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Place of malaria in the etiologies of febrile attacks in children in a conflict area zone: Case of department of pediatric regional hospital of Timbuktu

Place du paludisme dans les étiologies des accès fébriles chez les enfants dans une zone de conflit:
Cas du service de pédiatrie de l'hôpital régional de Tombouctou

M Ba¹, AA Oumar^{1*}, I Konate^{1,2}, O Maiga^{1,3}, Y Cissoko^{1,2}, MI Mahmoud⁴, S Dao^{1,2}, S Doumbia^{1,5}

Abstract

Introduction: Malaria, a public health problem in tropical countries, depends on several factors, some of which are social and environmental. In Mali in the Sahel zone, a socio-security crisis has prevailed in recent years. It was therefore interesting to study the epidemiology of this condition in situation. Objective: To determine the frequency of malaria among febrile syndromes in children aged 1 to 59 months in the pediatric ward of the Regional Hospital of Timbuktu. Material and methods: the study was longitudinal retrospective descriptive for a period from January 1 to December 31, 2015. The data were collected with fact sheets and consultation records. They were captured and analyzed on the Statistical Package for Social Scientist (SPSS) software version 21. Results: a total of 789 children hospitalized, 276 children had a febrile syndrome (35%). During the study period, we collected 180 cases of malaria, with a positive biological examination. The hospital frequency of malaria was 22.8% (180/789) and a frequency in febrile

syndromes of 65.2% (180/276) of malaria cases. Of these 180 cases, 147 cases of uncomplicated malaria (81.7%) and 33 cases of severe malaria (18.3%) were found. In 34.8%, the etiology of febrile syndromes was other than malaria. Seasonal variation in malaria was found in terms of months of the year, peaking in September. The hospital lethality was 1.1% in our series.

Conclusion: Malaria was the leading febrile syndromes among children under 5 in hospitals in Tombouctou.

Keywords: Malaria, Diagnosis, febrile etiology, Hospital, Mali

Résumé

Introduction : Le paludisme, problème de santé publique dans les pays tropicaux, dépend de plusieurs facteurs dont certains sont sociaux et environnementaux. Au Mali en zone sahélienne une crise socio sécuritaire prévaut depuis quelques années. Il serait donc intéressant d'étudier l'épidémiologie actuelle de cette affection dans cette zone.

Objectif : il s'agissait de déterminer la fréquence du paludisme parmi les syndromes fébriles chez les enfants âgés de 1 à 59 mois dans le service de pédiatrie de l'hôpital Régional de Tombouctou.

Matériel et méthodes : l'étude était longitudinale rétrospective à visée descriptive sur une période allant du 1er janvier au 31 décembre 2015. Les données ont été collectées avec des fiches d'enquête et sur des registres de consultation. Elles ont été saisies et analysées sur le logiciel SPSS version 21.

Résultats : Sur un total de 789 enfants hospitalisés, 276 enfants avaient un syndrome fébrile. Durant la période d'étude, nous avons colligé 180 cas de paludisme, avec un examen biologique positif. La prévalence hospitalière du paludisme était de 22,8% (180/789) et une fréquence dans les syndromes fébriles de 65,2% (180/276) de cas d'accès palustre. Parmi ces 180 cas, on a retrouvé 147 cas d'accès palustres simples (81,7%) et 33 cas d'accès palustres graves (18,3%). Dans 34,8%, l'étiologie des syndromes fébriles était autre que le paludisme. Nous avons constaté, une variation saisonnière du paludisme en fonction des mois de l'année, avec un pic au mois de septembre. La létalité hospitalière a été de 1,1% dans notre série.

Conclusion : Le paludisme occupe la première place des syndromes fébriles chez les enfants de moins de 5 ans à Tombouctou.

Mots clés : Paludisme, GE, TDR, Tombouctou, Mali

Introduction

Malaria is a parasitic disease. It is a haemolytic febrile erythrocytopathy, due to the development and multiplication in humans of a haematozoan of the genus *Plasmodium* (1). According to the 2015 report of the World Health Organization (WHO), the Africa region still pays the highest price for malaria. However, it has made impressive progress

since 2000. Mortality from malaria has decreased by 66% in all age groups and by 71% among children under 5 years of age (1). According to the Demographic and Health Survey, Mali V (EDSM V), the annual malaria prevalence rate among children aged 6 to 59 months was estimated at 52% at the national level in Mali(2). The disease remains the leading cause of death among children under 5 (13%) and morbidity (15.6%) in the general population (3). It represents 37.5% of the reasons for curative consultation (4). In addition to loss of life, malaria hampers children's schooling and thus social and economic development (1). On the economic front, it is estimated that more than US \$ 12 billion of annual loss of gross domestic product (GDP) is due to malaria in Africa (1).

Generally, in malaria endemic areas, fever is one of the most common symptoms in sick people, particularly in sub-Saharan Africa and has a wide differential diagnosis (5). Very often, febrile illness is diagnosed and treated empirically as malaria, especially in areas of low malaria endemicity (6), leaving other non-malarious causes undiagnosed and untreated (7). Admittedly, in such endemic areas, the strategy of presumptive antimalarial treatment of all febrile attacks has been advocated by WHO (1), but not all febrile attacks are suggestive of malaria (8).

The biological examination is essential to make the diagnosis of certainty of malaria. There is little current data available in Timbuktu on the share of malaria in febrile syndromes in children, hence; the purpose of our study was to fill the data gap.

Material and Methods

This was a retrospective study with descriptive intent. It covered children from 1 to 59 months in consultation in the pediatric ward of the Timbuktu Regional Hospital from 1 January to 31 December

2015. We collected exhaustively for our study all cases of axillary temperature fever $\geq 38^{\circ}\text{C}$ measured with an electronic thermometer after correction. Malaria in our study was defined as an axillary temperature $\geq 38^{\circ}\text{C}$ with a positive Thick Drop (GE) and / or rapid diagnostic test (RDT). The RDTs used detected Histidine Rich Protein 2 (Plasmodium HRP2 associated or not with lactate dehydrogenase (pLDH) of Plasmodium species. Thickness was achieved only if RDT was negative in patients seen in consultation for fever. The RDT was free for children 0-59 months old. The malaria severity criteria used were those of WHO (9).

All cases of uncomplicated malaria treated with artemether / lumefantrine and cases of severe malaria with quinine infusion as recommended by Mali's National Malaria Control Program. The Widal Felix test has been used for the diagnosis of typhoid fever if the thick drop and the malaria RDT are negative. Other febrile access diagnoses were based on clinical arguments. Sociodemographic, clinical and biological variables were measured for each case. An investigation sheet served as a data carrier, taught from the outpatient records. Questionnaires contained all measured parameters (socio-demographic, clinical and biological).

The data were entered and analyzed on the SPSS software version 21. The χ^2 test was used according to their application conditions to compare the proportions. For the comparison of averages the Student's test or Anova were used. The results were expressed with the risk of error of 5%.

Results

We recorded 789 cases of total hospitalization in the pediatric ward of the Timbuktu Regional Hospital with a proportion of febrile syndromes of 35% (276/789) among them 180 cases of malaria were diagnosed or 65,2% febrile syndromes. In total we observed a hospital frequency of malaria of 22.8%. We found 147 cases of uncomplicated malaria (81.7%) and 33 cases of severe malaria (18.3%), all 180 cases were due to *Plasmodium falciparum* (Figure 1).

The majority of patients (72.1%) were referred by their parents. A male predominance of 52.53% of cases with a sex ratio of 1.10 was observed in favor of boys. Children in the 13 to 36 month age group were the most represented at 42.0%. In 52.9% of cases, the patients had a temperature between $[38-38^{\circ}\text{C}]$. In 34.8%, the etiology of febrile syndromes was other than malaria (Table I). Of the 34.8%, 15.94 were related to respiratory infection and 5.8% to gastroenteritis (Table II). Vomiting, cough, and diarrhea were associated with fever in 42.8%, 34.78%, and 30.43%, respectively (Table III).

We observed a monthly change in the incidence of malaria during the year, peaking in September (Figure 2). Of the 276 children included, 96% were discharged from hospitalization, we noted 6 cases of abandonment (discharge against medical opinion), a reference case to Mopti hospital (who returned cured) and we have observed 3 cases of death during the study period, including 2 deaths

attributable to severe anemic malaria (a malarial lethality of 1.11%) (Table IV).

Table I sociodemographic and clinical data in patients at the department of pediatric hospital regional of Timbuktu- 2015 (*RDT: Rapid diagnostic test)

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Demographic and clinical data		Effective	Percentage
Affections febrile			
Malaria	RDT* (positive)	92	51.2
	tick drop (positive)	88	48.8
	Total	180	65.2
others		96	34.8
Age range in month			
[0 - 12[		91	32.9
[13 - 36[		116	42.1
[37 - 60[		69	25.0
Sex			
Male		145	52.5
Female		131	47.5
Admission Temperature			
[38° - 38,9°[		146	53.0
[39° - 39,9°[		107	38.7
≥40°]		23	8.3
Reference			
Referred		77	27.9
No referred		199	72.1

Table II : Distribution of children by other causes of fever at the department of pediatric hospital regional of Timbuktu-2015.

Affections	Effective	Percentage
Respiratory infections	44	15.94
Gastroententis	16	5.80
Neonatal infections	13	4.71
Sepsis	9	3.26
Toxi-food infections	7	2.54
Typhoid fever	3	1.09
Meningitis	2	0.72
Urinary tract infections	2	0.72
Total	96	34.78

Table III : Distribution of patients according to signs associated with fever at the department pediatric hospital regional of Timbuktu - 2015

Signs associated with fever	Effective n=205	Percentage
Vomiting	118	42.75
Cough	96	34.78
Diamhea	84	30.43
Anorexia	48	17.39
Convulsion	28	10.14
Alteration of consciousness	18	6.52
Bloating	13	4.71
Oliguria	3	1.09

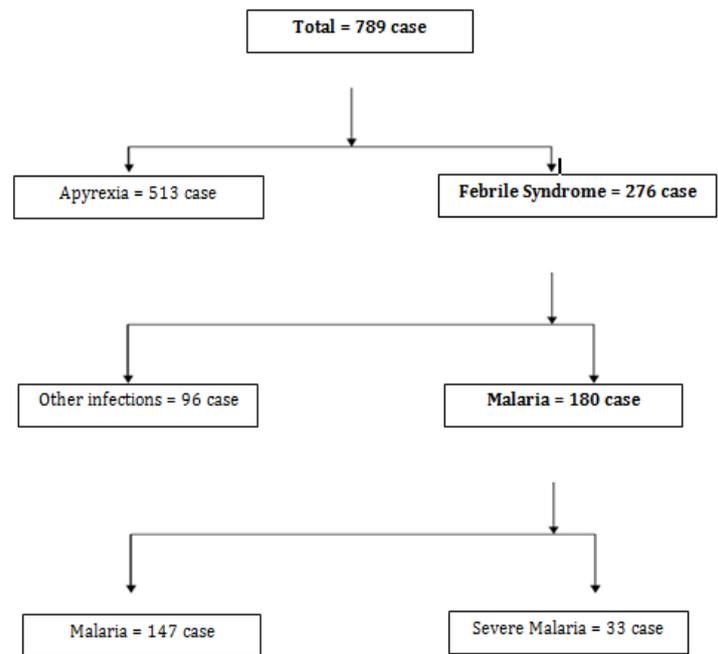


Figure 1 Distribution of patients by diagnosis at the department of pediatric hospital regional of Timbuktu- 2015

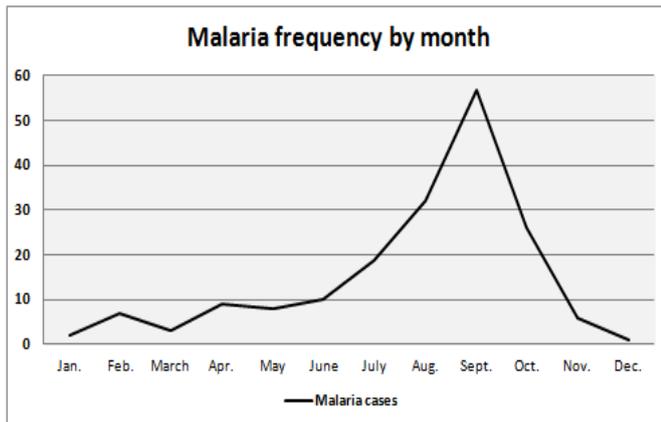


Figure 2 The distribution of malaria cases by month at the department of pediatric hospital Regional of Timbuktu-2015.

Discussion

This study is not necessarily representative of the reality of malaria given the situation of conflict (displacement of populations, insecurities, lack of laboratory and hospital staff, lack of supply of reagents and drugs, fear of travel...). The conduct of this study was indeed enamelled by certain difficulties: both related to the frequent instability of laboratory staff; the under-equipment of this one to make more advanced biological analyzes in addition to the thick drop and the serology of Widal and Felix; and above all the lack of financial means of the patients or the general anxiety in the area. The study population included children aged 1 to 59 months who had a temperature $\geq 38^{\circ}\text{C}$. This age group corresponded on the one hand to the population affected by severe and complicated malaria in malaria endemic areas on the one hand and secondly; it represents the majority of the consulting population in the pediatric ward of the Timbuktu Regional Hospital. The hospital frequency of malaria in the department was 22.8%. Some authors have found similar result (5, 10-12). About, 276 children admitted to a hyperthermia table, the biological diagnosis was 65.2% or 180 malaria cases, with 147 simple

malaria (81.7%) and 33 severe malaria (18,3%). This shows that in our study area, malaria is the leading cause of febrile illnesses. This high frequency of malaria is due to the inadequacies noted above and the purpose of our study and the association of malaria endemic zone associated with a security crisis. Our results are consistent with those of the authors (13-15). On the other hand, other studies (in Bamako in internal medicine in adults and in Brazzaville in children) have reported a second place of malaria in feverish affections after pneumopathies (11, 16). Nguefack et al., (Cameroon) reported a high incidence of malaria followed by ENT diseases (12). However, a high frequency of febrile illnesses with a lower proportion of malaria cases has been reported by Orish et al. (in Ghana) (17). This difference could be due to the fact that our study was carried out in an insecure malaria endemic area. In our series, the population consisted of children 1-59 months with a age range of thirteen (13) months to thirty-six (36) months which was the most common of our study population with 42.1%. These same observations have been made by some studies(18, 19). In our series, RDT was systematic in patients who had a clinical presumption of malaria. Thick Drop (GE) was performed when the RDT was negative (33.3% of positive RDT results plus 47.8% for GE). Parasitaemia has been determined by some authors (18, 20) but with small proportions. Ouattara et al, had highlighted RDT in the diagnosis of malaria(21). RDTs are sometimes the only available means to search for plasmodiums during a fever and to avoid inappropriate treatment, in isolated health centers like Timbuktu with the security crisis in 2015. These tests are based on the search for antigens circulating Plasmodium-specific proteins (histidine-rich protein or HRP2 and Plasmodium lactate dehydrogenase or pLDH), although the reference

remains the thick drop according to WHO. The sensitivity and specificity of these tests is quite good. After a correct treatment, the HRP2 remains positive for another fortnight, while the pLDH is negative in 8 days. The HRP2 test is especially useful for establishing a diagnosis and the pLDH for post-therapeutic follow-up. The majority of febrile patients (72.10%) presented to the health center with fever ranging from one (1) to seven (7) days. Similar results have been described by Traore et al., (4). Acute respiratory infections (15.94%) were the second most common cause of febrile seizures after malaria. Rose-Wood et al., (22) found a similar result in the irrigated area of Niono. The peak of malaria was in September (period of high transmission) during our study, with a frequency of 57 cases of malaria. Ranque et al., Observed the same phenomenon in Bamako in the pediatric ward in 2008 (23). The cure rate was 96.4% and the dropout rate was 2.2%. Lethality was 1.1% in our series. This rate is lower than that of Diallo in 2011 at Nianankoro Fomba Hospital in Ségou, which observed 2.2% lethality (20).

Conclusion

Malaria remains the major febrile condition in the pediatric ward of the Timbuktu Regional Hospital. The hospital frequency of malaria was 22.8% of febrile conditions in our study. This low incidence could be related to recruitment bias due to the conflict situation. Seasonal prevention due to malaria, especially for children under 5, should be strengthened and early health facilities should be used to reduce the morbidity and mortality of malaria.

*Correspondence

Aboubacar Alassane Oumar

(aao@icermali.org)

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¹Faculté de Médecine et d'odontostomatologie, Bamako, Mali

²Département Service de Maladies Infectieuses, CHU Point G, Bamako, Mali

³Centre Service de Pédiatrie, Hôpital Régional de Tombouctou, Mali

⁴Service Direction Nationale de la santé, Mali,

⁵Service Malaria Research and Training Center (MRTC), Bamako, Mali

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Conflicts d'intérêts : Aucun

References

- [1] Aide-mémoire-Paludisme [Internet]. Consulté le 24 decembre 2017. Available from: <http://www.who.int/mediacentre/factsheets/fs094/fr/>.
- [2] Samake S, Traoré, S.M,Ba, S, Dembele, E, Diop, M, Mariko, S. Enquête Démographique de la Santé au Mali, 2012-2013. Bamako: ICF International; 2012. Available from: <https://dhsprogram.com/pubs/pdf/FR286/FR286.pdf>.
- [3] Mali. P. Rapport annuel de Programme national de lutte contre le paludisme au Mali. Bamako: PNLP; 2016. p. 120.
- [4] Traoré BM, Dissa, L, Sinayoko, D, Boly, A, El Fakir, S. . Place du paludisme dans les etiologies des affections febriles dans le centre de sante communautaire de macina central, MALI. *Mali Med.* 2017;32(4):13-7.
- [5] Crump JA, Gove S, Parry CM. Management of adolescents and adults with febrile illness in resource limited areas. *BMJ.* 2011;343:d4847.
- [6] Reyburn H, Mbatia R, Drakeley C, Carneiro I, Mwakasungula E, Mwerinde O, et al. Overdiagnosis of malaria in patients with severe febrile illness in Tanzania: a prospective study. *BMJ.* 2004;329(7476):1212.
- [7] Batwala V, Magnussen P, Nuwaha F. Antibiotic use among patients with febrile illness in a low malaria endemicity setting in Uganda. *Malar J.* 2011;10:377.
- [8] Hildenwall H, Amos B, Mtove G, Muro F, Cederlund K, Reyburn H. Causes of non-malarial febrile illness in outpatients in Tanzania. *Trop Med Int Health.* 2016;21(1):149-56.
- [9] OMS. Guide pratique pour la prise en charge du paludisme grave Geneve: OMS; 2013. Consulté le 16 janvier 2019. <http://apps.who.int/medicinedocs/documents/s20170fr/s20170fr.pdf>
- [10] Coulibaly D, Rebaudet S, Travassos M, Tolo Y, Laurens M, Kone AK, et al. Spatio-temporal analysis of malaria within a transmission season in Bandiagara, Mali. *Malar J.* 2013;12:82.
- [11] Haidara SA, Doumbo, O, Traoré, A.H, Koita, O, Dembele, M, Dolo, A, et al. La place du paludisme dans les syndromes fébriles en médecine interne à l'hôpital du point G. *Med Afr Noire.* 1991;38:110-17.
- [12] Nguefack S, Ngo Kana CA, Mah E, Kuate Tegoue C, Chiabi A, Fru F, et al. [Clinical, etiological, and therapeutic aspects of febrile convulsions. A review of 325 cases in Yaounde]. *Arch Pediatr.* 2010;17(5):480-5.

- [13] Abba K, Deeks JJ, Olliaro P, Naing CM, Jackson SM, Takwoingi Y, et al. Rapid diagnostic tests for diagnosing uncomplicated *P. falciparum* malaria in endemic countries. The Cochrane database of systematic reviews. 2011(7):CD008122.
- [14] Deme AB, Park DJ, Bei AK, Sarr O, Badiane AS, Gueye Pel H, et al. Analysis of *pfrp2* genetic diversity in Senegal and implications for use of rapid diagnostic tests. *Malar J*. 2014;13:34.
- [15] O'Brien D, Tobin S, Brown GV, Torresi J. Fever in returned travelers: review of hospital admissions for a 3-year period. *Clin Infect Dis*. 2001;33(5):603-9.
- [16] Dicko A, Klion AD, Thera MA, Sagara I, Yalcouye D, Niambele MB, et al. The etiology of severe anemia in a village and a periurban area in Mali. *Blood*. 2004;104(4):1198-200.
- [17] Orish VN, Ansong JY, Anagi IB, Onyeabor OS, Sanyaolu AO, Iriemenam NC. Malaria and associated co-morbidity in children admitted with fever manifestation in Western Ghana: A retrospective study. *J Infect Dev Ctries*. 2015;9(11):1257-63.
- [18] Dolo A, Maiga B, Dara V, Tapily A, Tolo Y, Arama C, et al. [Place of malaria among febrile illnesses in two ethnic tribes living in sympatry in Mali from 1998 to 2008]. *Bull Soc Pathol Exot*. 2012;105(5):377-83.
- [19] Edillo FE, Tripet F, Toure YT, Lanzaro GC, Dolo G, Taylor CE. Water quality and immatures of the M and S forms of *Anopheles gambiae* s.s. and *An. arabiensis* in a Malian village. *Malar J*. 2006;5:35.
- [20] Diallo M. Place du paludisme dans les syndromes fébriles au service d'urgence de l'hôpital Nianankoro Fomba de Ségou. [Thèse], Médecine, Université de Bamako; 2011.
- [21] Laurent A, Schellenberg J, Shirima K, Ketende SC, Alonso PL, Mshinda H, et al. Performance of HRP-2 based rapid diagnostic test for malaria and its variation with age in an area of intense malaria transmission in southern Tanzania. *Malar J*. 2010;9:294.
- [22] Rose-Wood A, Doumbia S, Traore B, Castro MC. Trends in malaria morbidity among health care-seeking children under age five in Mopti and Sevare, Mali between 1998 and 2006. *Malar J*. 2010;9:319.
- [23] Ranque S, Poudiougou B, Traore A, Keita M, Oumar AA, Safeukui I, et al. Life-threatening malaria in African children: a prospective study in a mesoendemic urban setting. *Pediatr Infect Dis J*. 2008;27(2):130-5.

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