BILHARZIASIS

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Bilharziasis is a disease that is attracting ever-increasing attention in South Africa. Although it has been recognized in this country for over a century, it is for little more than a decade that the seriousness of our bilharzia problem has been generally realized. Public statements and press reports have suggested that the disease is rapidly spreading and that sufferers may be exposed to serious or even fatal consequences. Demands for state action to control the disease are becoming vociferous.

The questions now arise:

Is the disease spreading?

How serious are the consequences of infestation?

What can be done to control the disease?

DISTRIBUTION IN SOUTH AFRICA

Bilharziasis is essentially a disease that flourishes in rural areas, but which penetrates into peri-urban areas under certain circumstances.

Before the opening up of the Northern and Eastern Transvaal to agricultural and industrial development, the Bantu lived in scattered villages and tribal units. With the control of malaria, improved communications and the development of agriculture, commerce and industry, came irrigation and water conservation schemes and, very important in the spread of bilharziasis, increasing population movement and migration. Thus opportunities for the disease to spread from relatively limited, local infected areas to newly settled areas were greatly enhanced.

With improved means of transport and the increasing popularity of pleasure resorts, nature reserves and camping sites in endemic areas, visitors from farther afield increased greatly in numbers with the consequence that some became infected with bilharziasis. These visitors, together with labour attracted to urban and peri-urban employment, were thus able to convey and maintain bilharzial infestation in unprotected waters in the vicinity of many urban areas.

In all countries in which human bilharziasis is a menace to the public health, 2 common factors are almost invariably associated with the problem of increasing incidence and difficulty of control. These 2 factors are human migration and irrigation.

The areas in South Africa in which human bilharziasis were endemic, were mapped over 30 years ago by Dr. Annie Porter and other workers. These areas have remained remarkably constant ever since. There is little or no evidence to suggest that our endemic areas are becoming more widespread. If bilharzia is becoming more prevalent, it means that the increase of incidence is occurring within the endemic areas. It is apparent, however, that when all epidemiological factors are favourable, transmission in the Transvaal tends to spill over into certain waters on the fringe of the recognized endemic areas, and even further afield, perhaps in the form of limited and temporary, but minor, epidemics.

THE HUMAN VICTIM

As medical officers, the human victim is our ultimate concern. They are very numerous indeed in certain of our endemic areas, where bilharziasis is, no doubt, the most prevalent disease and our most serious parasitic problem. The Bantu are numerically by far the greatest sufferers, but up to now, the least seriously afflicted as individuals.

In Egypt and elsewhere, and even as close to us as Moçambique, bilharzia is regarded as a killer disease. Much morbidity and mortality is ascribed to infestation with the bilharzia parasite. There is much clinical and pathological evidence to support the alarm with which the bilharzia problem is regarded.

In South Africa, reliable and experienced workers have described bilharzial lesions in almost all of the organs of the body. Apart from lesions in the genito-urinary system and in the bowel, lesions in the lung, the liver and in parts of the central nervous system have been found. Cirrhosis and cancer of the liver have been attributed to bilharzia. This disease is held by some as largely responsible for the incidence of cancer of the bladder in the Bantu races.

Clinically, patients present themselves with acute and chronic manifestations of bilharziasis, and physical and mental retardation in school children have been ascribed to infestation with the parasite.

In contrast to all the morbidity and mortality attributed to bilharziasis, both within and without South Africa, it is quite obvious to many persons that the great majority of Bantu persons, even in endemic areas where the rate of infestation may be as high as 80% or more in the younger age groups, act as hosts to the schistosome in moderate or in complete comfort and often have no symptoms of the disease. The occurrence of haematuria and minor bowel disturbances are often accepted with equanimity. Spontaneous cure appears common. Symptomless bilharziasis is also known among the White population, as is spontaneous cure.

On the evidence available, it is not uncommon to find that our bilharzia problem is often viewed with minor concern. Certain workers have had difficulty in finding evidence of serious bilharzial lesions at postmortem examination. Perhaps we have not collected and recorded sufficient clinical and pathological material from our highly endemic areas. Perhaps we have been inclined in our research programmes to concentrate too much upon the behaviour of the snail rather than upon the reaction of man to the schistosome, but it would be a major public health error to underestimate the menace of bilharziasis in the Republic of South Africa. Timeous attention to this problem may find us prepared, should we find that bilharzia is responsible for rising morbidity and mortality rates.

With the spread of water-conservation schemes, it may be found that opportunities for heavier infestation and year round transmission are increased.

THE BILHARZIA PARASITE AND THE VECTOR SNAIL

The 2 most important snail vectors of bilharziasis in South Africa are *Bulinus* (*Physopsis*) *Africanus*, conveying *Schistosoma haematobium* and *S. mattheei*, and *Biomphalaria pfeifferi* conveying *S. mansoni*. *S. mattheei* is a parasite of cattle, sheep, goats and certain antelope, but is found to cause disease in man.

The vector snails are entirely aquatic and act only as intermediate hosts of the disease. The disease cannot be passed directly from one snail to another; each snail must be attacked by a larval form of the schistosome that hatches from an egg excreted by man in his urine or faeces. Once infested, a snail may eventually shed numerous cercariae. The cercariae of other species of schistosome, including non-mammalian types, may be seen when vector snails are shedding. Schistosomes that do not develop within man may, however, penetrate his skin and cause urticaria and irritation.

The greatest danger to man being attacked by cercariae does not lie in our large dams, large rivers or disturbed waters. Small irrigation dams, irrigation canals and sluices, small streams and stagnant pools are often highly dangerous. Roadside pools may be colonized by vector snails, particularly if polluted by man. Water far from habitations is safer than that situated close to villages and compounds.

The cercariae of the schistosome, which are shed by vector snails, may be found in dams and tanks that are protected from snail entry, and these are quite capable of attacking man. For bilharzia transmission to occur, conditions must be suitable for cercariae shedding and for cercariae survival and not only for the existence of the snail host. Snails are often found in small collections of water quite isolated from other waters.

PREVENTION AND CONTROL OF BILHARZIASIS

No complete solution to the bilharzia problem has ever been offered and the possibility of bilharzia eradication in South Africa is not within sight. Attempts to control bilharziasis must vary with the different circumstances that exist in different countries or within a country itself.

1. *Eliminating the Human Reservoir*

In South Africa, the most important reservoir of the disease is undoubtedly the Bantu family in endemic areas, living close to nature and being dependent upon unprotected natural or artificial surface waters for all domestic purposes and for bathing. This reservoir exists not only in remote Bantu areas, but has developed on farms, on White settlements, on industrial premises and in locations.

If this reservoir were to be eliminated by effective mass treatment, we should go a long way towards gaining control of our bilharzial problem. Unfortunately, attempts at mass treatment would be of small value. The drugs available for treatment are far from easy to administer, even under close supervision; population resistance to mass treatment would be an important factor, as is the case with attempts to immunize the population against other transmissable diseases; the side-effects of the drugs in use vary from the unpleasant to the dangerous. (Fatal results from improperly supervised attempts at treatment have been reported.)

Attempts at mass treatment, where opportunities exist for prompt re-infestation, serve no public health purpose and constitute fruitless expenditure. The discovery of a highly effective, single-dose, orally administered drug of low toxicity might, however, make mass treatment attempts worth while.

2. *Eliminating the Vector Snail*

Attacks on the snail as a means of gaining control over bilharzial transmission are regarded by many as the most promising approach to the problem. There is much literature and much controversy on this subject and many experiments have been carried out in South Africa and elsewhere. It is generally agreed, however, that such attacks do not lead to the elimination of bilharziasis from any country, but that limited success on a limited scale may be anticipated under certain conditions.

Chemical poisons (molluscicides) are generally used for attacks upon snails. Mulluscicíding of waters offers many difficulties and disappointments. Regular and repeated applications are essential. The poisonous effects of the known molluscicides are not limited to vector snails or to snails alone and it is claimed that repeated applications of certain chemicals to irrigation water may adversely affect arable land.

The effectiveness of molluscicides varies with the chemical composition of the water to which they are applied and with the acidity and alkalinity of the water. Some are destroyed by sunlight.

The administration of molluscides to extensive surfaces of water would be an expensive undertaking, demanding a large labour force, close supervision and constant search for surviving snail colonies.

It is doubtful whether the use of known molluscicides, except on a limited scale, is worth while as an effective measure in South Africa. Residual molluscicides with specific affinity for the snail, are not yet available.

Should mollusciciding be attempted on an extensive scale, individual owners or occupiers of land, including local authorities, farmers and Bantu headmen, would have to cooperate, and become conversant with methods and possible snail identification, to ensure success. Snail eradication would not only be beneficial in controlling human disease, but would assist in controlling certain diseases in stock, e.g. liver fluke disease.

3. *Environmental Control*

It seems as essential to study the habits of man in relationship to water as it is to study the ecology of the snail.

If human beings were to avoid all suspected waters, bilharzia transmission would become infrequent and the schistosome might gradually die out. Animal hosts of the human trypanosome would probably not offer a great problem. As the human being needs water, he cannot be kept away from dangerous water unless he is supplied with safe water for all domestic and recreational needs. Unless water conservation and irrigation projects are so planned and developed as to discourage snail infestation and to minimize pollution by man, problems of bilharziasis control will increase with each new scheme developed within our endemic areas.

Settlement and resettlement of populations, unless carefully planned with the health hazards in view, may very easily add to the bilharzia problem and require a great deal of work to remedy.

The supply of safe water to all those at risk would be a great step forward in an antibilharzial campaign in South Africa and would greatly increase the value of such measures as group treatment of infected individuals and the application of molluscicides to limited collections of water.

TREATMENT OF BILHARZIASIS IN MAN

The treatment of the individual is not, at present, of great importance from the public health point of view, nor is the seriously ill bilharzia patient. It is the active and mobile person who is asymptomatic or the mildly affected individual who constitutes the greatest danger by maintaining the disease in South Africa. It would be an impossible task, however, to trace all infected individuals by means of serological or microscopic examinations, to treat them under supervision, re-examine them for cure and to ensure against re-infection under existing tribal and environmental conditions.

Although not a basic public health measure at present, I believe all persons who present themselves for treatment should receive treatment. All persons belonging to susceptible population groups, which exhibit no evidence of possible immunity, should be encouraged to have themselves examined if exposure is suspected, and treated, and

all persons with acute or chronic symptoms should be given one or more courses of treatment. It is not, however, always easy or possible to affect complete cure with the drugs at our disposal, and some patients may react more seriously to the treatment than they do to the disease.

Medical practitioners are resorting more and more to the serological test (complement-fixation test) as a means of diagnosing bilharziasis and as an indication for commencing treatment. This tendency is not to be commended and is the cause of many complaints from patients on account of the expense involved.

Generally speaking, a diagnosis of bilharziasis should be made from the microscopic examination of a patient's urine or faeces, or by means of rectal snips. Treatment should generally not be undertaken on a positive serological test alone. This test does not become negative immediately following a successful course of treatment.

As the test becomes positive in approximately 3 weeks after infection it may be useful in the acute invasive stage of bilharziasis in suggesting that febrile attacks, urticaria, allergy, liver dysfunction, etc., are possibly the result of a bilharzia infestation. It may also be of assistance in the differential diagnosis of obscure lesions where ectopic development of the worm has taken place.