

Preeclampsia in Multiparous Women: Epidemiological and Clinical Profile and Maternal-Fetal Prognosis

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Abstract

Introduction: Preeclampsia (PE) is a serious pregnancy complication responsible for numerous maternal and fetal issues and remains a global public health concern. It primarily affects first-time mothers, but its impact on women who have given birth before is often less studied. This study aims to analyze the epidemiological and clinical characteristics of preeclampsia in women who have given birth before and to assess the associated maternal and fetal risks.

Methodology: This was a cross-sectional study conducted at the Gabriel Touré University Hospital in Bamako over 12 months (January 1-December 31, 2022). The study included all patients presenting with pre-eclampsia, divided into three groups according to parity: primiparous, pauciparous, and multiparous. Data were collected from medical records and analyzed using IBM SPSS software with appropriate statistical tests. **Results:** Among 4225 admissions, 858 cases of preeclampsia were identified, with a prevalence of 19.99%. The incidence of preeclampsia in multiparous women was 37.72%. The most frequent clinical signs included headaches (38.1% in primiparous women vs. 37% in multiparous women), epigastric pain, and visual disturbances. The most common maternal complications were eclampsia (52.1%), followed by refractory hypertension of the mother (32.5%). The maternal mortality rate was 5.6%, while 72% of newborns had a birth weight less than 2500 g. **Conclusion:** Preeclampsia has severe consequences for maternal and fetal prognosis, particularly in multiparous women, where the risks of complications such as eclampsia and refractory hypertension are more frequent.

Keywords

Preeclampsia, Multiparous Women, Management, Prognosis, G. Touré

1. Introduction

Pregnancy is a physiological process generally welcomed by couples, but it can sometimes be complicated by serious pathologies that threaten the maternal and fetal prognosis. Among these pathologies, pre-eclampsia (PE), formerly called toxemia of pregnancy, is among the most concerning due to its potentially fatal consequences for the mother and fetus [1].

Preeclampsia is characterized by high blood pressure (systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg) that appears after the 20th week of amenorrhea and resolves within six weeks postpartum, as well as proteinuria ≥ 0.3 g/24h, often accompanied by sudden or rapidly worsening edema of the lower limbs [2]. This condition represents a major public health concern, as highlighted by the World Health Organization (WHO), which estimates that preeclampsia is responsible for approximately 14% of maternal deaths worldwide [3]. Globally, the prevalence of preeclampsia is estimated at nearly 3% of pregnancies [2]. It also varies according to region and population. In Asia, the prevalence is generally between 2% and 5% [4]. In America, data from New York State revealed that the prevalence among Caucasian women was 2%, compared to 3.3% among Afro-Caribbean women [5] [6]. In Europe, the prevalence ranges from 4.5% in Norway to 4.9% in the United Kingdom [7] [8].

In Africa, the prevalence of pre-eclampsia is estimated at 4% in the general population, but can reach up to 18% in certain specific ethnic groups, such as in Mauritania, where women of the White Moorish ethnic group are the most affected, representing 63% of cases, compared to 33% for Black Moors and 4% for Black African women [9] [10]. Other studies in Africa have reported a prevalence varying between 4.8% in Benin in 2017 [11], between 0.61% and 6.65% in Morocco in 2010 [12], and 1.2% in Mauritania [13], 1.03% in Senegal in 2020 [14]. In Mali, the figures vary depending on the health structures: a frequency of 5% was reported at the Reference Health Center (CsRéf) of Commune I [15], while a study at the same time in the gynecology-obstetrics department of Gabriel Touré Hospital recorded a frequency of 18.8% in 2018 [16].

Despite progress in the management of preeclampsia, maternal and perinatal morbidity and mortality remain high, particularly in West Africa, where this condition accounts for an average of 12.7% of maternal deaths [17]. Preeclampsia is often linked to various risk factors, including immunological, maternal, and ovular factors [18], but there is no single clearly defined cause for this condition. It leads to numerous complications, both maternal and fetal, which can be fatal if not properly managed. This management requires multidisciplinary collaboration, which is not always implemented in our context, particularly in resource-limited countries.

Preeclampsia primarily affects young primiparous women, often with no personal or family history of pregnancies, but multiparous women are also affected, although to a lesser extent. The latter, often perceived as less vulnerable, nevertheless have an increased risk of serious complications, particularly when preeclampsia occurs without early intervention. Indeed, most studies on hypertension and pregnancy in this department do not differentiate between maternal and fetal outcomes based on parity. Therefore, this study was initiated to assess the impact of preeclampsia in multiparous women, a group that has not been the subject of numerous detailed studies in the local literature. The objectives are to determine the incidence of pre-eclampsia in the gynecology-obstetrics department of the Gabriel Touré University Hospital, to study the epidemiological-clinical profile of pre-eclampsia in multiparous women and to specify the maternal-fetal prognosis of pre-eclampsia in multiparous women.

2. Methodology

2.1. Framework of the Study

This study was conducted in the obstetrics and gynecology department of the Gabriel Touré University Hospital in the Bamako district, a leading hospital in Mali's capital specializing in the management of serious obstetric complications. The department receives patients from across the district and surrounding regions, making it a center for the management of complex cases, particularly those related to pre-eclampsia.

2.2. Type of Study

This is a descriptive cross-sectional study conducted over a 12-month period, from January 1 to December 31, 2022. This approach allows us to analyze the prevalence of pre-eclampsia and to examine the risk factors, complications and maternal -fetal prognosis in multiparous patients in a hospital setting.

2.3. Study Population

The study population consisted of all patients admitted to the obstetrics and gynecology department of the Gabriel Touré University Hospital during the study period and diagnosed with pre-eclampsia. The patients were divided into three groups according to their parity:

- **Group 1** Primiparous women, those who are giving birth for the first time
- **Group 2:** Pauciparous, those who have given birth 2 or 3 times
- **Group 3** Multiparous women, those who have given birth at least 4 times or more

1) Criteria inclusion

Patients meeting the following criteria were included in the study:

- Diagnosis of pre-eclampsia, with or without associated complications.
- Diagnosis of superimposed pre-eclampsia.
- Presence of proteinuria associated with organic complications (acute renal fail-

ure, eclampsia, etc.).

2) Exclusion criteria

The following were not included in the study:

- Those presenting with another type of high blood pressure unrelated to pre-eclampsia.
- Patients whose files were incomplete or unusable (missing files, information not provided on essential aspects of medical follow-up).

2.4. Sampling

We used exhaustive sampling, including all patients meeting the inclusion criteria during the study period. A total of 858 cases of pre-eclampsia were identified among 4225 obstetric admissions during this period.

2.5. Data Collection

The data was collected from various sources:

- **Obstetric records:** information on medical history, the course of the pregnancy and any complications observed.
- **Birth register and hospitalization register:** administrative and clinical data relating to hospitalization and care of patients.
- **Operative report and evacuation reference sheets:** details on surgical interventions (cesarean sections, instrumental deliveries) and transfers to other facilities.

2.6. Data Entry and Analysis

The data was entered and processed using IBM SPSS Statistics version 21. The following parameters were analyzed:

- **Means and standard deviations** to describe continuous variables (age, length of hospital stay, etc.).
- Frequencies for qualitative variables (parity, type of pre-eclampsia, maternal and fetal complications).
- Statistical tests:
 - The **Pearson's Chi-square test** was used to assess correlations between qualitative variables (e.g., parity and complications).
 - The **Fisher test** was applied to variables with small sample sizes.
 - The **relative risk (RR)** and its 95% confidence interval (95% CI) were used to estimate the association between risk factors and the incidence of complications.

The results were considered significant when the p-value was less than 0.05.

2.7. Ethics

The study was conducted in accordance with the ethical principles of medical research. Approval was obtained from the ethics committee of Gabriel Touré Hospital, and informed consent was obtained from the patients for the use of their

clinical data in this study.

3. Results

3.1. Frequency and Incidence of Preeclampsia

Out of a total of 4225 obstetric admissions, 858 patients were diagnosed with pre-eclampsia, representing a frequency of 19.99% in the obstetrics and gynecology department of the Gabriel Touré University Hospital. The incidence of pre-eclampsia in multiparous women was 37.72%, compared to 39.5% in primiparous women and 22.5% in pauciparous women, as shown in **Table 1**.

Table 1. Frequency of pre-eclampsia according to parity.

Parity	Effective	Frequency (%)
First-time mother	339	39.5%
Paucipare	193	22.5%
Multiparous	326	37.72%
Total	858	100%

3.2. Sociodemographic and Clinical Characteristics

The mean age of primiparous women was 20 years, with a range from 13 to 41 years, while the mean age of multiparous women was 32 years, with a range from 20 to 44 years, with a chi-square value of 17.583, 4 degrees of freedom (df), and a p-value of 0.000. The age distribution is characterized by a high proportion of primiparous women under 20 years of age (56.6%) and older multiparous women, with 37.7% being over 35 years old, as shown in **Table 2**.

The most frequent clinical signs in patients with pre-eclampsia include headaches (38.1% in primiparous and 37.1% in multiparous) with RR: 0.92 [0.80 - 1.07], epigastric pain and visual disturbances, with a predominance of epigastric pain in multiparous (46.2%) with RR; 1.06 [0.87 - 1.28].

Table 2. Relationship between patient age and parity.

Age group	First-time mother (%)	Pauciparous (%)	Multiparous (%)	Total (%)
<20 years old	56.6%	13.5%	0%	218
20 - 34 years old	42.2%	81.8%	63.2%	504
≥35 years old	1.2%	4.2%	37.7%	136
Total	100%	100%	100%	858

Chi-square: 417.583 df: 4 P = 0.000.

3.3. Proteinuria and Parity

Proteinuria detected by urine dipstick is a key indicator in the diagnosis of pre-eclampsia. According to the results, 61.4% of primiparous women had 3-cross proteinuria (2 g/dL), and 48.2% of multiparous women had similar proteinuria.

Multiparous women also had a higher proportion of 1-cross proteinuria (18.7%) compared to primiparous women (8%), as shown in **Table 3**, with a Chi-square value of 21.114, degrees of freedom (df) of 2, and a p-value of 0.02.

Table 3. Relationship between proteinuria on urine dipstick (UD) and parity.

Proteinuria	First-time mother (%)	Pauciparous (%)	Multiparous (%)	Total (%)
1 cross	8.0%	11.9%	18.7%	111
2 crosses	30.1%	30.1%	32.2%	265
3 crosses	61.4%	57.5%	48.2%	476
4 crosses	0.6%	0.5%	0.9%	6

Further investigations confirmed renal involvement in 7% of cases, observed through elevated serum creatinine levels. Obstetric ultrasound revealed placental insufficiency in 32% of cases, with signs of intrauterine growth restriction (IUGR) in 45% of fetuses, highlighting the direct impact of pre-eclampsia on fetal development. Liver function tests showed elevated liver transaminase levels in 121 (42.2%) primiparous women compared to 68 (42.0%) of pauciparous women and 106 (39.7%) of multiparous women with a Chi-square: 3.780 with a p: 0.820.

3.4. Support

The management of patients with pre-eclampsia in our study was based on standardized measures to control blood pressure and prevent complications. Nicardipine, an antihypertensive drug, was administered in 40% of cases, and magnesium sulfate, used to prevent eclampsia, was administered to 88.2% of primiparous women, 77% of pauciparous women, and 73% of multiparous women. Corticosteroid therapy was used to promote lung maturation in premature fetuses in 18% of multiparous and pauciparous cases.

Blood transfusions were administered in 52% of multiparous women due to complications such as anemia and thrombocytopenia observed in these patients. The use of magnesium sulfate and antihypertensive drugs is crucial for managing severe forms of preeclampsia, as shown in **Table 4**.

Table 4. Relationship between treatment received and parity.

Treatment	First-time mother (%)	Pauciparous (%)	Multiparous (%)	Total (%)
Nicardipine	40.7%	19.4%	39.9%	40.4%
Magnesium sulfate	43.6%	21.7%	34.7%	40.0%
Corticosteroid	9.4%	18.7%	18.4%	15.6%
Transfusion	45.4%	29.3%	52.3%	39.5%

The mode of delivery was chosen based on the progression of the pregnancy and complications associated with pre-eclampsia. Of the 326 multiparous women

included, 72% delivered by cesarean section, primarily due to pre-eclampsia complications such as eclampsia, refractory hypertension, and acute fetal distress. In contrast, 28% of patients delivered vaginally, mainly those with a less severe form of pre-eclampsia, without major complications affecting fetal health.

3.5. Maternal Complications

Observed maternal complications included eclampsia, refractory hypertension, HELLP syndrome, acute kidney injury (AKI), acute pulmonary edema (APE), and stroke. Among patients with pre-eclampsia, 15.3% of multiparous women developed eclampsia compared to 67.9% of primiparous women and 16.8% of pauciparous women, with a relative risk (RR) of 0.69 [0.54 - 0.88]. However, multiparity was associated with a higher incidence of placental abruption (59.3%) compared to primiparous women (16.2%), with an RR of 1.30 [1.08 - 1.57]. Multiparous women showed a higher risk of developing placental abruption and acute renal failure, which could be due to obstetric history and advanced maternal age as shown in **Table 5**.

Table 5. Correlation between maternal complications and parity.

Maternal complications	Parity				
	Pauci pare (%)	First-time mother (%)	RR [IC]	Multiparous (%)	RR [IC]
Eclampsia	45 (16.8)	182 (67.9)	1.90 [1.51 - 2.38]	41 (15.3)	0.69 [0.54 - 0.88]
HRP	41 (24.5)	27 (16.2)	0.52 [0.39 - 0.71]	99 (59.3)	1.30 [1.08 - 1.57]
HELLP syndrome	19 (35.8)	15 (28.3)	0.62 [0.42 - 0.92]	16 (35.9)	0.70 [0.48 - 1.02]
stroke	2 (25)	3 (37.5)	0.88 [0.43 - 1.81]	3 (37.5)	0.96 [0.46 - 1.98]
OAP	1 (5.9)	10 (58.8)	1.35 [1.10 - 1.65]	6 (35.3)	1.39 [1.01 - 1.90]
Acute IR	7 (19.5)	8 (22.2)	0.77 [0.48 - 1.25]	21 (58.3)	1.23 [0.97 - 1.55]
Death maternal	12 (25.1)	10 (20.8)	0.70 [0.44 - 1.11]	26 (54.1)	1.09 [0.87 - 1.37]

3.6. The Development of Newborns

The fetal prognosis in cases of preeclampsia is also concerning. Among patients with preeclampsia, primiparity was associated with low birth weight in 40.1% of cases, compared to 36.8% for multiparous women, with a relative risk (RR) of 0.95 [0.79 - 1.14], reflecting a high incidence of prematurity and intrauterine growth restriction (IUGR). Furthermore, the Apgar score at 1 minute was 0/10 in 42.3% of newborns from multiparous mothers, and 0.95% of newborns from multiparous mothers had an Apgar score at 5 minutes between 4 and 7/10. This indicates signs of neonatal distress, although many newborns survived with appropriate intensive care, as shown in **Table 6** and **Table 7**.

Table 6. Relationship between the Apgar score at the 1st minute and parity.

Apgar score	Parity			Total
	First-time mother	Pauci pare	Multiparous	
0	51 (17.4%)	79 (44.6%)	133 (42.3%)	263
1 - 3	2 (0.7%)	0 (0.0%)	3 (1.0%)	5
4 - 7	68 (23.3%)	24 (13.6%)	48 (15.3%)	140
≥8	171 (58.6%)	74 (41.8%)	130 (41.4%)	375
Total	292 (100.0%)	177 (100.0%)	314 (100.0%)	783

Table 7. Relationship between the transfer of newborns to neonatology and parity.

Transfer in neonatology	Parity			Total
	First-time mother	Pauci pare	Multiparous	
Yes	153 (52.4%)	68 (38.4%)	133 (38.4%)	354
No	139 (47.6%)	109 (47.6%)	181 (57.6%)	429
Total	292 (100.0%)	177 (100.0%)	314 (100.0%)	783

3.7. Prognosis

Complications such as eclampsia and HELLP syndrome remain the leading causes of maternal death and stillbirth. The overall maternal mortality rate was 5.6%, or 46/858. Multiparous women had a higher mortality rate of 26 cases (54.1%) compared to 10 cases (20.8%) for primiparous women, with a relative risk (RR) of 1.09 [0.87 - 1.37], particularly due to complications related to refractory hypertension. Among stillbirths, 64.9% were fresh stillbirths, with a higher proportion in multiparous women (71.2%).

4. Discussion

4.1. Limitations of the Study

The main limitations of this study include selection bias, as only patients treated at a referral center were included. This may lead to an overestimation of the prevalence of pre-eclampsia in the general population, since the most severe cases are more likely to be referred to these facilities. Furthermore, the absence of certain clinical data, such as postpartum monitoring and long-term complications, is another significant limitation, restricting the scope of conclusions regarding the long-term prognosis of multiparous women.

4.2. Frequency and Epidemiological Profile of Pre-Eclampsia in Multiparous Women

This study revealed a pre-eclampsia prevalence of 37.72% among multiparous women, which is higher than in previous studies conducted in West Africa, where the prevalence in multiparous women generally ranges from 0.4% to 1.5% [7] [9]. This higher prevalence in our study could be explained by several factors, includ-

ing the nature of the hospital, which is a referral center for serious obstetric pathologies, the lack of routine prenatal care, and the medical history of multiparous patients, which puts them at higher risk of pre-eclampsia complications [14]. A study conducted in Mali at a similar facility reported a prevalence of 5% [15], which appears to be more consistent with our findings.

It is interesting to note that preeclampsia in multiparous women is often less frequently diagnosed at an early stage, largely due to the pathophysiological adaptations these patients develop over the course of multiple pregnancies. This observation is supported by previous research indicating that preeclampsia in multiparous women is often less obvious due to the absence of overt clinical symptoms in early pregnancy [14] [19]. This situation underscores the need for closer monitoring of multiparous women to enable the rapid diagnosis of more severe forms of this condition.

4.3. Risk Factors Associated with Pre-Eclampsia in Multiparous Women

The results of our study confirm the findings of previous work which demonstrated that advanced maternal age, particularly over 35 years, is a major risk factor for pre-eclampsia [14]. In our study, the multiparous women were older (mean age 32 years), which is consistent with data from the literature suggesting that maternal aging leads to an increased risk of pre-eclampsia, often associated with a history of chronic hypertension and gestational diabetes [15] [16] [20].

The influence of obstetric history on the development of preeclampsia in multiparous women was also observed in this study. Indeed, factors such as previous pregnancies with hypertensive complications or a planned cesarean section for similar reasons increase the risk of recurrence of the condition [14]. This relationship has been well established in previous studies, which found that women who experienced preeclampsia during a previous pregnancy have an increased risk of developing it again [16] [19].

4.4. Management of Pre-Eclampsia

The management of preeclampsia in multiparous women, as in primiparous women, relies on antihypertensive treatment to control blood pressure, as well as continuous monitoring to prevent serious complications such as eclampsia and acute renal failure. In our study, the management of preeclampsia in multiparous women included the use of medications such as nicardipine and magnesium sulfate, in accordance with international guidelines [14] [19]. However, the management of these patients often remains complex due to their obstetric history and associated comorbidities.

It is important to emphasize that despite the use of effective treatments, the management of preeclampsia in our setting remains challenging, particularly due to limited resources and the lack of specialized intensive care in some healthcare facilities. Previous studies have also highlighted the lack of access to specialized

care and advanced treatments, which can lead to serious complications in multiparous women [14] [15]. Improvements in access to specialized care, training of medical staff, and rigorous monitoring of multiparous women would be crucial steps in improving the management of this condition.

4.5. Mode of Delivery and Clinical Decisions

The question of the mode of delivery in multiparous patients with preeclampsia is complex and depends on the severity of the condition. As in many studies, cesarean section was indicated in 72% of cases in our study, primarily due to the increased risks to the mother and fetus, including eclampsia, refractory hypertension, and signs of acute fetal distress. This high proportion of cesarean sections also reflects the trend observed in other African studies, where severe preeclampsia, associated with serious maternal complications, often justifies this obstetric approach [15] [19].

However, vaginal delivery was also considered for some patients, particularly those with mild or moderate pre-eclampsia without severe complications. The use of instrumental intervention in 15% of cases highlights the need for continuous monitoring during labor and rapid intervention to preserve fetal well-being. These observations align with international recommendations that advocate individualized assessment of the mode of delivery for women with pre-eclampsia, taking into account the risks to both the mother and the fetus [14].

4.6. Maternal and Fetal Complications

The maternal complications observed in our study, such as eclampsia and refractory hypertension, are well documented in the literature. Eclampsia, in particular, remains one of the most severe manifestations of preeclampsia and is often responsible for maternal deaths in developing countries, where access to resuscitation care and necessary medical equipment is limited [14] [17]. The elevated rates of eclampsia and acute kidney injury in our study confirm that multiparous women are more likely to develop serious complications due to the late detection of the condition and underlying comorbidities.

Regarding fetal outcomes, our study shows a high incidence of prematurity and low birth weight, which is consistent with the results of previous studies that observed a correlation between preeclampsia and these fetal complications [15]. Prematurity, often due to placental insufficiency, remains one of the leading causes of neonatal mortality and morbidity in patients with preeclampsia [19]. Perinatal mortality is very high in our study compared to those reported by African authors. Stillbirth and early neonatal death were predominant in multiparous women. Prematurity was the main complication and major cause of morbidity and mortality in our setting, primarily due to insufficient technical facilities and the lack of human and financial resources necessary for the care of premature infants.

Improving prenatal care, including the administration of corticosteroids for fe-

tal lung maturation, could help improve these fetal outcomes, as suggested by international recommendations [14].

5. Conclusion

Preeclampsia remains a serious condition, particularly in multiparous women, and is often underestimated. Although multiparous women are at lower risk than primiparous women, they are still exposed to serious complications such as eclampsia and refractory hypertension, with significant fetal consequences. Early diagnosis and rigorous management are essential to reduce morbidity and mortality.

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Conflicts of Interest

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

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