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MALARIA PROBLEM, MALARIA RESEARCH AND MALARIA CONTROL IN EAST PAKISTAN

by

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Malaria has been recognized as one of the greatest problems in Bengal. Though not a dramatic killer like cholera, yet malaria has been known to cause sufferings, devastation and deaths in many places.

When the Department of Public Health was started about forty years ago, malaria was taken up as its number one problem, and maximum amount of time and money were spent to solve this problem. Research and control were simultaneously taken up but to all intents and purposes, it proved no more than palliative. Dr. C. A. Bently, the then Director of Public Health, Bengal, laid stress on research work and created the post of Assistant Director, Malaria Research for thorough investigation into the problem. Drs. S. N. Sur, P. Sen, Mr. M.O.T. Lycuger and others carried out extensive malaria surveys in rural and urban areas and tried to contribute to the solution. The present activities of malaria research in East Pakistan are a continuation of the previous thirty years work in this line.

THE FOUR DIFFERENT REGIONS OF EAST PAKISTAN

To understand properly and make an assessment of the malaria problem of East Pakistan, it may be necessary to give the general features: topography, climatic conditions, etc., of this part of Pakistan. The province can be divided into at least four distinct regions.

1. The mountainous and sub-mountainous regions in the north-east and extreme east and south-east comprising the districts of Sylhet, Chittagong, Chittagong Hill Tracts, eastern portion of Tipperah, northern parts of Mymensingh and Noakhali fall into this region. The soil consists of rocks, gravel and clay.

2. The undulating plains of the north west, comprising the western parts of Rajshahi, southern parts of Dinajpur and the Bhawal region of Dacca in the centre constitute another region where the soil is mostly laterite. The area is drier than the rest.

3. The comparatively higher plains in the centre, south-west and on the north, where deltic formation has ceased, are the districts of Rajshahi, Dinajpur and parts of Rangpur, Kushtia, Jessore, and Mymensingh. The soil here is usually clay.

4. The great flat plains where deltic formation is still active, have got two distinct features: On the east, the districts of Dacca, Faridpur, Pabna and Noakhali and parts of Mymensingh which are subjected to regular floods during monsoon only have got one feature. On the south, however, the district of Bakergonj, Khulna and the northern parts of Noakhali have got another feature which is not only subjected to flooding during the monsoon but also flushed by the tidal flooding of the rivers twice a day, during the greater part of the year.

THE CLIMATIC CONDITIONS OF EAST PAKISTAN

TEMPERATURE

In East Pakistan the average mean temperature, specially during monsoon can be looked upon as a predisposing factor, having bearing on the breeding of anopheline mosquitoes and development of malaria parasites in Anopheline mosquitoes. The average mean is about 25°C and does favour the prevalence of malignant tertian malaria. The temperature in East Pakistan during the malaria season generally varies within this range.

HUMIDITY

Like temperature, humidity remains favourable for the breeding of mosquitoes practically throughout the year in East Pakistan. The months of December, January and February, when conditions of relative humidity become slightly unfavourable may be taken as exceptions.

RAINFALL

The rainfall and the period over which the rainy season continues have got much influence on the prevalence and distribution of malaria in East Pakistan. The rains favour extensive breeding of Anopheline mosquitoes. During the later period of the monsoon when intermittent moderate rainfall occurs with intervals of sunshine, sufficient ground

and time for oviposition and hatching is afforded. Contrary to what is seen in West Pakistan, malaria is most prevalent in this part during the year of heavy rains. It begins shortly after the subsidence of the overflow from the region when water starts collecting in the shallow pools and puddles. In East Pakistan rains generally start by the middle of June and continue till the end of September, with maximum falls during the months of July and August.

ALTITUDE

The theory being that, the higher the altitude, the less is the breeding of Anophelines. East Pakistan is a more or less plain and flat country and so the advantage of altitude in limiting the breeding of Anophelines or malaria transmission is not present here.

LATITUDE

The regions that fall within the latitude of 60°N and 40°S are considered the regions of malaria. The entire Pakistan and India fall within this range of malaria distribution.

SUBSOIL WATER

Almost everywhere, the level of subsoil water is comparatively high in East Pakistan. The high ground water level has got effect on the formation of marshes and jungles and this with the addition of favourable temperature and humidity are contributing factors to the high endemicity of malaria and its sudden flare up.

CULTIVATION

Drs. Stewart and Procter reported after investigation that malaria in undivided Bengal has got a definite relation to the cultivation of rice in close proximity to villages. It is perhaps not the rice cultivation but the association of rice cultivation with water is the responsible factor. According to the observation of P. Sen, larvae of A. philippinensis first appears when the rice plant is 16 inches high but disappear when it reaches two feet in September. This may be due to some effect of shade. Harvesting of rice and jute disturb the environment and increase the organic contamination of water in which only a few species of non-vectors can breed.

MALARIA RESEARCH

Almost every year after Independence, malaria surveys have been carried out for the purpose of malaria research and malaria control. The records of the last three years are furnished below.

SPLEEN INDEX

From a sampling at random a number of 1,688 villages from eight districts of East Pakistan where splenometric surveys were carried out, the results show that only three districts, namely, Kushtia, Jessore, and Dinajpur are still endemic areas of malaria. The remaining five districts Bakargong Khulna, Chittagong, Tipperah and Mymensingh are moderately endemic. Indoor spraying of DDT was undertaken on the thana wise basis, with an average population of 100,000 in each. The 1,688 villages selected for spleen index were taken from the above 71 thanas of the 8 districts and only a few of these 71 thanas have been sprayed with DDT. The reduction of spleen index, on the whole might be due to indoor DDT spray in those few thanas. The results of DDT spraying although on a very limited scale have been found to be encouraging.

PARASITIC INDEX

Along with the examination of the children for spleen, blood slides were also collected and examined for malaria parasite. The parasitic index has always been noted comparatively very low. The Government of East Pakistan has got provision for mass distribution of antimalaria drugs every year, through the District and municipal Health organizations. The low parasitic index may be the effect of anti-malaria drugs taken up by the malaria patients. The average parasitic index during the last three years has been noted as between 7% to 12%.

MALARIA INCIDENCE

The incidence of malaria as collected from the hospital figures show a marked improvement. The figures of mortality have also appreciably come down. From the malaria mortality figures of 100,000 in the year 1956, it has come down to 44,000 in the year 1958. The gradual fall in morbidity and mortality figures have been recorded year by year and a casual glance on those figures will indicate how malaria incidence has come down in East Pakistan. Indoor DDT spray and continuous distribution of anti-malaria drugs have been described as the cause of the present improvement.

SPECIES OF ANOPHELINES

The species of Anopheline mosquitoes that are generally found in East Pakistan are:

A. philippinensis, A. vagus, A. subpictus, A. aconitus, A. varuna, A. minimus, A. annularis, A. barbirostris, A. hyrcanus, A. sundaicus, A. culicifacies, A. pallidus, A. jamsai and A. ramsai.

Of these species only three, viz. A. philippinensis, A. minimus, and A. sundaicus have been known as the vector species responsible for incidence of malaria in East Pakistan. The three vector species have again been known to have got their own regions of choice for breeding. For example, A. philippinensis in the plains, A. minimus in the mountains and submountains, and A. sundaicus in the saline areas. The breeding places of the three main species of East Pakistan are as follows:

A. philippinensis breeds in tanks, ponds, borrowpits and ditches containing clean water with marginal and dense growth of subaqueous bushes. It does not breed in water even slightly contaminated or polluted.

A. minimus breeds in clean unpolluted slowly moving water with grassy edges. It prefers partial shade and cooler water but full sunshine is no hindrance to breeding at times, it can also breed in wells and cisterns.

A. sundaicus breeds in saline water usually, like lagoons formed by silting up of river mouths and behind embankments erected to protect rice fields from saline water. It can breed in open sunshine. It is found along the coastal districts of East Pakistan, namely Chittagong, Noakhali, Barisal (Bakergonj) and Khulna.

IDENTIFICATION AND DISSECTIONS

The collection of mosquitoes are arranged from fixed catching stations and from human dwellings and cowsheds in the areas to be surveyed. The most important feature of this collection of Anophelines is that the vector species do not form more than 5 to 10% of the total catch. The predominance of the vector species according to the type of region has however always been noted as a constant feature. For example, A. philippinensis in the plains, A. minimus in the mountain and submountain regions, and A. sundaicus in the tidal regions. Sometimes A. minimus and A. philippinensis in the submountain region and A. philippinensis and A. sundaicus in the tidal and saline regions have also been noted. The distribution of the vector species of Anophdline mosquitoes on a regional basis can therefore be shown as follows:

1. The distract of Mymensingh, Chittagong, Chittagong Hill Tracts and part of Noakhali may be called as the habitat of the A. philippinensis and A. minimus.

2. The district of Bakergonj and Khulna and the remaining part of Noakhali may be called the habitat of A. philippinensis and A. sundaicus.

3. The remaining districts for example, Dacca, Rangpur, Dinajpur, Rajshahi, Bogra, Faridpur, Jessore Kushtia and Pabna are the habitat of A. philippinensis.

It has always been queried why the percentage or catches of vector species is so low as compared with others. This led to various investigations as to the possibility of finding out other malaria vectors responsible. The predominance of A. annularis, A. subpictus, and A. varus has been noted to form more than 75% of the total catch but the results of dissection of these mosquitoes have not indicated that they are involved in the transmission of malaria.

MALARIA CONTROL

The antimalaria activities of the Government of East Pakistan have been directed in different ways for example:

1. Distribution of antimalaria drugs.

2. Grant of money to the local bodies for anti-malaria measures in the urban area.

3. Indoor DDT spray under the National Malaria Control Scheme for rural areas.

(1) Distribution of Antimalaria Drugs.

The practice of distribution of anti-malaria drugs in the rural and urban area of East Pakistan has been kept up and maintained since pre-independence days. Year after year hundreds of thousands of paludrine tablets worth about several lakhs of rupees are distributed. This has got a definite bearing on the low incidence of malaria that are seen at present. The record shows that from the year 1956 to 1958, 10,783,390 tablets of paludrine have been distributed for control of malaria.

(2) Grants to the Municipality (Urban Area).

The principle is that the municipality should undertake its own antimalaria mosquito measures work and carry out their own scheme and the Government will then contribute 50% of the total cost involved if the Scheme is found satisfactory. On the basis of this principle many of the municipalities of East Pakistan have received Government grant and carried out antimalaria mosquito measures in their municipalities. From the year 1956 to 1958 the Government of East Pakistan have contributed Rs.207228-2-6 to more than 8 municipalities for the control of malaria in their respective areas.

(3) Indoor DDT Spray (Rural Area).

Control of malaria by indoor DDT spray has been undertaken by the Government of East Pakistan since 1949. Although continuity could not be maintained for want of money and other technical difficulties yet the effect of even this intermittent indoor DDT spray has produced good results. There is a popular belief that malaria can be eradicated from

these highly endemic areas of East Pakistan simply by indoor DDT spray. Spraying operations were undertaken in almost all the 17 districts of East Pakistan. Taken on a thana-wise basis a number of 51 thanas out of 409 thanas of East Pakistan have been already sprayed with DDT. Some of these thanas have been sprayed four times, some three times, some twice, and others once only. The systematic and regular spraying could not be undertaken for reasons already stated above. It may be possible to make an assessment of the present situation if the following figures, recorded for the years 1956, 1957 and 1958 are looked into:

1.	Total number of villages sprayed.....	22,511
2.	No. of houses sprayed.....	1,741,755
3.	No. of rooms sprayed	7,798,551
4.	No. of persons directly protected.....	11,440,650
5.	Quantity of DDT sprayed (50% w.p.)	115,794 lbs.
6.	Quantity of DDT sprayed (75% w.p.)	1,612,424 lbs.
7.	Estimated cost of DDT used	Rs. 4016222-4-0
8.	Expenditure on staff and Transport, etc	Rs. 972821-0-0
9.	Total cost involved	Rs 5634441-0-0
10.	Cost per capita from annas.	0-7-6 to 0-8-

It may be concluded that the problem of malaria in East Pakistan is now well in hand and the improvements so far achieved, perhaps primarily because of indoor DDT residual spraying, also augurs well for the future. If this scourge of malaria can be eradicated by indoor DDT spraying, surely it will be a great achievement and many social and economic problems of East Pakistan will be solved. It will be a red letter day in the history of the peasants who live in the rural areas and who form more than 90% of the total population of East Pakistan.