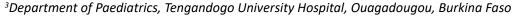# International Journal of Pediatric Research

Management of Dengue Fever in Children: Current Situation at the Regional University Hospital of Ouahigouya (Burkina Faso)

Savadogo H[1,2]*, Dao L[3,4], Kiendrébéogo L[1], Ouermi AS[1,2], Guira I[1], Ouattara ABI[1,2], Sawadogo A[5,2] and Koueta F[4,6]

[1]Department of Paediatrics, Regional University Hospital of Ouahigouya, Ouahigouya, Burkina Faso

[2]Health Sciences Training and Research Unit, Lédéa-Bernard-Ouédraogo University, Ouahigouya, Burkina Faso

[3]Department of Paediatrics, Tengandogo University Hospital, Ouagadougou, Burkina Faso

[4]Health Sciences Training and Research Unit, Joseph Ki-Zerbo University, Ouagadougou, Burkina Faso

[5]Department of Infectious and Tropical Diseases, Regional University Hospital of Ouahigouya, Ouahigouya, Burkina Faso

[6]Department of Paediatrics, Yalgado-Ouédraogo University Hospital, Ouagadougou, Burkina Faso

*Corresponding author: *Hamidou Savadogo, Regional University Hospital of Ouahigouya, Ouahigouya, 36, Burkina Faso, Tel: +226-610-693-05*

Abstract

Introduction: Considered as re-emerging disease from the 1970s onwards, dengue fever has now become the most widespread arbovirosis in the world. The aim of our work was to provide paediatric data on the subject in our context.

Patients and method: This was a retrospective study covering the period from January 1st to 31st December 2023. Children aged 29 days to 14 years hospitalised in the paediatric department of the Regional University Hospital of Ouahigouya, were included.

Results: One hundred and five patients were included in the study. The mean age of these patients was 4.9 ± 2.6 years, with extremes of 08 months and 14 years. The sex ratio was 1.4. Children under five years of age accounted for 54.3% of cases. The main reasons for consultation were fever, headache, vomiting and epistaxis. The main complications were haemorrhage (37.1%), severe thrombocytopenia (18.1%) and hepatic cytolysis (10.5%). More than half the patients (51.4%) were AgNS1 positive. The average hospital stay was 3.9 ± 2.2 days, with extremes of 2 and 11 days. The case fatality rate was 4.8%. Severe malaria (p = 0.012) and shock (p = 0.001) were statistically associated with death.

Conclusion: Dengue fever has become a public health problem in our context. Preventing and managing it requires raising public awareness, ongoing training for healthcare professionals and epidemiological surveillance.

Introduction

Dengue fever, or tropical flu, is currently considered a neglected tropical disease. It is a viral disease transmitted by the bite of a female mosquito, mainly *Aedes aegypti*, but also *Aedes albopictus*. The dengue virus belongs to the Flaviviridae family. There are four serotypes of the virus responsible for dengue fever, namely DENV-1, DENV-2, DENV-3 and DENV-4, and severe forms can be observed with all serotypes [1-3]. Dengue is currently the most widespread arbovirus disease in the world. It is particularly prevalent in tropical and subtropical regions, making this infection a public health problem [4,5]. In recent years, there has been an increase in the global incidence of the disease. The World Health Organisation estimates that there are more than 390 million cases of dengue fever worldwide each year, with approximately 20,000 to 25,000 deaths per year (mainly children in developing countries). We are therefore witnessing an unprecedented peak, with the disease spreading to other regions of the world

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[3,6]. Africa is one of the regions most affected by dengue fever, with 171,991 cases of dengue fever and 753 deaths in 2023. Burkina Faso was the most affected country in the region. As of 18 December 2023, the country had recorded a total of 68,346 probable cases and 688 deaths [6,7]. The clinical manifestations of dengue fever are polymorphic and no clinical signs are specific [8]. Reinfection with other serotypes increases the risk of developing severe dengue fever [3]. There is currently no specific treatment for the disease. Management is therefore symptomatic [9].

The northern region of Burkina Faso was not spared by the dengue epidemic that occurred in the country in 2023. Several patients, both adults and children, were treated at the Regional University Hospital of Ouahigouya, the major city in the north of the country. We faced an influx of dengue cases in paediatrics, some of which were severe. However, data on dengue in children in our context is scarce. That is why we decided to conduct this study with a view to providing data on the subject and contributing to better management of dengue in paediatrics at the Regional University Hospital of Ouahigouya.

Patients and Method

This was a retrospective, single-center, descriptive and analytical study conducted in the paediatric department of the Regional University Hospital of Ouahigouya covering the period from January 1st to 31st December 2023. The study included children aged 29 days to 14 years who were hospitalised in the department for dengue fever during the study period and who tested positive in a rapid dengue diagnostic test (NS1 antigen or immunoglobulin M and/or immunoglobulin G positive).

We used the following operational definitions:

· Thrombocytopenia: platelet count below 150,000 cells/mm³

· Severe thrombocytopenia: platelet count < 50,000 cells/mm³

· Complications: the following situations were considered complications of dengue fever:

- Shock syndrome: systolic blood pressure < 90 mm Hg with signs of peripheral hypoperfusion

- Presence of visible or occult bleeding.

The data were extracted from hospitalisation and consultation medical records using an individual form, then collectively integrated anonymously into an Excel file to enable statistical analysis. The variables concerned socio-demographic information, clinical data and biological data. Information on the progression of the disease was also collected. These data were analysed using Stata 16 software. The mean and standard deviation were used to estimate quantitative variables and proportions for qualitative variables. The Chi-square statistical test was used to compare proportions with a significance threshold of 5%. We obtained authorisation from the General Director of the University Hospital of Ouahigouya and the head of the Paediatrics Department to conduct the study. The confidentiality of the information collected was respected for each patient included.

Results

Sample characteristics

During the study period, 2,916 patients were admitted to the paediatric department of the Ouahigouya Regional University Hospital Centre. Among them, 105 cases of dengue fever were recorded, representing a frequency of 3.6%.

Age and gender

The mean age of patients was 4.9 ± 2.6 years, ranging from 8 months to 14 years. The sex ratio was 1.4. The distribution of patients by age group and sex is shown in table 1.

Place of residence

In our series, 76 children resided in urban areas, representing 72.4% of cases, and 29 patients, representing 27.6% of cases, lived in rural areas.

Clinical aspects

Reasons for consultation

The various reasons for consultation are shown in table 2.

Clinical signs at admission to the pediatric emergency

The main clinical signs found on physical examination at admission were crackles (4.8% of cases), respiratory distress and hepatomegaly in 3.8% of cases respectively.

Biological signs

Immunologically, the NS1 antigen was positive in 51.4% of cases (Table 3). The average haemoglobin level was 9.9 ± 3.2 g/dL, with extremes of 2.3 and 16.1 g/dL. Haematocrit was elevated in four patients (3.8% of cases) and decreased in 70 patients (66.7% of cases). Sixty-nine patients (65.7% of cases) had thrombocytopenia, and 37.7% of these had severe thrombocytopenia. Leukopenia was present in 19% of cases. In these patients, the mean leukocyte count was

Table 1: Distribution of patients by age group and gender (n = 105).

Age range (years)	Gender		Total n (%)
	Male	Female	
[0-5]	30	27	57 (54.3%)
[5-10]	24	15	39 (37.1%)
[10-14]	07	2	09 (8.6%)
Total	61 (58.1%)	44 (41.9%)	105 (100%)

Table 2: Distribution of patients by reason for consultation.

Signs	Number of cases	Percent (%)
Fever	105	100
Headache	53	50.5
Vomiting	53	50.5
Abdominal pain	43	40.9
Hemorrhage	37	35.2
Retro-orbital pain	18	17
Cough	11	10.5
Respiratory distress	04	3.8
Seizures	03	2.9
Diarrhea	02	1.9
Arthralgia	02	1.9
Chest pain	01	0.9
Myalgia	01	0.9

NB: The same patient could have several reasons for consultation at the same time.

Table 3: Distribution of patients according to immunological profile (n = 105).

Viral markers	Number of cases	Percent (%)
NS1 antigen positive	54	51.4
Immunoglobulin M positive	33	31.4
NS1 antigen and Immunoglobulin M positive	05	4.8
Immunoglobulin M and Immunoglobulin G positive	02	1.9
NS1 antigen and Immunoglobulin G positive	06	5.7

Table 4: Distribution of patients according to the frequency of complications (n = 105).

Type of complications	Number of cases	Percent (%)
Haemorrhagic	39	37.1
Related to plasma leakage***	07	6.7
Respiratory distress	04	3.8
Renal failure	01	0.9
Severe thrombocytopenia	19	18.1

***: Shock Syndrome, Ascites, Pleurisy
NB: The same patient could have several associated complications.

2,874.4 ± 802.2 cells/mm³, with extremes of 1,144 and 3,890 cells/mm³. Hepatic cytolysis was recorded with elevated alanine aminotransferase (ALT) in 10.5% of cases. The mean ALT in these patients was 233.8 ± 94.9 IU/L, with extremes of 111 and 341 IU/L.

Complications and comorbidities

Complications were noted in 40 patients, representing 38.1% of cases. The distribution of patients according to the different types of complications is shown in table 4. Epistaxis accounted for 37.1% of haemorrhagic complications. Severe malaria accounted for 88% of comorbidities.

Outcome of patients

The average length of hospital stay was 3.9 days, ranging from 2 to 11 days. The outcome was favourable in 93.3% of patients. Five patients (4.8% of cases) died. A statistically significant association was found in univariate analysis between the occurrence of complications and residence in an urban area (p = 0.00; odds ratio = 2.6), age under 5 years (p = 0.03; odds ratio = 0.4) and the presence of comorbidities (p = 0.03; odds ratio = 2.4). Multivariate analysis of factors associated with death showed a statistically significant association between death and shock syndrome (p = 0.01; odds ratio = 0.8), severe dengue (p = 0.04; odds ratio = 0.7) and co-infection with dengue and severe malaria (p = 0.01; odds ratio = 0.1).

Discussion

Characteristics of the sample

The average age of our patients was 4.9 ± 2.6 years, ranging from 8 months to 14 years. Pothapregada, et al. [10] in India reported an average age of 6.9 ± 3.3 years. Bonsi, et al. [11] in Cameroon found an average age of 7.1 ± 2.9 years. In our series, children under 5 years of age (54.3%) were the most affected by dengue fever. Other authors have also reported this predominance, notably Soudré, et al. (58.09%) [7] and Ilboudo [12] in Ouagadougou. This predominance could be explained by the vulnerability of this age group. Indeed, protection by maternal antibodies is effective during the first months of life and then gradually decreases from 6 months onwards. Added to this is the immaturity of the immune system of children in this age group [13,14].

The male predominance (sex ratio = 1.4) found in our study has also been reported by other authors, notably Mistry, et al. in India (male predominance in 57.9% of cases) [15], as well as Traoré in Bamako (male predominance in 55.8% of cases) [16]. This could be explained by the fact that boys are more mobile and may frequent damp areas that are breeding grounds for mosquitoes.

Clinical data

The clinical signs were dominated by fever (100% of cases). This result is comparable to that of Doho [17] and Monnin, et al. [18], who reported fever as the main reason for consultation in 86.24% and 100% of cases, respectively. Fever during dengue fever is thought to be linked to the release of pro-inflammatory mediators in response to infection [19]. The physical signs found in our study (respiratory distress and hepatomegaly in 3.8% of cases respectively, lace sign in 2.9% of cases) were reported by Pothapregada, et al. [10] in India, but with different frequencies (hepatomegaly, the lace sign and respiratory distress were observed in 59.8%, 12.6% and 1.5% of cases, respectively). This difference could be explained by the retrospective nature of our study, with medical records that were not always complete. Furthermore, the lace sign is difficult to assess on black skin.

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Biological signs

Biologically, thrombocytopenia was found in 65.7% of patients, and among them, 37.7% had severe thrombocytopenia. These results are comparable to those of Sondo et al. [20], Ilboudo [12] in Ouagadougou, and Prasad, et al. [21] in India, who found thrombocytopenia in 89%, 69.2%, and 73.5% of cases, respectively. Sondo et al. and Ilboudo noted severe thrombocytopenia in 16% and 53.8% of cases, respectively. These results prove that thrombocytopenia is the main haematological disorder in dengue fever. It is generally caused by the action of the virus.

Complications and comorbidities

In our study, the overall frequency of complications was 38.1%. This frequency is higher than those reported by Gnamou [22] in Burkina Faso and Monin, et al. [18] in Martinique (5%). The high frequency of complications in our study could be explained by the fact that 2023 saw an unprecedented dengue epidemic in the sub-region in general and in Burkina Faso in particular, which recorded the highest number of cases [23]. Complications in our study were dominated by haemorrhages in 37.1% of patients. Gnamou, [22] also found a predominance of haemorrhagic complications (38.55% of cases) in his series. Haemorrhagic complications are therefore common during dengue and may be aggravated in cases of severe thrombocytopenia. Co-infections were dominated by malaria. This could be explained by the fact that Burkina Faso is located in a malaria-endemic area.

Evolution and prognosis

The average length of hospital stay was 3.9 days in our study. This duration is comparable to that reported by Ly, [24] and lower than that reported by Badianne, et al. [25], who found 4.18 days and 6 days, respectively. The outcome was favorable in 93.3% of patients. There was a low mortality rate of 4.8%. Badianne, et al. [25] reported similar results, with a favorable outcome in 88.6% of cases and a mortality rate of 6.8%. These results could be explained by the existence of national guidelines for the management of dengue fever in Burkina Faso [26,27]. In our study, there was a statistically significant link between comorbidities and the risk of complications. Marois, et al. [28] reported that comorbidities were significantly associated with severe forms of the disease.

In our study, there was a statistically significant link between dengue fever combined with severe malaria and death. Badianne, et al. [25] made the same observation in Senegal. The concomitant diagnosis of both diseases is made difficult by their clinical similarity. The comorbidity of dengue fever and malaria therefore results in a poor prognosis, hence the need to investigate and treat any possible association in order to prevent complications.

Conclusion

Dengue fever is a real public health issue in our context. A prospective multicenter study will enable us to better assess the subject in a pediatric setting in our context.

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