

# High Blood Pressure and Pregnancy: Epidemiological, Diagnostic, Therapeutic and Prognostic Aspects at the Maternity Unit of the Institute of Social Hygiene of Dakar (Senegal)

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## Abstract

**Objectives:** To specify the epidemiological and clinical profile of the patients, to determine the methods of management and to evaluate the maternal and perinatal prognosis in the association of arterial hypertension and pregnancy (HTA) at the Institute of Social Hygiene of Dakar. **Material and Methods:** This was a retrospective, descriptive and analytical study on the management of the association of hypertension and pregnancy in the maternity ward of the Institute of Social Hygiene of Dakar between January 1<sup>st</sup>, 2019 and on December 31<sup>st</sup>, 2020. **Results:** During the study period, we recorded 326 cases of hypertension associated with pregnancy among the 4290 pregnant women, *i.e.* a frequency of 7.6%. The epidemiological profile of the patients was that of a woman with an average age of 29, nulliparous (48.2%), married (99.1%), at a low socioeconomic level (61.3%) and with a personal history preeclampsia (14.4%). Most patients (83.1%) were evacuated or referred with pre-eclampsia as the main reason (40.8%). The average gestational age was 37 weeks of amenorrhea (SA) with extremes of 20 SA 6 days and 41 SA 5 days. Term pregnancies were the most represented (76.7%). Prenatal follow-up (CPN) was carried out in 319 patients (97.8%) with an average number of CPN of 3 and extremes of 1 and 9. Severe diastolic and severe systolic hypertension concerned respectively 19.3% and 16, 9% of patients. One hundred and eighty patients (55.2%) presented with oliguria. Strip albuminuria was performed in 235 patients (72.1%). It found 3 or more crosses in 38.3% of cases. We recorded 53 cases of anemia (16.3%), 16 cases of significant proteinuria (5%), hepatic cytolysis in 22 patients (6.7%), thrombocytopenia in 37 patients (11.3%), and 43 cases of hyperuricaemia (13.2%). Obstetric ultrasound found 36 cases of severe oligohydramnios (11%), 8 twin pregnancies (2.4%) and an

umbilical Doppler anomaly in 10 patients (3.1%). Pre-eclampsia was the most common clinical form (70.5%), followed by chronic hypertension (15.1%) and pregnancy-induced hypertension (14.4%). In our study, 32 patients (9.8%) had received resuscitation. The most used anti-hypertensives were alpha methyl-dopa (46.1%) and nicardipine (24.5%). The obstetrical treatment consisted of uterine evacuation which was most often done by caesarean section (63.1%). Maternal complications were dominated by retroplacental hematoma (16.3%) followed by eclampsia (7.4%) and HELLP syndrome (6.7%). We have not recorded any maternal deaths. Prematurity (19.3%) and intrauterine growth restriction (IUGR) (16.3%) were the most common perinatal complications. Severe and moderate neonatal asphyxia concerned respectively 14.8% and 14.4% of newborns. The birth weight was on average 2400 grams with extremes of 400 and 4500 grams. Low birth weight accounted for 49.5% of the sample. One hundred and twelve newborns (34.4%) were referred to neonatology most often for neonatal asphyxia (29.2%). We recorded 37 fetal deaths in utero (11.3%) and 10 neonatal deaths (3.1%), representing a perinatal mortality of 168.5 per 1000 live births. During the postnatal follow-up, we noted a normalization of the blood pressure figures in 98.8% of the patients. Contraception was instituted in 150 patients (46.1%). These were most often progestogen implants (32.2%) or intrauterine device (IUD) (11.7%). The choice of delivery route was significantly associated with the clinical form. Indeed, caesarean section was more frequent in case of preeclampsia compared to pregnancy-induced hypertension ( $p = 0.03$ ). Maternal and perinatal complications such as HELLP syndrome (86.4%), PRH (64.2%), eclampsia (79.2%) and UFID (23.6%) were more frequent in cases severe preeclampsia ( $p = 0.028$ ,  $p = 0.0001$ ). **Conclusion:** The association of hypertension and pregnancy is frequent in our practice. Its prognosis is marked by the risk of prematurity, IUGR and maternal complications.

## Keywords

HTA, Pregnancy, Preeclampsia, Caesarean Section, Prematurity

## 1. Introduction

Vasculorenal syndromes and their complications rank second among direct obstetric causes of maternal death. The frequency of high blood pressure during pregnancy is estimated at between 6% and 10% of pregnancies in the United States and Europe [1]. In Senegal, several studies have been carried out in reference maternities and the reported frequencies vary between 10.6% and 15.07% [2]. The severity of this association is linked to its high specific lethality of around 17.1%. This is partly linked to the difficulties of care encountered in our health structures. We wanted, through this study, to evaluate the management of high blood pressure associated with pregnancy at the Institute of Social Hygiene Hospital in Dakar between January 1<sup>st</sup>, 2019 and December 31<sup>st</sup>, 2020. The spe-

cific objectives of this study were to determine the frequency of the association of arterial hypertension and pregnancy, to specify the epidemiological and clinical profile of the patients, to identify the methods of management, to evaluate the maternal and perinatal prognosis and to highlight the factors associated with the risk of maternal and perinatal complications.

## 2. Patients and Methods

### Type, scope and period of study

We carried out a retrospective, descriptive and analytical study on the management of the association of arterial hypertension and pregnancy in the maternity ward of the Institute of Social Hygiene hospital in Dakar between January 1<sup>st</sup>, 2019 and December 31<sup>st</sup>, 2020. Our study population was composed of pregnant women and parturients admitted to the service during the study period.

### Patient selection criteria

We included in our work all patients who presented with arterial hypertension (with SBP  $\geq$  140 mmHg and TAD  $\geq$  90 mmHg) and pregnancy and who were treated in the department during the study period.

### Data collection and analysis

The data was collected from the medical records of the patients, and from the registers of childbirth and hospitalization in pathological pregnancy and in the post-operated unit. They were recorded on a computerized form containing the following items: the socio-demographic characteristics of the patients, the clinical and paraclinical data, the outcome of the pregnancy and the maternal and perinatal prognosis. Data analysis was performed using Excel and IBM SPSS statistics 25 software. The qualitative variables were described in number and percentage and the quantitative variables in average with the standard deviation and the extremes. Regarding the analytical part of our study, the Khi2 test was used to compare the proportions and the difference was statistically significant when the p-value was less than 0.05.

## 3. Results

### 3.1. Descriptive Results

#### Frequency

During the study period, we recorded 326 cases of high blood pressure associated with pregnancy among 4290 pregnant and parturient women, *i.e.* a frequency of 7.6% of pregnancies treated.

#### Socio-demographic characteristics of patients

The patients were aged between 15 and 46 years with an average of 29 years. The age group of 20 to 29 years was the most represented (43.3%). Almost all of the patients were married (99.1%), single people represented 0.9% of the study sample. Most of the patients (61.3%) had a low socio-economic level. The average parity was 1.3 with extremes of 1 and 10. Nulliparous and pauciparous represented respectively 48.2% and 30.4% of our study population. Sixty-nine

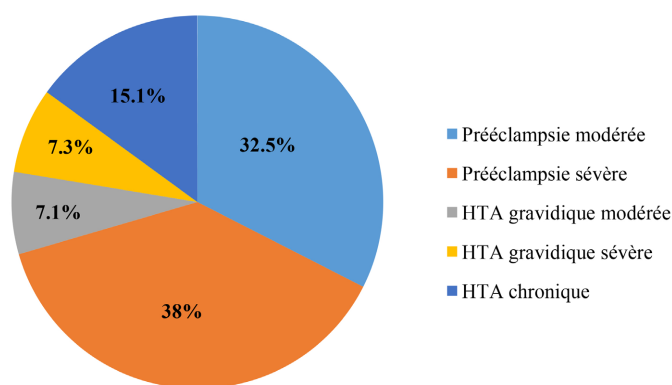
patients (21.2%) had a medical history and it was often high blood pressure (14.4%).

#### Clinical and paraclinical data on admission

The average gestational age at admission was 37 weeks of amenorrhea with extremes of 20 SA 6 days and 41 SA 5 days. Term pregnancies were the most represented (76.7%). We recorded 20.2% of preterm deliveries. Severe diastolic and severe systolic hypertension accounted for 19.3% and 16.9% of our study population, respectively. One hundred and eighty patients (55.2%) presented with oliguria (**Table 1**). Strip albuminuria was performed in 235 patients (72.1%). It found 3 or more crosses in 38.3% of cases.

The results of the biological examinations are recorded in **Table 2**.

Pre-eclampsia was the most common clinical picture (70.5%), followed by chronic hypertension (15.1%) and pregnancy-induced hypertension (14.4%) (**Figure 1**).



**Figure 1.** Distribution according to the clinical form of hypertension and pregnancy (N = 326).

**Table 1.** Distribution according to blood pressure and diuresis values (N = 326).

Settings	Number	Frequency (%)
<b>Systolic blood pressure</b>		
- Mild systolic hypertension	181	55.5
- Moderate systolic hypertension	79	24.2
- Severe systolic hypertension	63	19.3
<b>Diastolic blood pressure</b>		
- Mild diastolic hypertension	158	48.5
- Moderate diastolic hypertension	110	33.7
- Severe diastolic hypertension	55	16.9
<b>Diuresis</b>		
- Normal	146	44.8
- Oliguria	180	55.2

**Table 2.** Distribution according to the results of the biological examinations (N = 326).

Results of the biological examinations	Number	Frequency (%)
<b>Hemoglobin level</b>		
- Normal	273	83.7
- ≤8 g/dl	17	5.2
- 8 to 11 g/dl	36	11.1
<b>24 hours proteinuria</b>		
- Negative	180	55.2
- 300 to 4999 mg	5	1.5
- ≥5000 mg	11	3.4
<b>Transaminase assay</b>		
- Normal	304	93.2
- High	22	6.8
<b>Platelet count</b>		
- Normal	289	88.6
- <50,000/mm <sup>3</sup>	2	0.6
- 50,000 to 150,000/mm <sup>3</sup>	35	10.7
<b>Uricemia</b>		
- Normal	283	86.8
- Hyperuricaemia	43	13.2
<b>Prothrombin count (PT)</b>		
- Normal	322	98.8
- Low	4	1.2

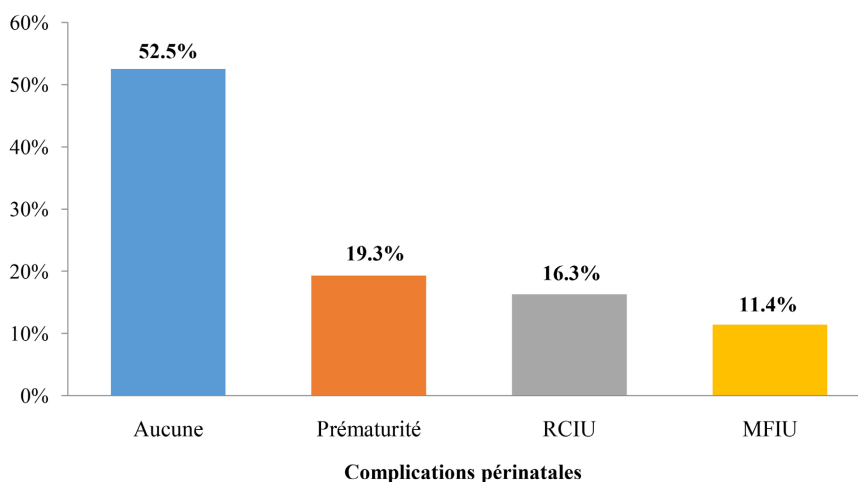
Obstetric ultrasound performed in 171 patients (52.4%) revealed 36 cases of severe oligohydramnios (11%), 8 twin pregnancies (2.4%) and disturbed Doppler in 10 patients (3.1 %).

#### Therapeutic data

Antihypertensive treatment was instituted in 290 patients (88.9%) orally (67.1%) or parenterally (21.8%). The molecules used were dominated by alpha methyl-dopa (46.1%) and nicardipine (24.5%). Uterine evacuation was performed in all patients. It was done most often by caesarean section (63.1%).

#### Prognosis

In our series, 99 patients (30.4%) presented acute complications of hypertension. These were cases of retroplacental hematoma (16.3%), eclampsia (7.4%) and HELLP syndrome (6.7%). In addition, we have not recorded any maternal deaths. We counted 155 perinatal complications (47.5%). They were dominated by prematurity (19.3%) and intrauterine growth retardation (IUGR) (16.3%) (**Figure 2**). The birth weight was on average 2400 grams with extremes of 400



**Figure 2.** Distribution according to recorded perinatal complications (N = 326).

and 4500 grams. Low birth weight accounted for 49.5% of the sample. One hundred and twelve newborns (34.4%) were referred to the neonatology unit. The reasons were dominated by neonatal asphyxia (29.2%). The evolution was favorable in 102 of them (31.3%). In addition, we recorded 10 neonatal deaths (3.1%) and 37 fetal deaths in utero (11.3%), representing an overall perinatal mortality of 168.5 per 1000 live births.

### 3.2. Analytical Results

We performed a multivariate analysis to specify the factors associated with the choice of delivery route and the occurrence of maternal and perinatal complications. This allowed us to find that the choice of delivery route was significantly associated with the clinical form. In fact, caesarean section was more frequent in cases of preeclampsia compared to pregnancy-induced hypertension ( $p = 0.03$ ) (**Table 3**).

Maternal complications such as HELLP syndrome (86.4%), PRH (64.2%) and eclampsia (79.2%) and UFID (23.6%) were more common in preeclampsia severe ( $p = 0.028$ ) (**Table 4**).

Fetal death in utero was more common in pre-eclampsia than in pregnancy-induced hypertension. Indeed, we recorded 23.6% of fetal deaths in utero in the event of severe pre-eclampsia, while this rate was 12.5% in the event of severe gravidic hypertension. Regarding neonatal deaths, they were only recorded in cases of severe (6.6%) or moderate (2.4%) pre-eclampsia. There is a statistically significant link between the perinatal outcome and the clinical form of hypertension and pregnancy ( $p = 0.0001$ ) (**Table 5**).

## 4. Discussion

### 4.1. Epidemiology

The frequency of hypertension in pregnant women varies according to the authors between 10% and 15% of pregnancies [3] [4]. Our rate is comparable to

**Table 3.** Delivery route and clinical form of hypertension and pregnancy (N = 326).

Clinical forms	Mode d'accouchement			Total
	Vaginal delivery	Vaginal delivery after induction of labor	Caesarean section	
Moderate HTAG	6 (26.1%)	3 (13.1%)	14 (60.8%)	23 (100%)
Severe HTAG	13 (54.2%)	1 (4.2%)	10 (41.6%)	24 (100%)
Moderate preeclampsia	41 (33.1%)	5 (4%)	78 (62.9%)	124 (100%)
Severe preeclampsia	11 (10.4%)	3 (2.8%)	92 (86.8%)	106 (100%)
Moderate HTAC	33 (100%)	-	-	33 (100%)
Severe HTAC	16 (100%)	-	-	16 (100%)

p = 0.03; HTAG: Hypertension during pregnancy; HTAC: Chronic arterial hypertension.

**Table 4.** Maternal complications and clinical form of hypertension and pregnancy (N = 326).

Clinical forms	HELLP syndrome	Placenta abruptio	Eclampsia
Moderate pregnancy-induced high blood pressure	1 (4.5%)	1 (1.9%)	1 (4.2%)
Severe pregnancy-induced high blood pressure	-	-	-
Moderate preeclampsia	2 (9.1%)	18 (33.9%)	4 (16.6%)
Severe preeclampsia	19 (86.4%)	34 (64.2%)	19 (79.2%)
<b>Total</b>	<b>22 (100%)</b>	<b>53 (100%)</b>	<b>24 (100%)</b>

**Table 5.** Perinatal outcome and clinical form of hypertension and pregnancy (N = 326).

Clinical forms	Perinatal outcome		
	Living well	Fetal death in utero	Neonatal death
Moderate pregnancy-induced high blood pressure	20 (86.9%)	3 (13.1%)	-
Severe pregnancy-induced high blood pressure	21 (87.5%)	3 (12.5%)	-
Moderate preeclampsia	115 (92.7%)	6 (4.8%)	3 (2.4%)
Severe preeclampsia	74 (69.8%)	25 (23.6%)	7 (6.6%)
Moderate chronic high blood pressure	33 (100%)	-	-
Severe chronic high blood pressure	16 (100%)	-	-

p = 0.0001; HTA: Pregnancy-induced high blood pressure.

those recorded in other African countries. Indeed, Todisoa [5] in Madagascar, Traoré Tidiani [6] in Mali, and Mboudou [7] in Cameroon had found respective frequencies of 7.66%, 8.01% and 8.2% of hypertension associated with the pregnancy. In the United States and Europe the same trend is observed with rates varying between 6% and 10% [1]. The epidemiological profile of our patients is

comparable to those found in the literature. Indeed, Tidiani [6] and Fatoumata [8] had found in their respective series a predominance of women aged between 20 and 34 years with rates of 55.8% and 56.4%. Cissé [9] had found a double-hump distribution with a peak around 25 years and a second around 35 years. Pregnancy-associated hypertension is more common in primigravida and nulliparous women, as noted in our series. According to Cissé [9], the role attributed to a certain maternal immune intolerance in the genesis of preeclampsia suggests that it is rather the development of the first pregnancy that should be more incriminated and considered as one of the most important risk factors.

## 4.2. Clinical and Paraclinical Data

In our study, the average gestational age at delivery was 37 weeks of amenorrhea and we recorded 20.2% of premature deliveries. The same observation was made by Mboudou [7] in Cameroon and Itoua [10] in Congo who reported in their respective series 22.11% and 42.36% of induced prematurity. Cissé [9] in Dakar found 41.8% of premature live births. This could be explained by the frequency of severe preeclampsia (38%) and severe pregnant hypertension (7.3%) in our patients, which justifies the need to terminate the pregnancy often prematurely to avoid maternal complications. In our series, preeclampsia was the most frequent clinical form with a rate of 70.5% followed by chronic hypertension (15.1%) and pregnancy-induced hypertension (14.4%). Our results are comparable to those recorded in other African series [11] [12] [13]. Severe forms of hypertension associated with pregnancy were predominant in our series, particularly severe preeclampsia (38%). This could be explained by various reasons: the poor quality of the prenatal follow-up responsible for a delay in the diagnosis of preeclampsia and also its management, the low socio-economic level of our patients but also our status as a reference center of the Southern District which means that we receive cases of high-risk pregnancies from the secondary structures of the District.

## 4.3. Delivery Route

In our series, caesarean section was the most frequent route of delivery (63.1%). This rate is comparable to those recorded by Pierre [14] in Burundi and Cissé [9] in Senegal who had found respective caesarean section rates of around 66.1% and 64.1%. These high caesarean section rates recorded in the African series would probably be due to the severity of the cases of hypertension associated with the pregnancy that we treat. They remain significantly lower than those published in the West. This difference could be explained by better monitoring and optimal management of pregnant women in these countries, supported by the accessibility of diagnostic means and health structures [10], but also better management of prematurity which facilitates the decision to terminate the pregnancy at a certain gestational age. In our developing countries, we tend to buy a little more time to minimize the risk associated with prematurity.



#### 4.4. Prognosis

Our rate of maternal complications is comparable to those recorded by Fatoumata [8] and Kembou [15] in Mali, which were 35.4% and 33.6% respectively. They were dominated in our study by retroplacental hematoma (16.3%), followed by eclampsia (7.4%) and HELLP syndrome (6.7%). This observation was already made by Cissé [9] in 2001, who specified in his work that PRH and eclampsia occupied an important place in our obstetrical practice with an incidence of 1000 per 100,000 births for eclampsia and 2970 per 100,000 births for retroplacental hematoma. These high rates of complications noted in our series could be explained by the delay in diagnosis and management. Indeed, blood pressure monitoring in pregnant women, which should be done at least once a week, is actually only done during prenatal consultations. It therefore appears necessary to advise pregnant women to take their blood pressure weekly, especially in the third trimester of pregnancy, which is the usual period of onset of pregnancy-associated hypertension. A multivariate analysis allowed us to observe that the risk of maternal complications was significantly higher in the event of severe preeclampsia ( $p = 0.028$ ), which justifies the recommendation to terminate the pregnancy in this context. In our series, perinatal complications were dominated by prematurity (19.3%) followed by IUGR (16.3%) and MFIU (11.4%). Mboudou [7] had found this predominance of prematurity with a lower rate than ours of around 13.2%. On the other hand, for Doumbia [16] and Baragou [17] the IUGR was the most frequent complication with respective rates of 36.29% and 21.5%. This predominance of prematurity in the perinatal complications noted in our series could be explained, as for the other authors, by the therapeutic and premature interruption of pregnancy necessary in the event of severe preeclampsia to avoid maternal and perinatal complications. It is therefore an induced prematurity. We recorded 37 fetal deaths in utero (11.3%) and 10 neonatal deaths (3.1%), *i.e.* a perinatal mortality of 168.5 per 1000 live births. Doumbia [16] had found a rate of 10.48% of MFIU comparable to ours. On the other hand, in Baragou's study [17], UFI was far more frequent with a rate of 31%. The perinatal complications in particular the MFIU constitute a reflection of the insufficiency in the care of the patients in particular the delay in the diagnosis and the care of the hypertensive pregnant women. In our study, a multivariate analysis had established that fetal death in utero was more frequent in case of pre-eclampsia than in case of gravidic hypertension ( $p = 0.0001$ ). According to Cissé [9], in African settings, late diagnosis at the stage of obstetrical complications, the inadequacy of therapeutic indications and the inadequacy of resuscitation means explain the particular seriousness of preeclampsia, which is one of the main causes of maternal and perinatal.

#### 5. Conclusion

The association of high blood pressure and pregnancy is frequent in our practice with a predominance of preeclampsia in the clinical forms. Despite the efforts

made in the fields of prevention, diagnosis and early management, maternal and perinatal morbidity and mortality remain high in our practice.

### Conflicts of Interest

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

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