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Research Article

Malaria in Children in Guediawaye, Senegal

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ABSTRACT

Introduction: Malaria is one of the leading causes of infant and child mortality, despite the efforts made in Senegal. The objective of this study is to describe the epidemiological, clinical, Para clinical, therapeutic and evolutionary aspects of malaria in children in a pediatric ward of a Dakar hospital.

Patients and methods: This is a retrospective descriptive study, with an analytical focus over a 5-year period from January 1st, 2013 to December 31st, 2017, in the pediatrics department of Roi Baudouin Hospital Center, involving 259 children hospitalized for malaria.

Results: The frequency of hospitalization during the period was estimated at 7.7%.The mean age was 82.9 months, with a median of 84 months, and the age range from 1 month to 5 years was the most representative (35.9%) with extremes from 1 to 180 months.

The majority of cases occurred in the last quarter of the year, with a peak in October (19.7%). Clinical manifestations on admission were dominated by fever, which was found in 93.1% of cases. More than 30.9% of the children showed clinical signs of severity on entry, with jaundice (37.5%) in the foreground, followed respectively by disturbances of consciousness (29.0%) and respiratory distress (19.0%). The majority of patients were treated with quinine (80.3%) and overall progress was satisfactory with a cure rate of 97.7%. Factors associated with death were represented by a time to management more than 7 days and the presence of co-infections, with a p value equal to 0.002 and 0.04 respectively.

Keywords: Malaria; Children; Senegal; Pediatric

INTRODUCTION

Malaria is the world's leading parasitic endemic, particularly in sub-Saharan Africa, where it is a real public health problem despite enormous efforts to combat it. The WHO African Region has been found to bear a disproportionate share of the global malaria burden [1].

Potentially severe among children and pregnant women, malaria in Africa kills about one million children less than five years of age each year and one child dies every two minutes [2]. In response to this situation, the progress made in recent years in diagnosis, treatment and prevention has reduced the prevalence of the disease in many countries in Africa and Asia.

Senegal is one of 43 countries in Sub-Saharan Africa where malaria is endemic. To date, this condition has been a significant economic burden, particularly in parts of the country where it accounts for a significant proportion of deaths [3].

In order to evaluate the impact of new strategies to fight against malaria in terms of its management in hospitals, particularly pediatrics, we undertook this study in the paediatrics department of the Roi Baudouin Hospital Centre in Guédiawaye.

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The objectives of this work were to describe the epidemiological, clinical, Para clinical, therapeutic and evolutionary aspects of malaria.

PATIENTS AND METHODS

This is a retrospective descriptive study with an analytical focus over a period of 5 years, from January 1st 2013 to December 31st 2017 in the pediatrics department of the King Baudouin Hospital Centre. This health structure is located in Guédiawaye, which is one of the four departments of the Dakar region. It is a level 1 public health establishment with a pediatric ward with a capacity of 14 hospital beds with two pediatricians, a laboratory and a pharmacy.

All children who were hospitalized for malaria and whose medical records were well maintained were included in our study. The data collected covered socio-demographic (age between 1 and 180 months and sex), clinical, Para clinical, therapeutic, and evolutionary (cured, deceased or evacuated) aspects. Data were entered and analyzed in Microsoft Office Excel, averages were compared using Student's test and proportions were compared using the Chi-square or Fischer's exact test, depending on their conditions of applicability. A p value less than 0.05 was considered statistically significant.

RESULTS

During the study period, 259 children were hospitalized for malaria out of a total of 3338 children, representing all hospitalizations during the same period, i.e. a hospital frequency of 7.7% are represented in the Tables 1-4 and Figure 1.

Socio-demographically, the mean age was 82.9 months, with a median of 84 months. The age group from 1 month to 5 years was the most representative (35.9%) with extremes from 1 to 180 months. The male sex was the most represented with a sex ratio of 2.04.

Table 1: Distribution of children by age group.

Age range of children	Absolute frequency (n)	Relative frequency (%)
1 month-5 years	93	35,9
5-10 years	87	33,6
10-15 years	79	30,5
Total	259	100,0

Clinical and paraclinical characteristics:

The majority of cases occurred in the last quarter of the year with a peak in October (19.7%).

Clinical manifestations on admission were diverse, but fever was the most common sign of onset of illness with 93.1%. The average temperature at the entrance was 38.4° with extremes of 36.7 and 40.7°C.

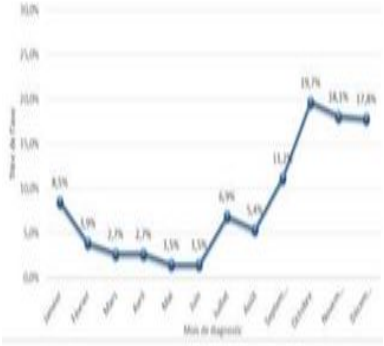

Figure 1: Distribution of patients by time of onset.

Table 2: Patient distribution by clinical signs.

Start signs	Absolute frequency (n)	Relative frequency (%)
Fever	241	93,1
Vomiting	122	47,1
Headaches	110	42,5
Abdominal pain	41	15,8
Shivers	23	8,9
Cough	23	8,9
Joint pain	13	5,0
Convulsions	17	6,6
Sweaters	16	6,2
Multiple pain	14	5,4
Diarrhoea	13	13,9
Asthenia	11	4,2
Anorexia	11	4,2
Seizures	10	3,9
Dizziness	8	3,1
Delirium	7	2,7
Incessant crying	6	2,3
Rhinitis	6	2,3
Chest pain	3	1,2

Breathing difficulties	2	0,8
Mouth ulcers	2	0,8
Lethargy	2	0,8
Others	12	4,6

More than thirty percent of the children (30.9%) showed clinical signs of severity on entry, with jaundice being the most common sign in 37.5% of cases, followed by disturbances of consciousness and respiratory distress.

Table 3: Distribution of patients by clinical signs of severity.

Clinical signs	Absolute frequency (n)	Relative frequency (%)
Jaundice	30	37,5
Disorders of consciousness or coma	29	36,3
Respiratory distress	19	23,8
Multiple seizures	6	7,5
Hemoglobinuria	3	3,8
Inability to eat	2	2,5
Prostration	1	1,3
Abnormal bleeding	1	1,3

In paraclinical terms, thick drop was the most used diagnostic method (90%), with a positivity rate of 86.9%.

Factors associated with deaths

A delay in management of more than 7 days and the presence of co-infections were associated with death with a p value equal to 0.02 and 0.04 respectively.

Table 4: Distribution of patients by factors associated with death.

Settings		Deceased n (%)		Total	p value	Ods
		Yes	No			
Background	Present	0(0,0)	22(100,0)	22	0,539	
	Absent	4(1,7)	233(98,3)	237		
Pickup time	≤ 2 days	1(2,0)	49(98,0)	50	0,002	0,08[0,004-1,56]
	3-7 days	1(1,0)	202(,0)	204		1
	>7 days	1(20,0)	4(80,0)	5		0,01[0,001-0,37]
Signs of Severity	Jaundice	2(2,7)	28(93,3)	30	0,287	
	Coma	2(6,9)	27(93,1)	29	0,263	
	Respiratory distress	0(0,0)	19(100,0)	19	0,324	
	Seizures	0(0,0)	6(100,0)	6	0,615	
	Hemoglobinuria	0(0,0)	3(100,0)	3	0,727	
	Inability to eat	0(0,0)	2(100,0)	2	0,777	
Danger Signs	Present	1(1,5)	67(98,5)	68	0,954	
	Absent	3(1,6)	188(98,4)	191		
Co-infections	Present	3(4,0)	72(96,0)	75	0,040	7,6[1-74]
						1

DISCUSSION

Our study took place in a level 1 hospital located in the suburbs of Dakar and aimed to describe the epidemiological, clinical, paraclinical, therapeutic and evolutionary aspects of malaria.

Thus, the median age was 84 months and the age group from 1 month to 5 years was the most representative with 35.9%. Okoko et al. [4], Bobossi-Serengbe et al. [5] found similar results of 45.6% and 93.7% respectively in Congo Brazzaville and the Central African Republic. However, in other previous studies conducted in Senegal, children aged 5 years and older were more represented [6]. Children under 5 years of age are the target of most of the prevention strategies developed by the Ministry of Health [7].

It was noted in our series, a slight male predominance, with a sex ratio of 2.4. This result is similar with several other studies in Africa, particularly in that of Tamini Toguyeni et al. [8] at the Charles DE Gaulle paediatric hospital of Ouagadougou (52.89%), of Okoko et al. [4], in the paediatrics department of Brazzaville University Hospital (60.7%) and of Ilunga-Ilunga et al. [9] in various hospitals in the city-province of Kinshasa.

The epidemiological profile of malaria in Senegal is linked to climatic conditions that can influence the abundance and survival of mosquitoes, and its transmission strongly follows the rhythm of rainfall, as reported by some authors in previous

studies [10-12]. Most of the cases in our series (19.7%) occurred in the last quarter of the year, with a peak in October [13]. These data are compatible with those found in the series of Camara et al. [7] carried out at the Albert Royer children's hospital of Fann in Dakar. However, Ilunga-Ilunga et al. [9], Sengua et al. [14] in Kinshasa in the Democratic Republic of Congo (DRC) noted a different observation. Located in Central Africa where the epidemiological aspect is holo-endemic, DRC experiences high and stable malaria transmission during the year.

Ninety-three percent (93%) of the patients in our study had fever, making it the first clinical manifestation. Several authors including Bobossi-Serengbe et al. [15] in Central Africa, Atohoun [16] and Thiandoume [17] in Senegal, Asse et al. [18] in Côte d'Ivoire and kuissi Kamgaing et al [19] in Gabon reported the same results in previous studies.

Jaundice (37.5%), disturbances of consciousness (36.3%) and respiratory distress (23.8%) were the main signs of severity found in our study. Regarding jaundice, other African authors, notably Bobossi-Serengbe et al. [15], Atohoun [16] had noted a variable frequency with respective rates of 1.3% and 4.1%, thus less important compared to the data of our study.

Losimba et al. [20] reported consciousness disorders with a low rate of 9.8% compared to our study.

Respiratory distress caused by anemia and neurological disorders was found by Camara et al. [7] at rates that overlap (20.9%) with those found in our study (23.8%).

From a paraclinical point of view, kidney failure was found in a proportion of 9.7% in our patients. This rate is high compared to that observed in the studies carried out by Mabiala-Babela J.R et al. [21] (0.5%) in Brazzaville, Djadou et al. [22] (0.5%) at the regional hospital centre of Tsévié (Togo).

A hemoglobin level of less than 5 g/dL was found in 7.8% of patients. Losimba et al. [20], Tamini Toguyeni et al. [8] had documented it in a similar study but at higher proportions with 40.3%; 40.62% respectively.

According to WHO, early diagnosis and treatment of malaria reduces the risk of complications and prevents death [23].

Quinine was the most commonly used antimalarial drug in our study (83.0%) and was associated with a favourable outcome in 97.7% of cases. Similar results were found in the studies conducted by Bobossi-Serengbe et al. [15], Atohoun [16] with respectively 97.1% and 89.2% of patients treated with quinine. However, Moussa et al. [24] in Niamey, Niass [25] in Senegal reported higher proportions of children treated with artesunate, with 76% and 66.6% of patients respectively.

Unfortunately, we noted a significant delay in pick up in our series, estimated at 3.9 days on average. Okoko et al. [4], Camara et al. [10] Tamini Toguyeni et al. [8] reported similar results in studies conducted in Brazzaville, Dakar and Ouagadougou respectively. A delay of more than 7 days and the presence of co-infections were statistically associated with death in our series, with respectively (p value=0.002 and 0.4). For Koueta et al. Tamini Toguyeni et al. [8] in Burkina-Faso, a treatment delay of more than 24 h significantly increased the risk of death.

CONCLUSION

Malaria is the world's first reported parasite endemic. In sub-Saharan Africa in particular, it is a real public health problem despite the enormous efforts made to combat it. This study shows that children under 5 years of age are still a vulnerable group and that fever is the first clinical sign. Regarding the signs of severity, we have mainly noted, in order of importance: convulsions, jaundice, disturbances of consciousness and respiratory distress. A long delay in management, greater than 7 days, associated with co-infections was the main factors associated with death in our study. Systematization of RDTs for all cases of fever and management of co-morbidities, combined with conventional prevention strategies, could help reduce malaria mortality.

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