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Introduction

Rabies in Mexico is a disease of considerable importance, primarily because of the number of people that die of the disease and the number of human vaccinations administered to prevent it, with the inherent risks involved.

For the five year period from 1964-1968 there was a total of 368 human cases with an average of 73 per year and an incidence 0.17 per 100,000 for the country. The political areas with the greatest problem were the Federal District, and the States of Jalisco, Veracruz, Mexico, Puebla, and Guanajuato, in which 55% of the total cases were reported, with indices slightly higher than the national one, varying from 0.19 to 0.23 per 100,000 yearly.

Most of the cases are in urban areas (80% compared to 20% in rural areas), although these reports are not very precise since most of the human cases are attended in the large hospitals in the cities. Yet even without this investigation it appears as if the great majority of cases are from the cities. On the other hand, approximately 50,000 persons are immunized yearly because of exposure to the disease although quite a number of these are vaccinated because the biting animal cannot be found. During the programs which we have had in the country and the information gleaned from these we feel that the level of canine immunization is below 40%, with the exception of the border area in which the level is 80% or more. The principal indicator of the problem in our country is still the number of human deaths, and we can affirm that a rabies enzootic exists in the whole country without full knowledge of the number of cases or the areas affected.

Urban Rabies

In all countries having a rabies problem it is the urban area which affords the conditions necessary for its persistence, and the dog being the most affected species, is also the animal most intimately associated with man. This susceptible canine population is not subject to large variations and the environmental conditions permit them to easily obtain food, shelter, and the necessary conditions for their multiplication.

The fact that the dog is particularly vulnerable, the ease with which he contacts other animals while the animal is wandering throughout the streets and the period of viral excretion help the viability of the disease in urban areas. These facts, plus the addition of new susceptibles periodically, favors the presence of outbreaks. In keeping with the canine ecosystem, we have the transmission from dog to dog, dog to man, dog to cat and other pet species, from dog to cattle, and probably from dog to wildlife species. The type of dog that primarily keeps the infection going is the stray which walks around freely and thus can more easily spread the disease. This situation points out the importance of vaccinating the susceptible dog and controlling those that are not susceptible. Iu these conditions man and other animals, cats, pets, and others are exclusively circumstantial victims and of secondary importance to the urban epidemiological panorama. Various studies in Mexico indicate that in the urban areas 95% of the cases are in dogs, 4% in cats, and 1% are in other species.

In the urban areas the rat raises an important doubt on many occasions since it, after the dog, is the species which most often bites humans. Yet rarely have the animals shown to be rabid and there is no case in which transmission to man or other species has been demonstrated. One result of this is the excessive numbers of unnecessary treatments given, a situation made even worse since many rodents escape after biting and make it impossible to establish a correct diagnosis.

Urban rabies generally starts from an initial focus of infection with one or more cases noted from which the infection spreads along the avenues and streets or by some natural accident, always forming an epidemiological area in which the infection appears and disappears indistinctly in one or another zone, and with the movement of animals from one city to another.

In each focus the number of cases increases progressively and there appears to be a shortening of the incubation period until the peak is reached; after this the number of cases is reduced until only sporadic cases are seen. It is at this time that the enzootic may be established and the more or less constant annual variation may be seen. For this reason, this is the time at which to establish control measures that would stop the spread of the problem. The present growth rate of urban areas has brought with it an increase in the canine population in direct proportion to the human one and this increases the opportunities for contact among dogs. These urban areas extend into neighboring rural ones which are then transformed into suburban areas in which continuing cases are seen through animal movement or over-population, thus increasing the chances of infection in close relation with the rural dogs or the wildlife species. On many occasions cities which have started control programs and which later forget the problem see themselves once more affected if a surveillance system is not established in the rural areas. This emphasizes the importance of controlling the urban areas, the suburban areas, and the rural areas.

Rural Rabies

In the ecology of rabies there are 3 ecosystems which permit the multiplication and transmission of rabies virus. The first is in dogs, the second is made up of the terrestrial wildlife species, and the third is in bats.

It is precisely the rural area surrounding the cities where the 3 mix or cross, because of the possibility of contact between wildlife species, bats, and dogs, and man at the end of the chain. Thus, urban or rural problems are created in which all species are involved.

In the bat ecosystem there are two principal groups; the insectivorous, etc. bats and the vampires. Bats are capable of transmitting rabies for prolonged periods, apparently as normal carriers, constituting important centers of infection for the perpetuation of the virus which their offspring probably may acquire directly by ingestion of maternal milk or by bites when trying to find a suitable area in their habitats.

In this way the ecosystem formed from bat to bat and from bat, especially the vampire, to cattle and occasionally to man, wildlife and dogs. This aspect constitutes a problem which is almost exclusively economic, without affecting public health significantly. The rabies problem is always related directly to the number of susceptible animals in an area and the opportunities for contacts. Since the wildlife populations vary cyclically according to climatic and geographic conditions, the disease is subject to the same fluctuations according to the presence, absence, or relative predominance of certain groups of animals. We can state as an example, the extensive cattle growing areas in the tropical zones of Latin America which are constantly attacked by vampire bats, a problem which does not exist in the colder and higher regions which are not suitable for these mammals.

Rabies in Dogs and Wildlife

We are all very much aware of the shift in some areas of the world from canine rabies to wildlife rabies through the reduction of rabies in dogs, either through immunization programs or stray dog control or a combination of both.

Nevertheless this primary hypothesis might be changed if we would have better information about the ecology of wildlife. Drs. Kaplan and Shiffman in the International Seminar on Rabies, held in Argentina in 1967, made an analysis of the world wide rabies picture, and among other things, pointed out the increasing numbers of rabies cases in wildlife with particular emphasis on several European countries, the United States, and Canada, and also pointed out the possibility that the problem might be present in Latin America. Among other things they described an outbreak of canine rabies in non-vaccinated dogs in Greenland that followed an outbreak in foxes and deer. They thus emphasized the necessity of increasing the surveillance, the epidemiological surveillance system and improving reporting. I believe that three years later we should follow their recommendations. The relationship between canine rabies and wildlife rabies is evident. In the northern border rabies program in which the level of protection has been increased in the susceptible animal and in which a substantial reduction in uncontrolled dogs has been achieved, the number of rabies cases has been reduced and we have found with greater frequency than before cases of rabies in cats and other animals which makes us think of two concrete facts. One, that canine rabies control is being achieved and the problem is shifting to cats and other animals. Second, that while effecting a good program we are discovering cases that might not have been ferreted out before, even though they were present. We might even think about breaking the ecological barrier that impeded its penetration into suburban zones. The epidemiological situation that urban canine rabies presents to us has conditioned our programs to focus on that priority, leaving a little loose the aspects of epidemiological investigation of other ecosystems. While the first is resolved we penetrate the other equally important field which in this primary stage has not been possible to consider.

In the Plan of Operations of the northern border for 1970 we contemplate emphasizing epidemiological surveillance, pointing out that in this stage of the program it will be necessary to find out, besides the animal species and the area in which it was found, the characteristics of the area such as urban or rural areas, topography, communications, social-economic and cultural factors.

It is not reasonable to await immediate changes in this field but we certainly should have increased and better attention paid to the problems since they undoubtedly play an important part in the perputation of the virus in nature and the production of rabies cases in domestic animals. Also, since in Mexico the conditions for canine control are still limited in many aspects, the health authorities of our country have paid most attention of dogs, which represent 95% of the rabies problem, and wildlife control is the responsibility of the Department of Agriculture. Nevertheless, up to now, we have not had research in wildlife species nor control programs sufficiently advanced to give us adequate information or systematic control programs. In order to improve this situation we think that in the border control program the sampling of wildlife species in various areas might be initiated to determine the situation that exists in these animal populations and which might represent danger for the border cities and thus make the necessary efforts to achieve more active participation of the indicated authorities.

Conclusions

In reference to the above we can make the following conclusions:

1. Rabies is an important world wide problem.

2. In the last decade an increase in the problem of wildlife rabies has been observed as a consequence of the control of canine rabies, particularly in central Europe, the United States and Canada.
3. In Latin America the problem is found mostly in dogs and bats with little information about other animals.
4. In Mexico most attention has been given to the canine rabies problem and a research program has been initiated into bat rabies.
5. The border rabies program of Mexico at the present time is considering more complete epidemiological surveillance that might result in obtaining information about wildlife populations in various areas.
6. It is necessary to increase the exchange of information on the border that would allow us at any given moment to have more knowledge of the problem and to serve as a basis for joint research or simultaneous control measures.