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Association between Dengue Fever and Pregnancy at the Sourô Sanou University Hospital Center in Bobo-Dioulasso, Burkina Faso, Based on 58 Cases: Clinical, Biological, and Prognostic Aspects

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Abstract

Objective: The objective of this study was to describe the clinical, biological, and prognostic aspects of dengue and pregnancy in pregnant women hospitalized in a university hospital in Burkina Faso from August 1, 2023, to February 7, 2024. **Methodology:** This was a descriptive cohort study conducted from August 1, 2023, to February 7, 2024. It involved 58 pregnant women admitted to the obstetrics department of the Sourô Sanou University Hospital Center who had a confirmed diagnosis of dengue fever. The variables investigated were the clinical, biological, and prognostic aspects of this association. Data were collected through direct individual interviews supplemented by a literature review and recorded on a written questionnaire. The analysis was performed using Epi-Info software version 7.0.9.7. **Results:** The frequency of dengue fever and pregnancy was 2.08% of all pregnant women admitted to the emergency department. The average age of the patients was 26.8 years and the average gestational age was 2.6 months. Patients who were in the third trimester of their pregnancy accounted for 38%. The main complications were hemorrhage, hepatic cytolysis, intrauterine fetal death, and prematurity. Perinatal mortality was 13.8% and maternal mortality was 1.7%. **Conclusion:** Maternal and fetal complications are common in cases of dengue fever and pregnancy. When faced with any fever in a pregnant woman in our context,

healthcare providers should systematically consider the diagnosis of dengue until proven otherwise. Infected women should then receive multidisciplinary follow-up until delivery.

Keywords

Dengue, Pregnant Women, Complications, Fever, Bobo-Dioulasso

1. Introduction

Numerous emerging or re-emerging infectious diseases have appeared in recent decades and pose major public health problems [1]. Dengue fever, an infection transmitted by Aedes mosquitoes in intertropical areas, is the most significant human arbovirus disease. It is classified as an emerging disease [2]. Transmissible diseases, which cause a quarter of all deaths worldwide, are vector-borne diseases [3]. Viral infections affecting pregnant women can have various consequences for the mother, foetus and/or newborn, depending on when they occur during pregnancy or the type of virus [4]. This virus belongs to the Flavivirus genus of the Flaviviridae family. It occurs in four serotypes that are antigenically similar: serotypes 1, 2, 3 and 4, abbreviated as DENV-1, DENV-2, DENV-3 and DENV-4, respectively.

Dengue screening is based on the early detection of the NS1 antigen, which is a non-structural viral protein produced by the virus. Ideally, it should be detected before antibodies are produced, *i.e.* during the first 7 days of the disease.

Serological tests are used to detect the presence of antibodies in the blood. These are primarily IgM antibodies, which appear between the third and fifth day, indicating a recent infection. Next are IgG antibodies, which appear later and persist throughout the person's life, indicating a past or recent infection. Finally, reverse transcription polymerase chain reaction (RT-PCR) allows the genetic material of the virus, ribonucleic acid (RNA), to be identified directly. This test is very useful within 72 hours of the onset of symptoms to quickly confirm the diagnosis.

Dengue infections in Africa are poorly quantified, but outbreaks suggest that dengue fever could become more common in sub-Saharan parts of the continent [5]. In 2023, there was an outbreak of dengue fever in Burkina Faso. At that time, cases of dengue virus infection in pregnant women were reported in the obstetrics department of the Sourô Sanou University Hospital Centre (CHUSS).

The authors conducted this study to describe the clinical, biological and prognostic aspects of the association between dengue and pregnancy in order to contribute to better care for pregnant women with this condition.

2. Methodology

This was a descriptive cohort study. Patients were gradually included between 1 August 2023 and 7 February 2024. Once included, each patient was then followed up for seven days from the date of confirmation of the dengue diagnosis. The last

woman was followed up until 7 February 2024, marking the end of data collection. The study took place in the obstetrics department of the Department of Gynaecology, Obstetrics and Reproductive Medicine (DGOMR) at the Sourô Sanou University Hospital Centre (CHUSS) in Bobo-Dioulasso. This department consists of three care units: the delivery room, the operating theatre, and pathological pregnancies and postpartum care. All pregnant women, regardless of gestational age, who tested positive for dengue fever using a rapid diagnostic test (RDT) were included. Each of them agreed to be monitored for seven consecutive days. This monitoring could continue during labour and the postpartum period in order to complete the seven days of monitoring. Each woman gave her free and informed verbal consent to participate in the study. The inclusion of subjects was exhaustive, resulting in a final sample of fifty-eight patients. Data collection during this survey was prospective, using three techniques: semi-structured face-to-face interviews, documentary review, and clinical examination of patients and their newborns. The instrument used for data collection was a written questionnaire validated by a 15-day pre-test at the Do district hospital in Bobo-Dioulasso. The data collected were entered and analysed on a computer using Epi-Info Version 7.0.9.7 software. Confidentiality and anonymity were ensured throughout the study. For data processing, only the file number of each woman was recorded. Neither names nor any other identifying information were mentioned. This study has added value to the diagnosis and management of dengue fever in pregnant women at the CHUSS. It did not disrupt the well-being of society. The results we have achieved provide an important basis for advocacy with the authorities and for raising awareness among the population.

3. Results

3.1. Epidemiological and Sociodemographic Aspects

A total of 2787 pregnant women were admitted to the emergency department of the Department of Gynecology, Obstetrics and Reproductive Medicine (DGOMR) during the study period, including 58 cases of dengue fever. The frequency of dengue fever and pregnancy was therefore 2.08% of all pregnant women admitted to the emergency department. The average age of the patients was 26.8 ± 7.4 years, with extremes of 17 and 43 years. The 15 - 25 age group was predominant, accounting for 41.4%. The average number of pregnancies was 2.6 ± 1.7, with extremes of 1 and 7. The average parity was 1.5 ± 1.5 (extremes of 0 and 5). At admission, 44.8% of women were in their second trimester, 38% were in their third trimester and 17.2% were in their first trimester. Patients with no schooling accounted for 62.1% of the sample. Two-thirds of the women (67.2%) were homemakers and 81% lived in the city of Bobo-Dioulasso. With regard to factors that may contribute to the onset of dengue fever, none of the patients in the study had a means of water drainage at home, and 96.6% did not have a means of wastewater drainage at their workplace. Respectively, 37.9% and 15.5% of women had plants in their homes and a rubbish dump near their homes.

3.2. Clinical and Paraclinical Aspects

A total of 98.3% of patients were referred from peripheral facilities. Six (6) patients, or 10.3%, had started self-medication with decoctions, while the others had consulted without having started treatment. Regarding medical history, one patient (1.7%) had already contracted dengue fever, nine (15.5%) were major sickle cell patients, including eight (13.8%) SC and one SS patient. Two women (3.4%) were known to be diabetic. The main clinical signs were headache (86.2%), fever (82.7%) and haemorrhaging (39.7%). These cases of haemorrhaging were anterior epistaxis, gingival bleeding and metrorrhagia in 17.3%, 8.6% and 7% of cases, respectively. In one case (1.7%), the symptoms were melena, rectal bleeding, ecchymosis and haemoglobinuria. With regard to additional tests, dengue serology detected the NS1 antigen (AgNS1) in 31 women (53.4%). In 27 of these patients (46.6%), neither immunoglobulin M (IgM) nor IgG was detected.

The distribution of patients according to the results of dengue serology is shown in Table 1.

Table 1. Distribution of patients according to dengue serology results.

Dengue serology results	Number	Percentage (%)
Ag NS1 (+)	27	46.6
IgM (+)	15	25.9
IgG (+)	6	10.3
IgM (+) and IgG (+)	6	10.3
Ag NS1 (+) and IgG (+)	2	3.5
Ag NS1 (+) and IgM (+)	1	1.7
Ag NS1 (+) and IgM (+) and IgG (+)	1	1.7
Total	58	100.0

Ag: antigen; (+): positive; Ig: immunoglobulin.

Haematologically, 48 patients (82.7%) had thrombocytopenia, 14 (24.1%) had leukopenia and 9 others (15.5%) had hyperleukocytosis. Regarding biochemical tests, 33 patients (56.9%) had ionic disorders and 7 others had hypercreatinaemia.

3.3. Therapeutic Aspects

A total of 96.5% and 98.2% of patients received antipyretic treatment with paracetamol and crystalloid fluid replacement, respectively. Antimalarial treatment was administered to 35 patients (60.3%). Ten patients (17.2%) were treated with antibiotics and 12 others (20.6%) were resuscitated. Transfusions were administered to 31 patients, or 53.4%. The labile blood products transfused were red blood cell concentrates for 26 women (44.8%), followed by fresh frozen plasma and platelets, as shown in Table 2.

Table 2. Distribution of patients according to type of transfusion.

Transfusion Data Received	Number	Average	SD	Extrema
Red Blood Cell Concentrate (RBC)	26	-	-	-
Number of Times	87	3.1	2.7	1 - 12
Volume (ml)	44,100	1590	1200	300 - 3000
Fresh Frozen Plasma (FFP)	12	-	-	-
Number of Times	16	1.3	0.7	1 - 3
Volume (ml)	7200	600	360	200 - 1400
Platelets	3	-	-	-
Number of Times	3	0.7	0.3	1 - 1
Volume (ml)	240	78	30	60 - 1200

SD = standard deviation; 1 transfusion bag of RBC = 300 cm^3; 1 transfusion bag of FFP = 200 cm^3; 1 transfusion bag of platelets = 60 cm^3.

3.4. Maternal and Neonatal Prognostic Aspects

Forty-six patients, or 79.3%, had complications marked by ionic disorders (56.9%), haemorrhage (39.6%) and liver damage (hepatic cytolysis and cholestasis). These complications are listed in Table 3.

Table 3. Distribution of patients according to the complication that occurred.

Complication Occurred	Number	Percentage (%)
Ionic Disturbances	33	56.9
Haemorrhage	23	39.6
Hepatic Cytolysis	22	37.9
Cholestasis Syndrome	10	17.2
Renal Failure	7	12.0
Neurological Impairment	5	8.6
Haemorrhagic Shock	1	1.7
Severe Thrombocytopenia	11	18.9

In our series, 15 deliveries were recorded, including 12 vaginal deliveries. Six stillbirths were reported, including five (5) in the context of foetal death in utero. This information is reported in Table 4.

The average length of hospitalisation was 7.5 days ± 7 days. Forty-one women recovered, representing 70.8%. Three patients left without medical advice and 13 were transferred to the general intensive care unit or the infectious diseases department.

One maternal death due to haemorrhagic shock (1.7%) and two neonatal deaths due to neonatal infection out of 15 births were reported.

Table 4. Distribution of patients according to complications and pregnancy outcomes during illness.

Complications and Outcome of Pregnancy during Illness	Number	Percentage (%)
metrorrhagia	7	12.1
Abortion	3	5.1
Fetal Death in Utero	6	10.3
Severe Oligoamnios	1	1.7
Childbirth		
• Low Lane	12	20.7
• Caesarean Section	3	5.2
No Complications	41	70.8
Progressive Pregnancy at Discharge	39	67.2

4. Discussion

4.1. Limitations and Constraints

This study had a few biases and limitations, which were:

1) The disruption of rapid dengue screening tests (RDTs) in several laboratories in the city of Bobo-Dioulasso during August and February 2024; this probably led to under-reporting of cases.

2) Polymerase chain reaction (PCR) testing was not available to confirm dengue cases and identify different serotypes.

3) Certain paraclinical tests were financially inaccessible to some patients.

4) Our results can only be generalized to the hospital population and not to the general population.

Despite these limitations, the results of this study are relevant and deserve to be discussed alongside those in the literature.

4.2. Epidemiological Factor

The frequency of dengue and pregnancy in our series was 2.08%. Sharma *et al.* [6] in India in 2016, in the Department of Obstetrics and Gynaecology at Bahadur Hospital in Delhi, reported a frequency of 2.6% in a sample of 60 patients. This is slightly higher than our rate, which could be explained by the shortage of rapid diagnostic tests (RDTs) in the obstetrics department at the time of the study and the high frequency of asymptomatic cases. This rate remains significant and requires the implementation of rigorous preventive measures.

In 2016, Kabore [7] found a frequency of 0.05% in the obstetrics department of the Yalgado Ouédraogo University Hospital (CHUYO) in Ouagadougou. This difference between the two hospitals in the same country can be explained by the duration of Kaboré's study, which was only 3 months compared to 7 months in our series.

4.3. Sociodemographic Aspects

In the present study, the average age of the women was 26.8 years, comparable to the averages reported in the literature. Indeed, Kabore in 2016 and Lompo *et al.* [8] in 2017 at CHUYO reported average ages of 28 and 25.1 years, respectively. Sharma *et al.* [6], meanwhile, found an average age of 25 years in India in 2016. This could be explained by the fact that fertility is optimal at this stage of life, in addition to the fact that the population is predominantly young in Burkina Faso.

In our study, women who were homemakers were the most numerous. The same observation was made by Lompo [8] and Kabore [7] at CHUYO. These women working in the home each lived in a dwelling that lacked sewage disposal facilities or, conversely, in dwellings where there were plants or rubbish dumps nearby that could provide habitats for Aedes. Household sanitation is therefore an effective means of vector control.

4.4. Clinical Aspects

In our study, a history of diabetes and haemoglobinopathy was found. Authors have identified sickle cell disease as a factor associated with severe forms of dengue [9] [10]. Consequently, patients with dengue who have one of these conditions should be closely monitored by health workers.

All those in our series who had at least one of these conditions had complications.

Six (6) women had started self-medicating before consulting a doctor and six others had used herbal remedies. This situation leads to a delay in receiving appropriate treatment. In addition, the substances used can aggravate the course of the disease or complicate pregnancy. For example, excessive intake of paracetamol will increase the risk of hepatitis [11]. Non-steroidal anti-inflammatory drugs and aspirin also increase the risk of haemorrhage [12]. It is therefore necessary to raise awareness among the population about the harmful effects of self-medication when signs suggestive of dengue fever appear.

Headaches, fever, nausea/vomiting, arthralgia and myalgia were the most common clinical signs in our series. These symptoms are the main clinical manifestations of dengue fever. Several studies have also found fever, nausea/vomiting, headaches and myalgia to be the most common symptoms. This is the case in the study by Lompo [8], who found fever in 98.2% of cases, headaches in 60.7% of cases, myalgia in 32.1% of cases, and vomiting in 26.7% of cases. Kabore [7] noted fever and pain syndrome in all pregnant women, with vomiting present in half of the cases. Carles [13] in Guyana reported fever in all 38 patients in his series. He also noted headaches and myalgia in 81.5% and 78.9% of patients, respectively. For Basurko [14] in Guyana, fever was the first symptom (71%), followed by headaches, abdominal pain (38%) and arthralgia (34%).

We observed haemorrhagic signs in nearly 39.6% of patients, compared to 50% reported by Sharma [6] and Kabore [7] in their series. The size and duration of the different studies could explain this difference in rates.

However, the distribution of types of haemorrhage in our series is comparable to that in the literature. Lompo [8] reported twelve cases of epistaxis, seven cases of menorrhagia, two cases of haemoptysis and one case of gingival bleeding. Haemorrhages are the bane of practitioners because they can be life-threatening.

4.5. Additional Tests

Most patients were in the viraemic phase (46.6%). Sharma [6] in India found the NS1 antigen (Ag NS1) in all patients in his study. Ag NS1 indicates the presence of the virus, with the patient being contagious during this period. This high frequency could be explained by the fact that these patients sought medical attention quickly. Indeed, AgNS1 is only detectable two days before and seven days after the onset of symptoms.

Reinfection was observed in two cases in our series, marked by the presence of IgG associated with that of Ag NS1. According to the literature, a history of dengue virus infection should be considered a risk factor for the development of severe forms of the disease. Indeed, the most widely accepted theory refers to the phenomenon of "immunological facilitation" as defined by Halstead's theory of facilitating antibodies [15] [16]. According to this theory, in a subject with a history of infection with one of the four serotypes and who is not protected against the other three, a second heterologous infection could result in dengue with shock syndrome.

In this study, leukopenia was present in fourteen (14) patients, or 24.1%, and hyperleukocytosis in nine (9) patients, or 15.5%. This result corroborates those of Carles [13] in French Guiana and Kabore [7] in Burkina Faso. These authors found leukopenia in 23.6% and 25% of their respective samples.

Leukopenia and thrombocytopenia are commonly observed in dengue virus infection. Regular monitoring of blood counts is necessary in cases of dengue and pregnancy. In the present study, thrombocytopenia was present in 74.1% of women. Sharma [6] and Nigam [17] reported 62% and 60% respectively.

Severe thrombocytopenia was present in 18.9% of patients in our study. This is comparable to the nine patients who had thrombocytopenia below 50,000/mm^3 in the series by Lompo [8].

Hepatic cytolysis is one of the common biological disorders during dengue [18] [19]. In our series, elevated liver enzymes mainly concerned alanine aminotransferase (ALAT), diagnosed in 34.5% of patients. Kaboré [7] and de Lompo *et al.* [8] reported similar results. All these biological changes require the obstetrician to also screen for pre-eclampsia when the pregnancy is 20 weeks or more.

4.6. Prognosis

In our study, the maternal prognosis was mainly influenced, on the one hand, by the numerous haemorrhagic complications (39.6%) that could lead to shock (1.7%) and, on the other hand, by medical history such as major sickle cell disease. Lompo [8] reported six haemorrhagic complications in their series, including two cases of haemorrhagic shock. For Kabore [7], the most common maternal complication

was postpartum haemorrhage with shock, occurring in a quarter of patients. These haemorrhagic complications are probably related to severe virus-induced thrombocytopenia and constitute a factor for poor prognosis.

The maternal mortality rate recorded in our series (1.7%) is lower than the data in the literature. However, it is significantly higher than that observed in malaria (0.1%) and in the general population (28‰) [20] in Burkina Faso. Indeed, in the literature, Lompo [8] recorded three cases of maternal deaths, two from haemorrhagic shock and one from multiple organ failure. Agrawal [21] and Sharma [6] reported maternal mortality rates of 12% and 18%, respectively. This is probably due to the haemorrhagic complications observed during dengue fever. Efforts should be focused on prevention through the vaccination of women of childbearing age against dengue fever, as this vaccine is contraindicated in pregnant women.

The foetus is also exposed to serious complications during this association. The main complication was premature delivery, 12.1% in our study. Our rate is identical to those of Lompo [8] at CHUYO in 2016 and Sharma [6] in India.

However, for Kabore in Ouagadougou, Carles and Basurko in Guyana, the frequency of premature delivery during dengue was 25%, 21% and 20% respectively [7] [13] [14], which is almost twice as high.

One of the common signs of dengue is fever. All the pregnant women in our study had a fever. During pregnancy, fever can induce uterine contractions and cause cervical changes. The threat of premature delivery and premature delivery are therefore common complications when dengue and pregnancy are combined.

Perinatal mortality was 13.8%, including two neonatal deaths, five (5) foetal deaths in utero and one per partum death. Basurko [14] found a perinatal mortality rate of 5.6% and Agrawal [21] in India found a rate of 18%. All these results show that the perinatal complications of dengue are considerable. This justifies timely consultation by pregnant women at the first symptoms and multidisciplinary management of dengue during pregnancy.

5. Conclusions

This study showed that when dengue occurs in pregnant women, maternal and perinatal complications are real and can be serious and sometimes fatal. Haemorrhagic complications and premature births were the most common complications. They occur mainly in the third trimester of pregnancy. In newborns, prematurity, foetal death in utero and foetal distress are the main complications.

When a pregnant woman has a fever, it is important to consider dengue and perform a rapid diagnostic test for dengue in order to make a diagnosis and consider appropriate treatment. However, the population must be made aware of individual protection measures, sanitation of the living environment and vaccination of women of childbearing age.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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