Epidemiological Trends of Certain Arbovirus Diseases – Yellow Fever in West and Central Africa

by

Dr. Y. Robin, Director, WHO Regional Reference Centre for Arboviruses, Institut Pasteur, Dakar, Senegal

1. Central Africa

1.1 Historical review

To begin with, it is a striking fact that there have never been important epidemics of yellow fever in Central Africa. The most that has occurred has been a few grouped cases in Zaire in 1958.

Since 1970, there seems to have been resumed activity of the virus, as reported from Cameroon (1 case – 1 death) and Equatorial Guinea (4 cases) in 1970, Angola (65 cases – 42 deaths) and Zaire (2 cases – 2 deaths) in 1971 and again Cameroon (2 cases – 2 deaths) in 1972.

Obviously the real number of yellow fever cases is very much higher than the number notified, but it would seem that no important epidemic could have occurred unnoticed.

1.2 Present situation

Despite the institution of a surveillance system in 1968, not very much is known about the present situation.

1.2.1 Serological studies among the human population

Serological surveys have been carried out in several countries of Central Africa: Central African Republic, Chad, Cameroon, and Gabon. While these surveys have still not made it possible to obtain a true idea of the circulation of yellow fever virus because of vaccinations and other infections caused by Group B viruses, they are nevertheless useful for assessing the degree of receptivity of the populations. Although there has never been a real epidemic, the size of the receptive population makes the danger of one occurring ever present.

1.2.2 Serological study among wild vertebrates

Millan et al. rarely found carriers of yellow fever antibodies in studies of 694 sera from wild and domestic animals: a few among squirrels (2/68) and monkeys (6/36).
In the Central African Republic and Chad, Digoutte carried out serological studies on wild animals (birds, rodents and large mammals); these studies however, did not reveal any antibodies for yellow fever on its own. On the other hand, reactions of the type caused by multiple infection with Group B viruses were frequent.

1.2.3 Study of the vectors

In Central Africa, while studies have provided many facts concerning potential vectors in the Central African Republic, Cameroon and Gabon, there have been very few studies on the Congo or Chad.

It could be said however, that generally speaking, vectors are present everywhere.

_Aedes aegypti_ has been found everywhere in towns, most often as a peridomestic pest, since the problem of water storage does not arise in the humid zones of Central Africa.

_A. africanus_ has been well studied, above all in Cameroon and the Central African Republic. In those countries it is very abundant and very aggressive near the ground (palm groves, marshy lowlands, forest galleries). It bites day and night, but mostly at dawn and dusk.

_A. simpsoni_ is also peridomestic in its ecology (banana plantations). It is active during the day-time but becomes less anthropophilic from east to west. Where it is anthropophilic, it may cause transmission between humans and thus start an epidemic (Ethiopia, 1960-1962).

The three vectors therefore, so far recognized as major vectors of yellow fever, are omnipresent in Central Africa.

1.3 Future prospects

Studies are still needed in order to determine how yellow fever virus maintains itself in its sylvatic cycle. Efforts must be concentrated on regions where it is suspected that the virus is permanently active: Cameroon (Ayos Region) and the Central African Republic (South West Region).

2. West Africa

2.1 Historical review

Unlike Central Africa, West Africa has known vast epidemics of yellow fever during its history.

The revival of yellow fever first became manifest at Diourbel in Senegal in the form of an epidemic in 1965. In 1969, there was an epidemic in five West African countries: Mali, Upper Volta, Nigeria, Togo and Ghana. In 1970, yellow fever was recorded in Ghana, Nigeria and Togo and in 1972 again in Ghana. On the other hand, no case of yellow fever has been reported from Ivory Coast since 1948, from Dahomey since 1951, from Guinea since 1952 and from Sierra Leone since 1955.

2.1 Present situation

The whole surveillance system depends in effect on the interest shown in this disease by doctors in the sentinel hospitals and the preventive medicine departments. So far, the system has not produced the results anticipated, so much so that apart from studies carried out by a few teams, knowledge of the epidemiological situation in regard to yellow fever in West Africa has made little progress.
2.2.1 Serological studies among the human population

Serological surveys among the human population have covered almost the whole area of West Africa. Because of the interference from vaccinations and heterologous Group B reactions, it is difficult to draw any conclusions from them as regards circulation of the yellow fever virus. However, surveillance of children should enable the problem to be tackled. This is the case in the Kedougou region, where in children who have certainly not been vaccinated, serological reactions have been recorded which very strongly suggest recent attack by the yellow fever virus. In the English-speaking countries where there have been no regular vaccination campaigns, interpretation is easier. This is the case with Sierra Leone where a recent survey showed a very low level of activity of the yellow fever virus.

In any case, serological surveys do give some idea of the size of the receptive population. The danger of an epidemic will then depend on the existence near the population concerned of a source of the virus (sylvatic cycle) and the presence in sufficient numbers, of vectors capable of bringing about transmission between human beings.

2.2.2 Serological studies among wild vertebrates

It is essentially surveillance of the primates that has been the subject of a joint study between ORSTOM and the Institut Pasteur, Dakar, with assistance from WHO. Interpretation of the results is made difficult by interference from other Group B arboviruses, mainly the Zika virus. It may however be concluded that the zone where yellow fever is most highly endemic covers the Guinea savanna areas between 9° and 11° N. It is therefore in this zone that particularly strict surveillance should be exercised.

2.2.3 Study of the vectors

The list of known potential vectors comprises 11 species at the moment, but it is not exhaustive and laboratory studies should bring to light other potential vectors. Major vectors are present everywhere.

A. aegypti is present everywhere. In Senegal, the only zone where density indexes are still dangerous is the epidemic focus of 1965 where they are over 50 in almost all the villages surveyed. A. africanus remains restricted to the forest galleries.

A. simpsoni does not bite man.

On the other hand, Aedes of the Diceromyia genus readily bite in the villages, attacking the whole population indiscriminately and probably being the cause of the infections found in children.

2.3 Future prospects

Epidemiological research on yellow fever is a long-term task. The scanty results obtained seem out of proportion to the amount of work involved. However, we have had an opportunity of carrying out in certain restricted zones (East Senegal, the Korhogo Region in Ivory Coast) combined studies on the three links in the yellow fever virus cycle: man, other vertebrates and the vectors. Although these programmes may seem ambitious, they should not be abandoned for they are the very foundation of a system of effective surveillance.
REFERENCES


