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Hospital Prevalence and Clinical-paraclinical Profile of Cardiovascular Diseases During Pregnancy Among Women Managed in Two Referral Hospitals in Yaounde, Cameroon

Valerie Ndobo[1,2*], Siddikatou Djibrilla[3,4], Murielle Bogne[1], Madye Ange Ngo Dingom[2], Wilfried Ndeme Mboussi[5], Pascal Mpono[1,6], Felicite Kamdem[3,7], Felix Essiben[1,2], Liliane Mfeukeu Kuate[1,2]

Abstract

Background: The occurrence of cardiovascular diseases (CVDs) during pregnancy increases maternal and fetal morbidity, with a risk of intrauterine growth restriction, prematurity, and stillbirth. Delayed diagnosis and inadequate prenatal follow-up worsen these complications and hospital admissions. This study aimed to estimate the hospital prevalence of CVDs among pregnant women followed up in two referral hospitals in Yaoundé and to describe their clinical and paraclinical profiles.

Methods: We conducted a descriptive cross-sectional study in the cardiology and obstetrics-gynecology units of the Yaounde Gyneco-Obstetric and Pediatric Hospital and the Yaounde Central Hospital. Data on the diagnosis of CVDs, clinical, and paraclinical characteristics were collected from 116 women.

Results: The mean age of participants was 28 ± 7 years, ranging from 15 to 43 years. The most represented age group was 15–25 years (n = 49; 42%). Diagnosed CVDs included hypertensive disorders of pregnancy (n = 111; 95.6%), peripartum cardiomyopathy (n = 2; 1.7%), deep vein thrombosis (n = 1; 0.9%), atrial septal defect (n = 1; 0.9%), and atrioventricular block (n = 1; 0.9%). The most frequent risk factor was obesity (n = 40; 34.8%).

Conclusion: Hypertensive disorders of pregnancy were the most frequently diagnosed CVDs in our sample, with obesity as the main risk factor. However, further studies are needed to confirm these trends among pregnant women in Cameroon.

Keywords: Cardiovascular diseases, hospital prevalence, pregnant women, referral hospitals.

Introduction

Cardiovascular diseases (CVDs) represent a major cause of maternal and fetal morbidity and mortality, with a rising prevalence among women of reproductive age, and a spectrum that includes hypertensive disorders of pregnancy (HDP), congenital heart disease, valvular disease (notably from acute rheumatic fever), and peripartum cardiomyopathy (PPCM) [1–3]. HDP affect up to 10% of pregnancies and are strongly associated with prematurity, intrauterine growth restriction, and perinatal mortality [3–5]. Congenital heart disease and valvular disease expose women to maternal complications (heart failure, arrhythmias, hospitalizations) and neonatal complications (prematurity, growth restriction), while PPCM remains a specific entity of

Affiliation:

[1]Faculty of Medicine and Biomedical Sciences, University of Yaounde I, Yaounde, Cameroon.

[2]Central Hospital of Yaounde, Yaounde, Cameroon.

[3]Faculty of medicine and pharmaceutical Sciences, University of Douala, Douala, Cameroon.

[4]Laquintinie Hospital, Douala, Cameroon.

[5]Statvision, Douala, Cameroon.

[6]Hospital Center Research And Application In Surgery Endoscopique And Human Reproduction, Yaounde, Cameroon

[7]Douala General Hospital, Douala, Cameroon.

***Corresponding author:**
Valerie Ndobo. Lecturer in Internal Medicine (FMBS, University of Yaounde I) and Cardiologist, Yaounde Central Hospital, Cameroon.

E-mail: ndobovalerie8@gmail.com
Phone: +237 681555997

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systolic decompensation occurring at the end of pregnancy or in the postpartum period, often with delayed diagnosis [6–10].

In low- and middle-income countries, the burden of CVDs during pregnancy is aggravated by limited access to specialized care, to valvular interventions, and to integrated cardio-obstetric pathways, resulting in a disproportionate burden of adverse outcomes [11–13]. In sub-Saharan Africa, HDP and rheumatic valvular diseases contribute substantially to severe maternal and fetal outcomes; the prevalence of HDP is higher than in other regions, and the burden of rheumatic valvular disease remains significant [5,14–16]. In Cameroon and the sub-region, several studies have highlighted the role of risk factors (obesity, nulliparity, history of hypertension) and the persistence of hypertension after preeclampsia, as well as electrolyte disorders associated with HDP, underscoring the need for strengthened screening and follow-up [17–20].

However, local data remain heterogeneous and often limited to monocentric studies, with variable definitions and incomplete characterization of clinical and paraclinical profiles. These gaps hinder the planning of cardio-obstetric interventions adapted to the context of referral hospitals in Cameroon. In this setting, the present study aimed to estimate the hospital prevalence of CVDs during pregnancy among women followed in two referral hospitals in Yaoundé (Cameroon) and to describe in detail their clinical and paraclinical characteristics, in order to guide screening, risk stratification, and the organization of care.

Materials and Methods

Study type and design

We conducted a descriptive cross-sectional study. The primary objective was to estimate the hospital prevalence of cardiovascular diseases (CVDs) during pregnancy; the secondary objective was to describe the clinical and paraclinical characteristics of the affected patients. Data collection was carried out over six months (December 2024 – June 2025) within an eight-month project (October 2024 – June 2025) that included preparatory, pilot-testing, and closing phases.

Study setting

The study was conducted in the cardiology and obstetrics-gynecology units of the Yaoundé Gyneco-Obstetric and Pediatric Hospital (HGOPY) and the Yaoundé Central Hospital (HCY), two referral hospitals in Yaoundé, Cameroon.

Study population

The target population consisted of pregnant women followed up at HCY and/or HGOPY. The source population comprised all pregnant women attending these two hospitals during the study period.

Inclusion and exclusion criteria

We included patients: admitted or seen in consultation during the study period; pregnant; presenting with clinical signs and/or risk factors suggestive of CVD, with diagnosis confirmed by complementary tests (hypertensive disorders of pregnancy/preeclampsia, peripartum cardiomyopathy, congenital heart diseases, rhythm disorders, deep vein thrombosis/pulmonary embolism). We excluded patients whose complementary investigations did not confirm a diagnosis of CVD.

Sampling method and sample size

Sampling was systematic and consecutive, including all pregnant women identified during the recruitment period in both sites. The minimum theoretical sample size was calculated using Cochran's formula ($n = Z^2 \cdot p \cdot [1–p]/i^2$) [21] with Z = 1.96 (95% CI), p = 4% (expected prevalence of CVDs in pregnancy based on regional data)[22], and i = 2%, yielding $n \approx 60$. The final sample included N = 116 participants, providing increased precision for descriptive estimates.

Variables and operational definitions

A standardized questionnaire collected sociodemographic variables: age, marital status, educational level, and occupation. Anamnestic data covered reason for admission, medical history (hypertension, previous preeclampsia, HIV, etc.), gynecological and obstetrical history (parity, prior complications), and pregnancy follow-up (number and type of antenatal care visits, iron/calcium/aspirin prophylaxis as indicated, type of pregnancy, number of obstetric ultrasounds, gestational age).

On the clinical side, data included general condition, obstetric examination, functional symptoms (headaches, palpitations, dyspnea, edema), blood pressure status, and cardiovascular examination classified according to standard guidelines. The paraclinical evaluation included ECG (sinus tachycardia, left ventricular hypertrophy, repolarization abnormalities, prolonged PR interval), echocardiography (LVEF, LVH, filling pressures, atrial septal defect/patent foramen ovale, dilated inferior vena cava), and laboratory tests (CBC: anemia, thrombocytopenia; liver enzymes; urea, creatinine; D-dimers). Immediate outcomes (hospitalization, referral) were also recorded when available.

Procedures and quality assurance

The preparatory phase included protocol drafting/validation, administrative authorizations (hospitals), and pilot testing of the standardized questionnaire. Data collection was carried out using a structured form, filled through interviews, clinical examination, and review of medical records, supplemented by reports of complementary tests (ECG, echocardiography, laboratory).

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Quality assurance relied on supervision by the principal investigator, consistency checks, double random reading of records, and resolution of discrepancies prior to final data entry. Missing data were documented by variable; analyses were conducted on complete cases only, with effective denominators specified for each percentage.

Statistical analysis

Data were analyzed with SPSS v23.0; Microsoft Excel 2019 was used for database preparation. Qualitative variables were presented as frequencies and percentages; quantitative variables as mean ± standard deviation, with minimum and maximum.

Potential biases and mitigation measures

To reduce selection bias, inclusion was consecutive and systematic over the study period and across both sites. Information bias was minimized through standardized tools, harmonized operational definitions, and specialist interpretation of cardiology tests, with triangulation of sources (clinical, medical record, test reports). Major confounding factors (age, parity, history, comorbidities) were collected to allow, where necessary, adjusted descriptive analyses.

Ethical considerations

The protocol complied with the Declaration of Helsinki and the Nuremberg Code[23]. It was submitted to the Ethics Committee of the Faculty of Medicine and Biomedical Sciences of the University of Yaoundé I, and institutional authorizations (HGOPY, HCY) were obtained before recruitment. Confidentiality, anonymization, and participants' dignity were ensured throughout the entire process of data collection and analysis.

Results

Social characteristics of the study population

The mean age of the patients was 28 ± 7 years, with extremes ranging from 15 to 43 years. The most represented age group was 15 to 25 years (n = 49; 42%). The majority of patients were single (n = 70; 60%), had a secondary level of education (n = 70; 61%), and were pupils or students (n = 37; 32%) (Table 1).

Cardiovascular history, blood pressure status, and clinical characteristics

Obesity was the main cardiovascular risk factor, observed in 40 patients (34.8%). Among personal histories, preeclampsia was the most frequent (n = 19; 14.6%), while hypertension predominated among family histories (n = 64; 55.2%), followed by diabetes (n = 35; 30.1%). Headaches were the most commonly reported symptom (n = 78; 67.2%), followed by lower limb edema (n = 40; 34.5%). Blood pressure distribution showed a predominance of grade I hypertension (n = 51; 44.0%). Regarding obstetric history, primiparity was found in 59 patients (50.9%); the majority of pregnancies were singleton (n = 108; 93.1%), and 75 patients (64.6%) had up-to-date antenatal follow-up. Calcium and iron prophylaxis had been administered to 84 (72.4%) and 112 (96.5%) patients, respectively, while aspirin was prescribed in 54 (46.6%) cases when indicated (Table 2).

Table 1: Sociodemographic characteristics.

Characteristics	Frequency(n)	Percentage (%)
Mean age ± sd [minimum -maximum]	28±7[15-43]	
Age_group (years)		
[15,25[	49	42
[25,35[	44	38
[35,45[	23	20
Marital status		
Single	70	60
Married	46	40
Education level		
Primary	10	9
Secondary	70	61
Higher education	35	30
Occupation		
Retail trader	26	23
Pupil or student	37	32
Employee (salaried)	29	25
No occupation	23	20

Paraclinical characteristics

On ECG, sinus tachycardia was the most common abnormality (5/116; 4.3%), followed by left ventricular hypertrophy (3/116; 2.6%), repolarization abnormalities (2/116; 1.7%), and prolonged PR interval (1/116; 0.8%). On echocardiography, abnormalities were rare and almost equally distributed: reduced ejection fraction, LVH, and elevated filling pressures (each 2/116; 1.7%), then four-chamber hypertrophy, patent foramen ovale, and dilated inferior vena cava (each 1/116; 0.8%). On the biological side, thrombocytopenia was the most frequent alteration (8/116; 7.2%), followed by anemia (6/116; 5.4%) and elevated transaminases (6/116; 5.2%). Renal markers were less often elevated (uremia 4/116; 3.4% and creatininemia 5/116; 4.3%), while D-dimers were increased in only one patient (0.8%) (Table 3).

Main cardiovascular pathologies diagnosed

Hypertensive disorders of pregnancy were the most frequent cardiovascular pathology (n = 111; 95.6%). Other conditions were rare: peripartum cardiomyopathy (n = 2; 1.7%), deep vein thrombosis (n = 1; 0.9%), atrial septal defect (n = 1; 0.9%), and atrioventricular block (n = 1; 0.9%) (Table 4).

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Table 2: Cardiovascular history, blood pressure status, and clinical characteristics.

clinical characteristiques	frequency (n)	Percentage (%)
Cardiovascular risk factors		
Obesity	40	34,8
Hypertension	11	9,5
Alcohol use	8	6,9
Physical inactivity	6	5,2
Smoking	2	1,7
Personal medical history		
Preeclampsia	19	14,6
Hypertension	11	9,5
HIV	2	1,8
Family history		
Hypertension	64	55,2
Diabetes	35	30,1
Preeclampsia/Eclampsia	13	11,2
Other	2	1,7
Cardiovascular symptoms		
Headache	78	67,2
Lower-limb edema	40	34,5
Palpitations	15	12,9
Visual disturbances	13	11,2
Dyspnea	10	8,6
Tinnitus	8	6,9
Epigastric pain	5	4,3
Chest pain	2	1,7
Blood pressure class		
Normal	7	6
Hypertension Grade I	51	44
Hypertension Grade II	33	28,5
Hypertension Grade III	25	21,5
Pregnancy history		
Primiparity	59	50,9
Singleton pregnancy	108	93,1
Multiple pregnancy	8	6,9
Up-to-date antenatal care	75	64,6
Calcium prophylaxis	84	72,4
Iron prophylaxis	112	96,5
Aspirin when indicated	54	46,6

Table 3: Paraclinical characteristics.

Paraclinical characteristics	Frequency (n)	Percentage (%)
Electrocardiogram (ECG) anomalies		
Sinus tachycardia	5	4.3
Left ventricular hypertrophy	3	2.6
Repolarization abnormality	2	1.7
Prolonged PR interval	1	0.8
Cardiac ultrasound (echocardiography) anomalies		
Reduced LVEF	2	1.7
Left ventricular hypertrophy	2	1.7
Elevated filling pressures	2	1.7
Four-chamber hypertrophy	1	0.8
Patent foramen ovale	1	0.8
Dilated inferior vena cava	1	0.8
Laboratory abnormalities		
Anemia (CBC)	6	5.4
Thrombocytopenia (CBC)	8	7.2
Elevated transaminases	6	5.2
Elevated urea	4	3.4
Elevated creatinine	5	4.3
Elevated D-dimers	1	0.8

Table 4: Main cardiovascular pathologies diagnosed.

Cardiovascular disease	Frequency (n)	Percentage (%)
Hypertension in pregnancy	111	95,6
Peripartum cardiomyopathy	2	1,7
Deep vein thrombosis	1	0,9
Atrial septal defect	1	0,9
Atrioventricular block	1	0,9

Discussion

Cardiovascular diseases (CVDs) during pregnancy are a major cause of maternal and fetal morbidity, particularly in resource-limited settings where access to screening, paraclinical examinations, and integrated cardio-obstetric pathways remains heterogeneous. In Yaoundé, the expected burden of hypertensive disorders and metabolic comorbidities, combined with social determinants (young maternal age, marital status, educational level) and suboptimal antenatal coverage, exposes patients to delayed diagnosis and an increased risk of complications. In this context, updated local data on the hospital prevalence of CVDs and on the clinical and paraclinical profile of pregnant women followed in referral hospitals are essential to guide early screening, risk stratification, and care organization. The present study was therefore designed to estimate the hospital prevalence of CVDs among pregnant women followed at HCY and HGOPY and to describe their clinical and paraclinical characteristics.

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The mean age (28 ± 7 years) and the strong representation of women aged 15–25 years (42%) reflect the profile of a young obstetric population in an urban sub-Saharan setting, where initiation and intensity of antenatal follow-up remain variable. The high proportion of single women with secondary education, including a substantial number of pupils/students, highlights social determinants likely to influence access to care, adherence, and timeliness of diagnosis. These findings are consistent with studies reporting low adoption and compliance with the WHO model of eight antenatal contacts in sub-Saharan Africa, with disparities linked to educational level, socioeconomic status, and urbanicity [24–26]. Better alignment with the 2016 WHO recommendations—focused on positive pregnancy experiences and quality contacts—could reduce adverse outcomes and improve early identification of CVDs, as described by De Masi et al. (2017) and Lattof et al. (2020) [27,28].

Obesity emerged as the most frequent risk factor (34.8%), consistent with literature associating overweight/obesity with approximately a twofold increased risk of preeclampsia [29–32]. The predominance of family history of hypertension suggests cumulative cardiometabolic vulnerability. Symptomatically, the high frequency of headaches aligns with the clinical presentation of hypertensive disorders of pregnancy (HDP). The predominance of grade I hypertension reinforces the need for early screening and preventive measures during pregnancy. Low-dose aspirin in women at risk reduces preeclampsia risk and is recommended by several organizations (American College of Obstetricians and Gynecologists / Society for Maternal–Fetal Medicine, the U.S. Preventive Services Task Force, and WHO), though the optimal dose (75–150 mg) and timing (before 16–20 weeks) remain debated [33–36]. In contexts of low calcium intake, calcium supplementation also reduces preeclampsia risk, supported by reviews such as those by Omotayo et al. and the 2011 WHO guideline [37–40]. These findings underscore the importance of integrated cardio-obstetric prevention targeting lifestyle and pharmacological prophylaxis in at-risk women.

The ECG abnormalities observed (sinus tachycardia, LVH, repolarization changes) were infrequent and may, in some cases, reflect the physiological adaptations of pregnancy (heart rate acceleration, QRS/axis changes, T-wave variations) that complicate clinical interpretation [41,42]. Echocardiographic abnormalities were also rare, consistent with data showing the role of echocardiography in distinguishing normal pregnancy adaptations (diastolic changes, volume variations) from true pathology and in guiding risk stratification [43–45]. Biologically, thrombocytopenia (7.2%) and anemia (5.4%) were less frequent than global estimates (anemia rates of 30–40% in many low-resource countries; gestational thrombocytopenia as the second most common hematologic abnormality of pregnancy) but remain consistent with selected hospital-based populations [46–48]. These results highlight the need for integrated clinical-paraclinical interpretation, considering gestational physiological variations to avoid over- or under-classification.

The predominance of HDP (95.6%) is consistent with the documented burden of HDP in maternal-fetal morbidity, including in sub-Saharan Africa, as shown by the meta-analysis of Gemechu et al. (2020) [5] and recent Global Burden of Disease analyses confirming persistently high regional prevalence [36,49]. Recruitment in referral hospitals may further inflate the proportion of complicated cases. Less frequent diagnoses such as peripartum cardiomyopathy (1.7%), deep vein thrombosis (0.9%), atrial septal defect (0.9%), and atrioventricular block (0.9%) were expected but remain clinically significant. PPCM is a specific cause of heart failure at the end of pregnancy/postpartum, often underdiagnosed due to overlapping symptoms with normal pregnancy [9,10,50]. Pregnancy-related venous thromboembolism remains a "silent risk," requiring vigilance and individualized prophylaxis [51–53]. Finally, congenital heart disease and conduction disorders expose women and newborns to complications and require specialized cardio-obstetric management [6,54,55]. Overall, these findings call for strengthening early screening, structuring cardio-obstetric referral systems, and addressing modifiable risk factors (obesity, hypertension) to reduce maternal-fetal morbidity.

Conclusion

Cardiovascular diseases during pregnancy are largely dominated by hypertensive disorders in a young population, with obesity as the main risk factor. The predominant symptoms were headaches and edema, while paraclinical abnormalities (ECG/echocardiography) were infrequent; biologically, thrombocytopenia and anemia were the most common findings. These results emphasize the need to reinforce early screening and the quality of antenatal care, to intensify preventive measures (lifestyle, aspirin and calcium for eligible women), and to structure cardio-obstetric care pathways to reduce maternal and fetal morbidity. Prospective analytical studies are needed to clarify modifiable determinants, assess the impact of interventions, and guide policies adapted to the Cameroonian context.

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Author Contributions

- Valérie Ndobo conceived and supervised the study, participated in protocol development, data collection, and manuscript drafting.

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- Siddikatou Djibrilla contributed to data analysis, interpretation of results, and critical revision of the manuscript.
- Murielle Bogne was involved in data collection, logistical organization, and data entry.
- Madye Ange Ngo Dingom contributed to patient management, clinical interpretation, and manuscript drafting.
- Wilfried Ndeme Mboussi performed statistical analysis, data interpretation, and preparation of the results.
- Pascal Mpono contributed to data collection, hospital coordination, and validation of clinical results.
- Félicité Kamdem contributed to methodological validation, scientific review, and discussion of the findings.
- Felix Essiben supervised the clinical and obstetrical analysis and participated in the final review.
- Liliane Mfeukeu-Kuate contributed to protocol development, medical supervision, and final revision of the manuscript.

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