

Epidemiological Aspects and Compliance with Post-Exposure Prophylaxis of People Bitten by a Dog and Received at the Buanionzi State Health Center in Boma, DR Congo

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Abstract

Objective: To describe and analyze the epidemiological aspects as well as the observance of post-exposure prophylaxis (PEP) of people bitten by a dog and received at the Buanionzi State Health Center from 2014 to 2017. **Methods:** Descriptive cross-sectional study which took place in two stages. The first interview was an interrogation carried out at the health Center until surgical trimming (100% of cases) followed by PEP (70.3% of cases) according to the Essen protocol. The second time was a 24 h telephone interview after a missed appointment for a dose of PEP. **Results:** The prevalence was 5.6 bites/10.000 people. The average age was 26.4 ± 18.3 years. Age ≤ 26 years was more concerned with 59.3% of cases ($p = 0.006$) in which children < 15 and 5 - 15 years old represented 60.5% ($p = 0.003$) and 57% ($p = 0.04$) of cases respectively. The male sex accounted for 55.9% ($p = 0.009$). Residents of Kambondo were the most affected with 40% followed by Kalamu with 29.7% ($p = 0.003$). 70.3% of people started a PEP ($p = 0.01$). Completeness was 1.9% and 78.4% received one dose of vaccine. **Conclusion:** The rabies risk is potential in Boma. Efforts in terms of public health strategies must be made to reduce it.

Keywords

Epidemiological Aspects, Observance, Post-Exposure Prophylaxis, Dog Bite, Buanionzi State Health Centre, Boma

1. Introduction

Rabies is a concern in the world. It affects more than 150 countries and territories and kills tens of thousands of people every year. Over 98% of human deaths are the result of a rabid dog bite [1].

Children under the 15 years and people living in rural areas of Asia and Africa are the most vulnerable. These deaths can be avoided thanks to Post-Exposure Prophylaxis (PEP), which includes anti-rabies vaccination combined in some situations with serotherapy [2]-[9]. However, the drop-out rate is high in low-income countries due to the refusal of animal owners to take care of the victims as well as the lack of means to buy the vaccine [10]. In the Democratic Republic of Congo (DRC), particularly in Boma, rabies is endemic. However, there are still problems of awareness, staff training, health and veterinary structuring and the supply of prophylactic drugs causing shortage. Moreover, the high price of these drugs explains the reluctance of suppliers to make them a permanent stock at the risk of expiry.

Also it discourages people, often poor, from spontaneously adhering to prophylaxis or continuing it. This study describes and analyzes the epidemiological aspects and compliance post-exposure prophylaxis of people bitten by a dog and received at the Buanionzi State Health Center in Boma.

2. Patients and Methods

2.1. Study Framework

This study took place at the Buanionzi State Health Center, located in the courtyard of the Boma General Reference Hospital (GRH) (Figure 1), in the Buanionzi Health Area, Boma Urban Health Zone (BUHZ) (Figure 1).

This Center carries out a minimum package of preventive and curative care activities. During the study period, the team was made up of: a Coordinating doctor; three second-cycle Medical Students; a head Nurse from the center or his Assistant. The study population consisted of 145 people bitten by a dog (World Health Organization Category three exposures) and received at the Center.

They came from three municipalities of Boma (Nzadi, Kalamu and Kabondo) and the neighboring agglomerations (Km8 and Manterne). Boma is a port City located in southwest of the DR Congo in the Province of Kongo Central, 470 Km from Kinshasa, 140 Km from Tshela, 125 Km from Matadi and 117 Km from Muanda. Its area is 65 Km², a population of 254.842 inhabitants (Source: Boma Urban Health Zone).

The sampling was of convenience of 145 cases.



Figure 1. Buanionzi State Health Center located in the courtyard of the Boma General Reference.

2.2. Methodology

This study was a cross-sectional with a descriptive and analytical, conducted from February 2014 to December 2017.

It took place in two stages:

- The first interview was an interrogation carried out by a nurse from the Centre. Then, the case was presented to the head nurse or his assistant for surgical trimming according to WHO standards and PEP consisting of anti-rabies vaccine according to the Essen protocol or Serum if the non-immune victim buys it. The vaccines used were VERORAB, RABIFORT and CHIRON. The serum was from the Institute of India lot 1489TO16 (2000 IU ampoule).
- The second time was a 24 H hour telephone interview after a missed appointment for a dose of PEP. This time was provided by the head nurse.

It was from the register of the Center that the students collected the data using a pre-established form.

These data concern:

- Socio-demographic characteristics (age, sex, residence);
- PEP administration;
- PEP compliance.

2.3. Statistical Analysis of Data

The statistical exploitation questionnaire was carried out with the student test. The statistics were performed using the Statistical Package of Social Science for Windows (IBM SPSS) version 28 software. The results were presented as frequency and percentage.

For the biochemical parameters, the statistical treatment was carried out using a student test, the comparison test with two independent samples. Furthermore, the percentage comparison was carried out using the khi-2 test.

2.4. Ethics Committee

The confidentiality of patient information was guaranteed at all times and the

data was anonymized during coding.

3. Results

During the study period, 145 people were bitten by dogs. This represents a prevalence of 5.6 bites per 10.000 people.

- The average age was 26.4 ± 18.3 years with extremes ranging from 1 to 80 years. Individuals ≤ 26 years were more affected with 59.3% ($p = 0.006$). In this group, children under 15 years of age were more affected in 60.5% of cases ($p = 0.003$), while those between 5 and 15 years of age accounted for 57% of cases ($p = 0.040$).
- The male sex was the most affected with 55.9% of cases ($p = 0.009$).
- Residents of the commune of Kabondo were more affected with 40% of cases, followed by those of the commune of Kalamu with 29.7% of cases ($p = 0.003$) (**Table 1**).
- 102 people (70.3% of cases) started a PEP ($p = 0.01$).
- Regarding compliance with PEP, completeness was 1.9%, while those who received a dose of vaccine accounted for 78.4% of cases (**Table 2**).

Table 1. General characteristic of the study population.

Variables	n(%)	p
Age (years)		0.006
>26	59 (40.7)	
≤ 26	86 (59.3)	
		0.003
<15	52 (60.5)	
15 - 26	34 (39.5)	
		0.040
<5	4 (4.6)	
5 - 15	49 (57.0)	
16 - 26	33 (38.4)	
Sex		0.009
Feminine	64 (44.1)	
Male	81 (55.9)	
Residency		0.003
Kabondo Commune	58 (40)	
Kalamu Commune	43 (29.7)	
Nzadi Commune	37 (25.5)	
Km8 and Manterne	7 (4.8)	
Administration of PEP		0.01
Non recur dose	43 (29.7)	
At least one dose received	102 (70.3)	

Table 2. Compliance (completeness) of rabies prophylaxis.

Type of prophylaxies	n = 102 (%)
1 dose of Serum (40 UI/Kg IM)	2 (1.9)
1 dose of vaccine	80 (78.4)
2 doses of vaccine	8 (7.9)
3 doses of vaccine	9 (8.9)
4 doses of vaccine	1 (1.0)
5 doses of vaccine	2 (1.9)

- On the other hand, five people who had not received rabies prophylaxis developed clinical symptoms and signs of rabies in an average incubation period of 41 days with extremes ranging from 26 days to 3 months. They were admitted to the Boma HGR where they all died. All biting dogs were found alive.

4. Discussion

1) The **prevalence** of bites: we found 5.6 bites per 10.000 people. This high prevalence would be explained by the presence of occasional or permanent stray dogs favored by urbanization mainly thanks to the waste produced, the development of commensal fauna housing animals likely to transmit the disease [11].

2) **Age**: we found that people ≤ 26 years were more at risk in 59.3% of cases, including 60.5% of cases under 15 years of age and 57 % between 5 and 15 years of age.

This corroborates Sylla *et al.* [12] who found that children under 15 years of age represented almost half of subjects (48.02%). For our series 35.8% of cases were related to children and adolescents under 15 years of age. The age group most at risk was 10 - 19 years, with 33.1% of cases involving children and adolescents under 15 years of age. In fact, the population under 15 years consider dogs to be friends of companions, toys and constantly subject them to provocations (surprise, separate, oppose, dogs).

3) **Sex**: we found that the male sex was more exposed with 55.9% of cases. This explained by the fact that in Africa, the dog is more companion of the man especially children and adolescents under 15 years of age than the woman. In our series all age groups were affected by both deaths with the exception of the 80 - 89 age groups. There was no significant difference between the proportions of women and men except between the ages of 10 - 19 when men were mostly more biased than women.

4) **Residence**: we found that residents of the commune of Kabondo were more exposed followed by the commune of Kalamu with 40% and 29.7% respectively. In fact, these 2 communes constitute canister cities where the garbage cans are next to houses, often not fenced, thus promoting the attraction of stray dogs [13]. For our series of 86 cases of the population ≤ 26 years, 60 cases

(69.8%) were returned to these 2 communes of which 38 (44.2%) for Kabondo and 22 (25.6%) for Kalamu.

5) **The administration of the PEP:** we found that 102 victims had started PEP, 2 with SAR and 100 with VAR. However, completeness was 1.9%. This will be explained by: the lack of financial means for the dog owner and/or the dog bitten to have treatment or access to treatment as a result of the cost; refusal of the owners to have the dog bitten treated [10] [14]; refusal of the owners to recognize his dog; lack of sufficient information on the severity of the rabies and its real existence in Boma; absence of an Anti-Rabies Centre in Boma.

6) **Adherence to PEP:** we found that the majority of victims (78.4%) received only one dose of vaccine. This could be explained by lack of financial means; lack of information on the different protocols to be followed; illusion that people are fully immunized after 1 dose.

5. Conclusion

Rabies is a reality in Boma, with a high prevalence of bites. Efforts should be made in awareness raising, staff training medical and veterinary structuring, procurement and cost of PEP to minimize its impact.

Limit and Strength

Our study points to a limit of not having determined the areas of the bites, the characteristics of the wounds, the motive of the aggression and the characteristics of the dogs. However, this study has the merit of having determined the incubation period of rabies in Boma.

Author Contributions

All authors have contributed, read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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