

GUIDE FOR THE CONTROL OF EMERGENCIES
CAUSED BY YELLOW FEVER IN AFRICA

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OF YELLOW FEVER IN NIGERIA

by

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Yellow fever - Nigeria

Yellow fever is one of the most acute infectious diseases known to man. The virus of yellow fever, an RNA virus of the insect-transmitted group B does not only cause epidemics, but is also known to be endemic in inter-tropical zones of Africa and South America. Yellow fever can vary in intensity ranging from hyperacute, which could be fatal within 2-3 days, to the latent type. The typical disease is characterized by sudden onset with two-phased development, each phase separated by a short period of remission. The first phase is generally infectious without signs of localization, while the second phase is usually hepatorenal. Yellow fever is transmitted in West Africa by members of the mosquito family of Aedinae, genus Aedes.

The so called "classical" yellow fever occurs usually during epidemics, when the disease is observed in many individuals, is easier to diagnose clinically, subject of course to laboratory confirmation. This form of yellow fever has an incubation period of 3-6 days after the bite of an infected mosquito, although the incubation period may be longer in some cases. The disease is usually sudden and is marked by shivering, temperature of 39°C-40°C, intense headache with vertigo, generalized muscular pains, nausea and vomiting, conjunctivitis, bloated face sometimes with a scarletina type of rash. The urine at this stage is dark coloured and does not contain albumin. These syndromes last about 2-4 days, with decrease in intensity of the headache, but the congestive condition continues with minor hemorrhages and epistaxis. At this stage Faget's sign of high temperature (39°C-40°C) and a fall in pulse rate (from 110-80 or 130-90 beats per minute) occurs.

Generally, by the 3rd or 4th day from onset, a remission occurs, characterized by fall in temperature to 38°C, disappearance of headache, and improvement in the general condition of the patient. This condition is however short-lived, lasting only a few hours, and is followed by hepatorenal phase, which is characterized by a rise in temperature, reappearance of general symptoms, appearance of jaundice (if it had not occurred during the remission stage), vomiting, but this time more frequent and may contain digested blood (black vomitus). Other syndromes include hemorrhage especially of the gum, buccal mucosa, uterus, stomach, and intestine; albuminuria, which may be of sudden onset and

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is generally a common feature of yellow fever. In addition, cardiac involvement, especially of the myocardium is observed. Progressive tachycardia is considered an ominous sign. Not all cases of yellow fever are however typical or classical, as described above, or of the same gravity; thus variations in symptoms and/or in gravity may affect the course of the disease.

During non-epidemic periods, influenza-like (without pulmonary involvement) forms of yellow-fever have been described. The disease can be evaluated by either serology or virus isolation or both; recovery occurs within 2-3 days.

The foregoing have been deliberately emphasized. This was necessary because most of the problems encountered in the epidemiological studies of yellow fever in Nigeria are intimately tied in with the clinical syndromes associated with the disease.

In Nigeria during a retrospective evaluation of cases of yellow fever epidemics reported to the Federal Ministry of Health by different States in the Federation, for a 15 year period (1968-1982), no less than 17 epidemics were recorded. These epidemics spanned eight of the fifteen years studied. Overall, 175 cases with 5 deaths were reported from a total of eleven states (out of 19 States).

The diagnosis of yellow fever in Nigeria often presents with various problems, even during epidemics, and is even more difficult in subacute and atypical forms. Malaria, which is endemic in the country, usually shows clinical symptoms invariably almost identical with the early stages of yellow fever: sudden onset, headache, generalized aches, and vomiting. In addition in cases of primary malaria (especially *P. falciparum*) plasmodium may be rare in blood films. Most patients presenting with the symptoms above are generally treated for malaria, which may not help at all, since even in associated yellow fever, plasmodium would be rare in the blood stream. Most of these patients would not return to the clinic since they may not have been "cured" of their infection with malarial treatment. Under these circumstances, cases of yellow fever can go undetected. In other cases, the presence of scarletina rash could be confused with measles, although such a case may readily be eliminated if Koplick's spots are present.

Of greater importance is the diagnosis of cases presenting with any sign of jaundice, as infective hepatitis. Generally, clinical cases with malaise, fever, dark urine, jaundice are associated not only with hepatitis viruses but also with agents which cause hepato-biliary disorders (leptospirosis, hepato-toxins etc).

The transmission of yellow fever by vector mosquitoes of the family *Aedinae* has been well established. In Nigeria, as in several other parts of Africa, *Aedes aegypti*, *A. simpsoni*, *A. africanus* have been incriminated for maintaining active foci of yellow fever. In these vectors the extrinsic incubation period (that is the period from ingestion of infected blood to when such mosquitoes can transmit infectious virus) is about 12 days, such mosquitoes remain infectious for life (about 6 or more months). Experimentally, with *A. aegypti*, this period varies with the temperature.

In Africa, the monkey which acts as the main reservoir of yellow fever in the forest is less sensitive to the virus; unlike in the Americas where the main forest monkey reservoir (e.g. *Aotus*) is more susceptible to yellow fever virus, and usually dies of the infection; thus making it possible as an index to detect epizootics. The African monkeys survive yellow fever infection, the attention of epidemiologist could not be drawn to sudden mortality occurring among them.

The localization of foci of yellow fever infections at least in Africa is very difficult. In addition, in areas where active systemic vaccination of human population has taken place, active foci of infection could not be readily detected, except from occasional deaths of individuals who may have been infected before moving to an area with large numbers of vaccinees. Generally, serological surveys have been successful though in areas where systemic vaccinations have not taken place.

Epidemiological surveys in Nigeria are usually carried out to involve man, mosquitoes, and wild animals; limited data from such surveys can be summarized as follows:

- (a) In several parts of Nigeria there are still foci of yellow fever which are not well demarcated, therefore inspection and control are difficult.
- (b) Serious epidemics of yellow fever have occurred at the end of the rainy season when massive mosquito re-invasion occurs.
- (c) Areas of yellow fever epidemics are generally confluences of rivers, edges of the rain forests, derived savanna, and rice-growing places. Areas of endemicity include not only the above but also heavy damp guinea and equatorial forests. These areas are difficult to penetrate.
- (d) The extermination of mosquito vectors has proven to be not only difficult but almost impossible.
- (e) The only effective control for the protection of man, through which the cycle of transmission could be broken, is by continuous and sustained vaccination with stabilized and reliable yellow fever vaccines.

A well-equipped, and with properly trained staff, virus laboratory could effectively be of great value during epidemics and for surveillances for yellow fever. Such laboratories are very few and in some cases non-existent in several countries of Africa. In Nigeria only one such laboratory exists.

In addition to the scarcity of virus laboratories, communication, and transport systems in some countries are rudimentary, thus it may be difficult to communicate information on health problems to headquarters where crucial decisions have to be taken. Roads also prove to be impediments to epidemiological surveys. In some areas, the few available roads are impassable in the rainy season.

There is a necessity for the proper training of physicians, nurse, health officers etc. on what to look for in suspected cases of yellow fever. Indeed, for medical students and graduate physicians emphasis should be made that they should consider every case of jaundice as yellow fever until proven otherwise by laboratory evaluations. Differential diagnosis of yellow fever from dengue, influenza, typhoid, malaria, hepatitis and other jaundices should be emphasized and evaluated for effective and useful information in combating epidemics of yellow fever.

Laboratories should be established, properly equipped with reagents and staffed with competent virologist and supporting auxilliary staff.