases (Ismail and Mohamed, 1990).



b. Disease Control and Treatment

Third world nations including most tropical countries, invariably have limited funds in their national budgets for public health, the research and other programs essential to improving conditions are costly. The control of snails that transmit schistosomiasis, for example, is an expensive undertaking involving vehicles, pumps and other machinery and chemicals. Consequently, in spite of aid from such international agencies as the World Health Organization, funding for disease control is vastly inadequate (Bogitsh and Cheng, 1998).

Parasitic diseases most commonly afflict the poor and unfortunately pharmaceutical companies are reluctant to invest large sums in research and development of new drugs that victims are unlikely to be able to afford. Where significant progress has been made over the past two decades in developing new drugs, limited production has kept the price high beyond the means of most of the afflicted population (Bogitsh and Cheng, 1998).

c. Poor Nutrition

Immunological defense mechanisms in all animals including humans are influenced by several physiological processes including nutrition. In most parts of the world where parasitic diseases abound, malnutrition plays an important role in susceptibility to disease and the manifestation of clinical symptoms. Undernourished persons especially children



suffering from protein deficiency are particularly vulnerable to infection, physical and physiological deviations from the norm are also markedly more pronounced especially among the young. Good nutrition confers some protection against most parasitic diseases such as *Entamoeba histolytica* is much less invasive in people in living on a mixed diet which includes meat than in those individuals restricted to carbohydrates (Garnham, 1971).

d. Health Education

Education of the population in endemic concerning methods of reducing or eliminating parasitic infections is probably the most economical approach to disease control. Educational programs usually involve teams that present illustrated lectures to school children in rural areas. Longstanding practices and attitudes often produce stubborn resistance to change. However, while such efforts alone have limited effect, they can be useful when incorporated into more comprehensive programs involving the media and other advertising ploys such as road signs (Ismail and Mohamed, 1990).

e. Regional and Ethnic Customs

Epidemiological have long recognized that certain regional and ethnic customs practiced by inhabitants of third world countries in the tropics and subtropics contribute significantly to the spread of parasitic diseases. In Moslem countries, ablution is a common practice. The use of communal pools for this ritual bathing of previously



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