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From IUGR to Fetal Demise: Epidemiological and Prognostic Profile in Yaoundé

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Abstract

Introduction: Intrauterine fetal demise (IUFD) remains a major public health problem, particularly in developing countries. Intrauterine growth restriction (IUGR) is one of its most common complications. This study aimed to describe the epidemiological, clinical, therapeutic, and prognostic aspects of IUFD complicating IUGR in three hospitals in Yaoundé. **Methods:** This was a descriptive study with prospective and retrospective data collection, conducted from January 1, 2014, to April 30, 2024, at the Yaoundé Central Hospital (HCY), the Yaoundé Gynaeco-Obstetric and Paediatric Hospital (HGOPY), and the Deo Gratias Hospital. The sample consisted of 52 pregnant women admitted for IUFD with IUGR diagnosed by ultrasound or growth curve projection. **Results:** The mean age of the pregnant women was 26.69 ± 8.71 years. The majority of the pregnant women were single (61.6%) and primiparous or nulliparous (32.7% each). The etiology of IUFD complicating IUGR was unknown in 51.9% of cases. Severe preeclampsia was the most common documented cause (26.9%). Management was dominated by spontaneous onset of labor in 76.9% of cases, resulting in vaginal delivery in 76.9% of cases. **Conclusion:** IUFD complicating IUGR in Yaoundé is mainly of undetermined etiology, highlighting the need to improve etiological investigation. Severe preeclampsia remains a major risk factor. Better prenatal monitoring and early management of IUGR are essential to reduce the incidence of this complication.

Keywords

IUFD, IUGR, Fetal Death, Yaoundé

1. Introduction

Intrauterine fetal demise (IUFD) is defined as any fetal death occurring before the onset of labor, after the limit of fetal viability as set by the World Health Organization (WHO), *i.e.*, 22 weeks of amenorrhea or fetal weight ≥ 500 g; in several developing countries, the threshold used is fetal weight ≥ 1000 g [1] [2]. Among the main risk factors identified, intrauterine growth restriction (IUGR) occupies a prominent place [3].

IUFD constitutes a major public health problem, particularly in developing countries, with a significantly higher prevalence in Africa [4]. In developed countries, the incidence is estimated between 4 and 12 per 1000 births, depending on the viability threshold used, whereas it can reach 30 per 1000 births in developing countries. Globally, it was estimated in 2019 that approximately 2.0 million stillbirths occurred from 28 weeks of gestation, corresponding to a global stillbirth rate of 13.9 per 1000 births [4]. This frequency varies considerably from one country to another depending on the socio-economic level and the quality of prenatal care. It is less than 1% in highly medicalized countries, with reported rates of 0.66% in Switzerland and 0.69% in France [5].

In Africa, available data show great heterogeneity: 1.72% in Tunisia, 4.18% in Senegal, and 2.96% in Guinea according to Diallo *et al.* in 2008. In the Democratic Republic of Congo (DRC), reported prevalences vary from 3.9% to 13.9% depending on the series [6].

In Cameroon, a 2010 study on the etiologies of maternal mortality highlighted a predominance of hypertensive disorders in 22.4% of cases [7]. In 2018, Momo *et al.* conducted a case-control study at the Yaoundé Central Hospital identifying several risk factors associated with IUFD [2]. More recently, in 2021, Metogo *et al.* reported a frequency of IUFD of 5.9% in a reference maternity hospital in Yaoundé [4].

Beyond its epidemiological impact, IUFD also represents a major psychological ordeal, both for couples and for healthcare teams. It is a particularly traumatic event, often poorly accepted, generating in parents a feeling of guilt and many questions to which medical teams do not always have clear answers [4]-[6].

2. Methods

2.1. Study Type and Setting

We conducted a descriptive study with historical-prospective data collection, over the period from January 1, 2014, to April 30, 2024. The study took place in three hospitals in the city of Yaoundé, Cameroon: the Yaoundé Central Hospital (HCY), the Yaoundé Gynaeco-Obstetric and Paediatric Hospital (HGOPY), and the Deo Gratias Hospital. These centers were chosen because of their status as referral hos-

pitals and their obstetric activity volume.

2.2. Study Population and Sampling

The study population consisted of pregnant women admitted for IUFD. Inclusion criteria included any pregnant woman admitted for IUFD with IUGR diagnosed by ultrasound or after projection of fetal parameters onto a growth curve, regardless of fetal maceration. Cases of IUFD dating back more than two weeks or incomplete files were excluded.

A total of 192 files of patients presenting with IUFD were identified during the study period. Among these, 117 records were not eligible for recruitment because of unavailable files, incomplete documentation, absence of ultrasound confirmation of IUGR, or failure to meet inclusion criteria. Seventy-five patients were initially recruited, and 23 were subsequently excluded because the IUFD had occurred more than two weeks before admission or because the medical records were incomplete. The final analysis therefore included 52 cases of IUFD associated with IUGR.

2.3. Data Collection and Analysis

Data were collected using an anonymous survey form, including sociodemographic variables, obstetric history, clinical aspects, etiologies, management modalities, and prognosis. Etiologies were assigned based on clinical evaluation, obstetric history, laboratory investigations when available, ultrasound findings, and delivery data recorded in patient files. Placental histopathology, fetal autopsy, and advanced genetic investigations were not routinely available in the participating hospitals. Variables with missing or undocumented data were analyzed descriptively, and interpretations involving incompletely documented variables were made cautiously.

2.4. Ethical Considerations

Ethical and administrative approvals were obtained from the various healthcare facilities. Data confidentiality was guaranteed after obtaining participant consent. Participants were free to withdraw at any time without hindrance to the rest of their care.

3. Results

3.1. Study Setting and Population

A total of 192 patient files presenting with IUFD were identified. Of these, 75 patients were initially recruited, of whom 23 were excluded according to the exclusion criteria. The final sample thus comprised 52 patients presenting with IUFD complicating intrauterine growth restriction (IUGR).

3.2. Frequency of IUFD Associated with IUGR

Of the 192 cases of IUFD recorded in the three Yaoundé hospitals during the study

period, 52 cases were associated with IUGR, corresponding to a frequency of 27.08%.

3.3. Sociodemographic Characteristics of Patients

The mean age of patients was 26.69 ± 8.71 years, with extremes ranging from 16 to 42 years. The most represented age group was 30 - 35 years (38.6%).

The majority of patients were single (61.6%) and unemployed or housewives (38.5%). Patients came mainly from the Centre region (44.2%). The place of residence was not documented in 80.8% of files.

3.4. Clinical and Obstetric Characteristics

Comorbidities were found in 21 patients (40.3%). Hypertension was the most frequent (30.8%), followed by HIV infection (3.8%), hepatitis B (3.8%), and sickle cell disease (1.9%).

Nulliparous and primiparous women each represented 32.7% of the population. A history of abortion was noted in 46.1% of patients. No history of IUFD or gestational diabetes was found. A history of previous gestational hypertension was reported in 3.8% of patients (Table 1).

Table 1. Distribution of obstetric history before IUFD.

Variables	N = 52	Frequency (%)
Gestity		
Primigesta	19	36.6
Paucigesta	14	26.9
Multigesta	14	26.9
Grand multigesta	4	7.7
Parity		
Nulliparous	17	32.7
Primiparous	17	32.7
Pauciparous	12	23.1
Multiparous	5	9.6
History of abortion	24	46.1
History of gestational hypertension	2	3.8

No prenatal care (PNC) visits had been performed in 32.7% of patients, and the number of PNC visits was undocumented in the same proportion. Among the patients who received follow-up (67.3%), follow-up was mainly provided by midwives (48.1%). Iron and folic acid supplementation was noted in 65.4% of patients and the use of LLITNs in 63.5%. At least two doses of TTV had been administered in 67.3% of patients, while 53.8% had received three or more doses of IPTp. No patient tested positive for toxoplasmosis or rubella. Hepatitis was found in 5.7% of cases. No obstetric ultrasound had been performed in 34.6% of patients (Table 2).

Table 2. Data relating to the follow-up of the pregnancy ending in IUFD.

Variables	N = 52	Frequency (%)
Number of PNC visits		
0	17	32.7
1 - 3	10	19.2
4 - 7	6	11.5
≥8	2	3.8
Healthcare provider	35	67.3
Midwife	25	48.1
Gynecologist	5	9.6
Nurse	2	3.8
General practitioner	3	5.8
Number of TTV doses		
<2	17	32.7
≥2	35	67.3
Iron + folic acid	34	65.4
LLITN use	33	63.5
Number of IPTp doses		
0	17	32.7
1 - 2	7	13.5
3 - 4	28	53.8
4	0	0
Hepatitis	3	5.7
Number of ultrasounds performed		
0	18	34.6
1	7	13.5
2	15	28.8
3	12	23.1

3.5. Characteristics of IUFD

The majority of patients were referred (78.9%). The main reason for consultation was the absence of active fetal movements (69.2%), followed by pelvic pain (11.6%).

The mean gestational age at diagnosis was 33.48 ± 5.38 weeks of amenorrhea, with extremes of 22 to 44 weeks. IUFD occurred mainly between 28 and 37 weeks (46.2%). Pregnancies were monofetal in 86.5% of cases. Membranes were intact on admission in 92.3% of cases. Several obstetric parameters, notably fetal presentation and amniotic fluid appearance, were mostly undocumented (Table 3).

Table 3. Clinical examination data.

Variables	N = 52	Frequency (%)
Gestational age (weeks)		
<28	11	21.1
[28 - 37]	24	46.2
[37 - 42]	16	30.8
≥42	1	1.9
Nature of pregnancy		
Monofetal	45	86.5
Multiple	7	13.5
Membrane status on admission		
Intact	48	92.3
Ruptured	4	7.7
Amniotic fluid appearance		
Documented	0	0
Undocumented	52	100
Fetal presentation		
Cephalic	5	9.7
Breech	2	3.8
Transverse	0	0
Undocumented	45	86.5
History of gestational diabetes	0	0

An etiology was identified in 48.1% of cases. Vascular and placental causes were the most frequent (36.4%), dominated by severe preeclampsia (26.9%). Maternal causes represented 7.7%, mainly related to anemia, and fetal causes 3.8%, represented by congenital malformations. No cause was identified in 51.9% of cases (Table 4).

Table 4. Suspected etiologies in IUFD with IUGR.

Variables	N = 52	Frequency (%)
Etiology		
Documented	25	48.1%
Maternal causes	19	36.5
Sickle cell disease/anemia	4	7.7
Fetal causes	10	19.2
Multiple malformation syndrome	2	3.8

Continued

Vascular/placental causes		
Gestational hypertension	1	1.9
Severe preeclampsia	14	26.9
Tight nuchal cord	2	3.8
Placenta previa	1	1.9
Retroplacental hematoma	1	1.9
Undocumented	27	51.9%

3.6. Management Modalities

Labor was spontaneous in 76.9% of cases. Artificial induction was performed in 23.1% of patients, mainly with prostaglandins (95%). Delivery was vaginal in 76.9% of cases and by cesarean section in 23.1%, with indications mainly being severe preeclampsia and IUFD of the second twin (Table 5).

Table 5. Characteristics of labor and delivery.

Variables	N = 52	Frequency (%)
Labor induction		
Spontaneous	40	76.9
Artificial	12	23.1
Induction methods (n = 40)		
Medical (prostaglandins)	38	95.0
Mechanical (Foley catheter)	2	5.0
Mixed	0	0
Mode of delivery		
Vaginal delivery	40	76.9
Cesarean section	12	23.1
Indication for cesarean section (n = 12)		
Scarred uterus	1	8.3
Retroplacental hematoma	0	0
Severe preeclampsia	3	25.0
IUFD of second twin	2	16.7
Undocumented	6	50.0

Male fetuses accounted for 51.9% of cases (sex ratio = 1.08). The mean fetal weight was 1486 ± 824 g. The majority of fetuses were fresh stillbirths (78.8%). Morphological abnormalities were observed in 5.8% of cases.

3.7. Maternal Prognosis

Maternal complications were observed in 5.8% of patients, mainly postpartum hemorrhage (3.8%) and DIC (1.9%). No maternal deaths were recorded.

4. Discussion

4.1. Epidemiological Aspects

Among the IUFD cases identified during the study period, 27.08% were associated with IUGR is notably higher than the rates reported by Metogo *et al.* (5.9%) and Kangulu *et al.* (13.9%) [6] [8]. This discrepancy may be attributed to the heterogeneity of the study population due to the multicenter nature, variations in the diagnostic criteria for IUGR and IUFD, as well as the specific epidemiological characteristics of the Yaoundé population (prevalence of comorbidities, access to care).

4.2. Sociodemographic Characteristics of Patients Presenting with IUGR Complicated by IUFD

The mean maternal age was 26.69 ± 8.71 years, comparable to those reported in Cameroon by Metogo *et al.* (29.1 ± 6.4 years) and in the Democratic Republic of Congo by Wembonyama *et al.* (29.5 ± 6 years) in 2021 [4] [6]. A notable proportion of patients (38.6%) were aged 30 - 35 years. Several African studies have identified maternal age ≥ 30 years as a risk factor for obstetric complications, notably IUGR and intrauterine fetal death, particularly in Guinea Conakry (Diallo *et al.*, 2015) and Cameroon (Momo *et al.*, 2018) [2] [5]. Other authors have even reported an increased risk beyond 35 years [8]. These data suggest that advanced maternal age constitutes an important vulnerability factor in the occurrence of IUFD complicating IUGR, possibly related to the increase in maternal comorbidities and placental alterations associated with aging.

In our study, 61.6% of patients were single, a proportion close to those reported by Soumah *et al.* in Guinea (79.25%) and Metogo *et al.* in Cameroon (85.7%) [4]. Furthermore, 38.5% of patients were unemployed. This predominance of single and economically vulnerable women could partly explain the occurrence of IUGR complicated by IUFD through limited access to prenatal care and insufficient obstetric follow-up. The financial and psychosocial support generally observed among married women would promote better adherence to prenatal consultations, unlike single, unemployed women who are often confronted with socio-economic constraints that increase the risk of undetected or late-managed obstetric complications.

4.3. Clinical and Obstetric Characteristics of Patients

In our series, 32.7% of patients were nulliparous or primiparous, a result comparable to those reported by Metogo *et al.* in Cameroon in 2021 (42.9%) and Diallo *et al.* in Guinea Conakry in 2015 (25.71%) [4] [5]. The majority of patients in our series were nulliparous or primiparous (65.4%). Metogo *et al.* in Cameroon in

2021 (42.9%) and Diallo *et al.* in Guinea Conakry in 2015 (25.71%) also found these groups to be predominant. Indeed, primiparity is a major risk factor for preeclampsia. This preeclampsia is a major factor in the occurrence of IUGR, as also found in our work. Therefore, we can understand why this population group would be predominant in our study.

The majority of patients (78.9%) were referred to our facility, contrasting with data from Traoré Mohamed *et al.* in Guinea in 2014, where 59.5% of women consulted spontaneously [9] [10]. The predominant reason for consultation was the absence of active fetal movements (69.2%), followed by pelvic pain (11.6%). These results are similar to those reported in the DRC by Wembonyama *et al.* in 2021 and in Guinea by Diallo *et al.* in 2015, with a similar predominance of absence of fetal movements [5] [6]. The high referral rate and the nature of the reasons for consultation reflect a late presentation, often at a stage where IUFD is already established, highlighting the importance of early detection of fetal distress and the strengthening of referral systems.

Prenatal follow-up was insufficient in our population, with nearly one-third of patients (32.7%) having had no prenatal care visits, contradicting WHO recommendations that optimal pregnancy follow-up is based on eight prenatal contacts. This result is comparable to that of Soumah *et al.* in Guinea in 2018 [11]. The insufficient prenatal follow-up observed in this study may partly reflect socio-economic barriers limiting access to antenatal care. The absence of PNC compromises the early detection of maternal-fetal complications and the implementation of preventive interventions, thus increasing the risk of IUGR complicated by IUFD.

The majority of diagnoses of IUFD complicating IUGR were made between 28 and 37 weeks of amenorrhea (46.2%), contrary to the results of Niaré *et al.* in Mali in 2019, who reported a predominance between 37 and 40 weeks [12]. This difference could be explained by the fact that the gestational age retained corresponded to that of delivery in our study. The fetuses mainly had a weight between 1000 and 1500 g for a gestational age of 31 - 34 weeks, confirming the diagnosis of IUGR. A slight male predominance was observed (51.9%), a result consistent with the data from Diallo *et al.* in Guinea in 2016 [5]. Stillbirths were essentially fresh stillbirths (78.8%), suggesting relatively rapid referral to appropriate facilities after fetal death.

4.4. Observed Etiologies

An etiology could be identified in 48.1% of cases, while 51.9% remained undetermined, a proportion comparable to that reported by Foumane *et al.* in Cameroon in 2021 [6]. Vascular and placental causes were predominant (36.4%), dominated by preeclampsia (26.9%), in agreement with the results of Andriamandimbison *et al.* in 2013 [13]. These data confirm the central role of placental insufficiency, secondary to defective remodeling of the spiral arteries, leading to fetal hypoxia and nutritional deficiency responsible for IUGR and, in severe forms, IUFD. The high proportion of undetermined causes underscores the need for further investiga-

tions, including placental histopathology and post-mortem examination.

IUFD complicating IUGR was associated with several maternal complications, including postpartum hemorrhage, anemia, and disseminated intravascular coagulation. In our study, two cases of postpartum hemorrhage (3.8%), one case of DIC (1.9%), and three cases of maternal anemia (5.8%) were recorded. No maternal deaths were observed, with a case fatality rate comparable to that reported by Metogo *et al.* in 2021 (11.9%) [4]. These results are likely explained by the management in referral centers, which are better equipped to handle obstetric emergencies. However, the occurrence of these complications justifies rigorous postpartum monitoring in patients who have presented with IUFD associated with IUGR.

5. Limitations

This study has several limitations. First, its descriptive design limits causal interpretation. Second, retrospective data collection exposed the study to missing and incomplete documentation for several variables. Third, etiological investigations were limited by the lack of systematic placental histopathology, fetal autopsy, and advanced laboratory testing, which may explain the high proportion of cases classified as having no identified cause.

6. Conclusions

Intrauterine fetal demise complicating intrauterine growth restriction constitutes a major obstetric problem in our context, with IUGR being identified in 27.08% of IUFD cases in our cohort. It occurs preferentially in socially vulnerable women, who are inadequately monitored during pregnancy, and is often diagnosed late, at a stage where prevention possibilities are limited.

Placental insufficiency, frequently associated with hypertensive disorders of pregnancy, appears to be the main pathophysiological mechanism identified, although a significant proportion of cases remain without a clearly established etiology (51.9%). Management, mainly based on labor induction and vaginal delivery, helped limit maternal mortality despite the occurrence of sometimes severe complications such as postpartum hemorrhage, maternal anemia, disseminated intravascular coagulation (DIC), and disseminated intravascular coagulation (DIC), although no maternal deaths were recorded in our series.

These results underscore the need to strengthen early screening for IUGR, improve the accessibility and quality of prenatal follow-up, and optimize referral systems to reduce the occurrence of IUFD and its maternal consequences.

Authors' Contributions

MNJA, NLM, NNCC: conception, recruitment, writing; MHL, IAM, MTLW: writing and revision; NSR, NDMA, KM: revision.

Conflicts of Interest

The authors report no conflicts of interest.

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