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PROGRESS REPORT ON MALARIA ERADICATION IN IRAN WITH A STRESS ON THE MEASURES TAKEN AGAINST FRONTIER MALARIA PROBLEMS

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INTRODUCTION

Iran is an agricultural country. Seventy to eighty percent of its population are farmers who are more endangered with malaria. This is due to the irrigation system which makes swamps and stagnant waters suitable for larva breeding. According to the statistics, more than 3/4 of the Iran inhabitants live in malarious areas. Malaria extorted the great active power from our farmers, the most labourous rank of our community, while the large cultivations and capable lands of Iran needed this energy..

Since the execution of the malaria control programme followed by eradication, considerable changes have been yielded in the peasants life, safe guarding their health and increasing the crop. The following report is a summary of the actions taken in eliminating the disease, the headlights of which are: Priliminary Measures, Malaria Control from 1949 to 1956, Malaria Eradication from 1957 to 1960, and Plan of Operation for 1961 and 1962 which has been prepared on the basis of the past experiences and every aspect of the work duly regarded.

PRELIMINARY MEASURES

Survey on the disease first started in 1925. Reports give 49% infection, 53% spleen index and more than 41% mortality due to malaria among the people at Arax bank. Spleen enlargement in Khorramshahr was about 45% and in Baluchistan more than 50%. Even in the Gilan province, the infection rate inthe children from 2 - 9 years reached to 77% in some places such as Lasht-Nesha.

MALARIA CONTROL (1949-1956)

Malaria control with DDT spraying started in 1949. A decrease of 20-28% of the spleen index was observed in some parts of the above mentioned province after five years campaign.

In 1955, some parts of Gilan were still hyper-endemic but the continuation of the control changed them to hypo-endemic.

The spleen index in some localities of Mazenderan reached 80% and the average rate in other places was 32.5%. This reduced to 11% after the commencement of spraying in 1950.

Malaria Control yielded an appreciable success so much that assuming 100% infection in Gorgan and Mazenderan in 1949, this figure, according to the statistics, descended to 8% and the rate of mortality from 40% to 2%. Similar data may be presented for all areas placed under the control programme.

Along with the spraying programme, surveillance activities started in 1955 to evaluate the condition of the disease among the patients. Within one year, 4,546 villages were visited and 98,670 blood films were collected which were read and the positives were treated.

The eight years malaria control operations reduced the infection rate throughout the country. The 55% spleen index decreased to 5%. The abandoned idle lands of the villages were turned to productive farms and the cultivation rate of wheat and barley, according to the reports of the sanitary engineers, was increased by 47%.

Because of the reduction of the natural immunity, there was the probability of the disease attack-more acute and more dangerous. Resistance of *A.stephensi* was even noticed in some areas. To this end and as per the WHO recommendation it was decided to implement the malaria eradication programme as from 1957.

MALARIA ERADICATION (1957-1960)

The eradication programme in 1957 started in the province of Gilan, Mazenderan and Western Azerbaijan, in 1958 in the southern provinces and in 1959 in the central province, a part of Isfahan, Kermanshah, Eastern Azerbaijan and Northern Khorasan. Upto 1960, fruitful results were yielded from this programme so much that Eastern Azerbaijan was turned to clean area.

The expansion of the malaria eradication programme and the success achieved through its implementation necessitated a larger and more equipped organization. The matter, after being commented by the authorities and the technical experts, was initiated in early 1960. A wider organization with increased experienced staff, and with surveillance and entomological posts to clear out the condition in the area from the viewpoint of appearance of dangerous epidemics.

The country was divided into four zones in 1957. Each of them had to g go under the eradication programme in different years. In the autumn of 1957, however, A.stephensi in the Khuzistan province showed resistance to DDT causing epidemic in the area. On the recommendation of the WHO experts the former zoning was therefore changed and the A.stephensi resistant area was placed under eradication sooner than the formerly appointed date. Furthermore, the financial difficulties caused in postponing the 1960 plan of action to 1960 and 1962.

PLAN OF OPERATION (1961, 1962)

In 1961, to facilitate the execution of the work and supervision of the operations, the country was divided into Northern and Southern zones. Factors such as climatic conditions, educational level of the public, living conditions (tribal, migration), local and religious customs and traditions, and anopheles resistance to insecticides were effective in this division. On this basis, the plan of operation in 1961 for different provinces was prepared as follows.

OPERATIONS AND RESULTS IN 1961

Northern Zone Ostans.

In the consolidation area, 5 - 7 monthly surveillnace visits during transmission season were paid to 19,993 villages which protected 5,636,390 people.

Residual spraying with 2 gms DDT per square metre along with 5 - 7 ACD visits during transmission were carried out in 4,458 villages in the advanced-attack area, protecting 1,153,060 people.

Residual spraying with 2 gms DDT per square metre was done in 2,199 villages in the attack phase area protecting 486,601 people. Among them 1,529 villages with 365,721 people were selected where infant and fever parasite survey was effectuated to show out the spraying effect on the interruption of transmission.

Consequently, out of 862,691 ACD slides 1,022 were positive, of 2,589 PCD (dispensaries and physicians) 241 were positive, and of 394,841 APCD and EI (Epidemiological Investigation) 684 were positive, as follows:

Phase	Falciparum & Mix	Vivax & Malariae	Population
Consolidation	7	1,159	5,636,390
Advanced-attack	65	509	1,153,060
Attack	49	159	365,721

1,252 villages in 9 foci detected in consolidation area were sprayed protecting 415,441 people.

EI was carried out on most accessible positives in consolidation area and radical treatment was executed. The same was also done as far as possible in areas of advanced attack and attack phase.

Description of radical treatment:

Falciparum: 1,500 mgs chloroquine base for adults 3 consecutive days; 900 mgs 1st day, 300 mgs 2nd and 3rd days. 45 mgs primaquine base for adults as gametocytocide (Reduction in dose is made to accord the lower age groups).

Vivax & Malariae: 600 mgs chloroquine base as schizonticide; radical treatment: 45 mgs primaquine base for adults 8 consecutive weeks. (Reduction according to lower age groups).

Foci detected in consolidation area: the surveillance activities resulted in detection of 3 foci in Anzal (Rezaieh), Amol and Maraveh-Tappeh (Mazenderan). The locality is shown on the map attached. The foci in Anzal and Amol were due to incoming labourers from outside of consolidation area and the high density of A.maculipennis because of spraying discontinuation for 3 consecutive years. The propagation of disease was due to long distance of surveillance programmes and absence of cooperation from dispensaries resulting in 196 positives in 3 villages in Anzal area and 89 positive among the labourers of Amol road construction and 3 villages adjacent to the road.

The 3rd focus was detected in Maraveh-Tappeh of Gorgan. The reason is the presence of former infection among the people with semi-tribal living in this area whom rarely are detected and treated by the surveillance agents. Arrival of these people last year to this area, with high rainfall and breeding places increasing the density of A.superpictus, caused epidemic focus in several villages with 91 positives.

Southern Zone Ostans.

All (non-A.stephensi) attack areas situated in responsive and problem areas (tribes, type of dwellings, A.fluviatilis, outside resting places, etc.) were covered with 2 gms DDT per square metre residual spraying. The tribal tents and huts during their settlement in warm and cold quarters were also sprayed with DDT 75% 2 mgs. per square metre. The positives in the southern responsive areas were radically treated, and EI was executed to clear out the situation of the area.

In the A.stephensi area, as explained in the 1961 programme, the entomological posts through their reports on the density of A.stephensi and presence of transmission, confirmed the necessity of the spraying in the summer. The resistance test, however, was delayed for the commencement of the spraying. As the area had to be sprayed without any delay from the point of view of transmission season, spraying started on the certain date almost

half through that the resistance tests cleared out of full resistance of A.stephensi in the ostans of Fars, Kerman and Baluchistan but susceptible to some extent in the plain of Khuzistan. Therefore, the spraying of Fars, Kerman and Baluchistan plain continued.

Altogether in the southern ostans, 18,424 villages with 2,187,766 population were sprayed. Infant and febrile parasite rate survey was conducted in 6,297 villages collecting 280,569 blood slides out of which 3,359 were positive. Out of 2,324 blood films gathered through dispensaries 483 were positive. 4,833 positives were found among 34,251 blood smears coming from surveys and other sources.

Based on the above results, the Scientific Council decided on the administration of drug among the suspected and fever cases in lieu of the spraying programmes in order to prevent the propagation of the disease and its mortalities as well as keeping the infection on the same level as was achieved during the past activities.

The approved drug administration in a period of 4 months of transmission season was conducted as follows:

- 50 mgs (for adults) pyrimethamine to everybody from preventive and sprontocidal view-point and 600 mgs chloroquine to fever cases during the first round of the programme.

- 600 mgs chloroquine with 50 mgs pyrimethamine to febrile and suspected cases during 2nd, 3rd, and 4th rounds (adult dose, lower ages less).

This programme was carried out during the 1st and 2nd rounds. However, due to shortage of pyrimethamine in some areas it was advised that 2 camoprim tablets (adult) and 1 chloroquine tablet (totally 30 mgs primaquine base and 300 mgs chloroquine base) be administered to fever and suspected cases (lower dose for lower age groups).

The results of the treatment in the shahrestans of Bushir and Lar are shown on graphs Nos. 1 and 2. Compared with the percent positives of 1960 and 1961 the graphs are self-explanatory on the effect of this programme for the prevention of the disease propagation and mortality.

In the plain of Khuzistan, especially in Abadan and Khorramshahr, no local positive case was observed. Details on entomological activities in Khuzistan by the MEO and IPM posts will be reported by the Chief Entomological post of Abadan assigned by IPM.

Geographical reconnaissance was carried out in the northern area of the Kerman Ostan. The activity is shown on table No. 8. It is hoped to terminate before the start of spraying in 1962.

In 1961 ME operation, 26,333 villages were sprayed protecting 4,242,868 people. Surveillance and parasite rate surveys were effectuated in 32,277 villages where monthly protection covered 9,301,463 people. A total of 1,600,566 blood slides were tested by the ME laboratories throughout the country.

PROGRAMME FOR 1962 (APPROVED BY THE SCIENTIFIC COUNCIL)

Monthly house-to-house ACD visit and collection of blood slides from all fever and suspected individuals to detect the remaining or imported cases throughout the area under consolidation (nearly 21,961 villages). Totally 1,164 villages in 4 foci under consolidation will be sprayed.

Spraying and surveillance in 3,543 villages in the area under advanced-attack phase where transmission is interrupted and probably could be kept under consolidation in 1963

Spraying to be continued in the villages under attack phase. The former procedure (infant and fever parasite case detection) should follow in these areas. Furthermore, in the areas not yet under eradication but where primary surveys, such as collection of general information and entomological and epidemiological studies, have been processed the execution of this programme is advised from two points of view, preventing transmission in the area, and preventing importation to the adjacent and distant areas cleaned of malaria.

Along with spraying in these two types of the areas under attack phase the parasite rate survey will be carried out by collecting blood slides from fever and suspected cases and 0-1 year infants to lead to the progress of the activities. Totally, 14,844 villages will be sprayed and 7,685 villages will go under survey to show out the parasite among the children.

Spraying the problem areas (summer quarters of most tribes) where, due to particular living system of the people and the area vectors, the past operations did not produce an overall effect on the interruption of transmission but decreased the disease considerably. These activities are necessary to safe-guard the neighbouring areas, and should be continued until new solutions are provided. 8,800 villages will go under this programme.

Two distinctive plans are recommended for the areas where A. stephensi is resistant to DDT and DLD which could not be used to interrupt transmission

a) In the plain of Khuzistan, where the past operations were effective and no danger exists at present, treatment and surveillance programme should cover 1,770 villages. This is because of the importance of the area where most of the development plans of the Plan Organization, the National Oil Company and Agriculture is under process resulting to rush-up of labourers in search of job which may lead into disordering the situation of the area, reappearance of the disease and stop of the development plans.

b) Treatment and preventive activities in other A. stephensi areas should be done in the southern area of Baluchistan, Kerman, Fars, and a part of Khuzistan. It is aimed to have this plan implemented in 5,545 villages by stationery teams in the village centres with the cooperation of other health and voluntary agents.

Entomological activities in all malarious shahrestans under eradication programmes to show out the anopheline activities. Five villages will be selected in each shahrestan.

Continuation of activities of entomological posts in southern areas within the A.stephensi propagation area.

Collection of general information and G.R. in order to clear out the tribal and nomadic areas for eradication purposes which will cover 1,643 villages in tribal areas of Salas, Shahreza and Fasa.