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Original Research Article

Severe pre-eclampsia: epidemiological, diagnostic, therapeutic and prognostic aspects at Hospital Principal Dakar from January 2019 to December 2020

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ABSTRACT

Background: Preeclampsia, major public health problem, is one of the leading causes of maternal and infant mortality. It is increasingly frequent in our referral health centers, especially in its severe form.

Methods: Retrospective descriptive and analytical study about severe preeclampsia at the Maternity of Hospital Principal Dakar, from 01 January 2019 to 31 December 2020.

Results: Frequency of severe preeclampsia was 3.09%. Medical evacuation (70.59%) was the most frequent mode of admission. Patients were in average 29.8 years and primipare. Personal medical history was dominated by high blood pressure (16.29%). The average gestational age was 34+2 days, but pregnancy was carried to term by the majority of patients. Functional signs were dominated by headache (40.65%). Blood pressure was greater than or equal to 160/90 mmHg (90.32%). Hyperuricemia was the most frequent biological anomaly after proteinuria (45.1%). Complications were dominated by retroplacental hematoma (4.49%) and intrauterine growth retardation (IUGR) (28.48%). Calcium channel blockers (81.88%) were the main antihypertensive agents administered. Caesarean section was the most common delivery method (80.46%). The maternal prognosis was good, with no maternal deaths recorded. Perinatal mortality was 173.9%.

Conclusions: Preeclampsia remains a fearsome pregnancy's pathology. Raising awareness of pregnant women during ANC on the risks of pre-eclampsia, retraining of health personnel, close and early monitoring of women at risk and management in a multidisciplinary setting help to improve the maternal-fetal prognosis.

Keywords: Severe preeclampsia, Pregnancy, Complications, Maternal prognosis, Perinatal mortality, Treatment

INTRODUCTION

Preeclampsia, the most severe form of hypertensive disease in pregnancy, is the second most common cause of maternal mortality and is therefore a major public health problem, particularly in developing countries.¹ It is one of the most frequent complications during pregnancy. Its seriousness is linked to its complications, which are major

causes of maternal and perinatal mortality and morbidity throughout the world.² Maternal and foetal prognosis depends on the early diagnosis and the quality of the management, which must be multidisciplinary.

Preeclampsia occupies an important place in the medical literature dealing with pathologies of pregnancy. This is in line with the concerns it inspires in obstetricians. In

Senegal, several studies have been carried out in reference maternity hospitals and the reported frequencies varied between 3.6% and 12.4%.³⁻⁵ It is in this context that we lead a study in the gynaecology-obstetrics department of Hospital Principal Dakar during the period from January 2019 to December 2020. The objectives of our study were to: identify the frequency of severe pre-eclampsia (SEP) in the gynaecology-obstetrics department of Hospital Principal Dakar; describe the epidemiological profile of the patients; describe the clinical and paraclinical characteristics of severe pre-eclampsia; and evaluate the management and the maternal-fetal prognosis.

METHODS

This was a retrospective, descriptive and analytical study carried out at the maternity ward of Hospital Principal Dakar during 24 months, from 01 January 2019 to 31 December 2020. Our study population was represented by the pregnant women admitted to the service during the study period. All pregnant women admitted for severe preeclampsia with a gestational age of more than 22 weeks and who delivered in the department were included in the study. We did not include patients admitted after delivery to another facility or those with incomplete records.

The parameters studied in each patient were sociodemographic, clinical and paraclinical characteristics, therapeutic data and maternal-fetal prognosis. Data were collected from the patients' files and the operating theatre registers and entered into excel. Analysis was done using R software. The statistical tests used were as follows: Shapiro, student, Chi square, Fisher, Wilcoxon MW. Our p value was considered statistically significant when it was less than 0.05.

RESULTS

During the study period, we counted 179 cases of severe pre-eclampsia out of a total of 5782 deliveries which is a frequency of 3.1%. Table 1 summarises the socio-demographic characteristics and history of the patients. In our study, the age of the patients ranged from 15 to 46 years. The mean age of the patients was 29.8 years with a standard deviation of 6.57. The age range of 25 to 35 years was the most represented (54.9%). The majority of the patients were married (97.81%). More than half of the patients were primigravida (51.1%). Multigestation patients represented 19.9% of the patients.

One in five women (21.23%) had a cardiovascular risk factor. Chronic high blood pressure was the most frequent factor (16.2%). Abortion was the most common history (18.99%). Preeclampsia and eclampsia in a previous pregnancy were reported in 5.59% and 1.12% of patients respectively. Familial hypertension was found in 58.10% of patients.

The pregnancy was well monitored in the majority of patients (98%) either by a gynaecologist (50.5%) or by a

midwife (49.5%). High blood pressure and albuminuria were detected during prenatal consultations in 79.5% and 6.8% of patients respectively. Salicylotherapy and pulmonary maturation were performed during pregnancy in 23.9% and 24.8% of patients respectively. In our study, parturients were admitted at an average of 34+2 days with extremes of 22+5 days and 43+1 days. Most of the patients (94.41%) had a monofetal pregnancy and were most often admitted before the 37th gestational age (64.1%). In our study we counted 10 cases of multiple pregnancies (8 twins, 2 trimellars). Evacuation and referral was the most frequent mode of admission (70.6%). In almost half of the cases (48.7%) they came from a hospital.

Table 1: Socio-demographic characteristics of patients.

Characteristics	Absolute frequency (n)	Relative frequency (%)
Age group		
15-25	45	25.1
25-35	98	54.9
≥35	36	20
Marital status		
Married	175	97.8
Single	3	1.7
Widowed	1	0.6
Gestation		
1	90	51.1
2-3	51	29
>4	35	19.9
Parity		
0-1	126	72.4
2-3	35	20.1
>4	13	7.5

Almost all the patients had functional signs (86.6%). Neurosensory signs were present in 45.2% of cases, dominated by headache (40%). A BP ≥16/10 cmHg was present in 82.3%.

Biologically, proteinuria greater than or equal to 3 crosses was present in 57.9% of cases. Hyperuricemia was the most frequent abnormality after significant proteinuria (45.1%).

Ultrasound evaluation of pregnant women on admission showed intrauterine growth restriction in more than half of the cases (55.8%). Doppler velocimetry of the umbilical artery was disturbed in 39.5% of cases with a mean resistance index (RI) of 0.79 and extremes of 0.45 and 1. Table 2 shows the distribution of patients according to the ultrasound abnormalities found.

One in 8 patients (13.97%) and 37.7% of the fetuses had complications. Retroplacental haematoma was the most common maternal complication (4.5%), followed by eclampsia (3.9%). Fetal complications were dominated by IUGR (17.8%) as shown by Table 3.

As part of the medical management, antihypertensive treatment was administered to 77.1% of the patients, distributed as follows: calcium channel blockers in 81.9% of the patients; alpha methyl dopa in 2.9% and dual therapy in 15.2%.

The magnesium sulphate protocol and corticosteroid therapy (pulmonary maturation) were used in 27.4% and 26.8% of patients respectively. The second dose of lung maturation could only be administered in half of the patients.

Table 2: Distribution of patients according to ultrasound abnormalities.

Ultrasound abnormalities	Absolute frequency	Relative frequency (%)
IUGR	96	55.8
Umbilical artery Doppler disturbed	68	39.5
Oligohydramnios	54	31.4
CFS	8	4.6

Table 3: Distribution of patients by type of complication.

Complications	Number (n)	Frequency (%)
Maternal complications		
Retro placental haematoma	8	4.5
Eclampsia	7	3.9
HELLP syndrome	5	2.8
Stroke	3	1.7
Acute lung oedema (ALO)	3	1.7
Fetal complications		
IUGR	34	17.8
FAS	14	7.3
Fetal death in utero	7	3.7
CFS	3	1.6

Thirteen patients (7.26%) were transferred to the intensive care unit. The most frequent reasons for transfer were eclampsia (61.5%), HELLP syndrome (30.8%) and postpartum coagulopathy (7.7%).

Table 4: Factors associated with maternal complications after bivariate analysis.

Parameters	Eclampsia	RPH	ALO	Stroke	HELLP syndrome
Age range	0.001	0.0826	0.191	0.171	0.622
Parity range	0.628	0.289	0.353	0.227	0.328
Chronic high blood pressure	0.597	0.627	0.656	0.656	0.589
Miscarriage history	0.004	0.005	0.002	0.002	1
Preeclampsia history	0.037	0.025	0.036	0.036	1
Eclampsia history	0.019	0.019	0.017	0.017	1
RPH history	0.019	0.019	0.017	0.017	1
ANC quality	0.156	0.064	0.614	0.613	0.68

The majority of parturients had given birth by caesarean section (80.5%). Among the women who had given birth by vaginal delivery, half (50%) had benefited from an artificial induction of labour, mainly with oxytocin (82.3%). The main indications for caesarean section were severe preeclampsia (93.57%) and intrauterine growth restriction (20.7%). There were 178 live births (93.19%). Perinatal mortality was 167.5% or 13 stillbirths. The average birth weight of newborns was 1966 grams with extremes of 300 and 4225 grams. These were full-term births in 31.7% of cases. The prematurity rate was 64.1%. We noted 20.4% of live children with intrauterine growth retardation. The maternal prognosis was good with a recovery rate without sequelae of 66.32%.

In our series, no maternal deaths were recorded. Among the live births, 78.3% of the newborns were transferred to the neonatology unit. The reason for transfer was prematurity in 67.7% of cases and an abnormal appearance of the amniotic fluid in 10%.

The bivariate analysis identified factors associated with the occurrence of maternal complications as shown in Table 4. There was a statistically significant association between age and the occurrence of eclampsia, as the table is not informative about the age group concerned. History of abortion, pre-eclampsia, eclampsia and PRH were also correlated with the occurrence of maternal complications during pregnancy with significant p values. On the other hand, there was no statistically significant association between chronic hypertension and any complication, nor between parity class and maternal complications of severe preeclampsia.

Intrauterine growth restriction was correlated with several factors including the quality of ANC, the route of delivery and certain maternal complications (eclampsia, RPH, ALO, stroke, HELLP syndrome).

Chronic fetal distress and acute fetal distress were statistically related to the route of delivery. In our series, the only factor statistically related to perinatal death was the quality of ANC. Table 5 summarises the results of the bivariate analysis between the identified determinants and the occurrence of perinatal complications.

Table 5: Factors associated with the occurrence of fetal complications and death after bivariate analysis.

Parameters	IUGF	CFS	AFS	Perinatal death
ANC quality	<0.001	0.326	0.484	<0.001
Delivery route	0.043	0.004	0.004	0.319
Eclampsia	<0.001	0.29	0.399	0.406
RPH	<0.001	0.762	0.898	0.186
ALO	<0.001	0.64	0.397	0.389
Stroke	<0.001	0.64	0.816	0.389
HELLP syndrome	0.831	1	1	0.588

DISCUSSION

Socio-demographic aspects

The frequency of preeclampsia varies according to the authors, with the highest rates reported in sub-Saharan Africa.

Our rate (3.09%) was comparable to that of Ndiaye at the Centre Hospitalier Abass Ndao in Senegal (3.6%) and Aboussouf in Morocco (2.4%).^{3,6} Other studies in Senegal found much higher rates with 6.3% in Diabakhaté's study, 6.7% in El Abdallaoui's and 10.6% for Danmadji.^{4,7,8}

In developed countries such as France, a study by Tran in 2016 had shown a much lower frequency of 0.8%.⁹ These higher rates in our series, as in other African countries, could be explained by the poor quality of prenatal follow-up as well as the delay in diagnosis and management of preeclampsia. The average age of our patients was 29.8 years. Our results are similar to those of other Senegalese studies (28.1 years for Danmadji; 28.3 years for Diabakhaté) and Sub-Saharan African studies (27.25 years for Sogoba in Mali and 28 years for Ratovoniaina in Madagascar.^{4,8,11,14} A younger age for pregnant women is reported by other authors such as Goita in Mali (24.57 years) and Elombila in Congo (25.6 years).^{15,16} However, in other studies, an older age was found. This is the case of Laghzaoui in Morocco (29 years) and Koual in France (31.9 years).^{17,18} The younger age of the patients in our series could be explained by the early marriage and conception.

In our series the average parity was 0.97. Nulliparous women represented more than half of the patients (57.5%). These results are comparable to those found by most authors, notably Koual with 63.2% nulliparous, Diba with 65.12% nulliparous and Samaké who found in his series a higher proportion of primigravida and nulliparous women (54.62%).^{5,18,19}

These results are in line with the data in the literature which implies that primiparity is one of the risk factors for the occurrence of preeclampsia. For most authors,

preeclampsia in primiparous women is mainly the result of a poor adaptation of the parental immune system.^{4,8,11,14}

Pregnancy history and background

In our series, 16.2% of patients had a history of hypertension. This was also the case in the series of Sogoba with 22.2%, Koual with 18% and Goita with 12% of chronically hypertensive patients.^{14,15,18} A WHO study including 10745 pregnant women from 24 countries showed that the existence of hypertension before pregnancy could multiply the risk of preeclampsia by 8.

In France, a significant association between chronic hypertension and PE was confirmed in the Merviel study (adjusted OR=2.77; 95% CI).²⁰ Danmadji in his study hypothesised that a history of chronic hypertension may have a "protective effect" against complicated forms of preeclampsia, namely eclampsia, PRH, HELLP syndrome and MFIU.⁸

In our study, we did not find statistically significant results to support this hypothesis. The most frequent obstetrical history among patients was abortion (18.99%). Danmadji and Diabakhaté made the same observation with 20.1% and 19.8% of cases of abortion respectively.^{4,8} The majority of our patients had a non-term pregnancy at the time of admission (71.3%) with a mean gestational age of 34 SA + 2 days. Conversely, in Danmadji's study the mean gestational age was 36.3 days, and this was also the case in Diabakhaté's series with a mean gestational age of 35.7 days and 50.8% of the pregnancies had reached term.^{4,8} The coverage of antenatal care was adequate (98%) both quantitatively and qualitatively in accordance with WHO recommendations. There was a discrepancy with the studies by Danmadji in Senegal and Samaké in Mali, which found poor quality of antenatal care with respectively 54.4% and 87.7% of patients having received less than 4 antenatal consultations.^{8,19}

Arterial hypertension was detected in 79.5% of patients with 32.5% hospitalised for preeclampsia. These rates are higher than those of Danmadji's series with 30.5% of patients having hypertension during prenatal follow-up but with a hospitalization rate of only 5.8%.⁸ The interest of measuring blood pressure during pregnancy and consequently of screening for preeclampsia lies in the early management that allows the occurrence of serious complications to be avoided. In our study, 4.47% of pregnancies were twin pregnancies. This is comparable to the results obtained by El Abdallaoui who found 5%, while Sogoba found a higher rate of 8.9%.^{7,14}

Diagnostic aspects

Functional signs in our series were dominated by headache (40.65%) as in those of El Abdallaoui and Diabakhaté with respectively 62.5% and 35.4% of cases.^{4,7} The blood pressure figures on admission were very high (PAS \geq 160mmhg and PAD \geq 110 mmhg) in 82.35% of patients.

This proportion was 65.1% in the Danmadji series.⁸ Severe hypertension is also a criterion of severity of preeclampsia, which is quite frequent as shown by our results and those of most studies. This was indeed the case in Samaké for whom 58.46% of the patients had a PAS between 160 and 180mmHg; but also in Diabakhaté with a PAS \geq 160 mmHg in 76% of cases and a PAD \geq 110 mmHg for 49%.^{4,19}

An oedematous syndrome in 66.47% of the patients against a rate of 47.6% in the series of Diabakhaté and 37.4% in that of Danmadji.^{4,8} It should be emphasised that the presence of an oedematous syndrome is no longer a criterion of severity of preeclampsia, but its mode of onset can be a measure of the severity of the condition. Proteinuria was greater than or equal to 3 crosses on urine dipstick in 57.9% of our patients. It was the most frequent biological abnormality, followed by hyperuricemia in 45.1% of cases and then anemia in 32.5%.

In Danmadji's study 76.8% of patients had massive proteinuria \geq 3 crosses on urine dipstick and 36.2% of patients had anemia.⁸ Other authors had also found a high proportion of patients with massive proteinuria. This was the case of Goita and Samaké who found proteinuria \geq 3 crosses in 70% and 99.2% of cases respectively.^{15,19}

Concerning the ultrasound data, intrauterine growth retardation was the most objectified anomaly (55.7%) with a mean resistance index (RI) of 0.79 on Doppler velocimetry of the umbilical artery which was disturbed in 39.34% of cases. On the other hand, in the Senegalese series by Diabakhaté, IUGR was observed in only 13.5% of pregnant women with a high resistance index (RI) in 7.3% with a mean value of 0.8.⁴

Our results in terms of maternal morbidity are similar to the data in the literature, which consistently find PRH, eclampsia and HELLP syndrome as the main complications of severe pre-eclampsia.

In the series by Danmadji and Diabakhaté, HRP was by far the most frequent complication found (specify rates).^{4,8} The rate reported by Yassine Smiti in Morocco was 45% in a total of 342 cases.²¹ A lower rate of PRH was reported by Kanta and Sangaré in Mali with 5.1% and 0.85 respectively.^{22,23} Eclampsia is also frequent in most studies: 24.9% for Danmadji, 9.4% for Diabakhaté and 1.53% in the series by Djigandé.^{4,8,24}

Therapeutic aspects

In our sample 81.88% of patients were on calcium channel blockers. Our results were similar to those of El Abdallaoui and Danmadji, who noted respectively 91.7% and 82.1% use of Nicardipine.^{7,8}

In our study magnesium sulphate was used in 27.37% of patients. This frequency is low compared to the studies of

Diabakhaté and Danmadji which found use rates of 54.7% and 50%.^{4,8}

Corticotherapy was administered to 26.82% of our patients compared to 22% in the Diabakhaté series and 16.7% in the Danmadji series.^{4,8} This low rate of recourse to pulmonary maturation could be explained in our context by the short delay between hospitalization and fetal extraction. In our study, only 7.26% of patients were admitted to the intensive care unit. This was the same finding in the series by Diabakhaté who also found 7.3% of patients having stayed in intensive care.⁴

Danmadji and El Abdallaoui found higher rates with respectively 35.9% and 8.3% of patients admitted to intensive care.^{7,8} This low rate is probably linked to a delay in admission and management, which would probably be responsible for more frequent admission to intensive care. It could be explained by the problem of availability of intensive care beds or by the rapid recourse to fetal extraction which reduces the rate of complications.

Concerning obstetrical management, termination of the pregnancy required a caesarean section in 80.46% of cases and 9.77% of patients had benefited from artificial labour induction. Lower rates were found in the series of Diabakhaté, Danmadji and Sogoba where fetal extraction was also performed by caesarean section in respectively 67.61% and 56.30%.^{4,8,14}

On the other hand, in the series by Goita there was almost the same rate of vaginal delivery (42%) as caesarean section (40.8%).¹⁵

Prognostic aspects

The evolution of the mother was in the majority of cases favourable with a recovery rate of 66.32%.

Lethality was nil in our series probably due to early obstetric management and constant collaboration with the intensive care unit. Maternal death rates related to eclampsia of 0.26% and 1.6% have recently been reported in Algeria (2022) and Senegal (2021). Perinatal mortality was 167.5‰ with 6.8% stillbirths.¹¹

In our series, perinatal mortality is ameliorated by the availability of neonatology. Only one factor was statistically related to neonatal death: this was the quality of ANC; this may support the hypothesis that better quality ANC improves maternal-fetal prognosis.

Most preterm deliveries were induced because of an indication for fetal extraction for maternal rescue (uncontrollable severe hypertension, HRP, eclampsia) and/or fetal extraction (fetal heart rhythm abnormalities, fetal hypotrophy).

All studies agree that in severe pre-eclampsia newborns suffer both from prematurity and fetal suffering due to

intrauterine growth retardation as a consequence of fetal hypoperfusion.²⁵

Limitations

Due to the retrospective character of our study, we were limited essentially by the qualitative insufficiency: results of some requested tests were not found in the files, mention on the file of the diagnosis of severe preeclampsia was omitted in several files despite the presence of suggestive signs, and lack of information regarding postpartum follow-up and fate of newborns.

It is possible that some cases of our period of study have been forgotten. A study from computerized files or pre-filled forms would have made easier the collection.

CONCLUSION

Preeclampsia remains a dreaded pathology during pregnancy. Raising awareness of pregnant women during ANC on the risks of pre-eclampsia, retraining of health care providers, close and early monitoring of women at risk and management in a multidisciplinary setting can improve the maternal-fetal prognosis.

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