CANINE RABIES IN NIGERIA, 1970-1980 REPORTED CASES IN VACCINATED DOGS

A. E. J. OKOH

National Veterinary Research Institute,
Vom, Plateau State, Nigeria

(Received for Publication June 6, 1982)

SUMMARY

From 1970 through 1980, 14 cases of rabies in vaccinated dogs were reported in various parts of Nigeria. All the dogs (100%) were owned; and adult (93%); most demonstrated furious behaviour (64%), and had exposure to humans (43%).

A history of vaccination was reported for 1200 dogs. Of the 14 cases there were 10 cases of apparent vaccine failure involving modified live (low egg passage chick embryo) vaccine in use during the study period.

In 4 of these cases, infection may actually have been induced by the vaccine. Surveillance should be heightened to monitor efficacy of vaccines in current use in the country.

INTRODUCTION

Despite the control and vaccination programmes of rabies instituted in Nigeria since 1935 the incidence of rabies has not quite declined appreciably. Thus canine rabies continues to be an important element of the rabies problem in Nigeria. The cases in dogs and the bites from dogs, including escaped or unexamined dogs are probably responsible for most of the human antirabies treatment administered in Nigeria today. Boulger and Hardy (1960) reported that in this country 6,000 people receive post-exposure treatment yearly. Study of cases in vaccinated animals could provide a measure of the effectiveness of canine rabies control and efficacy of canine rabies vaccines in field application.

MATERIALS AND METHODS

Laboratory requests for rabies examination submitted to the National Veterinary Research Institute for the duration January 1970 to December, 1980 from various parts of Nigeria were retrieved. The requests were examined in search of likely epidemiological factors human, environmental and animal associated with rabies incidence and causation in Nigeria.

Information was retrieved on the location, date of diagnosis, ownership, vaccination history, clinical behaviour, exposure to humans and other animals and history regarding the source of infection for the dog. Information of age of dog was obtained when given in the
laboratory request forms.

RESULTS

A total of 14 cases of laboratory-confirmed canine rabies associated with vaccination was reported in Nigeria for the period January 1970 to December, 1980. During the same period 584 cases of laboratory-confirmed canine rabies was diagnosed out of a total of 2,028 specimens received by the laboratory in Vum (See Table II). The distribution of the vaccine-associated rabies cases and their case histories are given in Table 1.

Information regarding vaccination was sought on all 2,028 dogs. Of these, 1,200 (59.17 per cent) had not been vaccinated. For another 600 (29.58 per cent) the vaccination history was not indicated. Since the owner of a vaccinated dog would usually acknowledge vaccination, these dogs had probably not been vaccinated. Vaccination was claimed for only 218 cases; but in 104 of these, inadequate information to indicate vaccination was provided. Cases in this category included those where relations of owners claimed vaccination but could supply no details and cases where bite victims simply killed and submitted dog heads for rabies confirmation.

In another 110 cases, the vaccination was outdated (i.e., more than 3 years post-vaccination) for the modified live virus vaccine (MLV) low egg passage (LEP) rabies vaccine. In another four onset of clinical disease occurred less than 30 days after first vaccination, a period when the immune response is incomplete. In most of these cases it is probable that the dogs were exposed before being vaccinated. In 2 of the 14 cases there was a history of stray dog exposure prior to vaccination and onset of rabies for the two cases was 7 days. However, with the exclusion of the previous detailed cases, there remain 10 cases of apparent vaccine failure associated with low egg passage - chicken embryo origin (LEP - CEO) vaccine from one producer; all 10 'dogs developed posterior paralysis and were subsequently shown to be infected with rabies.

Overall, apparent vaccine failure occurred in from 0.5% (if cases in animals with unknown vaccination status are included in the denominator) to 0.71 per cent (if only cases in animals with a specified vaccination history are used) of the reported cases.

Of the 14 cases in vaccinated dogs, 4 showed dumb rabies while 10 showed furious form of rabies, and at least 9 persons were bitten by the furious cases.
Table 1. Case Histories - Rabies in Vaccinated Dogs in NIGERIA 1970 - 1980 (continued)

<table>
<thead>
<tr>
<th>Lab. Ref. No.</th>
<th>Location</th>
<th>Species</th>
<th>Clinical History</th>
<th>Diagnosis Confirmed</th>
</tr>
</thead>
<tbody>
<tr>
<td>222</td>
<td>Anglo-Jos</td>
<td>dog</td>
<td>Adult dog, sex not indicated, showed nervous derangement, anorexia for a number of days. Profuse salivation when admitted to Vet. Clinic Jos on 27/5/75, showed sand in buccal cavity. Temperature was 39.8°C and exhibited posterior paralysis. Had rabies vaccine (LIF) flury on 25/4/75. Died 28/5/75 in quarantine at Vet. Clinic Jos.</td>
<td>Positive Rabies day 12 by MIT</td>
</tr>
<tr>
<td>373</td>
<td>Jos</td>
<td>dog</td>
<td>Dog vaccinated with ARV (dog) on 7/6/75. Behaviour changed suddenly towards owner and children, fighting everybody. Loss of appetite and brought to Vet. Clinic Jos. on 9/6/75 showing posterior paralysis but died on clinic table before any assistance could be given.</td>
<td>Positive Rabies day 13 by MIT</td>
</tr>
<tr>
<td>2169</td>
<td>Kaduna</td>
<td>dog</td>
<td>One year old male dog. Bit 3 people in March, 1977. Dog was inoculated against rabies with ARV (dog) in Sept. 1976. Dog died in quarantine within 10 days of observation.</td>
<td>Positive Rabies day 10 by MIT</td>
</tr>
<tr>
<td>277</td>
<td>Benin City</td>
<td>dog</td>
<td>The anorexic bitch bit puppies and became aggressive; reported to Vet. Clinic B/City on 14/2/78. Vaccinated in March 1977 with ARV (dog). Quarantined and died 24/2/78.</td>
<td>Positive Rabies day 11 by MIT</td>
</tr>
<tr>
<td>4279</td>
<td>Otukpo</td>
<td>dog</td>
<td>Puppy 3½ months old had lower jaw broken due to a bite from a suspected rabid dog on 25/11/80. Jaw stitched and on 1/2/80 a ½ dose ARV (dog) given IM. Puppy went off feed on 8/2/80 and on 11/2/80 became aggressive. Died on 13/2/80 after showing paralysis.</td>
<td>Positive Rabies day 15 by MIT</td>
</tr>
</tbody>
</table>

**DISCUSSION**

The production and use of rabies vaccines in Nigeria have been described by Nawathe, Banerjee, Okoke and Tiyagnet (1981). For the control of rabies by vaccination of dogs above 6 months age the then Veterinary Department in 1935 issued Simple-type phenolized sheep brain vaccine to be given in 2 doses a week apart. The vaccine met with apparent neuroparalytic accidents and vaccine failures resulting in its withdrawal from the field within five years of
its issue (Thorne, 1954). No vaccine was available until 1956 when low egg passage (LEP) Flury vaccine grown in chicken embryos was developed and issued to the field. The same is continued till today with modification in the techniques to suit production in quantity. High egg passage (HEP) Flury vaccine was developed and issued to the field since 1971 for cats, cattle and horses.

The occurrence of apparent vaccine failure cases and apparent cases of vaccine-induced rabies infection indicate that the LEP Flury vaccine may not be 100% effective. The occurrence of vaccine-induced rabies or failures could further complicate rabies problem in Nigeria, as not all vaccinated dogs may be protected. LEP vaccine appears safe for adult dogs but retains some pathogenicity for young puppies, cats and cattle (Crick and Brown, 1976). It has been shown to compare favourably with the more recently developed tissue culture vaccines and with suckling mouse brain vaccines (Sikes, 1971), and a single dose of vaccine in dogs provided a duration of immunity of more than three years (Tierkel and others, 1953). In 10 of the 14 reported cases associated with LEP vaccine, the dogs developed rabies between 5 months and 2 years post-inoculation.

Tierkel (1959) reported that the average incubation period in dogs varied from 3 - 8 weeks but rarely might be less than 2 weeks or more than 4 months. In four cases, onset of clinical disease occurred less than 30 days after first vaccination, a period when immune response is incomplete.

The long incubation period following naturally acquired rabies virus infection allows time for manipulation of the host's immune system in ways that can promote protection. There are, however, occasional failures, even when vaccine of established potency has been used, and much remains obscure about the pathogenesis of rabies virus infection, and about the precise way in which rabies vaccine confers protection (Poterfield, 1981).

Animals immunized before exposure are usually resistant to infection if neutralizing antibodies are present in their sera (Crick, 1973). However the presence of antibody in the serum of a person and presumably animal treated after exposure by vaccine with or without anti-serum may not be a reliable indication of the protection effect of the therapy (WHO Expert Committee on Rabies 1973), although it has been assumed that the rapid production of antibody is essential. This is because it is thought that once the virus has entered the central nervous system it is not longer accessible to circulating antibody. Up to the end of December 1980, 584 cases of rabies have been confirmed in dogs by our laboratory.

In vaccinated dogs rabies has been confirmed 14 times. The breakdown of this figure is:

- Rabies confirmed in less than 1 month after vaccination = 4
- Rabies confirmed in less than 6 months after vaccination = 2
- Rabies confirmed in more than 6 months after vaccination = 8

Total = 14

When we take into consideration the fact that the incubation period of rabies may extend to 6 months and therefore the possibility of some dogs having been infected prior to vaccination, it is probably fair to disregard the majority of breakdowns which occurred within 6 months of vaccination. Even so, there remain 8 cases of rabies in dogs which were vaccinated over six


