Maternal and Perinatal Prognosis of Arterial Hypertension and Pregnancy in a Peripheral Health Center in Mali

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Abstract

Introduction: Maternal mortality constitutes a public health problem and its rate is an indicator of a country's development. Among the causes of maternal and perinatal death, high blood pressure associated with pregnancy occupies a significant part. It represents 5% of direct maternal deaths. **Objective:** to study the maternal and perinatal prognosis of high blood pressure during pregnancy in the Tenenkou reference health center in Mali. **Methodology:** This was a descriptive, analytical and retrospective cross-sectional study over a period of twelve months from January 1, 2021 to December 31, 2021 and involving 144 cases of high blood pressure associated with pregnancy. **Results:** We obtained a frequency of 11.75%. The majority of patients 70.9% were aged between 20 - 35 years. The important risk factor found was young age. During our study, 46.5% of patients had performed at least one CPN and only 13.9% performed 04 CPN. Pre-eclampsia was the most common type of high blood pressure during pregnancy, *i.e.* 61.1%. Eclampsia and retroplacental hematoma were the most common maternal complications, respectively 27.8% and 11.1%. The most common fetal complications were premature births and fetal distress with 20.9% and 17.4% respectively. **Conclusion:** Hypertension associated with pregnancy still remains a major cause of ma-

ternal-fetal morbidity and mortality in our context where diagnosis is often late. The main clinical form was preeclampsia. Eclampsia and retroplacental hematoma were the most frequent maternal complications. Fetal complications were mainly prematurity and fetal distress.

Keywords

1. Introduction

High blood pressure (hypertension) is defined as a systolic pressure of 140 mmHg and/or a diastolic pressure of 90 mmHg [1]. It is a public health problem worldwide. High blood pressure (hypertension) constitutes a major risk factor for mortality during pregnancy, and represents the third cause of maternal mortality and the leading cause of perinatal mortality [2]. It is responsible for 30% of maternal deaths and 20% of fetal and neonatal mortality in Africa [3] compared to 16% of maternal deaths in developed countries. Hypertension is classified into four types including chronic hypertension, pre-eclampsia/eclampsia, pre-eclampsia in addition to chronic hypertension and gestational hypertension [4]. Regardless of the type of hypertensive disorders, hypertension during pregnancy can lead to adverse perinatal outcomes such as low birth weight, prematurity, stillbirth and intrauterine growth restriction [5]. Even though there are means of preventing the disease and treatments are available, it continues to represent a significant cause of mortality and morbidity [6]. High blood pressure is responsible for around ten million deaths per year worldwide; it affects 5% to 10% of pregnant women and its research is systematic in prenatal consultations [7]. Among the causes of maternal and perinatal death, high blood pressure associated with pregnancy occupies a significant part. It represents 2% of all maternal deaths and 5% of direct maternal deaths. Indeed, maternal mortality constitutes a public health problem and its rate is an indicator of a country's development [8]. In Africa, the death rate related to eclampsia was 11.64%. Perinatal mortality was 125‰ live births, and the prematurity rate was 43.2% to (44.82%, [9] [10]). In Mali, maternal complications linked to high blood pressure during pregnancy represented 31.8% according to a study carried out at the Ségou hospital [11]. The incidence rate of pre-eclampsia was 2.3% in Timbuktu. The stillbirth rates were 19% and perinatal lethality of 21.5% [12]. Arterial hypertension is experiencing a worrying increase in sub-Saharan Africa [13] of which Mali is no exception. Thus, the present work has set itself the objective of studying the maternal and perinatal prognosis, high blood pressure on pregnancy in the Tenenkou reference health center in Mali

2. Methodology

The study took place in the Tenenkou reference health center. This was a

cross-sectional, descriptive, analytical, retrospective study with a quantitative approach over a period from January 1, 2021 to December 31, 2021, *i.e.* a duration of twelve months and focusing on the maternal and perinatal prognosis of hypertension, arterial and pregnancy. This study concerned all women during the gravido-puerperium period who sought care in the Tenenkou health district. It included all patients admitted during the gravido-puerperium period in whom the diagnosis of hypertension had been made. An exhaustive sampling which concerned all the patients seen in consultation and who benefited from a control of blood pressure figures at rest for 4 hours, was carried out. It concerned all gravido-puerperal patients admitted to the Tenenkou reference health center during the study period with usable records. The variables studied were: sociodemographic parameters (age, place of residence, main function, level of study, marital status), clinical characteristics (history, mode of admission, reason for admission). admission, the value of systolic blood pressure and diastolic, uterine height, fetal heart sound, active fetal movement, signs of severity), paraclinical characteristics (proteinuria on dipstick, blood count, characteristics of management (drug treatment, route of delivery), maternal and fetal outcomes and outcomes Data were collected on a survey form from delivery and SONU registers, obstetric records. Data entered on Access were analyzed using the software. Epi info 7.2 after export to Excel 2016. The Chi^2 test was used with a significance threshold set at 5% ($P < 0.05$) For ethical considerations, the approval of health and administrative authorities, and patients had been obtained before the start of the activities. The confidentiality of personal data was respected. The first and last names of the subjects were not used. Only an identification number was assigned to identify the subject. The data was kept confidential and was only used for scientific purposes.

3. Results

During the study we identified 1225 patients who consulted the CSRef maternity ward of Tenenkou during the gravido-puerperium period, among whom 144 patients presented with hypertension, *i.e.* 11.75% (Figure 1).
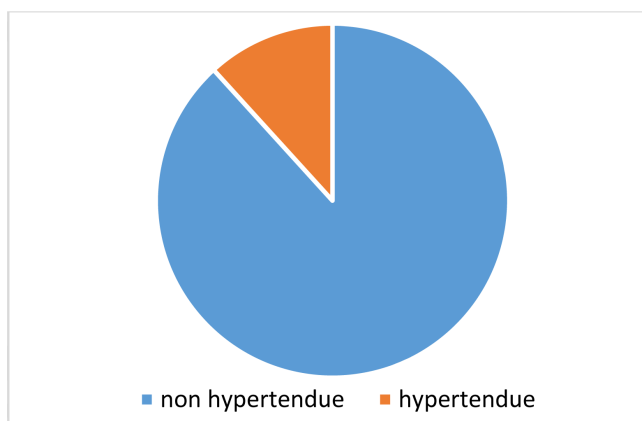

Figure 1. Distribution according to frequency of high blood pressure.

The age group of 20 to 35 years represented 70.9% of our sample. The average age was 26.22 years with extremes of 15 and 45 years. Housewives represented 98% of patients. In this study there was a clear predominance of non-schooling patients with more than 92.36%. Most of the participants, 84%, resided in rural areas and the patients were almost all married, *i.e.* 99% (See Table 1).

Multiparous women represented 45.8%, with an average of 3.67 deliveries per patient. Among the patients, 46.5% had completed less than 3 CPN visits with an average of 1.65 CPN visits. Only 13.9% of patients had performed 4 CPN, 39.6% had not performed any CPN. The participants came on their own in 56.9%, and having used their own means in 96.5%. Referred patients represented 41.0%.

Table 1. Distribution according to age group, level of study, profession, marital status, and residence.

	Effective	Percentage
Age range		
<20 years	27	18.7
20 to 35 years old	102	70.9
Age > 35 years	15	10.4
Total	144	100
The level of study		
Non-academic	133	92.36
Primary	5	3.48
Literate	4	2.78
Secondary	2	1.38
Total	144	100
The profession		
Household	142	98
Saleswoman/trader	1	1
Others	1	1
Total	144	100
Marital status		
Married	143	99
Bachelor	1	1
Total	144	100
Residence		
Urban	120	84
Rural	24	16
Total	144	100

Nearly half of the patients lived beyond 15 km from the CSRef, *i.e.* 49.3%. On admission, 46.5% of patients were in labor with good general condition in 37.5%. Fetal heart sounds were present in 63.9% of patients. For these patients admitted for hypertension, the mean values of the blood pressure figures were 17.17 mm Hg with a standard deviation of 2.3 for systole and 10.58 mm Hg for diastole with a standard deviation of 1.64. Among the patients, 61.1% had type I hypertension, and 21.5% had type II hypertension. Proteinuria was positive at 4 crosses in 39.6%, at 3 crosses in 26.4% and 2 crosses in 2.8% (Figure 2).

The patients had a hemoglobin level in 88.9%, among whom 9.8% had severe anemia (a hemoglobin level ≤ 7 g/dl), 45.1% had moderate anemia (7 < a level of hemoglobin < 12 g/dl). Female patients in 11.1% had not performed a hemoglobin level. The vaginal route was the main route of delivery in 66.7%, 23.6% of patients had given birth by cesarean section. The delivery was assisted by qualified personnel in 86.8% of cases. In the majority of cases, 58.3% of newborns were not resuscitated, however 11.8% of newborns were not resuscitated. During the same study the stillbirth rate was 18.7%. After delivery, newborns with low birth weight represented 34.0%. Patients were treated with dual therapy antihypertensives in the majority of cases, *i.e.* 54.2%. We applied the magnesium sulfate protocol to 68.1% of hypertensive patients. In relation to the complications developed during the study, 60.4% of our patients had developed a complication with the main complication being eclampsia in 27.8%, followed by retroplacental hematoma in 11.1%. A fetal complication was found in 55.5% of newborns (*See Table 2*).

In relation to prognostic cofactors associated with arterial hypertension, the study found a statistically significant link between the occurrence of preeclampsia and primiparity (p = 0.001.). We also noticed that there was a statistically significant link between the different types of high blood pressure according to the age groups in our study (p = 0.001). During the study, it was found that the main maternal complication was preeclampsia in the primiparous with a statistically significant link between the types of maternal complications in the pariet (p = 0.003). On the other hand, the study did not find a statistically significant link between the number of prenatal consultations and the type of high blood
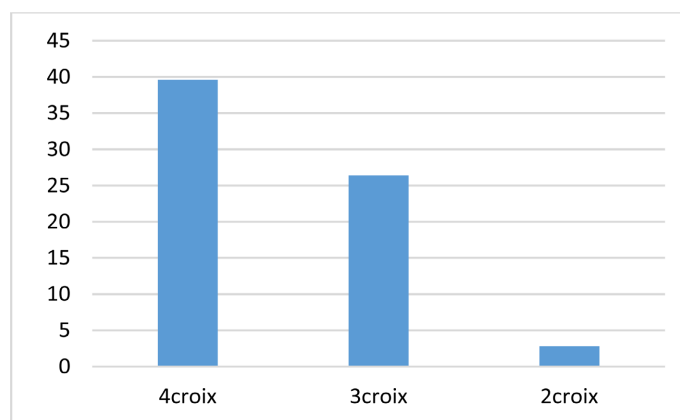

Figure 2. The number of crosses for proteinuria.

Table 2. Distributions according to antihypertensive protocol, use of magnesium sulfate, and maternal-fetal obstetric complications.

	Effective	Percentage
Antihypertensive		
monotherapy	59	40.9
dual therapy	78	54.2
Triple therapy	7	4.9
Total	144	100
Magnesium sulfate		
Yes	98	68.1
No	46	31.9
Obstetric complications		
Yes	87	60.4
No	57	39.6
Total	144	100
Maternal complications		
Eclampsia	40	27.7
Retro placental hematoma	16	11.1
HELLP syndrome	14	9.8
Acute pulmonary edema	13	9
Renal failure	2	1.3
Death	1	0.7
Stroke	1	0.7
Total	144	100
Fetal complications		
Prematurity	30	20.9
Fetal death in utero	21	14.5
Acute fetal distress	14	10.4
Chronic fetal distress	10	6.9
Abortion	4	2.8
None	64	44.5
Total	144	100

pressure, the type of high blood pressure and the route of delivery and finally the type of high blood pressure and residence patients.

4. Discussion

The frequency of the association of hypertension and pregnancy is variously ap-

preciated in the literature. In sub-Saharan Africa, in Niger Touré A I *et al.* found a frequency of 8.9% [14], Attolou *et al.* obtained a frequency of 7.65% in Benin [15]. Other African authors like M. Akotionka *et al.* [16], in Burkina, Mbuyamba Ntobo L in DR Congo [17], Mboundou *et al.* [18] in Cameroon, BA *et al.* [19] and in Mali recorded respective frequencies of 6.7%; 3.67%; 8.2% and 6.1%. In our study we have a frequency of 11.1%, which is superimposable to the results obtained in Togo 12.3% [20], in France whose frequency is between 5 and 15% [21] in the United States with a frequency between 6 and 10% [22]. Conversely, a little lower than those of Bah *et al.* [23] which report a frequency of 17.05% in Guinea Conakry from Moodley [24] in South Africa 18%. The incidence of hypertension during pregnancy in African countries is close to those in Europe and the United States. This worrying progression of hypertension in sub-Saharan Africa can be explained by the socio-cultural conditions characterized by the breakdown of the traditional way of life, the adoption of a "Western" type lifestyle and diet such as salt consumption, alcohol consumption [24]. Young age is implicated in the occurrence of hypertension in pregnant women. In our study the age group of 20 to 35 years was the most represented with 70.9% of our sample with an average age of 26.22 years. The extremes were 15 and 45 years old. This result is comparable to that of other studies. M. Akotionka *et al.* [16] found an average age of 27 years, Ley Bafeno Lyande *et al.* [25] found that the most represented age group was *between 20 to 29 years,* Mboundou *et al.* [18] found between 30 to 34 years. The main function of our patients was a household activity in 98% of cases. This result is comparable to other African studies where women are at home without paid activity; their essential role is limited to housework [24] [25]. On the other hand, Attolou V *et al.* [15] found in their study that more than half of their patients were civil servants, *i.e.* 53.2%. In this study there was a clear predominance of non-schooling patients with more than 92.36%. This result is similar to that of Sylla C *et al.* [26], who found 67.5% were out of school. Contrary Traoré T *et al.* [11] found almost one in two women was out of school, *i.e.* 50.8%. In our study, most of the participants, 84%, lived in rural areas and the patients were almost all married, *i.e.* 99%. The same proportions were found in the study by Traoré T *et al.* [20]. The high rate of illiterates and married women was explained by the low schooling rate of girls, *i.e.* 24%, but also early marriage in Mali [27]. Multiparous women represented 45.8%, with an average of 3.67 deliveries per patient. On the other hand, in the study by Attolou V *et al.* [15], multiparous (5 *and over*) represented only 10.1%. The absence of follow-up of prenatal consultations (ANC) among mothers with arterial hypertension is remarkable in our study: 46.5% had completed less than 3 prenatal consultations and only 13.9% of patients had completed 4 prenatal consultations. This rate is lower than that of Mboudou E. *et al.* [18], who noted that 63.46% of patients had less than 4 prenatal consultations. Failure to monitor the pregnancy doubles the risk of high blood pressure during pregnancy. There is therefore no doubt that good monitoring of pregnancy is a factor in better fetal prognosis [24]. For these patients admitted for hypertension, the average values

of the blood pressure figures were 17.17 mm Hg for systole and 10.58 mm Hg for diastole. In their study TP Randrianambinina *et al.* [10] found a SBP ≥ 160 mmHg in 96.18% of patients and a DBP ≥ 110 mmHg was found in 63.38% of patients. Hypertension was associated with dipstick proteinuria greater than or equal to two crosses in 68.8% of cases. In his Ahmed series, Ba. A.O *et al.* [23] also found that hypertension was associated with proteinuria greater than or equal to 2 crosses on the urine dipstick. The participants came on their own in 56.9%, and having used their own means in 96.5%. Referred patients represented 41.0%. Nearly half of the patients lived beyond 15 km from the Csref, *i.e.* 49.3%. In the series by Mamadou Ibrahima Kampo *et al.* [12] patients were most often brought by their parents and with non-medical means of transport. The distances between community health centers and referral health centers can sometimes be very significant. In addition, the poor condition of the roads, the insufficiency of means of transport and the context of insecurity constitute all challenges to be met. Thus, the improvement of the referral-evacuation system and the stabilization of the region are necessary to ensure rapid transport of patients to the most appropriate structures for their care in better conditions. The vaginal route was the main route of delivery in 66.7%, 23.6% of patients had given birth by cesarean section. This rate is similar to that of M. Akotionka *et al.* [16] who found a vaginal delivery rate of 70.7% and a cesarean section rate of 23.3%. In the majority of cases, 58.3% of newborns were not resuscitated, however 11.8% of newborns were not resuscitated. During the same study the stillbirth rate was 18.7%. This rate is comparable to that of M. Akotionka *et al.* [16] 15.1% and M. Akotionka *et al.* [16] 14.5%. But it is superior to the results of other authors Mboudou E. *et al.*, Traoré T *et al.*, who found 5.3% and 7.69% respectively [11] [23]. The main complications were eclampsia in 27.8%, retroplacental hematoma in 11.1%, and HELLP syndrome in 9.8% of cases. This result is similar to the results of other studies which found eclampsia and retroplacental hematoma as main complications (Attolou V. Traoré *et al.*, TP Randrianambinina *et al.* [10] [23] [28]). We recorded a death rate of 0.7%, which is comparable to that of Dembélé S. *et al.* [29] 0.4%. But our rate is lower than that of other African studies, Sylla C *et al.* and Cibangu Kashala J-P [26] [28], had respectively a rate of 2.5%, 4.2%; 1.25%. During our study, alphamethyldopa which is a central antihypertensive was the most used 40.9%. This product, which has had considerable experience, its effectiveness and safety have been proven and it also has no side effects on children [30]. Nicardipine was used intravenously in cases of severe disease. In short, dual antihypertensive therapy was the most used during our study, *i.e.* 54.2%. In their study, Ahmed B. *et al.* [31], alphamethyldopa is the most used in 49% of our patients, followed by nicardipine. Magnesium sulfate was used in 68.1% of hypertensive patients. Its use in combination with antihypertensives is necessary for the prevention of the occurrence of eclampsia and the treatment of eclampsia. TP Randrianambinina *et al.* [10], also placed almost half of their patients on Magnesium Sulfate, *i.e.* 44.59%.

During the study we encountered various difficulties such as:

- The absence of certain information in the files.
- The unavailability of certain additional examinations for the assessment of arterial hypertension in our health structure.
- The low socio-economic level of most patients, hence the incomplete or no assessment of arterial hypertension; which does not allow us to accurately assess the various complications.
- Absent or incorrect prenatal monitoring.

5. Conclusion

Maternal and perinatal complications of arterial hypertension and pregnancy are frequent and serious leading to morbidity and mortality, high materno-fetal. Management remains difficult in a context of under-equipment with a poorly diversified range of antihypertensives. Added to this is a problem of paraclinical monitoring. In order to improve the maternal-fetal prognosis, a particular effort must be made to correct all these insufficiencies.

Conflicts of Interest

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

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Annex: Investigation Sheet

Maternal and Perinatal Prognosis Arterial Hypertension and Pregnancy

ID number

General Information

Date of admission

Admission time

Age in Year…………

Patient's profession

   a) Housewife/__/,   b) Saleswoman/Shopkeeper/   c) Housekeeper /__/,   d) Unemployed /__/

   e) Other……………

Level of education:

   a) Primary   b) Secondary   c) Higher   d) Literate   e) None

Residence:

   a) Urban /__/,   b) Rural of ≤5 km /__/,   c) Rural of ≤15 km /__/   d) Rural > 15 km /__/

Marital status

   a) Single /__/,   b) Divorced /__/,   c) Married /__/   d) Widow /__/

Mode of admission a) Self-entry /__/   b) Referred /__/   c) Evacuated /__/

Means or conditions of evacuation/reference:

   a) Own means /__/,   b) CSRef ambulance /__/   c) other ambulance /__/,   d) CSRef canoe /__/

Background

Medical

   a) High blood pressure /__/,   b) Diabetes /__/,

Other /__/ i) None /__/

Obstetrics: (number)   a) G_____   b) P_____

Gestational Age: a) First trimester /__/   b) Second trimester /__/   c) Third trimesters /__/

Monitoring of CPNs (number)

   a) Less than 4 /__/,   b) More than 4 /__/,   c) No CPN /__/

III Clinical examination at entry:

General Examination:

General condition………Good…………Fair………..Poor……….

T A……………………….../mm Hg.

Temperature …………………………. /˚C

B˚) Obstetric examination:

HU…………………………………………

BDC………………………………………

Patient reception phase:

Not in work

In labor: a) Latency phase /__/,   b) Active phase /__/,   c) Expulsive phase /__/

Postpartum

Post Abortion

Number of fetuses   a) Monofetal /__/, b) Twin /__/,   c) >2 /__/

Additional tests:

Emergency hemoglobin or hematocrit level:

Dipstick proteinuria …………Yes……………No………….

Result Proteinuria…………………………………………………….

Diagnosis: diagnosis of hypertension retained

Type of hypertension linked to pregnancy:

　　a) hypertension during pregnancy　　　b) postpartum hypertension　　c) post-abortion hypertension

Type of hypertension during pregnancy:

　　a) Type I /__/,　　　　　b) Type II /__/,　　　c) Type III /__/,　　　　　d) Type IV /__/,

Therapeutic methods

Magnesium sulfate:

Yes No /__/,

Antihypertensive:

Monotherapy………………………………………………………………………………

Bitherapy…………………………………………………………………………

Tritherapy………………………………………………………… …………………

Evolution and prognosis

Favorable:　　　　　Yes /__/　　　　No /__/,

Complications:　　　Yes /__/　　　　No /__/,

Number of complications

Maternal　　　　a) Eclampsia /__/　　b) HRP /__/　　c) Help Syndrome /__/　　d) Renal Failure /__/

　　　　　　　　e) Stroke /__/　　　　f) OAP /__/　　g) Maternal Death /__/　　h) None

55) Fetal

　　a) Abortion /__/　　　b) Premature delivery /__/　　　c) Fetal Hypotrophy: /__/　　　d) CFS /__/　　e) SFA /__/

　　f) MFIU /_/ g) None

56) Mode of delivery

　　a) Low Way　　　　　b) High Way

Mode of intervention:

　　a) normal delivery　　b) Vacuum extraction　　c) Forceps extraction　　d) Caesarean section　　e) Other

Childbirth:

　　a) Assisted　　　　　b) Unassisted

Newborn weight

Condition of the Newborn:

　　a) Abortion　　　　　b) Unresuscitated child　　c) Resuscitated child　　d) Stillborn

　　e) Late abortion　　　f) No information