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ENDEMIC VECTOR-BORNE DISEASES IN EGYPT AND THE ROLE OF THE MINISTRY OF HEALTH IN THEIR PREVENTION AND CONTROL

by

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I INTRODUCTION

Endemic vector-borne diseases represent major health problems in the tropics and sub-tropics, particularly in rural areas where the environment, the lack of sanitation, the behaviour pattern of the population and illiteracy combine to provide a favourable habitat for the vector and augment the risk of exposure. The level of endemicity, prevalence and morbidity of these diseases are greatly influenced by man - vector contact, socio-economic standards, environmental changes, and the energy with which control programmes are formulated and implemented.

In Egypt, the endemic vector-borne diseases of importance are schistosomiasis (bilharzia), malaria, filariasis, leishmaniasis and Rift Valley fever.

The following is a brief account of the epidemiology of these diseases and of the role of the Ministry of Health in their prevention and control.

II PREVALENCE OF SCHISTOSOMIASIS

Schistosomiasis, the most prevalent and serious endemic disease in Egypt, has almost invariably been rated as the most important health problem of the country. The disease became endemic as a result of the settling of villages along the Nile Valley. The situation was aggravated by the presence of an abundant water supply for irrigation and domestic purposes. The continuing development and expansion of irrigation and drainage schemes, particularly the diversion from a basin to a perennial irrigation system, entailed potential dangers for spreading the disease. Furthermore, the construction of the enormous network of open canals and drains with a large surface area opened up huge foci of infection. Nevertheless, neither environmental control principles nor preventive measures were incorporated in any of these schemes.

The economic loss related to schistosomiasis is generally estimated at a minimum of 150 million Egyptian pounds annually excluding losses due to complications.

In Egypt, schistosomiasis of both the haematobium and mansoni types are prevalent. The haematobium variety is prevalent throughout the country, whereas the mansoni variety is confined to the Nile Delta with a higher degree of prevalence in the northern districts. In Upper Egypt, mansoni shows a focal distribution only in Giza Governorate. A survey carried out in 1935 covering about 40 000 individuals in a number of villages throughout the country indicated an overall prevalence of haematobium of 48% while it was found that mansoni was absent south of Giza but had an overall prevalence in the Delta of 32%.

Twenty years later, in 1955, the Ministry of Health carried out a similar survey covering a large sample of 124 000 in the same localities; the prevalence of haematobium was shown to have been reduced by 40%, and that of mansoni by 70%. The declines were explained by the impact of the energetic efforts of the Ministry of Health during the intervening period. The survey also showed that peak prevalence by age had shifted towards younger groups, indicating increased transmission despite the apparent drop in overall incidence, and the possibility that adults might have acquired partial immunity to the disease.

In 1979, sample surveys carried out in the Nile Delta showed that the overall prevalence of haematobium was 13.7%, ranging from 12.8% in the northern areas to 17.8% in the south. The mansoni type was prevalent at a rate of 9.9%, ranging from 29.8% in the north to 1.8% in the south. Before the implementation of schistosomiasis control projects, haematobium was prevalent in Middle Egypt in 1977 at a rate of 29.3% while in 1979 in Upper Egypt, south of Assiut to Aswan, prevalence was 26.3%.

The prevalence of schistosomiasis is generally higher in males and the age specific prevalence rises to a peak in the 10 - 15 year age group; these results can be explained by the greater degree of exposure of these groups, due to behavioural, social and occupational factors.

The most important factors affecting schistosomiasis prevalence in Egypt can be summarized as follows :

1. Factors tending to increase prevalence
   (a) Change of irrigation systems from basin to perennial,
   (b) Land reclamation,
   (c) Water development projects.

2. Factors favouring reduced prevalence
   (a) Available infrastructure of 2400 rural health units serving almost all villages with a population of 5 000 or more,
   (b) Potable water has been supplied to 95% of villages,
   (c) 10 000 schools have been established in villages,
   (d) Promotion of the socio-economic standards of the rural population.

Bulinus truncatus, the vector snail for haematobium, is found in irrigation and drainage canals throughout the country. Biomphalaria alexandrina, the vector snail of mansoni, is more frequently found in drains than in irrigation canals; it is abundant in the northern area of the Delta and less so in the south.

Lately, certain changes in the epidemiological pattern have been observed :

(a) The prevalence of haematobium in the Delta is on the decline while that of mansoni has been increasing steadily; the change has been accompanied

by a progressive increase in the population density of Biomphalaria alexandrina and a decline in that of Bulinus truncatus.

(b) In Upper Egypt Biomphalaria snails have been detected along the shores of the Nile and in the entries of large canals and drains in almost all governorates.

(c) In one village in the Beni Suef district, schistosomiasis ova with lateral spine have been detected in urine samples of school children with unus frequency.

III CONTROL OF SCHISTOSOMIASIS

Egypt was one of the first countries in the world to apply control measures agains schistosomiasis. Mass treatment campaigns started in Egypt, as early as 1921 and the first endemic disease units were established during the same year. In 1927 Khalil started the first molluscicide operation on a field scale using copper sulphate. Subsequently nationwide measures, including surveillance, chemotherapy, snail control and health education, were promoted over a wider area. A number of pilot projects were implemented in which either chemotherapy or snail control was employed as single strategy; however, the results lacked the consistency which would have interrupted transmission.

In the Fayum Schistosomiasis Control Project, as a result of integrated control measures involving the joint use of snail control and selective population chemotherapy, the prevalence of haematobium dropped from 45.7% in 1968 to 6.2% five years later. No new cases were detected in children below 5 years of age in the evaluatio survey made in 1976. A total of 38 567 kms of water courses were surveyed for infect snails but infestation appeared in only 0.5 km. The cost of the molluscicide

Bayluscide used during the years of active intervention did not exceed one million Egyptian pounds.

The limited results of single strategies and the achievements of the Fayum project in terms of preventing re-infection and effectively reducing transmission encouraged the Ministry of Health to adopt an integrated strategy in a nationwide programme to control schistosomiasis throughout the country over a 10-year period.

Egypt was accordingly divided into the following 10 areas :

1 Sinai	2. Suez Canal Zone	3. Eastern Delta
4. Middle Delta	5. Western Delta	6. Giza
7. Fayum	8. Middle Egypt	9. Upper Egypt
10. Dam Lake Area		

The areas were selected on the basis of the following criteria :

1. Well defined natural borders,
2. Same source of irrigation,
3. The same epidemiological features.

Priority in implementation was given to the Upper Egypt areas for the following reasons :

1. The earlier rise of prevalence after the irrigation system had been changed from basin to perennial,
2. Tunnel drainage projects had entailed the excavation of new drains and the widening of old drains, so that there was a wider bed for the breeding of snails,
3. In Upper Egypt, haematobium is the only species prevalent; the safe,effective and inexpensive drug Metrifonate was available,

4 To protect Upper Egypt from invasion by mansoni, particularly as Biomphalaria snails are now distributed along the course of the Nile from Cairo to Aswan,

5. Potential immigrants attracted to the High Dam Lake area by various development projects, required protection.

1. Middle Egypt project

The project area covers about 1 050 000 feddans between Beni Suef Governorate and Assiut town north of the Aswan Dam; it contains about 4.5 million people in 648 village The project was implemented in 1977.

Primary examination showed a prevalence of haematobium of 29.3%

Preliminary epidemiological evaluation through examination of cohort sample surveys indicated a drop in the overall incidence to 11.6% (reduction of 60 5%).

2. Upper Egypt project

The project area covers about 1 120 000 feddans between Assiut and Aswan and contains about 5 million people in 674 villages. The project was implemented in 1981.

IV PREVALENCE OF MALARIA

Anopheles pharoensis, the main vector of malaria in Egypt, is found in immense numbers throughout the valley of the River Nile; it breeds in almost all stagnant and semi-stagnant water collections containing vegetation. A.sergenti is a more efficient vector and breeds along the beds of streams, the edges of pools from springs and in rice fields; it is abundant in the Fayum Governorate, in the Suez Canal Zone and the Sinai Peninsula. This distribution pattern almost coincides with the distribution of Plasmodium malariae, A. multicolor breeds in brackish salty springs

in Sinai, the Oasis and in Fayum; its role as a malaria vector has been debatable. A. gambiae, on the other hand, is not a normal inhabitant of Egypt but, in 1942, it invaded the country from Sudan. The Aswan area, particularly at the southern borders of the High Dam Lake, is considered a potential port of entry.

The 3 common malaria parasites, P. vivax, P. malariae and P. falciparum exist in Egypt, in varying degrees of prevalence and intensity in different localities depending on climatic and entomological factors. P. malariae infection prevails in Fayum and the Oasis, while P. vivax and P. falciparum exist in the Nile valley.

In Egypt, in the past, malaria maintained a high level of endemicity and prevalence with alternate epidemic outbreaks. During the last malaria epidemic, in 1960, cases amounted 88053 with 16 deaths. In 1970, cases notified were only 2374.

Table I below reviews the number of samples examined through surveillance in villages, according to the returns of the Malaria Control Units, between 1975 and June 1981.

TABLE I

Year	No.examined	Benign	Malignant
1975 (6 months)	777 264	789 (0.1%)	11 (0.001%)
1976 "	241 710	369 (0.15%)	18 (0.007%)
1977	1 343 323	830 (0.06%)	209 (0.02%)
1978	1 222 776	738 (0.06%)	128 (0.01%)
1979	1 352 405	433 (0.03%)	77 (0.01%)
1980	1 282 540	369 (0.03%)	4 ..
1981 (6 months)	630 009	109 (0.02%)	..

It is evident, therefore, that malaria in Egypt has reached a hypo-endemic level of minor prevalence as a consequence of the impact on the mosquito vectors of the use of insecticides in agriculture and of the energetic efforts of the Ministry of Health.

V CONTROL OF MALARIA

A special department with responsibility for control of malaria and filariasis is affiliated to the Ministry of Health. Implementation of the control programme is carried out through 100 Malaria Units established in almost all districts in Egypt and through the part-time activities of 2 400 Rural Health Units.

1. The plan of control includes the following elements :

1.1 Surveillance

Blood slides are taken from all cases with high fever attending Fever Hospitals, Malaria Units, General Hospitals, Rural Health Units and Mother and Child Care Units. Blood slides are taken from all contacts of cases and areas showing multiple cases or malignant malaria must be surveyed.

1.2 Chemotherapy

4-Aminoquinoline and 8-Aminoquinoline are employed for the treatment of cases. The adult dosage schedule is as follows :

4-Aminoquinoline : 1500 mg. on 3 successive days

8-Aminoquinoline : 210 mg (15 mg. daily for 14 days)

Contacts are given : 4-Aminoquinoline 600 mg.

and 8-Aminoquinoline 60 mg.

1.3 Measures against adult mosquitoes and aquatic larvae

Malaria Units and sub-units spray all breeding places within a perimeter of 2 kilometers. A mixture of solar mixed with Malathion emulsion (57%) - 2% and mazotze 5% is used for spraying.

Residual spraying with insecticides is restricted to villages showing an increased incidence of cases, particularly in rice field areas.

There has been a movement in Egypt in favour of including measures for the prevention and control of water- and vector-borne diseases in appropriate projects at the early planning stage.

VI PREVALENCE OF FILARIASIS

Wuchereria bancrofti is the only filarial parasite species found in Egypt. The vector, Culex pipens molestus, is a domestic mosquito found in relatively dense numbers throughout Egypt during the spring, summer and autumn.

Cases are focally distributed in almost all Governorates in the Nile Delta and the Suez Canal Zone, particularly in Qualyubeiah, Sharkeiah, Damietta, Dakhaleiah and Rasheed (near Alexandria). In Upper Egypt cases have been recognized only in the Giza and Assiut Governorates. A national programme to survey filariasis in Egypt was implemented in 1975; Table II below gives statistics regarding the number of individuals examined and the number of positive cases showing microfilariae in peripheral blood, 1977 - 1981.

TABLE II

Year	Samples Examined	Positive (microfilariae)	%
1977	554 457	452	0.08
1978	1 550 970	1 633	0.11
1979	2 647 699	1 766	0.07
1980	2 959 095	2 605	0.09
1981	2 510 776	2 723	0.11

The infection rates in different localities do not however coincide with the density of the vector Moreover, the morbidity of filarial lymphatic complications varies in different sites and does not conform to the rate of infection.

Control of filariasis is sponsored by the Malaria and Filariasis Control Department of the Ministry of Health, supported by local, municipal, engineering and agricultural authorities. Measures of control include surveillance and appropriate treatment of cases with a view to minimizing complications and reducing the human reservoir. Control measures against the adult vector and its larvae are also employed. It is worth mentioning that, in Rasheed, the filling of unused wells was followed by a marked drop in prevalence and morbidity.

VII LEISHMANIASIS

1. Cutaneous leishmaniasis

The disease has been endemic in the Sharkeiah Governorate. Khalil in 1937 reported that 17.2% of the inhabitants of Hehya showed active cutaneous lesions and that 26.9% had scars. Later, the areas of Sohag, Assiut, Edfina, Canal Zone and the Imam El Shafeii district of Cairo were reported to be areas of infection; subsequently an outbreak was reported among troops camped in Ballah, Suez Canal Zone before the

1973 war. It is possible that this last outbreak was caused by trench-digging which disturbed rodents.

2. Visceral leishmaniasis

Records of the disease in Egypt include only the following individual cases :

(a) In 1904, 5 cases were discovered in Kasr El Aini Hospital; three of them were not residents of Egypt.

(b) In 1930, 2 cases were reported from Alexandria; both were Greeks.

(c) No further cases have been reported during the last 50 years.

There is however a potential danger of importing the disease through labourers returning from other Arab countries, particularly Saudi Arabia and Iraq.

Lately, a study to investigate the epidemiology of arthropod-borne diseases in Egypt (leishmaniasis, malaria and Rift Valley fever) was implemented by the Ain Shams University; a minimum of 15 000 individuals of all ages was to be examined in each Governorate for leishmaniasis. The results of the survey are contained in Table III below.

TABLE III

Governorate	No. examined	Clinical cases	Reported by Dermatologists
Sharkeiah	166 021	197	8
Beheirah	16 501	..	2
Alexandria	16 032	..	5
Matrouh and Oasis	17 300	..	..
Cairo	..		6

A single case of visceral leishmaniasis was diagnosed through sternal puncture, in a Sudanese.

VIII RIFT VALLEY FEVER

During the Rift Valley fever epidemic in 1977, official data indicated morbidity of 18 000 clinical cases with a case mortality rate of 3.3%. It was estimated by Darwish in 1981 that clinical cases ranged up to 200 000. In 1979, a serological study covering 24 426 samples from all Governorates indicated an overall positive sera of 5.9%; the highest level was in Assiut (19%), followed by Sharkeiah (15.4%) and Aswan (8.3%).

Studies carried out by Ain Shams University were to investigate :

(a) The epidemiology of Rift Valley fever in Egypt,

(b) Possible vectors and reservoirs as well as the role of sandflies, mosquitoes and blood-sucking flies of the genus Culicoides in the domestic transmission of the disease;

(c) Possible measures for control and prevention.

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