

EVALUATION OF THE HEALTH MEASURES TAKEN
AT CAIRO AIRPORT
TO PREVENT THE ENTRY OF YELLOW FEVER
TO EGYPT

111
17a

Thesis

Submitted as a Partial Fulfilment for the
Master Degree in Public Health.

616.928

A. K

BY

ABDEL KHALEK MOHAMED FARID
M.B., B. Ch.

M. ch.

13477

SUPERVISORS

- * PROF. DR. ALY MASOUD
Chairman of the Department of Community,
Environmental & Industrial Medicine,
Ain Shams University.
- * DR. AKILA KEASAR KHELLA
Lecturer in the Department of Community,
Environmental & Industrial Medicine,
Ain Shams University.

(1982)

TO :

MY SON



ACKNOWLEDGMENT

I am deeply grateful to Prof. Dr. ALY MASOUD, The Chairman of the Department of Community, Environmental & Industrial Medicine, Ain Shams University, for his unlimited encouragement, his excellent supervision and wise advice.

I would like to express my deepest appreciation to Dr. AKILA KEASAR, Lecturer in the Department of Community Environmental & Industrial Medicine, Ain Shams University for her unlimited help, fruitful advice and good supervision during all the steps of this thesis.

I am greatly indebted to Dr. ADEL GAD, A.PROF. in the Research and Training Center on Vectors of Diseases, Ain Shams University, for his kind help, advice and identification of the mosquitoes

I wish to express my deepest gratitude to General M.K. MOHAMADY, Chairman of Cairo airport, to Dr. AHMED TAHA, Subsecretary of State Preventive Medicine Sector, M.P.H., to Dr. GALAL KHOLOUSY, General Director of Quarantine Section, M.P.H., and to Dr. FAROUK ABDIN, Medical Director of Cairo airport health authority, for their help and co-operation in collecting all the data required from the registers.

* * *

C O N T E N T S

	<u>Page</u>
INTRODUCTION	1
REVIEW OF LITERATURE	2
. The story of quarantine	2
. Short history of yellow fever	4
. Epidemiology	8
. Yellow fever endemic zones	9
. Susceptible areas for spread of yellow fever	10
. Vectors	11
. Virus and Serology	15
. Symptomatology	21
. Vaccine & Vaccination	27
. Diagnosis & Treatment	29
. Prevention & Control	32
INTERNATIONAL HEALTH REGULATIONS	34
AIM OF THE SURVEY	45
MATERIAL AND METHODS	46
RESULTS	54
DISCUSSION & CONCLUSIONS	101
SUMMARY	111
ANNEX	117
REFERENCES	139
ARABIC SUMMARY .	

✱ ✱ ✱

INTRODUCTION

INTRODUCTION

Yellow fever, in man, is an acute febrile illness of short duration and high mortality rate in epidemics. It results from infection by Group B arboviruses which is transmitted by certain genera of Culicine mosquitoes specially *Aedes aegypti*. The disease is endemic in large areas of South America and Africa.

Yellow fever is one of the quarantinable diseases which has not been conquered and is still a permanent threat. Health measures, according to the International Health Regulations, are taken at sea ports and airports to prevent the international spread of this disease. Egypt is a receptive area for the disease. So this survey was carried out to evaluate the health measures taken at Cairo airport to prevent the importation of yellow fever or its vectors into Egypt.

* * *

REVIEW OF LITERATURE

THE STORY OF QUARANTINE

The fact that persons and goods coming from an infected area to a healthy one might introduce an epidemic was early recognised, though not the mechanism of importation of the infection. The first and natural reaction of a threatened community was an attempt to isolate itself against the advancing danger. The first measures adopted were to prevent all entry of persons and goods from the infected areas and to prevent egress from the infected community into the outside world. This was called "Cardon Sanitaire". But attempts of complete isolation of communities were seldom successful except in small villages (Goodman, 1971).

The City of Venice in 1348 was the first to introduce quarantine as a protective measure. The incoming ships and their crew were isolated at an island in the harbor for a period of 40 days, hence the term "quarantine" meaning forty. (Burton & Smith, 1974).

The word "quarantine" is derived from the Italian words "quaranta giorni" meaning forty days. (Omar, 1958).

To avoid quarantine, ships had to produce an official document certifying that the last port of call was free from plague, small pox, yellow fever and later

cholera. These old quarantine measures proved to be useless after the terrible outbreak of plague which occurred in Marsilles in 1720 in spite of its quarantine administration being a model of efficiency for the period (Goodman, 1971).

From the seventeenth into the nineteenth century measures along these general lines were practised in the seaports of all maritime countries varying in efficiency and savagery. The rapid development of trade and travel through the introduction of the steamship (about 1810) and the railway (about 1830) had rendered commercial interests intolerant of the losses and delay imposed on them in the name of quarantine at the ports of each country. Pressures were brought to bear on the governments to relieve trade of these burdens or to render them less irksome and particularly more stable and uniform (Goodman, 1971).

SHORT HISTORY OF YELLOW FEVER

There is considerable agreement that the disease originated either in Africa or in Tropical America, that is, in areas in which the disease is today endemic. According to Gesrison (1929) the term yellow fever was first employed by Griffin Hughes in his "National History of Barbados 1750" (Warren, 1951).

The first epidemic that can be definitely identified as yellow fever occurred in Yacatan in 1648. During the 17th, 18th & 19th Centuries, the disease was widely distributed throughout the Caribbean islands and the adjoining regions of North, Central and South America. From this large focus, it was at times transported to more northerly located cities. Thus Baltimore, Philadelphia, and New York at times suffered severe epidemics, which were always confined to the warmer months of the year, disappearing entirely with the onset of cold weather and leaving the cities free until reinfected from outside. During this time yellow fever was essentially a disease of the trade routes of the Atlantic. Epidemics were common on sailing vessels where *Aedes aegypti* bred in water rats and this means of transportation was undoubtedly the method of dissimulation. From infected coastal towns, yellow fever was introduced into the heart of

North and South America by traffic on the Mississippi and the Amazon (Carter, 1931).

It was stated that there must have been at least 500,000 cases of the disease in the United States during the period of 1793 and 1900. The great epidemic in Spain in 1800 caused 60,000 deaths. Yellow fever was first reported in Cuba in 1649 and was almost continuously present until 1900 causing 35,900 deaths in Havana during the period between 1853-1900. During the brief occupation of Cuba by the American forces during the Spanish-American War, 1,575 cases of yellow fever with 231 deaths occurred in the American army; because of this the yellow fever Commission was appointed, with Major Walter Reed in charge. Modern knowledge of the etiology and epidemiology of yellow fever stems from the findings of this commission, which clearly demonstrated that the agent responsible for yellow fever passed through bacteria-tight filters and was present in the blood of the patient during the first three days of fever, and that the mosquito *Aedes aegypti* was capable of transmitting the disease by bite, provided a period of 12 days was allowed to lapse after an infective feeding. Acting on this information, Gorgas, by applying antimosquito measures, was able to eradicate yellow fever from Havana.

Following the application of anti-aegypti measures, it was noticed that yellow fever showed a tendency to disappear from neighbouring small towns and villages. This led to the development by Carter of the "Key Centre" theory, according to which, two factors are necessary to maintain yellow fever in a community; first, a large population of susceptible human beings, and second, a constant supply of the mosquito (Reed, 1911).

Stokes, Bauer and Hudson (1928), investigating yellow fever in Africa, showed that the rhesus monkey is susceptible to the virus and that mosquitoes other than *Aedes aegypti*, under experimental conditions can transmit the virus. These observations first opened up the possibilities of an epidemiology of yellow fever not confined to the cycle, man-aegypti-man. This possibility was emphasized by the finding of cases of yellow fever in South America in areas where *Aedes aegypti* does not exist and led to the discovery of the epidemiologic entity now known as jungle yellow fever. It has been clearly established that yellow fever virus is maintained in the jungle in South America and Africa in the absence of both man and *Aedes aegypti* and that under such conditions man becomes infected only by close contact with the jungle. In Africa, yellow fever has been known as an epidemic

for about two centuries. A jungle yellow fever cycle in Africa was recognised only 35 years ago. The most thorough studies of the transmission cycle of yellow fever in forests were carried out in Bwamba country in Uganda, and relieved the vital part played by two mosquito species, *Aedes africanus* and *Aedes simpsoni* (Theiler 1952).

❖ ❖ ❖

E P I D E M I O L O G Y

There are three epidemiological forms of yellow fever, the urban, rural, and jungle, which differ in regard to vectors and sources of infection. In urban yellow fever the reservoir is man and the vector exclusively the domestic mosquito *Aedes aegypti*. In rural yellow fever the reservoir may be man or animals and the vector is again usually *Aedes aegypti*. In the jungle form of the disease, the reservoir is not man but certain forest animals and the vectors are various species of *Aedes* or *haemogogus*. Transmission in all areas depends on a supply of vectors, infective reservoirs, and suitable non-immune hosts. In endemic areas infection is kept going mainly in young children. Infants are not easily infected in the early months because of immunity transmitted from the mother (Woodruff 1978).

Jungle type of yellow fever may occur either in endemic or epizootic forms. In the endemic form, the disease which is primarily one of the monkeys, is almost constantly present, and sporadic cases of human infection occur from time to time. The primary spread of the virus is from monkey to monkey via *Aedes africanus* in Africa and *Haemogogus* species in South America, both these mosquitoes