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Measles: Epidemiological Characteristics and Associated Factors of Patients Admitted to the Infectious Diseases Unit at the Brazzaville University Hospital

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Abstract **Objectives**. To describe the epidemiological aspects of measles cases admitted to the Infectious Diseases Unit and to identify associated factors. **Methodology**. This is a prospective study based on a descriptive and an analytical study of measles cases admitted to the Infectious Diseases Unit between December 15, 2017 and March 15, 2018. **Results**. Thirty-eight patients were admitted (3.6% of admissions), predominantly male (n = 24, 63.2%), mean age 2.5 ± 2.6, Brazzaville resident (n = 34; 5%) with no vaccination status (n = 32, 84.2%). The fathers' average age was 34.74 years (23-52 years) with a primary education level in 44.7% of cases (n = 17). The mothers' average was 29.39 years (18-40 years) and 45% of them had a primary level of education. The patients had an average of 6.16 ± 2 days for fever (n = 38, 100%); skin rash (n = 37, 97.4%), convulsions (n = 7, 18.4%) and rhinorrhea (n = 18, 47.4%). The average weight was 11.16 kilos (8-16 kg). 11 patients showed cases of malnutrition (28.9%). Retroviral serology and thick blood were positive in 6 patients (15.8%) respectively. The mean duration of hospitalization was 6.84 ± 1 days. The evolution was positive for 34 patients (89.5%). Four patients (10.5%) died. Seizures (P = 0.000), undernutrition (p = 0.013) and anemia (p = 0.000) had a statistically significant influence on the occurrence of death in patients. **Conclusion**. Measles remains a public health problem in Congo, especially among children who have not been or have been inadequately vaccinated. The dreadful complications justify the emergency of the prevention which passes by the systematic vaccination of the target population in order to stop the chain of transmission.

Keywords: *measles, associated factors, CHU-Brazzaville*

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1. Introduction

Measles is one of the oldest, most contagious infectious diseases, immunizing, mainly transmitted by respiratory route, due to an RNA virus of the genus morbillivirus with a basic reproduction rate estimated between 12 and 18 [1,2]. An epidemic may occur in a population when the rate of non-immune persons is above 10% [3,4]. A vaccination coverage of 95% is likely to interrupt the circulation of the virus within a given population [3]. The increase in vaccination coverage has been accompanied by a sharp decrease in the incidence of this morbid form eruption in Europe and, thanks to vaccination, measles deaths fell down by 79% between 2000 and 2014 [5]. In developing countries, measles remains a serious pathology and a major cause of early childhood death. In these countries, due to insufficient immunization coverage, over 24,000 cases of measles were reported between January 2008 and May 2016 [4,5]. In Congo, a country with low immunization coverage, malnutrition, and more particularly vitamin A deficiency, increases the risk of complications related to this pathology [3].

2. Goal

To describe the epidemiological peculiarities of the patients with measles at the CHU of Brazzaville and determine the associated factors.

3. Patients and Method

This is a prospective study based on a descriptive and an analytical purpose of measles cases admitted to the Infectious Diseases Unit at the Brazzaville University Hospital between December 15, 2017 and March 15, 2018 or 4 months of survey.

Patients at least 1 year of age, with a morbiform rash in a fever setting, vaccinated or unvaccinated, in which the diagnosis of measles was made clinically, were considered. The study variables for the patients were epidemiological (age, sex, vaccination status, educational level of parents as well as their age, socio-economic level), clinical (reason and time of consultation, immune status). For the sake of this study, no serological or molecular biology test (RT-PCR) was conducted to support the diagnosis of measles, which was solely made according to the epidemiological and clinical basis. Patients with persistent fever and signs of immunosuppression had a HIV serology. Other variables were progressive (healing, complications, deaths). The data had been processed with the software EPI info 3.3.2. Quantitative variables were given as mean and a standard deviation and extremes in parentheses. The qualitative variables were described in terms of numbers and percentages. The comparison of the qualitative variables used the Chi 2 test, and for the quantitative variables the Student's test. The required level of significance was <0.05.

Operational Definition [6,7].

WHO defines measles cases based on simple clinical criteria.

A clinical case of measles is defined before:

-a generalized maculopapular rash

-A fever at 38 ° C

-any of the following signs: cough, coryza, conjunctivitis, Koplik's sign

An epidemiologically confirmed case is defined as follows:

-A case that meets the definition of a clinical case and has been in contact within 18 days before the onset of signs with a case of measles confirmed biologically or epidemiologically.

4. Results

In total, thirty-eight patients were included (3.6% of admissions in Infectious Diseases), mostly male (n = 24, 63.2%). Women accounted for% (n = 14). The patients were aged on average 2.5 years ± 2.6, lived in Brazzaville (n = 34, 89.5%) with no vaccine status (n = 32, 84.2%). the average age of fathers was 34.74 years (23-52 years) with a primary education level in 44.7% of cases (n = 17) .Mothers averaged 29.39 years (18-40 years) and 45% of them had a level of education at the primary level. The patients had an average of 6.16 ± 2 days for fever (n = 38, 100%); skin rash (n = 37, 97.4%), convulsions (n = 7, 18.4%), rhinorrhea (n = 18, 47.4%) and conjunctivitis (n=18, 47, 4%) (Table 1). The average weight was 11.16 kilos (8-16 kg). 11 patients showed cases of malnutrition (28.9%). Retroviral serology and thick blood were positive in 6 patients (15.8%) respectively. The mean duration of hospitalization was 6.84 ± 1 days. The evolution was positive for 34 patients (89.5%). Four patients (10.5%) died. Seizures (P= 0.000), undernutrition (p = 0.013) and anemia (p = 0.000) had a statistically significant influence on the occurrence of death in patients (Table 2).

Table 1. Patient distribution by clinical signs

Clinical Signs	Number(n)	Pourcentage (%)
Fever	38	100,0
Diarrheas	38	100,0
Cough	37	97,4
Vomitinig	11	28,9
Convulsion	7	18,4
Pallor	10	26,3
Rhinorrhea	18	47,4
Conjunctivitis	18	47,4
OMI	1	2,6
Dehydratation	7	18,4
Malnutrition	16	42,1

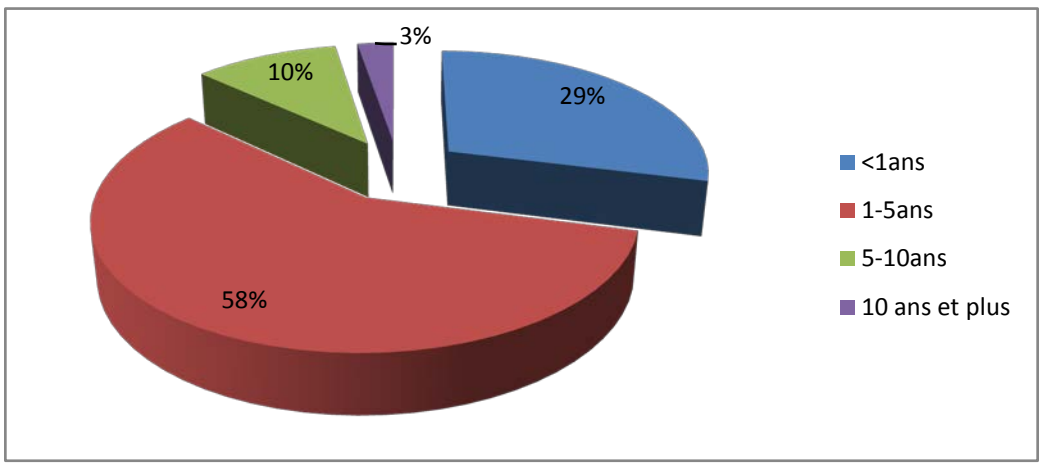

Figure 1. Measles case distribution according to age

Table 2. Patient distribution according to associated factors

		Evolution						P-value
		No death		Death		Total		
		n	**%**	**n**	**%**	**n**	**%**	
Age	<1year	10	29,4%	1	25,00%	11	28,90%	0,84
	1-10 years	23	67,6%	3	75,00%	26	68,42%	0,85
	10 years and more	1	2,9%	0	0,00%	1	2,60%	0,46
Sex	Masculine	20	58,8%	4	100,00%	24	63,20%	0,106
	Féminine	14	41,2%	0	0,00%	14	36,80%	
Vaccinal status	Doubtful	3	8,8%	1	25,00%	4	10,50%	0,557
	Absent	29	85,3%	3	75,00%	32	84,20%	0,319
	Vaccinated	2	5,9%	0	0,00%	2	5,30%	0,593
Mother's education level	None	8	23,5%	1	25,00%	9	23,70%	0,560
	Primary	17	50,0%	1	25,00%	18	47,40%	0,344
	Secondary	9	26,5%	2	50,00%	11	28,90%	0,326
HIV	Positive	4	11,8%	2	50,00%	6	15,80%	0,134
	Négative	28	82,4%	2	50,00%	30	78,90%	0,133
	Unknown	2	5,9%	0	0,00%	2	5,30%	0,618
consultation period	2-6 days	19	55,9%	3	75,00%	22	57,90%	0,748
	6-10 days	14	41,2%	1	25,00%	15	39,50%	0,531
	10 and more	1	2,9%	0	0,00%	1	2,60%	0,728
Hospitalisation duration	4-6 days	11	32,4%	2	50,00%	13	34,20%	0,417
	6-8 days	20	58,8%	1	25,00%	21	55,30%	0,198
	8-10 days	2	5,9%	1	25,00%	3	7,90%	0,18
	10 and more	1	2,9%	0	0,00%	1	2,60%	0,728
Convulsion	Yes	3	8,8%	4	100,00%	7	18,40%	0,000
	No	31	91,2%	0	0,00%	31	81,60%	
OMI	Yes	0	0,0%	1	25,00%	1	2,60%	0,003
	No	34	100,0%	3	75,00%	37	97,40%	
Malnutrition	Yes	12	35,3%	4	100,00%	16	42,10%	0,013
	No	22	64,7%	0	0,00%	22	57,90%	
Pallor	Yes	6	17,6%	4	100,00%	10	26,30%	0,000
	No	28	82,4%	0	0,00%	28	73,70%	

5. Discussion

Our survey shows some shortcomings related to selection of patients that only considered cases based on epidemiological and clinical arguments in an epidemic context. Such examinations as serology-ELISA and molecular tests (RT-PCR) were unrealized due to the lack of a powerful technical platform which could have helped select other cases. This is similar to that observed in other resource-poor African countries. However, the present study has succeeded to shed light on the existence or not of measles cases in Brazzaville.

Measles still remains a real public health problem in the Republic of Congo as the results of this study demonstrated. Its poorly estimated frequency due to underreported cases is relatively high in our series (3.6%). The low participation of populations in routine vaccination and the scarcity of mass vaccination

campaigns largely justify the persistence of circulation of morbiliform virus in Congo. Measles remains one of the most common vaccine-preventable diseases in sub-Saharan Africa because of low immunization coverage among the target population [8]. Its frequency is higher in Mauritania and Senegal [8,9]. Male children, insufficiently or unvaccinated, are still the majority as reported in other African series, however adolescents and adults-young are not spared from this viral disease [10]. The vaccination schedule requires a dose of vaccine MMR starting at nine months and the second dose should be administered before 24 months. Most children do not receive the second dose along their lifetime, which partly justifies cases of illness in an under-vaccinated population [5,9]. Most parents whose children have measles are adult-youth with primary education level in most cases. Intellectual weaknesses in the understanding and respect of the vaccination schedule on the one hand, and religious beliefs and especially traditional on the other, justify the refusal of some parents to vaccinate children. This has been reported in Mauritania and Côte d'Ivoire [11,12]. The average consultation time seems long in our series as elsewhere. The use of self-medication for the treatment of fever found in all patients and certain beliefs justify this delay in consultation by parents with little education in the majority of cases. In other places, patients consult primarily traditional healers, healers in the pre-eruptive phase of the disease to resort to a health facility that late [12,13]. The classic symptoms of measles were those found in almost all patients, namely fever, maculopapular rash, and rhinorrhea in 100%, 97.4% and 47.4% of cases respectively [11]. Undernutrition and seizures were the most common complications found in our series at significant proportions. In 16% of cases, there was immunodepression in patients. In order to survive and replicate in the body, the measles virus must escape the immune system either by defeating punctually the defense mechanisms that limit viral replication, or by inducing immunosuppression. This virus therefore induces transient immunosuppression accompanied by opportunistic secondary infections that are responsible for secondary complications found in patients and which are aggravated by malnutrition in our regions [14]. The forms associated with HIV infection are often described in the child.

In Kenya, children born with HIV + mothers are 3.8 times more likely to get measles before measles immunization than children of HIV-infected mothers [15]. The average duration of hospitalization of patients looks classic in our study as substantiated elsewhere [13]. It is 12 days at Nantes University Hospital [10]. All patients had benefited from a standard treatment with probabilistic curative antibiotic therapy to limit bacterial superinfections and reduce the mortality rate to 10.5% in this study and vitamin A therapy which is systematically recommended for all patients with measles child, which is the only treatment that has shown a decrease in morbidity and mortality in children [13,16,17] in addition to the correction of hydro electrolytic disorders and nutritional management [18]. The lethality rate in our series is high. It is 6% in Bobo-Dioulasso Burkina Faso, 0.3% in France [19,20].

There is also a change in epidemiology and a significant decrease in measles-related mortality in some African countries between 2000 and 2006 [21,22]. The low socioeconomic level and the late use of care facilities partly justify this high rate of mortality due mainly to the occurrence of seizures, with malnutrition and anemia thus constituting the factors of poor prognosis.

6. Conclusion

Measles still appears as a real public health problem in the Republic of Congo. Children from poor families pay the highest price. Prevention from this disease is the only cost-effective measure to eliminate this highly contagious disease and requires effective and easily accessible vaccination and mass vaccination campaigns [21,23].

Declaration of Interest

The authors hereafter declare that they have no conflict of interest in relation to this article.

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