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DOG BITE AND CLINICAL RABIES IN A SUBURBAN HOSPITAL IN NIGERIA: A 20-YEAR RETROSPECTIVE STUDY OF THE PREVALENCE AND TREATMENT WITH ANTI-RABIES VACCINE.

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ABSTRACT

Although dog bites that result in human rabies constitute a serious public health hazard at Auchi, the prevalence and treatment outcome are unknown. Therefore, this 20-year retrospective study was aimed at determining the prevalence and treatment outcome of dog bite injuries using anti-rabies vaccine at Osigbemhe Hospital, Auchi. Case records of patients managed at the hospital between January 1994 and January 2014 with the diagnosis of dog bite and rabies were retrieved. Relevant clinical data were extracted. Forty seven patients presented with dog bite injuries including four clinical cases of human rabies who died. Mean age of victims of dog bite was 21.8±14.6 years and the range was 2-54 years. The majority (51.1%) were children (0-10) years. Males (63.8%) were more affected than females (36.2%). The lower limbs and trunk/buttocks injuries were significantly higher than other sites. Most injuries (33%) were high risk (type III). Bite wounds (91.5%) were washed with water as well as irrigated with saline and some (21%) were disinfected. Debridement and suturing were done in some cases (44.7%) and 91.5% received postexposure anti-rabies vaccine. Other medications including analgesics, antibiotics and intravenous fluids were administered as indicated. In conclusion, though the prevalence of dog bite injuries was low, the use of anti-rabies vaccine with demonstrated clinical efficacy, was high (91.5%). Improved surveillance, availability and affordability of vaccines for pre- and post- exposure prophylaxis as well as interventions to prevent dog bite related injuries, particularly among children, are imperative.

Key words: Dog bite, Clinical rabies, Treatment of dog bite, Postexposure prophylaxis, Anti-rabies vaccine.

INTRODUCTION

In Nigeria, dog bite is a major public health and clinical problem that arouses tremendous fear and anxiety in both patients and physicians not only for the associated high morbidity but also for the risk of contracting rabies which, if left unrecognized and inadequately prevented, is almost invariably fatal. [1-3] Human rabies is endemic in Nigeria imposing a heavy burden on the lean health budget. Many families do not just keep dogs as pets but for hunting, security and economic reasons. For one reason or the other, these may be abandoned and they become stray dogs that can inflict injuries on victims, provoked or unprovoked. Worse still, most of these dogs are usually not immunized against rabies. [1-7]

Rabies (meaning *madness* in Latin) is a viral zoonosis caused by rabies virus of the family *Rahabdoviridae* and the genus *Lyssavirus*. [8] It causes an acute encephalomyelitis and it is typically transmitted from the saliva of a rabid animal via a bite, scratch or mucous membrane exposure. Carnivores (eg dogs, cats) are the reservoirs and major vectors of transmission especially in Africa and Asia whereas in the Americas, bats are more important in transmitting the disease. [9] Rabies is invariably fatal if post-exposure prophylaxis (PEP) is not administered before the development of symptoms. Prevention, the master key for controlling the disease, relies on a combination of interventions including administration of pre-exposure immunization to individuals at risk, administration of PEP with human rabies immune globulin (HRIG) and control of rabies in animal population. [10]

In Africa, the increasing human population is met with an attendant increase in dog population, a worrisome phenomenon that has great implications for the transmission of rabies. [9] In recent years, cases of dog bites and rabies have been on the increase in Nigeria. [1-6] Even then, vaccines and HRIG are hardly available. It was in this unsalutary situation that this study was undertaken to evaluate the prevalence and treatment outcome of cases of dog bite and rabies in Auchi, Nigeria.

PATIENTS AND METHODS

This observational retrospective study on clinical data of patients managed with the diagnosis of dog bite injuries and rabies was conducted at Osigbemhe Hospital Auchi, Edo State of Nigeria between January 1994 and January 2014. Osigbemhe Hospital is a 25-bed general

practice centre. A questionnaire was designed to extract relevant basic clinical data such as patient's hospital number, age, gender, site of the bite, type (severity) of bite, immunization status of the dog (if identified) wound care, use of pre-exposure and PEP anti-rabies vaccine, presenting symptoms and clinical findings on physical examination.

The patients with rabies were managed conservatively in a quiet room in the hospital. Adequate hydration and calories were provided through intravenous fluids. Diazepam was given for seizure control while cardiopulmonary support was instituted. The diagnosis of dog bite and rabies was clinical; post-mortem brain examination and/or serological confirmation were not done due to lack of facilities. Data analysis was performed using the SPSS software to generate frequency, means and standard deviations. Continuous variables were compared using Student's t-test. A value of $P < 0.5$ was recorded as statistically significant.

RESULTS

Over the 20-year period, 47 cases of dog bite including 4 patients out of which 3 were admitted with diagnosis of rabies and one 6-year old boy who did not complete his PEP immunization and later developed rabies, were recorded. Time of presentation at the hospital was between a few hours to 8 months. Table 1 shows that in most of the age groups, males (30[63.8%]) were significantly more affected than females (17[36.2 %]) ($P < 0.01$), giving a male to female ratio of 1.8:1. The mean age of victims was 21.8 ± 14.6 years while the age range was 2-54 years with children between 0-10 years (51.1%) mostly affected.

The most common sites of bite were left lower limb (40.4%), right lower limb (21.3%), trunk/buttocks (17.0%), right upper limb (8.5%) while the least affected sites were the left upper limb (4.3%) and the head/neck region (2.1%). Three (6.4%) had multiple bites, Table 2. Most of the bites (82%) were inflicted by stray dogs and majority were unprovoked. None of the owners of the dogs that were known (18%) could provide vaccination certificate as a proof. Surprisingly, two of the victims were bitten by their own dogs. Four patients (8.5%) presented with the clinical form of furious rabies: aggression and restlessness, hyperexcitability, fluctuating consciousness, inspirational muscle spasm, hydrophobia as well as aerophobia in one patient. No patient presented with dumb rabies.

One patient manifested symptoms of rabies postpartum. Till lost to follow up, her son did not show any sign of rabies. All those with rabies died within an average hospital stay of 5.7 ± 5.1 days.

From Table 3, 43 (91.5%) of victims received wound care following dog bite. Wounds were washed with soap and irrigated with water or saline; and sometimes (21%) a disinfectant such as povidone iodine was used to treat the wound as well. Twenty one (44.7%) had the wound sutured. All patients received prophylaxis against tetanus. PEP was administered in 43(91.5%) and immunization schedule was completed in all except one who later developed full blown rabies. HRIG was prescribed for 21(44.7%) but 2(4.3%) received the treatment.

Other ancillary medications such as analgesics, anti-inflammatory agents, antibiotics, intravenous fluids, diazepam and oxygen were administered as indicated. Two patients (4.3%) who developed moderately severe anaphylactic reactions were given epinephrine, antihistamine and hydrocortisone. Most of the patients (91.5%) were given some vitamins.

Table 1: Age and gender distribution of dog bite victims.

Age range (yr)	Gender		Total (%)
	Male (%)	Female (%)	
0 – 5	10 (21.3)*	7 (14.9)*	175 (36.2)*
6 – 10	5 (10.6)*	2 (4.3)	7 (14.9)*
11 – 15	4 (8.5)	2 (4.3)	6 (12.8)*
16 – 20	2 (4.3)	2 (4.3)	4 (8.5)
21 – 25	1 (2.1)	1 (2.1)	2 (4.3)
26 – 30	1 (2.1)	1 (2.1)	2 (4.3)
31 – 35	3 (6.4)	0 (0)	3 (6.4)
36 – 40	0 (0)	1 (2.1)	1 (2.1)
41 – 45	1 (2.1)	0 (0)	1 (2.1)
46 – 50	2 (4.3)	0 (0)	2 (4.3)
51 – 55	1 (2.1)	1 (2.1)	2 (4.3)
Total	**30 (63.8)**	**17 (36.2)**	**47 (100)**

*Higher % in these age ranges

Table 2: Common Sites of dog bite wounds /injury

Site	No of Victims	%
Left lower limb	19	40.4*
Right lower limb	10	21.3*
Right upper limb	4	8.5
Left upper limb	2	4.3
Trunk/buttocks	8	17.0*
Head/neck	1	2.1
Multiple injury	3	6.4
Total	47	100

WHO wound severity category

Category I (Non bite): low risk	0	0
Category II (Abrasion): moderate risk	14	29.8
Category III (Single/multiple wounds): High risk	33	70.2
Total	47	100

*****Higher %; WHO, World Health Organization[16]

Table 3: Treatment profile of victims of dog bite

Treatment/medication	No of Patients	% Usage
Wound care	43	91.5*
Wound care plus suturing	21	44.7*
Analgesics/Anti-inflammatory agents	42	89.4*
Antibiotics	44	93.6*
Antitetanus serum	21	44.7
Tetanus toxoid	43	91.5*
Human diploid cell culture vaccine (HDCV)	43	91.5*
Human rabies immune globulin (HRIG)	2	4
Intravenous fluids	21	2.1
Diazepam	4	8.5
Oxygen therapy	4	8.5
Epinephrine	2	4.3
Antihistamine	2	4.3
Corticosteroid	2	4.3
Vitamins (B Complex, C)	44	91.5

*Higher % usage

DISCUSSION

As evidenced in this study and in other previous reports [1-7] from Nigeria, dog bite remains a major public health and clinical challenge. Consistent with previous studies, [1-3] males in this study were more affected than females. For cultural and religious reasons, males are usually more adventurous and ambulant, hence they are more exposed to dogs and are therefore more likely to be bitten. [3] Children, particularly the less than 10 years, were the core victims, similar to some reports from Nigeria[1,8] and USA. [9,12] The lower limbs and the buttocks, which are usually more accessible to the dogs when the child attempts to run away, were most affected. The reasons usually given for children vulnerability are that they are more likely to provoke dogs and less likely able to defend themselves against attack. [2]

In contrast to reports [13-14] from developed countries were domestic dogs are kept as pets and therefore the main culprits responsible for bites, stray dogs were mainly responsible for bites

in this study and in others, [1,3,7] because their owners permit them to roam freely. The fact that most of the bites were unprovoked indicates the probability of the dogs being rabid and also given the lack of animal vaccination in the environment. Hence all victims had PEP.

None of the victims who had PEP developed rabies. The boy who took only 2 doses eventually developed rabies, implying that 2 doses may not be protective. The other 3 patients who were bitten in the nearby villages received herbal treatment. The fact that rabies developed in one patient 8 months after a bite and in another during the course of pregnancy only to manifest post- partum, underscores the insidious nature and long incubation period [9] (sometimes greater than one year) of the disease. Thus, when a documented or likely exposure has occurred, PEP is indicated regardless the length of the delay, provided clinical signs of rabies are not present. [10, 15]

Administration of anti-rabies vaccine such as HDCV together with HRIG soon after bite by suspected rabid dogs, have been found to be effective in preventing rabies. [1-7,9-15] The recommended PEP in Nigeria is intramuscular injection of 0.5ml HDCV into the deltoid in adults and anterolateral thigh in children on days 0, 3, 17,14 and 28 for both bite and non-bite exposures. HRIG is given at a dose of 20 IU/kg body weight. HRIG provides rapid passive immunity with a half-life of 21 days while HDCV provides active immunity with effect from about 7-14 days. HRIG is not given to patients who have been previously vaccinated and it should never be administered in the same syringe or in the same site as vaccine to avoid antigen-antibody reaction. [15,16] In this study, HRIG was only available for use for 2 patients. Also, infilteration of HRIG into category III bite wounds is essential since the passive antibodies neutralize the virus at site and protect for up to 14 days. Unfortunately, this life-saving biological agent was not available for majority of our patients. Proper wound treatment is an essential component of rabies PEP and the current recommendation is to suture wounds, taking into account cosmetic factors and the potential for bacterial infection. [7, 18]

Despite the above scenario, it is gratifying that this study patients who completed HDCV immunization did not develop rabies. Thus, PEP was justified in all the patients especially when the offending dogs could not be held for a 10-day observation (quarantine) or be euthanized for rabies examination if possible. The boy who did not complete immunization, probably because of the minor pains he had after 2 doses of HDCV, died of rabies. Reactions after vaccination with HDCV, though usually mild, have been reported. [7,10-12,15-16] However,

some serious reactions such as Guillain-Barre syndrome [18] and retrobulbar neuritis [19] have also been reported. Although these complications eventually resolved with little or no sequalee after treatment, such adverse reactions pose a serious dilemma for the patient and the attending physician. Two patients in this study who had mild anaphylactic reactions were successfully managed with epinephrine, antihistamine and hydrocortisone, and they completed their schedules. However, when a person with a history of serious hypersensitivity to rabies vaccine must be revaccinated or when faced with serious complications, epinephrine, antihistamine and corticosteroids can be administered. But corticosteroids, antimalarials and other immune suppressives must be used with caution since they can interfere with the development of active immunity after vaccination.[16,20-21]

Rabies was associated with pregnancy in this study. Although, there have been reports of rabies associated with pregnancy,[21-22] the possibility of *in utero* transmission of rabies has not been proven. [22-23] Because of the potential consequences of inadequately treated rabies exposure, and since teratogenicity has not been associated with rabies vaccination in pregnancy, pregnancy is not a contra-indication to PEP. If the risk of exposure to rabies is substantial, pre-exposure prophylaxis should be carried out in pregnancy. [24-25] Our 4 study rabies patients died, demonstrating the virtually 100% fatality of the disease. Thus, rabies treatment is so nearly limited to prevention, albeit, there is a report of 7 survivors in human history following the use of advanced therapeutics such as the Milwaukee Protocol which has hitherto met with very little success. [20]

In conclusion, although the prevalence of dog bite at Auchi is relatively low, the morbidity is high and the case fatality 100%. PEP with HDCV is maximally used with demonstrated high clinical efficacy. There is urgent need to educate dog owners to contain their pets and vaccinate them. The public should be encouraged to report all cases of dog bite to the hospital for proper treatment. Individuals at risk of rabies should have pre- and PEP. Government through the Ministry of Health should also control stray dogs through proper legislation and ensure animal vaccination, provide free immunobiologicals (HRIG and vaccine) or in the least, subsidize and make them affordable and available as well as funding research into new approaches for rabies treatment. The need for increased surveillance and education of the public about rabies, including pet safety education, is imperative.

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