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NOMADISM AND THE OPERATIONAL DIFFICULTIES RELATED TO IT, WITH SPECIAL REFERENCE TO IRAN

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Mass population movement under its different aspects, particularly nomadism and tribal movements, create a problem in malaria eradication common to many countries of the world, mainly those situated in the Eastern Mediterranean, African and South-east Asian regions. The importance of this problem as a complicating factor in the implementation and achievement of malaria eradication programmes has already been discussed and stressed at several WHO Expert Committees and Regional Malaria Conferences. Taking into consideration its importance it has always been recommended that beside the ordinary measures applied in fixed villages such as, total residual insecticidal coverage and surveillance, treatment of positive cases, etc., special attention should also be paid to the moving population. In this connection the 7th Expert Committee on Malaria, taking into consideration the several recommendations made in the sixth report of the Expert Committee on Malaria, the report of the WHO study group on international protection against malaria, and the report of the Technical Meeting for malaria eradication (Baghdad, December 1957), have stressed the importance of:-

"Regular spraying of the tents and temporary huts with suitable insecticide formulations;"

"Training suitable members selected from the tribesmen as auxiliaries to surveillance agents wherever possible,"

"Mass drug therapy when the tribes are in their fixed sites, perhaps by medicated salt."

Having all these basic recommended measures in mind, their application under tribal conditions should also be considered.

Several ecological and environmental factors govern the life of tribes and their living areas (including summer quarter, winter quarter and itineraries), such as:-

1- Using either closed or open black tents made from goat's hair and living in small or large groups scattered among the mountains and flat lands 1-6 kms., apart from each other, making use of other types of artificial shelters (summer huts) or natural shelters (caves, etc.) if necessary, according to the seasonal and climatic conditions.

2- Frequent and irregular decampment during their itineraries or even during their settlement in winter and summer quarters.

3- Special topography of their living areas, mountains, hilly and extremely inaccessible particularly in summer quarter and itineraries, the existence of innumerable natural resting places in the deep, stony valleys where the nomads live or camp.

4- Also the itineraries and settling quarters are kept constant during favourable years with abundant grass, these may be changed during the unfavourable years and upon the decision of the heads of tribes by prearrangements with the heads of other tribes or by renting new pasture lands sometimes more than 100 kms., far from the normal settling areas.

5- The practice of animal husbandary, and the number of epizootic animals causing high mortality among sheep also effect the movement of the tribe so that for that year at least all of the tribal people or part of them will remain in the area of summer quarters and only few families will move to conduct the remaining herds to the summer pasture.

6- Finally, because of death of the head of the tribal sect, the sect dissolves as an entity and the subordinate tribal men join other related tribal groups and adopt their habits and movement cycles.

These factors create many operational difficulties in the implementation of the existing anti-malaria measures among tribes, as regards the degree of perfection and accuracy which is required for malaria eradication.

Some of the operational difficulties could be listed briefly:-

6.1 For geographical reconnaissance the usual mapping, numbering, coding and census of the tribal groups and their living quarters are not similar and as easy as those recommended and carried out in the case of permanent villages,

6.2 The implementation of an accurate total insecticidal coverage of tents, summer huts in terms of time and space, the decision of the formulation of insecticide to be used and frequency of application are extremely difficult and not well known, and have to be clarified through special studies;

6.3 Surveillance operations in both active and passive aspects, or any other type of regular and periodical parasite survey, could not be performed easily and routinely among tribes

6.4 The administration of antimalarial drugs in the usual tablet form cannot be carried out regularly and totaly.

Thus, having all the above-mentioned factors and difficulties in mind, for the application of any eradication technique such as geographical reconnaissance, residual spraying, surveillance, drug administration, logistics, etc., in the case of nomadic tribes, these measures should be modified and be adopted to the prevailling conditions and factors and eventually new methods and approaches can be developed.

In order to clarify the situation of tribes in Iran and to modify and adopt different anti-malaria measures to be applied among them, few attempts have been made by the Institute of Parasitology and Malariology and some researches have been carried out accordingly. This research programme was designed first in the form of independent pilot studies which undertook the study of various aspects of implementation of:-

a) Geographical Reconnaissance

b) Spraying of tents

c) Administration of antimalarial drugs either in the form of tablets or through medicated salt.

We shall give a summary of the results of these above-mentioned studies and describe later the proposed project for the application of the best methods selected according to results obtained on a larger scale.

a- Geographical Reconnaissance

In the planning of any malaria eradication programme among tribes, great importance is to be placed on geographical reconnaissance. In this connection not only the unstability of population, the size, pattern and timing of movement should be studied, as well as the way in which the population is distributed, settlement patterns, shelter types, farming and any other economic practices, communications, topography of the areas where they live and move, may also be of vital importance and have to be carefully studied, mapped and recorded.

The study of geographical reconnaissance among tribes in Iran has shown that none of the usual geographical reconnaissance techniques such as mapping, numbering, recording, etc., recommended for fixed villages can be applied for tribes, and these have to be modified to some extent even changed completely. The following examples could clear the situation:-

(i) For the purpose of mapping, whenever the tribes camp or move, including winter quarter, summer quarter, their journeys back and forth, eventually seasonal and annual changes, should be mapped. Much emphasis should be put on itineraries, communications, spotting of the places where they are accessible and available, especially for purposes of logistics.

(ii) In the case of numbering, the usual numbering of villages and houses is not applicable for tribes. Generally a speaking nomadic tribes in Fars (South of Iran) are composed of the following parts.

Each tribe is divided into several clans and each clan into various number of sects; each sect has definite summer and winter camping sites; furthermore each sect is divided into different number of Bonkouh into few bors, each bor consisting of one to five families. The sites of camping for these subdivisions are not constant and vary within the area especially as regards sect. Usually their tents are irregularly scattered and mixed. Thus for the numbering of tents (i.e., families), special signs or marks should be given to clans and sects and numbers and sub-numbers to Bonkouhs and families.

(iii) For the purpose of recording houses and shelters, much emphasis should be put first on "temporary shelters" and secondly on permanent ones; also natural shelters which may eventually exist in the camping site should be mapped and recorded.

(iv) As far as general information is concerned, besides that recommended for permanent villages, more information should be collected specially as regards timing and duration of movement, places and spots where the tribes could be reached, accessibility of roads and corresponding period of time, type of vehicles recommended, etc.

According to the above mentioned recommendations as well as other necessary steps, few sects among some clans of Ghashghai tribe (Fars, south of Iran) have been and are now under geographical reconnaissance for the purpose of specific researches and pilot projects which are or will be conducted at Kazeroun Research Station.

b- Spraying of Tents

In the spraying of tents many questions arise:

(i) Kind, formulation and concentration of insecticide to be used for spraying of tents in order to obtain sufficient insecticidal action and residual effect against various anopheline vectors with different degrees of susceptibility, even after regular movement from one area to another.

(ii) How frequent, when and where the selected insecticide should be used, to get maximum efficiency with minimum efforts and expenses.

(iii) Which organization should implement the programme for operation.

In the study of efficacy of insecticides on tents many factors should be considered, such as daily movement of tents, quality of tents, formulation and residual effect of insecticides and method of application.

In this connection, a series of field trials were performed in Kazeroun area (Fars south of Iran) among various selected sub-tribes having a sufficient number of tents:

- Using different insecticides: DDT, DLD, BHC, with different formulations (W.W.P., solution in kerosene, mixed with gum arabic, DLD Novasol, BHC-Resin, etc.) for spraying or impregnation.

- Using various concentrations: DDT (2-4 grs./sq.m.), DLD (750, 1,000 mg/sq.m.) and BHC (1,000 mg. per sq.m.).

- Using various tents, materials: Thick (with small holes) used as top cover of the tent and, thin (with large holes) used for side walls.

The results were evaluated through various checking tests such as:-

- Chemical estimation of insecticide residue on tents (by taking small pieces of tent materials as scrappings).

- Entomological studies (measuring densities on adult and larvae).

- Bio-assay tests (using susceptible anophelines, i.e., A. stephensi, local strain from insectarium for DLD group and A. sacharovi, local strain of the area, for DDT and DLD groups).

- Test-hut by release of wild caught A. sacharovi or laboratory bred A. stephensi and observation made after 1, 2, 3, 4, 8, 12 and 24 hours.

The results of these field trials are briefly stated below:-

DDT-2 grm./sq.m. sprayed with solution in kerosene has shown a biological residual effect of six weeks in the case of non-moving tents (more than 50% kill in Bio-assay test) and much shorter in the case of moving tents.

DDT. WWP 4 grm./sq.m. has shown four weeks effect for non-moving tents and two to three weeks for moving tents.

DLD 1,000 mg./sq.m. sprayed with solution in kerosene, has shown a residual effect of two to three weeks in the case of both moving and non-moving tents. (shorter than DDT).

DLD, WWP, 1,000 mg./sq.m. or DLD Novasol 500 mg/sq.m. with six to seven weeks biological effect in the case of non-moving tents. (60% kill in Bio-assay test- 90% kill in test hut after 24 hours).

DLD WWP, 500 grm/sq.m. used by impregnation of moving tents has shown a longer effect of about two months, (70% kill in Bio-assay).

DDT WWP 4 grms/sq.m. (5 gr.% gum arabic or 0.5 gr.% asphodalus) in the case of moving tent, has shown four to five week biological effect. (30-40% kill in Bio-assay test).

Tents sprayed with BHC WWP 50% 1 gr/sq.m. or BHC resine 25% 1gr./sq.m. have shown biological effect of about two to three weeks in the case of non-moving tents (25-35% kill in Bio-assay). Once the results of spraying of tents on a preliminary basis were obtained, in the second phase of the programme, these results were applied in few groups of tribes by using the most suitable insecticide and formulation (DLD WWP), at different concentrations and the results were evaluated according to entomological, parasitological and chemical procedures. These studies proved that in addition to regular measures applied to permanent settling areas (spraying of villages prior to

the movement of tribes, recirculation after movement of tribes to complete the spraying of newly built houses, etc., spraying of tents of remaining tribes and repeated spraying of the area 15-30 days before the arrival of tribes from summer quarters), the spraying of tribal tents with suitable insecticide effective against local vector or vectors, is another necessary step toward the solution of malaria problem among nomadic tribes. It might protect them at least for the duration of their movement and short stops at the secondary summer quarters.

On the other hand, the frequency of spraying of tent materials are of particular importance. This should be arranged according to the duration of migration and settlement of tribes, the length of transmission season of malaria in the area as well as the residual effectiveness of the insecticide chosen.

The best site for implementation of spraying operation on tent materials, according to our experience in the south of Iran, are constant localities of nomads or their migration routes toward winter and summer quarters, when the whole tribal group will pass through the same place, usually a bridge, a narrow passage (isthmus), etc. These important spots should be specially recorded on the map during geographical reconnaissance of the tribes with determination of the corresponding date of arrival and duration of stay.

c- Administration of Antimalarial Drug

The mass administration of antimalaria drugs could be applied in two different ways, direct and indirect. The absence of an ideal anti-malarial is seen from Dr. Bruce-Chwatt's definition of such a drug.

"The ideal anti-malarial drug is one that combines the virtues of casual prophylaxis, suppression, rapid and complete curative action, sporonticidal effect and impossibility to create parasite resistance together with low toxicity, very slow secretion, palatibility and (last but not least) low cost".

The administration of the most suitable existing drugs in any of these two different ways (direct and indirect) has certain limitations and requires specific conditions.

The direct method, i.e., the mass administration of anti-malarial drug by means of tablet or liquid preparation, which has to be done at frequent intervals, once a week or once a month, encounters many difficulties.

The total coverage cannot be regularly and continuously ensured even under the most favourable conditions and with controlable groups of people. In this connection the absence of an accurate and proper census, the habits of the people and their various beliefs, the apathy and active antagonism of the population, primitive educational level, inadequate rural health structures, poor communications causing difficulties in reaching the people in the appropriate time, the presence of moving population (Nomadic tribes) which interfers with the periodic and regular distribution, and many other difficulties, have to be considered. Moreover the need for an appropriate and adequate organization composed of qualified and reliable agents, supervisors and evaluators, will prove such administration to be very expensive.

The indirect method, by incorporating the drug in common salt, is a type of mass drug administration which seems easier to apply and apparently less expensive. First in 1952 Pinotti suggested combining chloroquine with ordinary table salt in an attempt to break transmission in the Amazon River Valley where other antimalarial measures such as residual spraying or individual drug administration were not attainable. This trial was carried out successfully. Later studies confirmed the stability of chloroquine under conditions of storage, shopping and food preparation and showed that the drug, when combined with table salt in an appropriate amount, resulted in complete suppression of vivax malaria under repeated infection by mosquito bite.

Later on this method was discussed with particular interest at the WHO Expert Committees on Malaria (Seventh and Eighth Reports) and other technical meetings and believing in its usefulness, it was recommended for those circumstances where other methods used for malaria eradication are not readily applicable and where the source or sources of salt are controllable. In this connection, several programmes employing medicated salt are now underway in Brazil, British Guiana, Ghana, and Cambodia, and are planned for other areas of the world.

In Iran, the following technical and operational difficulties were found:-

- The development of resistance to both groups of chlorinated insecticides in A. stephensi, the main malaria vector of the south of Iran with major epidemic potential.

- The presence of partly exophilic vector (A. fluviatilis) becoming exophagic because of outdoor sleeping habits of the people during several months of the year.

- Impossibility in having an ideal insecticidal coverage because of the presence of either natural outdoor shelters (caves, holes, etc.) or irregularly created man-made shelters (tents, summer huts, etc.).

- Shortness of the residual effect of chlorinated and organophosphorous insecticides on different surfaces (tent materials, highly sorptive mud, etc.).

- The presence of moving population (nomadic tribes) which interfers with the periodic and regular distribution of anti malarial drugs.

A preliminary experiment, by using medicated salt (chloroquine pyrimethamine) was carried out among few small groups of tribes in Kaezroun (Fars-south of Iran), since September 1959 with the following aims:-

- To study the possibility and method of regular administration of this method among stable and particularly moving population (tribes) in an effective and useful way.

- To evaluate the effect of this method on parasitaemia and its value on interrupting malaria transmission.

- To clear many other factors as concerned with administration or evaluation.

For the purpose of this experiment few groups of tribes composed of 1,200 population were selected and put under the medicated salt project (600 for chloroquinized salt, 300 for daraprimized and another 300 as a control group). Malaria was prevalent among these people, and the studies performed prior to the administration of medicated salt showed an average annual parasite rate of about 25% consisting of both p. vivax and p. falciparum.

The source of salt for these tribal groups was found to be, neither abundant or easy to obtain this was easily controlled when a good quantity of edicated salt was distributed.

The quantity of daily salt consumption for each person was estimated as 10 grams, based on observation and experience among them. Chloroquine (Resoshin) and daraprim were used. It was calculated that each person could receive a total dose of either 12,000 mg. chloroquine (base) or 100 mg. daraprim per month through the intake of 300 grs. of salt.

The mixing of drugs with table salt in this small experiment, was usually made by means of a grinding and mixing machine, and then packed in 500 or 1,000 gram packages.

Distribution was performed by local trained agents on the basis of monthly tent to tent distribution (according to the family list).

Evaluation was made through the assessment of salt intake (observation, questioning, urine analysis), parasite survey (monthly mass blood collection) and investigation of positive cases. All of these were performed by epidemiologists supervisor and surveillance agents.

The preliminary results are stated briefly hereunder:-

- The average parasite rate of 25% for the period prior to the administration of drug dropped to 14% (second half of 1959), 6% (1960), and 0% (1961) in the case of a group receiving chloroquinized salt, while in the control group it remains as high as 20-32%.

- In the case of the group receiving daraprim, the rate dropped to 0% after six months administration and remained the same up to now.

- Persons who have regularly used the chloroquinized salt did not show any new case of p. vivax.

- Persons who had parasites in their blood before the use of chloroquinized salt, free from p. vivax, one month after the use of medicated salt.

- The asexual forms of p. vivax and p. falciparum disappeared quickly, but the sexual forms of falciparum first increased in the blood and then disappeared gradually (after six months).

- Persons who had refused to use medicated salt or had used it irregularly were found to have p. vivax or p. falciparum in their blood.

On the basis of these preliminary encouraging results and the experience gained, a larger scale programme was planned to be performed in Kazeroun area, covering 25,000 stable and moving population. The preliminary stage including the performance of proper geographical reconnaissance, determination of the sources of salt, provision of salt, drug of choice (chloroquine), mixing machines and other equipment, is underway or partly performed, and it is hoped that the main operation would begin from mid 1962.

SUMMARY

Nomadism and tribal movement is a problem common in many countries of the world including this region. The nomadic tribes because of their movement, their habits, their specific ecology and the prevailing environmental factors, create many difficulties and obstacles in the implementation of various malaria eradication techniques such as geographical reconnaissance, spraying operation, surveillance, drug administration, etc.

Some of these difficulties could be briefly listed:-

- Inability to locate population to receive proper tent spraying, surveillance and drug administration on a routine, monthly or periodical basis.

- Extreme difficulty of access to critical areas, because of poor communications or even, complete absence of roads.

- Unsuitability of many shelters (tent, summer huts, etc.) for residual spraying.

- Shortness of the residual effect of insecticides on tent materials influenced by the movement of tents.

- Existence of numerable natural resting places in the deep, stony valleys, where nomads live or camp.

- The habits of the tribal people and their various beliefs which may interfere with the performance of different antimalarial measures.

Thus for the purpose of a sound malaria eradication programme, it is advisable that these techniques be modified and adopted to the local factors and eventually new methods be developed. In this connection some points could be mentioned here, for the record: -

I Geographical Reconnaissance

- Mapping of the camping areas and itineraries particularly as regards locating accessible and specific places (site of operation and logistics).

- Numbering, giving specific marks, numbers and subnumbers to different tribal divisions and subdivisions.

- Proper census of population and recording of structures with particular emphasis to the temporary shelters (number, type, quality, etc.).

II Spraying

Spraying of tents is a necessary step toward the solution of the malaria problem among nomadic tribes, if a suitable insecticide (according to the susceptibility of local vectors) could be used with a suitable formulation (WWP, emulsion, mixed with a sticking agent), appropriate concentration (DDT. 4 grs., DLD-1gr.) and sufficient number of application performed in the appropriate times and sites.

III Surveillance

- Training of local tribal people as surveillance agents.

- Provision for mobile laboratory and microscopists.

- Active health education and public relation officers.

IV Drug Administration

Combined with spraying, or as the only necessary step:-

- Very difficult in tablet form because the total coverage in term of time and space cannot routinely be ensured, and if so, it is extremely expensive.

- In the form of medicated salt (chloroquinized) is mostly recommended and subject to more experiments and local experiences (as detailed in the text).

V Organization

It is proposed that literate persons should be selected among tribes to be trained as surveillance agents for implementation of various operations of the programme (supervision of the spraying, detection of parasite carrier and administration of drugs or distribution of medicated salt).

Establishment of an appropriate and specific organization for execution of tribal programme could be recommended. In the case of involvement of two regional M.E.O., complete coordination of work in every respect is essential.

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