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Original Research Article

Bronchiolitis epidemic: experience of the mother and child teaching hospital of Tsaralalàna Madagascar

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ABSTRACT

Background: An increase in the number of children hospitalized for bronchiolitis has been observed on February to April over the past 5 years. This study aimed to describe the bronchiolitis characteristic during the 2019 epidemic as well as its management at the Tsaralalàna Teaching Hospital.
Methods: This is a 3 months retrospective descriptive study, from February to April 2019, including all children diagnosed with bronchiolitis.
Results: Bronchiolitis was diagnosed in 1704 children (40.1%) and 425(29.4%) were hospitalized. Severe bronchiolitis was found in 212 children (49.9%) which were aged under 3 months in 46.7%. Secondary bacterial infection was noted in 359 children (84.5%) and cardiac failure in 145 children (34.1%). Hypertonic saline 3% was prescribed at 76.4% of children.
Conclusions: Younger infant under 3 months were the most frequently admitted in hospitalization. Severe or complicated bronchiolitis are predominant. Using a pediatric plan adapted to bronchiolitis epidemic may improve care of children.

Keywords: Bronchiolitis, Children, Epidemic, Heart failure, Hypertonic saline

INTRODUCTION

Acute bronchiolitis is the most common lower respiratory tract infection in infants and the leading cause of hospitalization in this group of patients.[1] Respiratory Syncytial Virus (RSV) is the common cause of bronchiolitis during epidemic period.[2]

A substantial proportion of children will experience at least one episode of bronchiolitis, and as much as 2-3% of all children will be hospitalized with bronchiolitis during their first year of life.[3-6] In tropical and semitropical climates, with arms temperatures and seasonal rainfall, bronchiolitis occurs throughout the year usually with outbreak during the rainy season.[7]

In Antananarivo, an increase in the number of children hospitalized for bronchiolitis has been observed on February to April over the past 5 years. Especially during the four first months of 2019, hospitalization for bronchiolitis was found to be more important.

So, Authors carried out this study whose objectives are to describe the bronchiolitis characteristics during the 2019 epidemic as well as its management at the Tsaralalàna Teaching Hospital.

METHODS

This is a retrospective descriptive study, at the Mother and Child Teaching Hospital of Tsaralalàna, Antananarivo. This was a hospital seen at the downtown of Antananarivo, capital of Madagascar. It had a capacity of 52 beds and 45 simultaneous oxygen therapies. The period of study was 3 months, the 01 February of 2019 to the 30 April of 2019.

All children aged 1 day to 2 years old diagnosed with bronchiolitis and hospitalized during this period were included. Children who presented bronchiolitis and treated in ambulatory are excluded.

Variables study were characteristics of children (age, antecedent of bronchiolitis, prematurity, smoking exposition, congenital heart disease) clinical feature (stage of bronchiolitis, complications) and treatment (nebulization, steroids, antibiotics) and the outcome. Wang score was used to determine the severity of this pathology. Bronchiolitis was severe if Wang score was greater than or equal to 8; moderate if it was between 4 and 7 and without severity if less than 4.

The data were analyzed with epi-info 7. Chi square test was used to determine the association between the age and variable study. p value <0.05 were considered significant.

RESULTS

A total of 4242 visits at triage and emergency department were identified during these 3 months. Bronchiolitis was diagnosed in 1704 children (40.1%) and 425 (29.4%) were hospitalized. Sex ratio was 1.03. The average of age was 4.4 months (±3.6). The peak of incidence was the week 9 to week 12 (25 February to 24 March 2019) (Figure 1).

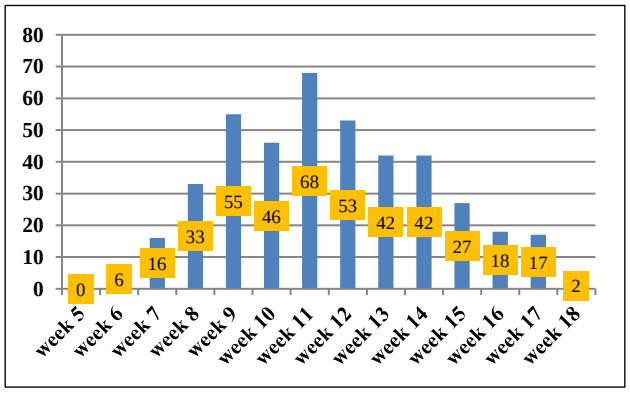

Figure 1: Distribution of bronchiolitis according to epidemiological week.

Nearly than half of children, 198(46.6%) were under 3 months of age and 89.9% under 12 months. Six children had died (1.4%). Severe bronchiolitis with Wang score more than 8 was found in 212 children (49.9%) which were aged under 3 months in 46,7%.

Secondary bacterial infection was noted in 359 children (84.5%) and cardiac failure in 145 children (34.1%) (Table 1).

Table 1: Demographics and characteristics of bronchiolitis hospitalization.

	Characteristics	Number (n)	(%)
Age distribution	< 1month	71	16.7
	1-2 months	127	29.9
	3-5 months	97	22.8
	6-8 months	58	13.6
	9-11 months	30	7
	12-24 months	43	10.1
Antecedent	Smoking expositio	60	14.1
	Bronchiolitis	38	8.9
	Prematurity	33	7.7
	Congenital heart disease	17	4
Stage of bronchiolitis	Severe	212	49.9
	Moderate	200	47
	Without severity	13	30.6
Complications	Secondary bacterial infection	359	84.5
	Heart failure	145	34.1
	Pneumothorax	2	0.5
Treatment	Hypertonic saline 3%	312	76.4
	Hypertonic saline 3%-epinephrine	73	17.2
	Salbutamol	35	8.2
	Epinephrine	3	0.7
	Steroids	135	31.7
	Antibiotics	359	84.5
Days of hospitalization	1-3 days	83	19.5
	4-6 days	190	44.7
	7-9 days	96	22.6
	10 days or more	56	13.2

Nebulization of hypertonic saline 3% was administered to 76.4% of children, 135(31,7%) received steroids and 359 (84.5%) antibiotics.

The average length of hospitalization was 6.4 days (±2.8) with extreme of 1 to 29 days (Table 1).

Association between heart failure and age was found (p=0,04) and between days of hospitalization and age (p<0,001) (Table 2).

DISCUSSION

Many studies from the USA, Europe and Africa show increasing rates of bronchiolitis.[8-10] In this study, the most

affected age group is infants under 3 months of age (46.6%). At Yaoundé - Cameroon, peak of incidence was between 2 and 4 months.[10] In Puerto Rico, subgroup analyses showed that the 3.1 to 6 months age group had the highest percentage of bronchiolitis hospitalizations (20% SD 9%).[11] This difference may be explained by systematic hospitalization of patients under 6 weeks of age in this present study. Prior studies have identified risk factors associated with hospitalization for bronchiolitis, including prematurity, younger age, environmental factors and co-morbidities.[12-15]

Table 2: Distribution of bronchiolitis characteristics according to group of age.

Age	< 3 months		3-8 months		9-24 months		p
	N	%	N	%	N	%	
Stage of severity							
Severe	101	47.6	79	37.3	32	15.1	0.51
Moderate	96	47.8	65	32.3	40	19.9	
Without severity	5	41.7	6	50	1	8.3	
Secondary bacterial infection	170	47,4	126	35.1	63	17.5	0.89
Heart failure	78	52.5	54	36.4	16	11	0.04
Days of hospitalization							
1-3 days	20	26	37	48	20	26	<0.001
4-6 days	85	43.5	74	38.1	36	18.6	
7-9 days	61	60.4	30	29.7	10	9.9	
≥10 days	37	71.1	8	15.4	7	13.4	

Severe bronchiolitis was found in 49.9% vs 9% at Yaoundé.[10] It may be explained by the youngest age of this population.[16] Secondary bacterial infection was seen in 84.5% patients vs 11% at Yaoundé.[10] This could be due to the fragility of the terrain (age, nutritional status, immunity), but also to a possible particular virulence of the virus. Antibiotic use is twice as high as in Lebanon.[17]

Association between group of age and severity of bronchiolitis has seen in this study as well as found by Praznik at Slovania. Chronological younger age and the use of antibiotics were associated with severe bronchiolitis defined as hospitalization longer than 1 day.[18]

Complications like encephalitis and myocarditis have been described as rare.[2] However, heart failure chart suggesting myocarditis or cardiac decompensation of congenital heart disease was seen in 34.1% of children. Significant association between group of age and heart failure was found in this study ($p<0.001$). The first report on detection of RSV in the myocardium in patients with bronchiolitis was in an infant with combined immunodeficiency; the virus was cultured from myocardium.[19] More recently RSV was again detected in the myocardium by PCR in a patient with myocarditis.[20] Right ventricular decompensation due to pulmonary hypertension is a possible cause for myocardial damage, cardiac troponin elevation and systolic hypotension. Pulmonary disease is associated with pulmonary hypertension in bronchiolitis.[21] The routine uses of multiple management modalities including bronchodilators, antibiotics and corticosteroids have not demonstrated better efficacy and should be avoided.[22]

In this study, average days of hospitalization was 6.4 days (±2.8). The median length of hospitalization in a large study including children below12 months was only one day. In a Norwegian study the mean length of hospitalization was 80 hours.[23] This result was similar of the days of stay found by Bogne at Yaoundé-Cameroun 5 days and the 5.4 days by Dagan et al.[10,24] In front of the length of days hospitalization, and to improve quality of care of children hospitalized to bronchiolitis, an organizational infrastructure plan adapted to bronchiolitis epidemic resulted in a significant decrease in the average hospital length of stay.

CONCLUSION

Bronchiolitis epidemics are responsible of important visits at emergency room and hospitalization. Younger infant under 3 months were the most frequently admitted in hospitalization. Severe or complicated bronchiolitis are predominant. Use of multiple management modalities such as antibiotics, steroids were already seen. Using a pediatric plan adapted to bronchiolitis epidemics may improve care of children. Furthermore, larger studies focused on factors of severity and virus involved characteristics should be conducted.

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