

DRUG PROPHYLAXIS IN MALARIA BY THE USE OF QUININE AND PLASMOCHIN IN THE FIELD.

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INTRODUCTION.

An experiment was carried out during the period 1933-1937 by the Bengal Public Health Department with a view to finding out how far it is possible to control malaria in a hyperendemic area by trying to prevent infection by *Anopheles* mosquitoes by destroying both the sexual and asexual forms of malaria parasites in the human blood by a blanket method of treatment, i.e. simultaneous free administration of plasmochin and quinine to the entire population within the selected area, followed by prompt treatment of all malaria cases as soon as they occur. This short memorandum gives the details of the scheme and the results achieved by the experiment.

AREA AND METHOD OF WORK.

The district of Burdwan was selected on account of its high malarial endemicity—the spleen index varies from 60 to 80%. A circular area of approximately 44 sq. units comprising 97 villages with a total population of 21,000 was selected in the Memari thana of the Burdwan district. Children under 12 formed roughly 30% of the total population. The campaign started in April, 1933, with an attempt to treat free of charge everybody within the selected area with a tablet of 0.02 gramme of plasmochin and 15 grains of quinine sulphate or cinchona febrifuge per day for 3 and 5 consecutive days respectively. The dosage naturally varied according to the age of the person treated. In spite of all propaganda and persuasion roughly about 17% of the population refused to undergo the treatment. The distribution of plasmochin and quinine to the population was carried out by the existing staff of the Public Health Department and was finished by the end of June, 1933. From the first week of July, 1933, thirty treatment centres were opened within the experimental area in charge of six sub-assistant surgeons. In these centres each case of malaria was on the first day of the visit treated with quinine and plasmochin—the daily adult dose being 15 grains of quinine and 0.02 gram of plasmochin for 3 days. On a subsequent visit the patient was given only quinine for another 3 days but no plasmochin. As the attendance of malaria patients decreased considerably by February, 1934, all the treatment centres were closed down and the doctors were detailed to go round the villages in their respective areas and treat malaria cases in their houses. From July to January the treat-

ment centres were kept open again. From March, 1934, 88 voluntary distributors were appointed through whom quinine and plasmochin were distributed in all the villages concerned. The District Board of Burdwan also deputed six sanitary assistants in the same year for a period of 3½ months who did propaganda work and otherwise formed a link between the doctors and the voluntary distributors. Besides the issue of quinine and plasmochin, regular observations regarding spleen index, fever index, parasite index, gametocyte rate, sporozoite rate, etc. were made for which a field laboratory was kept open in charge of an assistant surgeon at Amadpur, within the experimental area, throughout the period under report. To study the variations in the spleen index, thirteen villages within the experimental area were kept under observation, whilst for the purpose of control several villages just outside the experimental area, but with identical physiographical, meteorological and economic conditions, were selected. For purposes of comparison records of dispensaries both within and outside the experimental area have been taken into account.

In June, 1936, a departure was made in the system of treatment by issuing to all school children quinine for 7 days and plasmochin for 5 days from the third day of quinine treatment. Outside the schools all children and adults with enlarged spleen were given similar treatment with as few omissions as possible. The drugs were left with the school-masters and guardians of children with proper instructions. To start with, quinine for two days only was issued. On the third day, after enquiry as to the fate of the drug already issued, quinine and plasmochin for the next 5 days were given except to those who had refused to take the first issue. By the second week of July, 1936, the distribution of the drugs on the above lines had been completed and thirty treatment centres were again opened as in previous years. A modification was also made in treating actual fever cases attending these centres. Quinine was thenceforth given for 7 days and plasmochin for 5 days from the third to the seventh day of quinine treatment. All the treatment centres were discontinued from the 31st January, 1937, and the experiment finally closed on the 31st March, 1937.

As neither time nor space will permit the various observations being given here, only the summary of the results achieved by the experimental scheme as compared with those of the control area is given below :

	1933-34.	1934-35.	1935-36.	1936-37.
	July-Mar.	Apr.-Mar.	Apr.-Mar.	Apr.-Mar.
1. Malaria incidence in the experimental area (in treatment centres only) ..	6,968	5,967	3,114	2,963
2. Average Fever Index :	Oct.-Nov.	Aug.-Nov.	Aug.-Nov.	Aug.-Nov.
(a) Experimental area ..	16.0	12.0	7.5	4.2
(b) Control area ..	42.5	32.2	48.7	25.0

3. Spleen Index :	1933	1934	1935	1936	1937
(a) Experimental area ..	66.0	not examined		31.4	21.4
(b) Control area ..	60.5	not examined		65.2	42.9
4. Average Parasitic Index among children :	1933	1934	1935	1936	
(a) Experimental area ..	21.2	22.2	11.0	5.0	
(b) Control area ..	29.1	30.9	33.9	20.2	

FACTORS WHICH ADVERSELY AFFECTED THE RESULT OF THE EXPERIMENT.

(i) In spite of all propoganda and persuasion 17 per cent of the population refused to take the medicines. The number of Santals in the area is 3,352. They are notoriously backward and aboriginal people who rarely take drugs for any ailment but believe in and practise primitive rituals for curing them from all maladies. Apart from these Santals, a small percentage of other people, especially elderly women and babies, could not be persuaded to take the medicines. Owing to the custom of purdah among the female folk many women also could not be induced to be examined and properly treated. Thus this untreated section remained throughout an active human reservoir of malarial parasites. Consequently infection of mosquitoes and dissemination of the disease could not be totally controlled.

(ii) Almost all the quacks in a body carried out counter-propaganda against the scheme as they were afraid of losing their daily bread if the experiment became successful.

(iii) There was no control against the introduction of fresh infective material in the shape of gametocyte carriers or of infected mosquitoes from outside the area.

(iv) As neither quinine nor plasmochin or a combination of the two can completely sterilize the human host of all parasites or prevent relapses, gametocytes will continue to be formed as long as some parasites remain in the human host in spite of treatment. It is also not known how long a patient will remain gametocyte free after a short course of quinine and plasmochin and thus remain non-infective to mosquitoes.

Eradication of malaria and its control are two very different things. Obviously complete eradication of malaria by this scheme is not possible. It certainly reduces the incidence of malaria by curtailing the parasitic factor to a minimum. But how long the incidence of malaria will remain low in the locality in the absence of continued efforts is not known. The recurring expenditure on drugs and distributors cannot be indefinitely maintained.

As a corollary of this experiment it would be interesting and profitable to find out how far anti-larval steps alone without anti-parasitic measures can reduce the incidence in an equally hyperendemic area and at what cost. That either of the measures can reduce malaria is more or less admitted but

which of them is more efficient, less costly and more permanent in effect cannot be proved unless anti-mosquito measures are alone tried in a hyperendemic rural area. Till then we cannot but advocate both the measures together, anti-parasitic and anti-mosquito, to help us in our fight against this principal scourge of Bengal.