Research

African ancestry and the threshold for preterm birth in French Guiana: impact of prematurity irrespective of ethnicity

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Article

Abstract

Introduction: in French Guiana, preterm birth has remained at 13% despite efforts to improve antenatal care. It has been hypothesized that this high preterm birth rate is partly explained by the fact that women of African descent naturally tend to deliver earlier than Caucasian women. Our aim was to test this hypothesis using birth registry data. *Methods:* one data set was used: the 2013-2014 registry data for 12,983 live births, which included place of birth and adjustment variables such as social factors and comorbidities. Birth length by ethnicity/place of birth was analyzed. The proportion of neonatal intensive care unit transfer for births at 36 weeks was examined by ethnicity/place of birth and adjusted for potential confounders using logistic regression. *Results:* the median length of gestation was one week lower among Surinamese mothers (38 weeks) compared to other birthplaces. The birth was 0.5-0.8 weeks earlier in mothers born in countries with a predominant African ancestry compared to metropolitan France. After adjustment for social variables, preterm birth was still more common in populations of predominantly African ancestry: French Guiana, Suriname, and Haiti. However, at 36 weeks, there were no statistical differences between ethnic origins regarding complications requiring intensive care. *Conclusion:* although we found that women of African descent generally delivered earlier than Caucasian women or women born in mainland France, we found no argument to suggest that this was "physiological". In fact, looking only at 36 weeks, there were no differences in terms of complications requiring neonatal intensive care. This suggests that, irrespective of ethnicity, being born before 37 weeks is associated with neonatal complications and that the assumption that the high rates of preterm birth are partly artefactual cannot be supported by the available data.

Introduction

Gestational age is a useful but imperfect correlate of fetal maturation. It is highly correlated with the risk of neonatal death in the first year [1,2]. The relationship between gestational age and fetal maturation may be influenced by a variety of maternal stressors and has been shown to vary by ethnicity. A number of studies have shown that preterm birth varies by ethnicity, even when controlling for common confounders. Other studies have suggested decreased morbidity and mortality (hyaline membranes, need for mechanical ventilation) in preterm infants of African descent compared with those of Caucasian descent. On the contrary, in term and post-term infants, there seemed to be a reversal with increased morbidity in infants of African ancestry. Meconium staining, a marker that is more common in post-term deliveries, is more common in babies of African ancestry, suggesting that they mature earlier. In French Guiana, a French territory in South America, the rate of preterm birth is twice that of mainland France, a rate that has not declined over the past 2 decades. In addition, there is heterogeneity of preterm birth within French Guiana, with western French Guiana a region characterized by social vulnerability and geographic isolation from health care centers having consistently higher preterm birth rates. It is usually assumed that this reflects social inequalities in health [3].

However, in French Guiana and other French overseas territories with large populations of African descent, health professionals often argue that black women physiologically give birth about a week earlier than white women. This systematic one-week shift is therefore suspected by some of inflating the preterm birth rate, and it is therefore suggested that preterm birth may require a different definition between black and white women, perhaps that the threshold should be 36 weeks in black populations. However, perinatal deaths are indeed a significant cause of early mortality in French Guiana, suggesting that

preterm birth is a very real public health priority. Black populations have been shown to have higher rates of preterm birth, but often the major confounding factor is marked underlying social inequalities and psychosocial stressors that explain most of this association. We have attempted to identify individual predictors of spontaneous and induced preterm birth, demonstrating the difficulty of predicting it apart from women with a history of preterm birth or multiple pregnancies. Perhaps the identification of groups of women at risk would have added operational value. The aim of the present study was therefore to test whether black women actually delivered one week earlier and to describe the consequences for the newborn.

Methods

Study design: a pregnancy outcome registry was created in 1992. Until 2007, this registry recorded the women's ethnicity according to the assessment of the midwife who completed the registry at the time of delivery (this was declared to the regulatory authority, the *Commission Nationale Informatique et Libertés*). Subsequently, ethnicity was no longer recorded, as it was sometimes a vague concept, and the place of birth was recorded instead. In addition, social data were available in the last version of the pregnancy register to control for this important determinant of preterm birth. This was a retrospective review of all births in French Guiana (in hospital or at home).

Setting: we used data from 12,983 live births in 2013 and 2014 to determine the descriptive statistics of gestational age by place of birth of the mother.

Participants: the *Registre d'Issue de Grossesses Informatisé* (RIGI) (Computerized registry of pregnancy outcomes) lists all viable births in the territory (those that are greater than or equal to the 22-week viability threshold.

Exclusion criteria: all births below the viability threshold of 22 weeks.

Variables: area of residence, place of birth, health insurance coverage, age, family situation (couple or not), occupation, gravidity (number of pregnancies with abortions, miscarriages), parity (viable births from 22 weeks), scarred uterus, number of previous caesarean sections, type of pregnancy (singleton, twins, multiple), number of ultrasounds, type of care (gynecologist-obstetrician, midwife, general practitioner, mother and child care…), trimester at first visit, prenatal interview, preparation for delivery, number of prenatal consultations, anesthesia consultation, in utero transfer, serological abnormalities, alcohol, drug and tobacco use. The presence of cardiopathy, chronic hypertension, diabetes, sickle cell anemia or obesity is also recorded.

Other pathologies associated with pregnancy are also reported: pregnancy-induced hypertension, pre-eclampsia, gestational diabetes, a context of premature labor and premature rupture of membranes. Finally, the place of birth (home, hospital), the term of birth, the mode of induction of labor and the motive for induction of labor if labor was induced, the duration of membrane rupture, amniotic fluid color, mode of delivery (normal vaginal spontaneous, vaginal with instrumentation, cesarean section and motive), obstetrical extraction maneuvers, presentation, type of delivery, postpartum hemorrhage, perineal lesions and type of anesthesia if given. For the newborn, the RIGI includes sex, weight, height, cranial circumference, trophicity, appearance, pulse, grimace, activity, and respiration (APGAR) score at 1 and 5 minutes of life, lactates measurement, resuscitation, emergency procedures, congenital malformations, infant outcome (if deceased, transfer), and type of feeding. History of preterm birth, vaginal swab results are not part of the variables routinely collected in the RIGI. All viable births occurring after 22 weeks of amenorrhea were included.

Data sources: RIGI data are available to the French Guiana perinatal network. The extracted data are from 2013 to 2014.

Sample size: we examined the distribution of gestational age at birth by place of birth for 12,983 deliveries. After, we focused on deliveries at 36 and 37 weeks (thus 1,960 births) and the need to transfer the newborn to the neonatal Intensive Care Unit (ICU). The event of neonatal transfer was modeled by the mother's place of birth for these different conditions. However, because of potential confounding by social factors and medical history, we adjusted for these variables when examining neonatal transfer [4].

Statistical analysis: an overall descriptive analysis of the population was performed using Stata 12 software. The data are presented by neonatal transfer, and by specific criteria: mother's place of birth, occupation, social security cover, family situation (single or couple) and pathologies related to the pregnancy. A multivariate analysis by logistic regression was performed to identify the main factors associated with neonatal transfer. The explanatory variables were those associated with neonatal transfer with a final significance level of $p < 0.05$. The percentages of missing data are reported.

The latent hypothesis of many practitioners in the French Department of America is that newborns of African ancestry are more mature than Caucasian newborns, and therefore the definition of preterm birth is somehow different: more specifically, that 37 weeks would apply to Caucasian women, but that perhaps not to women of African ancestry. Therefore, we looked at the neonatal side, using ICU transfer as a proxy for neonatal health among women delivering at 36 weeks, hypothesizing that if the neonatal maturity assumption were true, we should find fewer transfers among babies born to mothers of African descent (French Guiana, Suriname, and Haiti) than among Caucasian mothers. We chose to compare the populations of interest born in French Guiana, Suriname and Haiti with those born in mainland France, which were

assumed to be predominantly Caucasian. To test the main hypothesis, we looked specifically at the subpopulation of women giving birth at 36-37 weeks.

Ethical approval: the RIGI was declared to the regulatory authority, the *Commission Nationale Informatique et Libertés*.

Results

Natives of French Guiana represented 45.8% (897/1960) of the population, the second most important population were women from Suriname (25.9% 508/1960). Figure 1 shows the term at birth by place of birth of the mother for all births in 2013-2014 (12983 viable births). The median term at birth was 39 weeks for mothers born in French Guiana, Haiti, and metropolitan France. The median term at birth was 1 week earlier for Surinamese mothers (38 weeks) compared with other mothers' birthplaces, with nearly a quarter of births in this subpopulation occurring before 37 weeks.

To disentangle potential confounding effects, we modeled parity (viable births from 22 weeks) using linear regression and the mother's place of birth, with mainland France as the reference. This showed that most women with a predominant African ancestry delivered earlier, with a term at delivery ranging from 0.5-0.8 weeks earlier than mothers born in metropolitan France (Table 1). The analysis of the proportion of postnatal transfers for babies born at 36 weeks and the adjusted odds ratios controlling for maternal pathologies and social factors are shown in Table 2. This showed that for babies born at 36 weeks, there was no significant difference between maternal place of birth.

In the logistic model, an interaction term between maternal birthplace and gestational age (36-37 weeks) showed that there were no statistically significant differences between the different groups (different maternal birthplaces). Similarly, we found that ICU (Intensive Care Unit) was twice

as common in infants born to mothers of African descent (French Guiana, Suriname, and Haitian) at 36 weeks than at 37 weeks, even after adjustment for social confounders and maternal pathology 2.5 [1.8-3.6] p = 0.0001 [OR [95% CI]] (Table 2).

Discussion

The widespread assumption that part of the high preterm birth rate in French Guiana, and its lack of decline over long periods of time, is due to the earlier physiological delivery of women of African descent does not seem to be supported by the available data. In fact, women of African ancestry, or born in places where most women have African ancestry, appear to have more preterm births [5-7].

However, when looking at newborns born at 36 weeks, there was no significant difference in neonatal morbidity (neonatal transfer to intensive care) between women born in a country with a predominant African ancestry or a country with a predominant Caucasian ancestry. This suggests that, in terms of neonatal outcome, the widespread assumption that newborns of African descent mature one week earlier than those of Caucasian descent is not supported by the available data in French Guiana. Thus, there is a non-negligible morbidity of black newborns at 36 weeks, suggesting that the 37-week threshold defining preterm birth should be the same for different ethnic groups. The heuristic of more mature black babies may also be rooted in the high incidence of preterm birth among women of African ancestry, which has led to the perception that delivery before 37 weeks is somehow "normal". Thus, the present findings are not trivial because they reemphasize that preterm birth is a serious outcome regardless of the ethnic origin of the patient [7].

Limitations

This is a retrospective study with its inherent limitations (reporting bias). However, the RIGI is completed by the midwife who delivers the baby within minutes or hours of birth. A major limitation of our study is that place of birth alone can't define the ethnicity of the population. However, a large proportion of women born in metropolitan France and living in French Guiana are Caucasian [8]. Nevertheless, the cosmopolitan profile of French Guiana means that women born in the region the majority of whom are of African descent are nevertheless the product of many interbreeding.

Conclusion

In conclusion, preterm birth is more common among women of African descent than among white women, even after adjustment for potential confounders. Neonates born at 36 weeks are equally at risk of requiring neonatal intensive care, suggesting that, even after controlling for potential confounders, they are equally vulnerable whether born preterm to a black or a white woman. Thus, the high rate of preterm birth in French Guiana is not an artifact of the ethnic composition of the population, as evidenced by the fact that perinatal complications remain one of the major causes of early mortality (<65 years) in French Guiana. However, there is still a need for further research on this issue.

What is known about this topic

- *In French Guiana, the rate of premature births remains at 13%;*
- *Despite efforts in perinatal care, this could be explained by the high proportion of women of African descent, who tend to give birth earlier.*

What this study adds

- *Irrespective of ethnicity, birth before 37 weeks is associated with neonatal complications;*
- *The assumption that the high rates of preterm birth in French Guiana are partly artefactual can't be supported.*

Competing interests

Authors' contributions

Malika Leneuve-Dorilas analyzed and interpreted the data. She participated in the drafting of the manuscript and performed the statistical analysis. Alphonse Louis, Anne Favre, Fabrice Quet and Stéphanie Bernard were involved in revising the article. Mathieu Nacher gave final approval of the version to be published made substantial contributions to the logical articulation of this article. All authors have read and agreed to the final manuscript.

Acknowledgments

Tables and figure

Table 1: linear regression modeling term at birth by ethnic group [RIGI 2013-2014 French Guiana]

Table 2: logistic regression modeling neonatal transfer in ICU among deliveries at 36-37 weeks, by mother's place of birth, adjusting for the potential confounding role of comorbidities and social factors [RIGI 2013-2014]

Figure 1: distribution of term at birth by mother's birthplace [2013-2014]

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Table 1: linear regression modeling term at birth by ethnic group [RIGI 2013-2014 French Guiana]			
	Place of mother's birth [2013-2014]	Coefficient	P
Mostly mixed African ancestry/Caucasian	Antilles	-0.020	0.933
	Other	-0.160	0.293
Mixed	Brazil	-0.301	0.011
Asian	China	+0.107	0.651
Mostly mixed African ancestry/Caucasian	Guyana	-0.487	0.004
Mostly African ancestry ± Caucasian	French Guiana	-0.760	0.000
Mostly mixed African ancestry/Caucasian	Haiti	-0.486	0.000
Mostly Caucasian	Dominican Republic	-0.159	0.378
Mostly mixed African ancestry/Caucasian	Suriname	-0.798	0.000
Mostly Caucasian	Mainland France	1	

Table 2: logistic regression modeling neonatal transfer in ICU among deliveries at 36-37 weeks, by mother's place of birth, adjusting for the potential confounding role of comorbidities and social factors [RIGI 2013-2014]

Neonatal transfer	Number (%)	Adjusted OR [95%CI] for neonatal transfer between newborn at 36 and 37 weeks	P
Prematurity at 36 weeks versus birth to term at 37 weeks	645/1960 (32.9%)	2.5 [1.8-3.6]	0.000
Birth place of mother			
French Guiana	296/897 (33%)	0.7 [0.3-1.9]	0.573
Haiti	70/199 (35.2%)	1.2 [0.4-3.2]	0.778
Mainland France	21/67 (31.3%)	1	
Suriname	170/508 (33.5%)	1.2 [0.4-3.1]	0.765
Family situation			
Living in a couple	472/1 452 (32.5%)	1	
Single	151/451 (33.5%)	0.9 [0.6-1.3]	0.556
No information	22/57 (38.6%)	1.2 [0.5-2.9]	0.613
Profession			
Agriculture	2/ 10 (20%)	1 Empty	
Business owner	6/ 17 (35.3%)	1 Empty	
Cadre	2/8 (25%)	1 Empty	
Unemployed	1/6 (16.7%)	2.8 [0.3-27.8]	0.370
Training/Student	40/150 (26.7%)	1.7 [0.8-3.9]	0.169
Employee	57/182 (31.3%)	1	
Labourer	4/10 (40%)	2.8 [0.5-16.5]	0.266
Intermediate Professions	22/70 (31.4%)	1.3 [0.4-3.6]	0.645
No profession	479/1 415 (33.9%)	0.9[0.4-1.6]	0.949
No information	32/92 (34.8%)	0.3 [0.1-1.2]	0.628
Health coverage			
General health insurance	345/1049 (32.9%)	1	
Universal coverage (CMU)	88/296 (29.7%)	0.9 [0.6-1.6]	0.819
State Insurance (Aide Médicale d'Etat)	65/215 (30.2%)	1.1 [0.6-2.1]	0.689
No Health Insurance	73/212 (34.4%)	0.9 [0.5-1.7]	0.755
No Information	74/188 (39.4%)	2.4 [1.5-3.8]	0.001
Pathologies associated with pregnancy			
Cardiopathy	3/8 (37.5%)	3.2 [0.3-31.2]	0.319
Hypertension	33/99 (33.3%)	1.1 [0.6-2.3]	0.754
Diabetes	6/14 (42.9%)	1.4 [0.7-2.9]	0.665
Sickle-cell	1/8 (12.5%)	1 Empty	
Pre-éclampsia	63/144 (43.8%)	1.7 [1-2.9]	0.005
Gestational diabetes	31/111 (27.9%)	1.4 [0.6-1.1]	0.371

Universal Health Coverage (CMU): Social insurance for low-income earners with legal administrative status in the country. Aide Médicale d'Etat (AME): Public insurance for persons in an irregular administrative situation in the territory.
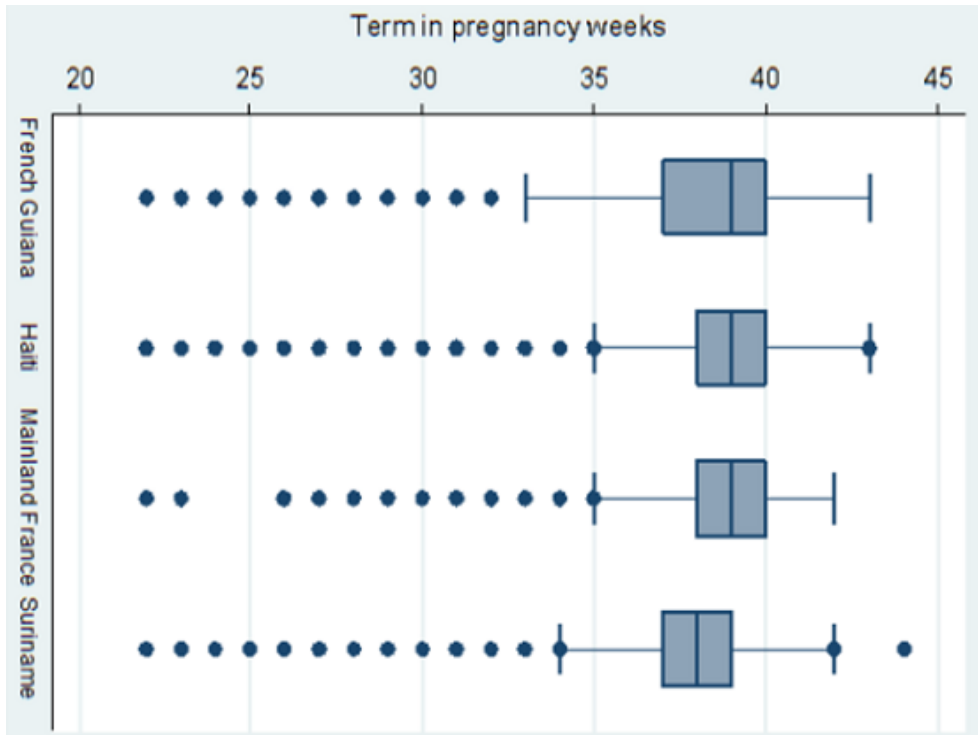
Figure 1: distribution of term at birth by mother's birthplace [2013-2014]