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Original Research Article

Evaluation of stillbirths: an epidemiological study over a 10-year period in Senegal

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ABSTRACT

Background: The main objective of this study was to analyse a series of foetal deaths from an epidemiological, clinical and aetiological point of view.
Methods: This study was performed over a period of ten (10) years, from 1 January 2014 to 31 December 2023. Our study included all patients who had delivered a stillbirth in our department after twenty-eight (28) weeks of amenorrhoea. The CODAC (causes of death and associated conditions) classification was then used to identify the principal aetiological groups. All data were analysed first in Microsoft Excel 2016 and then using the Statistical Package for Social Science (SPSS 26, Mac version).
Results: Over 10 years, we recorded 1812 cases of stillbirth out of a total of 60794 deliveries, representing a frequency of 2.9%. The average age of the patients was 28 years, with a mean gestite of 1.97. Artificial induction of labour was performed in 20.9% of cases. The most common maternal pathologies were, in order of frequency, retroplacental haematoma, maternal obesity and gestational diabetes. A caesarean section was performed in 26.7% of cases. The average birth weight was 1916 g. Using the CODAC classification, the most common causes were maternal, followed by placental anomalies. No cause was found in 35.4% of cases.
Conclusions: Our results reveal several challenges for improving the management of foetal deaths. It is crucial to strengthen diagnostic capacities, particularly through foetal autopsies and histological examinations of the placenta, and to train healthcare professionals in post-mortem investigation techniques.

Keywords: CODAC, Etiology, Pregnancy, Stillbirths

INTRODUCTION

Stillbirth is defined as the birth of an infant without signs of life after a certain gestational age. According to the WHO, stillbirth is referred to as a stillbirth from 28 weeks' gestation, i.e. a birth weight of at least 1000g.[1] This is a frequent situation, with a large proportion of these deaths occurring at the time of delivery. The frequency varies from country to country and is a reflect of the quality of ante-natal and perinatal care. The estimated number of newborns stillborn at 28 weeks' gestation is 2.6 million worldwide, resulting in a global stillbirth rate of 13.9 per 1000 births in 2021.[2] Stillbirth rates show significant regional disparities, ranging from 22.8 per 1000 births in West and Central Africa to 2.9 per 1000 births in Europe. The same study found that just over three quarters of stillbirths worldwide were concentrated in the three regions with the highest rates, namely South Asia, West and Central Africa and East and Southern Africa.[2-4]

The causes are varied, ranging from maternal causes to foetal malformations. In some cases, etiological research is difficult, with no obvious cause in the absence of advanced investigation. The main aim of this study was therefore to analyse a series of foetal deaths from the epidemiological, clinical and etiological aspects.

METHODS

Study design

This was a descriptive cross-sectional study carried out in the maternity unit of the Philippe Maguilen SENGHOR health Center.

Study period

This study was conducted over a period of ten (10) years, from 1st January 2014 to 31st December 2023.

Inclusion criteria

Our study included all patients who had given birth in the department to a stillborn baby after twenty-eight (28) weeks of amenorrhoea (SA).

Exclusion criteria

Fetal deaths occurring before twenty-two (28) weeks of amenorrhoea (SA) and those whose records could not be analysed were not included in our study.

Parameters studied

The parameters studied were as indicated below: 1) Socio-demographic characteristics: maternal age, mode of admission (self-referral, referral); 2) Personal history: gestity, parity, medical history, obstetric history; 3) Pregnancy characteristics: term of pregnancy, type of pregnancy, antenatal follow-up data; 4) Obstetrical data: amniotic sac (ruptured, intact), stage on admission, type of presentation.

Therapeutic data: induction of labour, mode of delivery, obstetric interventions (episiotomy, caesarean section, manipulations).

The characteristics of stillborn babies: sex, morphological appearance, weight; whether or not there were any anomalies.

The aetiologies of the stillbirths were identified on the basis of the patients' clinical examination, pregnancy data, associated pathologies and the examination at birth. It was not possible to carry out a foetopathological examination. The CODAC (causes of death and associated conditions) classification was then used to identify the major etiological groups.

Data and analysis

Data were extracted from the E-Perinatal database of Philippe Maguilen Senghor health center. The data were analysed using SPSS version 26 and Microsoft Excel 2019. Descriptive statistical analyses were performed on the continuous quantitative variables to determine their position and dispersion parameters. Frequencies were also calculated for qualitative and categorical variables.

RESULTS

Frequency

During the study period, the Philippe Maguilen SENGHOR health care recorded 1812 cases of stillbirths beyond 28 weeks of amenorrhoea out of a total of 60 794 deliveries, a frequency of 2.9%.

Socio-demographic characteristics

In our study, the average age of our patients was 28.4 years, with a maximum age of 47 years and a minimum age of 14 years. Patients over 35 represented 21.5% of the cohort.

The average number of previous pregnancies among the patients studied was 1.97, with extreme values of 0 and 12 pregnancies. Primigravida patients represented 36.4% of the cohort. Patients were evacuated to our facility for delivery management in 597 cases, a corresponding frequency of 36.7%. A previous caesarean section was recorded in 180 patients, a frequency of 11.1%. The average number of antenatal visits was 3, with extremes of 0 and 9. More than half the patients (53.4%) in our cohort had fewer than 4 antenatal visits.

Obstetrical data

These were mainly singleton pregnancies, with a frequency of 98%.

An estimate of the risk level of the pregnancy based on the maternal characteristics, the patient's history and the pathology associated with the pregnancy estimated that 68.4% of pregnancies were low-risk.

With regard to the term of the pregnancy, 43.8% were full-term, 49.5% premature and 4.2% post-term. In almost half the cases (43.7%, n=370), fetal cardiac activity was normal on admission.

The amniotic sac had already ruptured in 22.7% of cases (n = 370). The fetal presentation was cephalic in 88.8% of cases, while breech presentation occurred in 10%. At admission, most patients were already in labour (72.3%; n=1,177). Labour had been induced in 382 patients, a rate of 20.9%. The majority of inductions were performed with a prostaglandin analogue.

Table 1: Summary table of maternal and obstetric characteristics of patients in the event of a stillbirth.

Variables	Number	Percentage
Age in years		
<18	57	3.1
>35	393	21.7
Parity		
Nulliparous	659	36.1
Multiparous	157	8.6
Referral admission	622	34.1
Pregnancy term		
Pre-term	904	49.5
Term	800	43.8
Post-term	77	4.2
Low risk pregnancy	1240	68.4
Fetal heart rate		
Absent	840	46
Normal	798	43.7
Induction of labor	382	20.9
Mode of delivery		
Caesarean section	488	26.7
Fetal condition		
Fresh stillbirth	795	43.5
Macerated stillbirth	1031	56.5

Table 2: Distribution of disorders associated with pregnancy in the event of a stillbirth.

Pathology	Number	Percentage
Retroplacental haematoma	325	20
Obesity	462	28.4
Gestational diabetes	91	5.6
Funicular abnormalities	75	4.7
Intrauterine growth restriction	20	1.2
Abnormal amniotic fluid volume	29	1.8
Fetal macrosomia	68	4.2

The pathologies associated with pregnancy were, in order of frequency, retroplacental haematoma, maternal obesity, gestational diabetes, funicular anomalies, fetal hypotrophy and amniotic fluid volume anomalies (Table 2).

In terms of mode of delivery, caesarean section was performed in 488 patients, representing a frequency of 26.7%. The main indications for caesarean section were antepartum haemorrhage (28.5%), vasculo-renal syndromes (19.2%), fetal distress (13.4%), abnormal presentation (5.2%), multi-scar uterus (5.2%) and mechanical dystocia (4.8%).

Characteristics of stillborn

The mean birth weight was 1916 g with extremes of 500 and 6700 g. There was a slight predominance of males (49.5%), and the sex was undetermined in 22 cases (1.2%).

Examination of the fetus at birth revealed a stillborn baby in a state of maceration in more than half the cases (N=1031; 56.5%).

Comparing the mode of delivery and the condition of the fetus at birth, a caesarean section was performed in only 9.4% of cases where death had occurred antepartum. Caesarean section was performed in these cases mainly because of vasculo-renal syndrome, antepartum hemorrhage and a multi-scarred uterus.

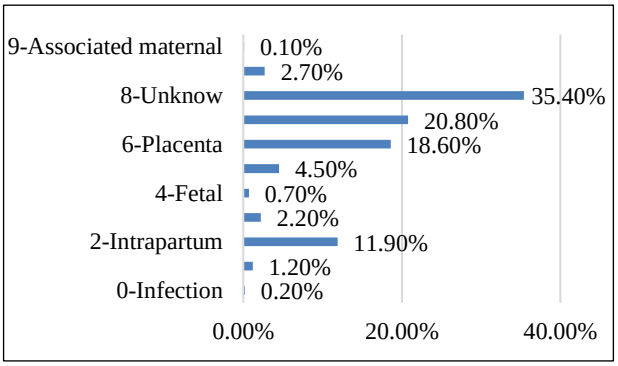

Figure 1: Distribution of causes of stillbirth according to CODAC classification.

Figure 1 shows the distribution of causes of stillbirth according to the CODAC classification. A maternal pathology was more frequently implicated in the occurrence of perinatal death (N= 381; 20.8%). It should be noted that in a third of cases no cause was found (N= 646; 35.4%).

DISCUSSION

At the end of the study, 60 794 deliveries were recorded, including 1812 stillbirths, giving a stillbirth rate of 29 per 1000 births. The average age of the patients was 28.35 years; patients aged over 35 represented 21.5% of the cohort.

Primigravida represented 36.4% of the study population. The average number of antenatal visits was 3. The majority of our patients (49.5%) were preterm. The majority of deliveries were vaginal, accounting for 74.5% of cases. In the majority of cases, no cause could be found (35.4%). Cases where an etiology was identified, it was most often a maternal cause (20.8%).

Interpretation of results and implications for research

During the study period, stillbirths accounted for 2.9% of births at the Philippe Maguilen Senghor health care. This rate is lower than those reported by many African authors such as Andriamandimbison at Antananarivo University Hospital (Madagascar), Diallo MH in Guinea and Kangulu IB in the DRC.[5-7] These rates are 5.2, 6.9 and 13.9% respectively. European data show much lower figures: this is the case for Deros-Degras et al in Guadeloupe, who

observed a frequency of 0.1%, and Cayrol et al in France, with 0.3%.[8,9]

n our study, the patients were young, with an average age of 28 years. The average age found was similar to that found by Arama et al in Mali, with an average of 28±6 years (extremes: 16 and 42 years), and Mercuzot et al in Amiens, with an average of 28.8 years.[10,11] This similarity could be explained by the fact that the age category between 20 and 35 corresponds to the period of greatest obstetrical activity, and not necessarily because it represents the age group most at risk. Patients over 35 represented 21.5% of the cohort. Several authors have identified age over 35 as a significant risk factor for stillbirth.[12]

In our study, 34.2% of patients were referred to us for management of a pathological pregnancy or with confirmed fetal death. These persistently high rates of obstetric evacuation in Kinshasa demonstrate the importance of strengthening the health network and systematically assessing patients' risk levels. This would make it possible to prevent certain complications and, failing that, to ensure early treatment, thereby reducing the number of stillbirths.

The majority of patients were not yet at term (53%). According to the Andriamandimbison study, prematurity is a major risk factor for stillbirth, although full-term fetuses are not spared either.[13] These high rates of prematurity in the study population underline the importance of etiological research and appropriate management of the threat of premature birth.

The average number of antenatal consultations was 2.86±1.28 (with a minimum of 0 and a maximum of 9 consultations). According to Senegal's EDS-Continue 2023, the proportion of women who had attended at least four antenatal clinics had risen from 47% in 2012-2013 to 68% in 2023. Similarly, the coverage of early antenatal consultations, carried out during the first trimester of pregnancy, increased from 56% to 71% over the same period. These improvements are crucial for detecting and managing potential pregnancy complications at an early stage. Several studies have shown that inadequate pregnancy monitoring exposes women to an increased risk of perinatal death. In particular, Mohsin et al observed a risk multiplied by 1.12 in patients whose first contact with the maternity hospital did not take place until after the first trimester.[14]

A study carried out in Ghana in 2016 showed that better quality antenatal consultations reduced the risk of stillbirth by about half, even after taking into account other factors such as the type of practitioner and the delivery establishment. Pregnant women's awareness of pregnancy complications plays a significant role in this risk reduction, depending on the quality of antenatal visits.[15]

In our country, antenatal consultations face serious challenges, largely related to socio-cultural obstacles, the quality of pregnancy management, referral and access to care, and the inadequacy of technical facilities and human resources.

Obstetric pathologies during pregnancy included, in order of frequency, obesity (28.4%), gestational diabetes (5.4%) and funicular anomalies (4.7%). During labour, complications of vasculo-renal syndromes were frequently observed, such as retroplacental haematoma (20%). These findings have been confirmed by a number of studies, including one in the United States which showed that maternal obesity was a significant risk factor for stillbirth, particularly in the late stages. Another study of more than 54,000 women in the Danish National Birth Cohort showed that a BMI of 30 was associated with a risk of fetal death of 3.5 at 37-39 weeks and 4.6 at 40 weeks or more, compared with women of normal weight.[16] In the literature, maternal overweight and obesity (body mass index >25 kg/m²) are identified as the most significant modifiable risk factor, contributing to approximately 8,000 stillbirths (≥22 weeks' gestation) per year in high-income countries.[17] Concerning vasculo-renal syndromes, particularly pre-eclampsia, a study carried out in a university maternity hospital in Dakar found a frequency of 10.5% of fetal deaths in utero.[18] This may be explained by the frequent fetal complications associated with these conditions, in particular intrauterine growth restriction , which can lead to death during prepartum and labour. According to the literature, the incidence of foetal death in utero is double in hypertensive patients compared with normal pregnancies. This risk is further increased in the presence of complications such as pre-eclampsia, retroplacental haematoma or eclampsia, as well as in cases of associated IUGR. The occurrence of foetal death is mainly linked to a reduction in placental perfusion, resulting from defective remodelling of the spiral arteries.[19]

Concerning the delivery, the vaginal route was the most frequent, with a frequency of 74.5%. This rate is lower than the rates reported by Goïta et al in Mali and Zouaki et al in Morocco, who respectively observed vaginal delivery rates of 89.4% and 85.7%.[20,21] This is logical, as vaginal delivery is generally preferred in the event of foetal death. In the literature, caesarean section has been indicated either because vaginal delivery and/or induction were not possible, or in cases of maternal emergency.[20]

In our study, antepartum haemorrhage was the main indication for caesarean section, as immediate intervention was necessary to protect the mother's life.

For the characteristics of stillbirths, there was a slight predominance of males. This trend was also observed by Diallo et al, Ouena et al, Niare et al who reported a male predominance of 52%, 55.5% and 59.13% respectively.[22,19,23] We have found no specific explanation for this situation. The average birth weight was 1916

grams, with extremes of 500 and 6700 grams. This is explained by the fact that in our study the majority of deliveries were premature. Examination of the fetus at birth revealed a stillborn in a state of maceration in more than half of the cases (n=1031; 56.5%). The still high rate of fresh stillbirths, suggesting death shortly before the start of labour or before birth, shows the importance of rigorous monitoring of the peripartum period, especially if there is an associated high-risk pathology. This also shows the importance of assessing the level of risk at the beginning of pregnancy in order to adapt the follow-up and guide the woman towards care at the end of her pregnancy.

In our study, the causes of stillbirth remained largely unknown in 35.4% of cases. When a cause was found, it was more often a maternal pathology followed by placental abnormalities. In comparison, a study conducted in Amiens revealed that placental causes constituted 54% of the identified aetiologies, maternal pathologies 20% and unknown causes 6%.[11] A study conducted in 50 countries in 2018 shows that, regardless of income level (low, middle or high), stillbirths were most often reported as unexplained, attributed to other causes, or due to haemorrhage.[24]

This situation in our country can be explained by the absence of additional investigations to determine the causes, such as fetal autopsy, histological examination of the placenta, cytogenetic analysis, fetal radiography and some biological examinations, due to the lack of technical equipment, financial and human resources.

Furthermore, it is complex to determine the causality of an abnormality or condition associated with the occurrence of foetal death, especially considering that some abnormalities may also be present in live births.[11] The proportion of intrapartum deaths with no associated pathology found was 11.9%. This high rate of intrapartum deaths highlights the importance of strengthening perinatal care.

CONCLUSION

Stillbirth remains common in our countries, with various causal factors. In the majority of cases, no causal factor was found, mainly due to the lack of more in-depth investigations, particularly foetopathology and genetics. Reducing this stillbirth rate requires a better understanding of the mechanisms involved, but also high-quality prenatal monitoring to enable early diagnosis and appropriate management of high-risk pregnancies.

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