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HELLP Syndrome: Frequency and Prognosis at the Departmental and University Hospital Center of Borgou and Alibori from 2019 to 2023

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Abstract

Introduction: HELLP syndrome is a severe complication of preeclampsia, associated with high maternal and fetal morbidity and mortality. This study aims to determine its frequency, prognosis, and risk factors at CHUD-BA. **Methods**: This was a cross-sectional and descriptive study with a retrospective data collection of medical records of women diagnosed with HELLP syndrome between 2019 and 2023 at CHUD-BA. Data were analyzed using R software. The study received approval from CLERB-UP and the necessary administrative authorizations. **Results**: The hospital frequency of HELLP syndrome was 0.59% (6 cases per 1000 admissions). The mean age of patients was 27.14 ± 5.33 years. 63.51% were in a common-law union, and 12.16% had a history of hypertension. The mean gestational age was 32.63 ± 3.75 weeks, and 81.67% of patients delivered via cesarean section. Clinically, 93.24% had headaches, and 64.86% had SBP ≥ 160 mmHg. Biologically, 63.51% had hemoglobin between 7 and 10 g/dL, and 55.41% had complete HELLP according to the Tennessee classification. The maternal prognosis was favorable in 94.59%, with a maternal mortality rate of 5.41%. Perinatal mortality was 28.33%. **Conclusion**: HELLP syndrome remains rare but severe, with significant maternal and fetal mortality. Early detection of associated factors could improve management and reduce complications.

Keywords

HELLP Syndrome, Preeclampsia, Maternal-Fetal Prognosis, Risk Factors

1. Introduction

Maternal mortality is a significant public health issue. Despite various strategies to combat this scourge, it remains high in developing countries, particularly in Benin. An analysis of the situation has revealed that pregnancy complications are the main causes of maternal mortality. According to the World Health Organization (WHO), nearly 800 women per day died in 2020 due to complications related to pregnancy and childbirth. Most of these deaths occurred in low-income countries. Preeclampsia and its complications were identified as the leading causes of maternal mortality.

HELLP syndrome, an acronym for Hemolysis (H), Elevated Liver Enzymes (EL), and Low Platelet count (LP), is a biological syndrome first described by Louis Weinstein in 1982 [1]. This condition occurs in severe forms of preeclampsia, where it is classically considered one of its complications [2].

Its diagnosis is challenging because the clinical presentation is sometimes incomplete. The clinical symptoms are similar to those of preeclampsia, primarily dominated by hypertension. However, it can occur during pregnancy without hypertension in 15% of cases, according to Medhioud *et al.* [3]. The incidence of HELLP syndrome is 0.5% to 0.9% of all pregnancies and accounts for 10% to 20% of cases of severe preeclampsia, according to Haram *et al.* [2]. In France, a study conducted in Toulouse by Vitalis *et al.* reported an incidence of 0.6% of HELLP syndrome cases [4]. In Senegal, a study reported a prevalence of 0.68%, according to Bèye *et al.* [5].

In Benin, a study conducted in Parakou in 2013 by Tchaou *et al.* [6] at the Borgou and Alibori Departmental University Hospital reported that hypertensive emergencies accounted for 16.4% of admissions to obstetric emergencies, with a maternal mortality rate of 0.4% and a fetal mortality rate of 9.2%. Another study conducted in the same city in 2015 by Hounkponou *et al.* [7] found that preeclampsia accounted for 39.35% of vascular-renal syndromes in hospital settings.

According to the literature, there are few studies on HELLP syndrome in Benin, particularly at the CHUD-BA. As a result, the prevalence of HELLP syndrome remains underestimated in our region.

2. Methods

This was a descriptive cross-sectional study with retrospective data collection conducted in the Department of Obstetrics and Gynecology of the Borgou-Alibori Departmental University Hospital Center (CHUD-BA) over a five-year period, from January 1, 2019, to December 31, 2023. The study population included all women admitted to CHUD-BA during the study period who were diagnosed with HELLP syndrome, regardless of gestational age or postpartum status. Sampling

was exhaustive, and all patients meeting the diagnostic criteria were included.

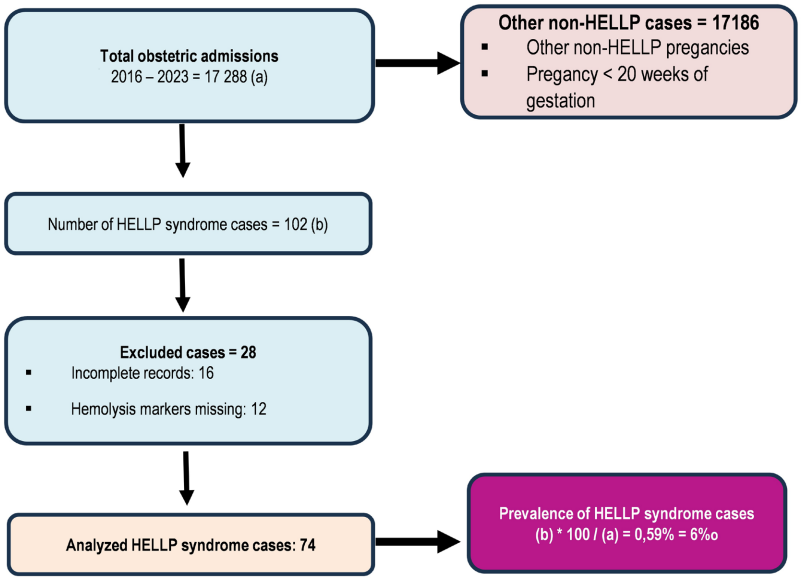
The diagnosis of HELLP syndrome was based on the Tennessee classification criteria, defined by thrombocytopenia (platelet count < 100 G/L), elevated liver enzymes (AST ≥ 70 IU/L), and evidence of hemolysis. In our setting, hemolysis could not be systematically assessed due to the unavailability of specific laboratory markers such as lactate dehydrogenase (LDH) and haptoglobin; therefore, it was assessed indirectly through decreased hemoglobin levels and, when available, the presence of schistocytes on peripheral blood smear. HELLP syndrome was classified as complete or incomplete according to the Tennessee classification, and the severity of thrombocytopenia was assessed using the Mississippi classification.

Data were collected from medical records using a standardized data collection form and included sociodemographic characteristics, medical and obstetric history, pregnancy-related data, clinical and biological findings, and maternal and fetal outcomes. Some variables, particularly clinical signs and complications, were multiple-response variables. Data were entered using Word and Excel and analyzed with R software. Qualitative variables were expressed as frequencies and percentages, while quantitative variables were described using means and standard deviations. The study was approved by the Local Ethics Committee for Biomedical Research of the University of Parakou (CLERB-UP) (Approval No. 758/2024/CLERB-UP/P/SP/R/SA), administrative authorization was obtained from CHUD-BA, and data confidentiality was strictly maintained.

3. Results

3.1. Frequency of HELLP Syndrome

The hospital frequency of HELLP syndrome in the Gynecology and Obstetrics Department of the Borgou-Alibori Departmental University Hospital from 2019 to 2023 was 0.59%, corresponding to approximately 6 cases of HELLP syndrome per 1000 admissions.



3.2. Sociodemographic Data

The mean age was 27.14 ± 5.33 years, ranging from 17 to 42 years. Most women were in a common-law union (63.51%). Married women accounted for 33.78%, and 2.70% were single (Table 1).

Table 1. Distribution of women with HELLP syndrome according to age and marital status at the Borgou-Alibori Departmental University Hospital Center, from 2019 to 2023.

	Count (n = 74)	Percentage (%)
Age		
≤20	11	14.86
]20 - 30]	45	60.81
>30	18	24.32
Marital Status		
Married	25	33.78
Single	02	02.70
Common-law union	47	63.51

3.3. Data on Medical History

Nine (9) out of 74 women (12.16%) had a medical history of hypertension, and cesarean sections accounted for 28.38% of surgical histories. The mean gravidity was 3.13 ± 2.06 pregnancies, ranging from 0 to 8. Paucigravidae represented 41.89% of the women. The mean parity was 2.28 ± 1.86, with extremes ranging from 1 to 11. Women were primiparous and pauciparous in 28.38% of cases, respectively (Table 2).

Table 2. Distribution of women with HELLP syndrome according to medical, surgical, and obstetric history at the Borgou-Alibori Departmental University Hospital Center, from 2019 to 2023.

	Count (n = 74)	Percentage (%)
Medical History		
None	61	82.43
Hypertension (HTN)	09	12.16
Others	04	05.40
Surgical History		
None	52	70.27
Cesarean section	21	28.38
Neck surgery	01	01.35
Gravidity		
Primigravida	17	22.97
Paucigravida	31	41.89
Multigravida	17	22.97
Grand multigravida	09	12.16

Continued

Parity		
Nulliparous	18	24.32
Primiparous	21	28.38
Pauciparous	21	28.38
Multiparous	09	12.16
Grand multiparous	05	06.76

3.4. Pregnancy Data

Among the 74 women, 60 were pregnant (81.08%), and the remaining 14 were admitted postpartum. The average gestational age was 32.63 ± 3.75 weeks of amenorrhea (WA), ranging from 22 WA to 40 WA + 2 days. Women with a gestational age of 32 WA or more accounted for 51.67%. The average number of antenatal care visits (ANC) was 2.63 ± 1.97, with extremes ranging from 0 to 9 visits. Nine women did not attend any ANC visits (Table 3).

Table 3. Distribution of pregnant women with HELLP syndrome according to gestational age and number of antenatal care visits at the Borgou-Alibori Departmental University Hospital Center, from 2019 to 2023.

	Count **(n = 60)**	Percentage **(%)**
Gestational Age in Weeks (WA)		
[20 - 32]	29	48.33
≥32	31	51.67
Antenatal Care (ANC)		
0	09	15.00
1	10	16.67
[2 - 4]	33	55.00
>4	08	13.33

3.5. Data on Mode and Reason for Admission

- **Reason for Referral**

Preeclampsia accounted for 52.70% of the reasons for referral, and 25.68% of women were admitted for suspected HELLP syndrome (Table 4).

Table 4. Distribution of women with HELLP syndrome according to reason for admission at the Borgou-Alibori Departmental University Hospital Center, from 2019 to 2023.

	Count (n = 74)	**Percentage (%)**
Reason for Referral[1]		
Suspected HELLP syndrome	19	25.68
Preeclampsia	39	52.70
Others[2]	34	45.95

[1]Multiple-response variable.

[2]Bleeding (4); AEC (2); CMPP (1); Thrombocytopenia (1); Renal failure (1); Eclampsia (9); Pulmonary edema (3); Severe hypertension (4); Severe anemia (7); Jaundice (1).

3.6. Clinical Data

- **Women Based on Functional Symptoms**

The women reported headaches (93.24%), followed by sharp epigastric pain (37.84%) (Table 5).

Table 5. Distribution of women with HELLP syndrome according to presenting symptoms at admission at the Borgou-Alibori Departmental University Hospital Center, from 2019 to 2023.

Symptoms	Count (n = 74)	Percentage (%)
Headache	69	93.24
Dizziness	18	24.32
Tinnitus, phosphenes	16	21.62
History of seizures	10	13.51
Nausea and vomiting	19	25.68
Dyspnea	11	14.86
Sharp epigastric pain	28	37.84
Dyslipidemia	15	20.27

- **General Signs**

The average systolic blood pressure of the women was 171.31 ± 27.90 mmHg, with extremes ranging from 96 to 237 mmHg, and the average diastolic blood pressure was 108.43 ± 19.43 mmHg, with extremes ranging from 49 to 161 mmHg. The women had an SBP ≥160 mmHg (64.86%) and a DBP ≥110 mmHg (47.30%). The average Glasgow Coma Scale score of the women was 14.09 ± 2.04, with extremes ranging from 8 to 15. The women had a GCS score greater than 13 (72.98%). The average heart rate was 98.71 ± 17.95 beats per minute, with extremes ranging from 60 to 140 beats per minute. The average respiratory rate was 21.54 ± 4.12 cycles per minute, with extremes ranging from 16 to 40 cycles per minute. The average body temperature of the women was 36.71 ± 0.4°C, with extremes ranging from 36°C to 37.9°C (Table 6).

Table 6. Distribution of women with HELLP syndrome according to general clinical signs at admission at the Borgou-Alibori Departmental University Hospital Center, from 2019 to 2023.

	Count (n = 74)	Percentage (%)
Systolic Blood Pressure (SBP)		
<140	09	12.16
[140 - 159]	17	22.97
≥160	48	64.86
Diastolic Blood Pressure (DBP)		
<90	14	18.92
[90 - 109]	25	33.78
≥110	35	47.30

Continued

Glasgow Coma Scale (GCS)		
[8 - 13]	20	27.02
>13	54	72.98
Heart Rate (HR)		
[60 - 100]	42	56.76
>100	32	43.24
Respiratory Rate (RR)		
[16 - 24]	61	82.43
>24	13	17.57

3.7. Biological Data

The average hemoglobin level was 8.15 ± 2.04 g/dL. Sixty-three point five one percent (63.51%) of the women had a hemoglobin level between 7 and 10 g/dL. The presence of schistocytes on the blood smear was reported in 2 women out of the 74. Seventy point two seven percent (70.27%) of the women had an ASAT level greater than 100 IU/L, and the ALAT level was greater than or equal to 40 IU/L in 79.73% of the women. Mississippi Class 2 represented 47.30% of the women. Urinary proteinuria was positive at 3 crosses in 39.19% of the women and negative in 2.70% of the women. According to the TENNESSEE classification, the HELLP syndrome was diagnosed in its complete form in 41 women out of 74, representing 55.41% (Table 7).

Table 7. Distribution of women with HELLP syndrome according to paraclinical findings at the Borgou-Alibori Departmental University Hospital Center, from 2019 to 2023.

	Count (n = 74)	Percentage (%)
Hemoglobin Level		
<7	19	25.68
[7 - 10]	47	63.51
>10	08	10.81
Presence of Schistocytes		
Non	72	97.30
Oui	02	02.70
ASAT Level		
[70 - 100]	22	29.73
>100	52	70.27
ALAT Level		
<40	15	20.27
≥40	59	79.73

Continued

Platelets (MISSISSIPPI Classification)		
<50 (class 1)	09	12.16
[50 - 100] (class 2)	35	47.30
[100 - 150] (class 3)	30	40.54
Urinary Proteinuria		
1 cross	03	04.05
2 croisses	16	21.62
3 croisses	29	39.19
4 croisses	24	32.43
Négative	02	02.70
TENNESSEE Classification		
Incomplete HELLP syndrome	33	44.59
Complete HELLP syndrome	41	55.41

- **Timing of Diagnosis**

Of the 74 women, the diagnosis of HELLP syndrome was made in the prepartum period for 60 women (81.08%) and in the postpartum period for 14 women (18.92%).

3.8. Prognostic Data

- **Maternal Prognosis**

45.95% of the women had no other complications associated with HELLP syndrome. Eclampsia was associated with HELLP syndrome in 22.97%, renal failure in 13.51%, followed by pulmonary edema and heart failure in 5.41% and 4.05%, respectively. The other 8.11% of associated complications included endometritis (1.35%), vaso-occlusive crises (4.05%), pre-rupture syndrome (1.35%), and stroke (1.35%).

- **Fetal Prognosis**

Prematurity accounted for 53.33% of fetal complications. This was followed by intrauterine growth restriction and fetal death in utero at 21.67% and 11.67%, respectively. Intrauterine growth restriction represented 3.33%, and no fetal complications were observed in 10% of the cases.

- **Obstetric Prognosis**

Of the 60 pregnant women, 49 underwent a cesarean section (81.67%) and the rest delivered vaginally (18.33%). 71.67% of the newborns were alive at birth. Fresh stillbirths and macerated stillbirths accounted for 16.67% and 11.66%, respectively.

- **Maternal Clinical Outcome**

The clinical outcome for the women was favorable in 94.59%. Four maternal deaths occurred in women who presented with HELLP syndrome (5.41%).

4. Discussion

4.1. Frequency of HELLP Syndrome

In this study, the hospital frequency of HELLP syndrome was 0.59%, or approximately 6 cases per 1000 admissions. This prevalence remains relatively low but consistent with other hospital series that report rates ranging from 0.2% to 0.9% of pregnancies [8]. According to Oparaji, HELLP syndrome is a rare but severe complication of preeclampsia, occurring in 10% to 20% of preeclamptic patients [9]. This proportion is consistent with our study, where more than half of the cases were referred for preeclampsia.

From a scientific perspective, the variability in reported rates can be explained by the diagnostic criteria used, ethnic differences, and obstetrical practices. A recent meta-analysis [10] confirmed that the incidence of HELLP heavily depends on the classification criteria used (Mississippi vs. Tennessee). Furthermore, Abdullahi *et al.* in 2024 observed that the prevalence of HELLP is higher in regions with limited access to prenatal care, which may explain the moderate frequency observed in our setting [11].

4.2. Maternal Age

The average age of the patients was 27.14 ± 5.33 years, with extremes ranging from 17 to 42 years. This result aligns with several studies that report an average age of patients between 25 and 30 years [12] [13]. Oparaji showed in 2024 that HELLP syndrome can occur in both young primigravidas and older multiparas [9], although cardiovascular risk factors increase with age.

This data underscores the importance of monitoring pregnant women regardless of age, although some studies, such as that of Wang *et al.* in 2024, have shown a more marked prevalence of HELLP after 35 years [14]. The pathophysiological explanation lies in the increased endothelial dysfunction and vascular stiffness that appear with age, making patients more vulnerable to hypertensive complications during pregnancy.

4.3. Medical and Obstetric History

In this study, 12.16% of patients had a history of hypertension, which is lower than the 20% - 30% reported by some studies [15]. However, Müller *et al.* in 2024 confirmed that chronic hypertension is a predictive factor for HELLP, increasing the risk by a factor of 3 to 5 [16]. On the other hand, a previous cesarean section was reported in 28.38% of patients, which is consistent with trends observed in recent studies [17]. This link between surgical history and HELLP could be explained by a predisposition to placental dysfunction, as suggested by Costa *et al.* in 2024, who demonstrated an association between genetic mutations in the trophoblast and an increased risk of severe preeclampsia and HELLP [18].

4.4. Pregnancy and Gestational Age

The average gestational age at delivery was 32.63 ± 3.75 weeks, with 51.67% of

women delivering at or after 32 weeks of gestation. This result aligns with data from Shi *et al.* in 2025, which showed that HELLP syndrome primarily occurs between 28 and 34 weeks, a period when the pathophysiology of the placenta reaches a critical threshold [19]. A study conducted in Canada [14] found that early forms of HELLP (<30 weeks) are associated with higher maternal and neonatal mortality. In contrast, in our study, the maternal outcome was favorable in 94.59% of cases, suggesting effective management despite limited resources.

4.5. Mode and Reason for Admission

In this series, 52.70% of women were referred for preeclampsia, and 25.68% had suspected HELLP. These figures are similar to those reported by Medeiros *et al.* in 2024, where preeclampsia was the primary initial diagnosis in 50% to 60% of HELLP cases [20]. This high rate of preeclampsia underscores the importance of early screening for hypertensive complications in hospital settings, especially since close monitoring is necessary to anticipate progression to HELLP, according to Rahman *et al.*, 2024 [21]. Moreover, Jenkins *et al.* in 2024 emphasized the need to review HELLP diagnostic criteria, as many cases could be detected earlier with more sensitive biological markers [22].

4.6. Biological Data

Anemia was present in 63.51% of the patients, with an average hemoglobin level of 8.15 ± 2.04 g/dL. This frequency is higher than that reported by Frimat *et al.* in 2024 (50% of cases) [23]. Hemolysis in HELLP syndrome is well-documented, and a recent study [24] showed that the elevation of liver enzymes often precedes a drop in platelet count.

The presence of schistocytes in 2.7% of patients is a key diagnostic criterion for HELLP. According to Rajput *et al.* in 2025 [25], HELLP must be differentiated from thrombotic thrombocytopenic purpura (TTP), especially in cases with significant schistocytosis.

4.7. Maternal and Fetal Prognosis

The maternal mortality rate was 5.41%, which is lower than the 10% - 20% reported in some African studies [11]. Maternal mortality in HELLP syndrome largely depends on early management and associated complications, such as renal failure (13.51%) and stroke (1.35%).

Regarding fetal prognosis, 53.33% of the children were premature, which aligns with data from Masuko *et al.* in 2024 [26], who reported prematurity in 50% - 60% of cases. The perinatal mortality rate of 28.33% (fresh and macerated stillbirths) is higher than the 20% observed in Europe [27], which may be explained by delays in management and limitations in neonatal care.

5. Conclusion

The HELLP syndrome is a severe condition complicating severe preeclampsia. Its

hospital frequency at CHUD B/A from 2019 to 2023 is not negligible, with 6 cases per 1000 admissions. It was more frequently observed in women referred for preeclampsia and living in rural areas. Headaches and epigastric pain were the most predominant symptoms. Maternal complications associated with HELLP mainly included eclampsia and renal failure, while preterm birth was the most common fetal complication. Special attention during maternal-fetal monitoring should be given to preeclamptic patients. Increased awareness of this condition among healthcare staff would help detect this complication at an earlier stage and improve its management.

Conflicts of Interest

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

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