

Severe Malaria in Children Aged 6 to 59 Months in the Paediatric Ward of the Commune II Health Centre in Bamako

Chaka Keita^{1*}, Kadiatou, BA¹, Boubacar Niare², Zoumana Samake¹, Fatoumata Sylla¹, Salia Ouonogo¹, Sidi Toure³, Hachimi Poma⁴, Samou Diarra⁵, Hawa Coulibaly¹, Kassim Ouattara¹, Bakary Abou Traore¹, Salif Djiguiba¹, Abdramane Traore⁶, Oumar Diallo⁶, Adama Dembele⁷, Boubacar Togo⁷

¹Reference Health Centre of the Commune 2 of Bamako,

²Bamako Regional Directorate, Mali

³Kayes Hospital, Mali

⁴Sikasso Hospital, Mali

⁵Reference Health Centre of Kayes, Mali

⁶University Hospital of Kati

⁷University Hospital of Gabriel TOURE

DOI: [10.36347/sjmcr.2023.v11i04.047](https://doi.org/10.36347/sjmcr.2023.v11i04.047)

| Received: 09.03.2023 | Accepted: 13.04.2023 | Published: 21.04.2023

*Corresponding author: Chaka Keita

Reference Health Centre of the Commune 2 of Bamako

Abstract

Original Research Article

Introduction: The aim of our work was to study the epidemiological, clinical, paraclinical and therapeutic aspects of severe malaria in children hospitalized in the pediatric ward of the CSRéf commune II of the district of Bamako in Mali. Materials and methods: We conducted a 12-month prospective study from January to December 2017. It took place in the paediatric service of the CSRéf of the commune II of the district of Bamako. **Results:** The study involved 70 children hospitalised out of 418 in the paediatric ward. The prevalence of severe malaria was 16.7%. The age group of children aged 36-59 months was the most affected with 58.6% with a sex ratio of 1.12 in favour of boys. The reasons for consultation were dominated by fever (43%). The neurological form was the most frequent with 71.4% followed by the anaemic form with 21.4%. Injectable artesunate was used as first line in 110 patients or 87%. The average duration of hospitalisation was 3.8 days. The evolution was favourable 97% of patients and 3% death.

Conclusion: Malaria remains a public health problem due to its frequency and severity in children.

Keywords: Severe malaria, child, commune II, Bamako Mali.

Copyright © 2023 The Author(s): This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International License (CC BY-NC 4.0) which permits unrestricted use, distribution, and reproduction in any medium for non-commercial use provided the original author and source are credited.

INTRODUCTION

Epidemiologically, severe falciparum malaria is defined by the presence of one or more severity criteria occurring in the absence of any other identified cause and if the patient has asexual P. falciparum parasitaemia (WHO 2021). Malaria remains a major public health problem in the world (EDSM VI- 2018). According to the World Malaria Report 2021, approximately 627,000 deaths are caused by malaria each year; more than 90 per cent of deaths occur in children in sub-Saharan Africa. (WHO 2021) A study done on severe malaria in Senegal in 2019 found a prevalence of 3.77% and death rate of 10.8% (F. Ly *et al.*, 2019). In Burkina Faso in 2018, malaria represented the first reason for consultations, hospitalisation and death with respectively 41.46%, 51.94% and 15.08%. Children under 5 years of age remain the most vulnerable (A.S. OUERMI *et al.*, 2020). In Mali

according to EDSM VI (2018) like most countries in sub-Saharan Africa, malaria is the leading cause of mortality and morbidity. In 2018, according to the health information system, 2,614,104 confirmed malaria cases and 1,001 deaths were recorded. Malaria was the primary reason for consultation 39%. Despite the efforts made by the state in the fight against this disease, morbidity and mortality in children aged 0-5 years still seem to be high. Few data are available on severe malaria in the paediatric ward of the Centre de Santé de Référence (CSRéf) in commune II of the district of Bamako. It is within this framework that this study aims to evaluate the epidemiological, clinical, para-clinical and therapeutic aspects of severe malaria in children aged 6 months to 59 months in the CSRéf of Bamako commune II.

PATIENTS AND METHOD

This study was carried out in commune II of the district of Bamako, Mali, it covers an area of 17 km² or \approx 7% of the total area of the district of Bamako 267 Km² with a population of 201842 inhabitants in 2016. The commune II health district is divided into 9 health areas: 1 CSRéf, 8 community health centres (Cscm). The diagnosis of severe malaria was retained according to the severity criteria defined by the national guidelines for the management of malaria in Mali (PNLP - 2016). We retained all records of children aged 6 to 5 years hospitalised for "severe malaria" in the paediatric department of the commune II reference health centre (CSRéf commune II) between January and December 2017. All children admitted and treated for severe malaria (without parasitological confirmation with negative thick drop and RDT) or other severe infections even in the presence of epidemiological and clinical presumptions were excluded. The following data were collected using a pre-established collection form: epidemiological data (sex, age in months, origin); anamnestic and clinical data (mode of entry, reasons for consultation, reasons for hospitalisation, clinical forms); paraclinical data (rapid diagnostic test, thickened drop, blood count to look for anaemia, grouping in the ABO rhesus system); therapeutic data (protocol used and other therapies); evolutionary data (cured, dead, referred). Data entry, analysis and processing were carried out on SPSS version 2.3. The text and graphics were done respectively on Word 2007 and Excel 2018.

RESULTS

During our study, we collected 70 cases of severe malaria out of 418 patients hospitalized from 01 January to 31 December 2017, i.e. a prevalence of 16.7%. The age group 36 to 59 months was the most represented with 58.6%. The average age of the patient was 17.5 months with extremes of 6 months and 59 months. We noted a predominance of sex 52.9% with a sex ratio of 1.12. The vast majority of patients resided in commune II or 80%. Tab 1 The mothers of the hospitalised children were not in school and were housewives in 83% of cases.

Table 1: Distribution according to epidemiological and socio-demographic data

	Number	Percentage
Age group		
6-11 month	5	7,1
12- 23 month	13	18,6
24 - 35 month	11	15,7
36 - 59 month	41	58,6
Sex		
Male	37	52,9
Female	33	47,1
Total	70	100

Fever was the most frequent reason for consultation 43% followed by convulsion and pallor respectively 27% and 14%. The reasons for hospitalisation were dominated by prostration 44.3% followed by repeated convulsions 31% Fig 1.

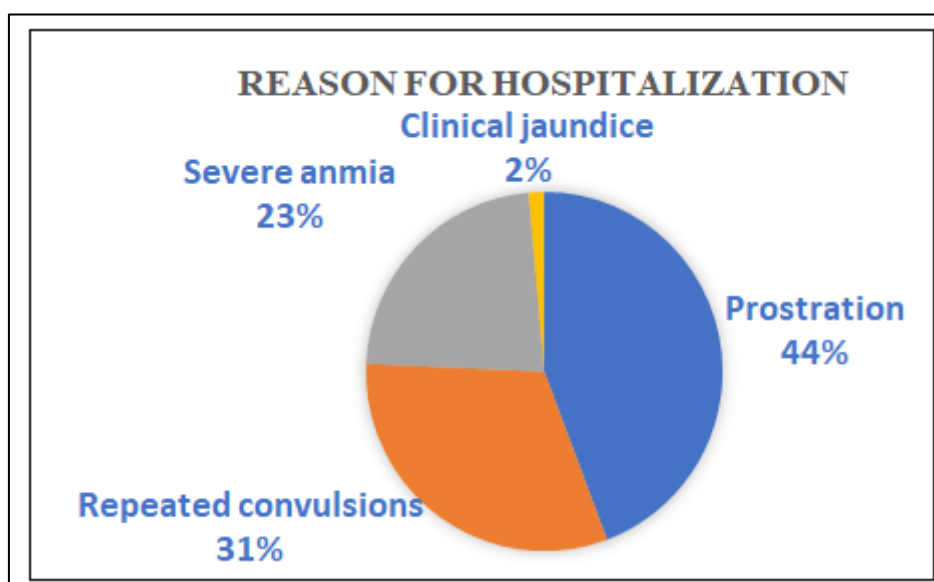


Fig 1: Distribution by reason for hospitalization

The RDT (rapid diagnostic test) was performed in 94% of our patients against 6% for GE (thickened gout). The clinical form was dominated by the neurological form (71.4%), followed by the anaemic form (21.4%) and the haemoglobin level was below 5 g/dl in 28.6%. Fig 2 Injectable artesunate was used as

first-line treatment in 87% of cases, followed by dihydrochloride in 10% and arthemether in 3%. The oral relay was essentially provided by artemisinin-based combination therapies (ACT). In our study, we had a cure rate of 97% with 3% deaths. Fig 3 No escape, no referral to higher level.

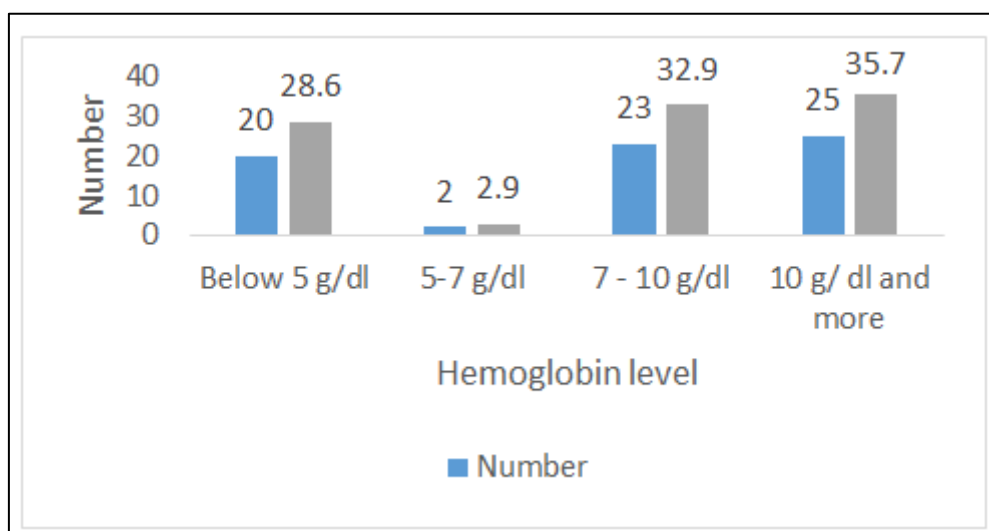


Fig 2: Distribution according to the hemoglobin level

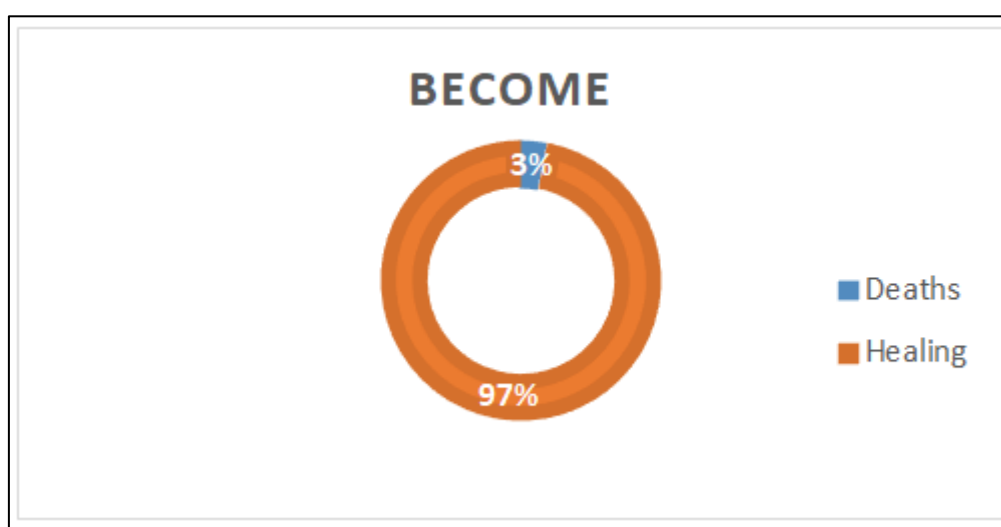


Fig 3: Distribution by patient outcome

DISCUSSION

During our study, a number of problems were encountered. The diagnosis of severe malaria requires a certain number of complementary examinations that are often difficult to carry out, on the one hand, within the reference health centre of the commune II of Bamako and, on the other hand, the imminence of the emergency and the socio-economic situation of the parents. In our study, we had a hospital prevalence of 16.7%. Our result is higher than that of (F. Ly *et al.*, 2019) 3.77%. On the other hand, it is lower than those of the commune IV of Bamako 32.05% (Keita M *et al.*, 2019), Kenya (Chilanga E *et al.*, 2020) and Benin (Adedemy JD *et al.* 2015) respectively 35.4% and 57%. This situation can be explained by the preventive and curative measures carried out by the National Malaria Control Programme (PNLP) and its partners in Mali and particularly in commune II. The age group 36-59 months was in the majority with 58.6% and an average age of 17.5 months. Our result is similar to that of (F.

Ly1 2019) in which the most predominant age range was 30 months to 6 years, i.e. 32.3%, and that of (M. Sawadogo 2014) in which the average age was 18 months. This predominance could be explained by the fragility of children under 5 years old related to the immaturity of the immune system. The majority of patients were male 52.9%, this predominance was noted by (M. Sawadogo 2014) 62.4%, (Sall H 2006) 58.6%. In our study, the children's mothers were not in school and were housewives in 83% of cases. This could be explained by the results of the report (EDSM VI 2018) which shows that two thirds of women aged 15-49 (66%) have no education in Mali. Children seen directly in consultation represented 87% against 13% referred. Our result agrees with that of (Bakayoko K *et al.* 2008), but differs from that of (Keita M 2019) 40, 17% in direct consultation. This situation could be explained by the community and 1st referral status of the reference health centre. Fever was the most frequent reason for consultation with 42.9%. This result is consistent with several other studies that show that

fever is the first reason for consultation of severe malaria (Keita M 2019) 32.2%, (F. Ly 2019) 95.8% and (M. SAVADOGO 2014) 39%. These results are consistent with the literature which gives fever as the first reason for malaria consultation (PNLP 2016). The reasons for hospitalisation were dominated by prostration 44.3% followed by recurrent convulsion 31.4 and severe anaemia 23%. Our result is identical to that of (F. Ly 2019) who found 74.3% neurological disorder followed by 52.7% anaemia, while (Keita M 2019) and (Alihonou F 2015) found anaemia followed by recurrent convulsions as the major clinical form. We noted more positive RDTs than GEs 94% versus 6%. Our result is similar to that of (Diallo Y 2013) who used the RDT in 79.35% of patients. Both examinations can be used for the diagnosis of severe malaria at the level of reference health centres in Mali. According to the national guidelines for the management of malaria, in case of non-availability of reagents for the GE, the RDT will be used. (Malaria guidelines 2016) Both diagnostic methods have been used by different authors (Keita M 2019), (F. Ly 2019). This situation could be explained by the delay in obtaining EW results in our facility which could take 5 to 6 hours. In our series the haemoglobin level below 5 g /dl was 28.6%. Our result is lower than those of (Keita M 2019) 50.4%, (Alihonou F2015) 42% (Camara E 2018) 56%. The neurological form was the most frequent with 74.4% followed by the anaemic form 21.4%. Our result is identical to those of (SALL A *et al.*, 2006), (Bakayoko K *et al.*, 2008) who found the predominance of the neurological form respectively 56.7% and 52.8%. On the other hand, the anaemic form was the most frequent (Sowunmi. A 2011), (Maiga B 2019) 42%, Keita M 2019) 42.7%. Artesunate injection was used in 87.1% followed by quinine dihydrochloride 10%. Artemisinin-based combination therapies (ACTs) were used in the next stage. Our results corroborate those of (Bruneel F *et al.*, 2012) and (Danis *et al.*, 2013) who reported injectable artesunate as the first-line treatment for severe malaria. This choice is explained by the respect of the national recommendations for the management of severe malaria which specify that injectable artesunate is the molecule of first choice (Ministry of Health and Public Hygiene of Mali 2014). In addition to etiological treatment patients received symptomatological treatment for fever, convulsion and transfusion. In our series, anticonvulsants were used in 34.3% of patients, 61.4% of patients received antipyretics and 20% of patients received a blood transfusion. The outcome was favourable in 97% of cases and we found 3% deaths. Similar studies have found 84.6% success, 5.5% death (Keita M 2019) and 67.1% success, 10.1% death (Maiga B 2019). Our results could be explained by the efforts made by our governments and their partners in terms of diagnosis, management and prevention of malaria. Patients had an average duration of hospitalisation of 3.8 days. This average is close to that found by (Keita M 2019) (Maiga *et al.*, 2019) which was respectively 4.8, and 4.5 days.

CONCLUSION

Severe malaria remains a worrying disease in Mali specifically in commune II with a high prevalence. The reinforcement of preventive measures and the improvement of the quality of care must be a priority in order to further reduce severe forms, mortality and the prevalence of malaria.

Conflicts of Interest: The authors declare that they have no conflicts of interest in relation to this article.

REFERENCES

- OMS. (2021). Lignes directrices de l’OMS sur le paludisme - 16 février 2021, 102 of 225.
- EDSM VI. (2028). Enquête Démographique et de Santé du Mali 2018.
- Ly, F., Camara, B., Sall Diouf, A., Sakho Kane, A., Sow, A., Niang, B., Keita, Y., Nkara, M., Sylla, A., & Ndiaye, O. (2019). Le paludisme grave de l’enfant Aspects épidémiologiques, cliniques, thérapeutiques, évolutifs et pronostiques Médecine d’Afrique Noire, 66(12), 604-614.
- Ouermi, A. S., Zoungrana, C., Gadiaga, H. N. B., Barro, M., Sanogo, B., Savadogo, H., Kalmogho, A., & Koueta, F. (2020). Facteurs de risque de décès des enfants atteints du paludisme grave au Centre Hospitalier Universitaire Régional de Ouahigouya (Burkina Faso), Médecine d’Afrique Noire, 67(12), 656-664.
- Programme national de lutte contre le paludisme: PNL. (2016). DIRECTIVES NATIONALES POUR LA PRISE EN CHARGE DES CAS DE PALUDISME AU MALI, 6-32.
- Mamadou, K., Salif, C., Dramane, S., Yacouba, C., Hamala, T., Boubacar, T., & Sounkalo, D. (2022). Paludisme Grave chez l’Enfant dans le District de Bamako: Aspects Épidémiologiques, Clinico-biologiques et Thérapeutiques: Paludisme grave chez l’enfant dans le district de Bamako. *Health Sciences and Disease*, 23(4), 30-33.
- Chilanga, E., Collin-Vezina, D., MacIntosh, H., Mitchell, C., & Cherney, K. (2020). Prevalence and determinants of malaria infection among children of local farmers in Central Malawi. *Malaria Journal*, 19(1), 1-10.
- Adedemy, J. D., Agossou, J., Alao, M. J., Noudamadjo, A., & Ayivi, B. (2015). Role de l’anémie sévère et de l’hypoglycémie dans la mortalité du paludisme grave de l’enfant en milieu hospitalier à Parakou (Benin). *Mali médical*, 30(1), 19-24.
- Savadogo, M., Boushab, M. B., & KYÉLEM¹, N. (2014). La prise en charge du paludisme grave des enfants de moins de cinq ans dans les formations sanitaires périphériques du Burkina Faso. *Médecine d’Afrique Noire*, 61(3), 165-168.

- Sall, H. (2006). Incidence et modalités de prise en charge du paludisme grave et compliqué dans le service de pédiatrie du centre hospitalier université Gabriel Touré. Thèse Med Bamako, 74.
- Camara, B., Diouf, S., Diagne, I., Fall, L., Ba, A., Ba, M., ... & Kuakuvi, N. (2003). Le paludisme grave de l'enfant en milieu hospitalier sénégalais. *Médecine et maladies infectieuses*, 33(1), 45-48.
- Serengbe, G. B., Ndoyo, J., Gaudeuille, A., Longo, J. D. D., Bezzo, M. E., Ouilibona, S. F., & Ayivi, B. (2004). Les aspects actuels du paludisme grave de l'enfant en milieu hospitalier pédiatrique centrafricain. *Médecine et maladies infectieuses*, 34(2), 86-91.
- Diallo, Y. (2013). Evaluation de la prise en charge des cas de paludisme chez les enfants de 0 à 59 mois en commune v du district de Bamako. Thèse méd. Bamako, 89.
- Alihonou, F., Sagbo, G. G., Bagnan, L., d'Almeida, M., Lalya, H. F., Koumakpai, S., & Ayivi, B. (2015). Transfusion sanguine dans le traitement du paludisme grave chez l'enfant au CHNU H. K. Maga Cotonou, *RAMUR*, 20(2), 84-88.
- Camara, E., Barry, I. K., Diallo, M. L., Diop, M., Ondima, H. M., & Boubacar, D. (2018). Corrélation entre densité parasitaire et taux d'hémoglobine au cours du paludisme grave chez les enfants de 0-5 ans à Conakry, *Revue Internationale des Sciences Médicales d'Abidjan*, 21(3), 196-200.
- Sall, A. (2006). Incidence et modalité de prise en charge du paludisme grave et compliqué dans le service de pédiatrie du CHU- Gabriel Touré. Thèse méd. Bamako, 92, 155
- Bakayoko, K. (2008). Incidence et létalité du paludisme grave et compliqué dans l'unité de réanimation pédiatrique de l'HGT. Thèse méd. Bamako 2008, 46.
- Sowunmi, A., Okuboyejo, T. M., Gbotosho, G. O., & Happ, C. T. (2011). Facteurs de risque d'hyperparasitémie à Plasmodium falciparum chez les enfants atteints de paludism *BMC Infectious Diseases*, 11, 268.
- Maiga, B., Sacko, K., Cissouma, A., Dembélé, A., Cissé, M., Diakité, A. A., ... & DickoTraoré, F. (2019). Caractéristiques du paludisme grave chez les enfants de 0 à 5 ans à l'Hôpital de Sikasso au Mali. *Mali médical*, 34(2), 1-5.
- Bruneel, F. (2012). Traitement du paludisme grave par artésunate intraveineux, *Réanimation*, 21, S399-S405.
- Danis, M., Thellier, M., Jauréguiberry, S., Bricaire, F., & Buffet, P. (2013). Le paludisme grave à P. falciparum en France, 2000-2011: évolution épidémiologique et nécessité d'une nouvelle prise en charge thérapeutique. *Bulletin de l'Académie nationale de médecine*, 197(3), 699-716.
- Ministère de la Santé et de l'Hygiène Publique du Mali. (2014). Programme national de lutte contre le paludisme. Manuel de prise charge du paludisme dans les structures sanitaires, 109.