A Retrospective Analysis of Stillbirth Epidemiology and Risk Factors Among First Nations and Non-First Nations Pregnancies in Alberta From 2000 to 2009

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Abstract

Objective: Using a large administrative dataset we examined stillbirth epidemiology in First Nations and non-First Nations pregnancies in Alberta, focusing on previously unexplored longitudinal trends.

Methods: We undertook a retrospective analysis of de-identified data from 426 945 delivery records for the years 2000 to 2009. Age-adjusted prevalence of antepartum and intrapartum stillbirth were calculated and compared by ethnicity, as were longitudinal changes via average annual percent change analyses. Risk factors were explored via multivariable logistic regression analysis.

Results: Overall age-adjusted prevalence of antepartum and intrapartum stillbirth was significantly higher ($P < 0.001$) in First Nations pregnancies than in non-First Nations pregnancies, and prevalence remained stable over time in both groups. Pre-existing diabetes was a strong predictor of stillbirth.

Conclusion: Stillbirth prevalence remains higher in First Nations pregnancies than in non-First Nations. Improved awareness of pre-existing diabetes and effective interventions are needed in First Nations women to decrease stillbirth risk.

Résumé

Objectif : En utilisant un important ensemble de données administratives, nous nous sommes penchés sur l'épidémiologie de la mortinaissance dans le cas des grossesses chez des femmes issues ou non des Premières Nations en Alberta; nous nous sommes alors centrés sur des tendances longitudinales qui n'avaient pas déjà été explorées.

Méthodes : Nous avons mené une analyse rétrospective de données anonymisées issues de 426 945 dossiers d'accouchement pour la période 2000-2009. La prévalence (corrigée en fonction de l'âge)

de la mortinaissance antepartum et intrapartum a été calculée et comparée en fonction de l'origine ethnique, tout comme les modifications longitudinales l'ont été par l'intermédiaire d'analyses des modifications annuelles moyennes en pourcentage. Les facteurs de risque ont été explorés par analyse de régression logistique multivariée.

Résultats : La prévalence (corrigée en fonction de l'âge) globale de la mortinaissance antepartum et intrapartum était considérablement plus élevée (P < 0,001) dans le cadre des grossesses chez des femmes issues des Premières Nations que dans celui des grossesses chez des femmes n'étant pas issues des Premières Nations; cette prévalence est demeurée stable avec le temps au sein des deux groupes. Le diabète préexistant constituait un important facteur prédictif pour ce qui est de la mortinaissance.

Conclusion : La prévalence de la mortinaissance demeure plus élevée chez les femmes des Premières Nations. Pour en venir à abaisser le risque de mortinaissance chez celles-ci, nous devons nous efforcer d'améliorer la détection du diabète préexistant et de mettre en œuvre des interventions efficaces.

INTRODUCTION

Globally, Indigenous women have been shown to be at elevated risk of adverse pregnancy outcomes, including stillbirths which are 68% more likely to occur in Indigenous than in non-Indigenous women according to a systematic review and meta-analysis.[1] In Canada, this has sparked new research into stillbirth among First Nations women, with Auger et al.[2] pointing toward diabetes (driven by obesity) as a major cause. The purpose of this study was to gain a better understanding of the extent of the problem of stillbirths and the relationship of stillbirth with diabetes and other potential pregnancy-related factors. In addition, we sought to quantify longitudinal trends in stillbirth prevalence, because these have yet to

be rigorously explored in First Nations populations. It was our hope that such knowledge will better inform the type and timing of pregnancy intervention, ultimately leading to a lowered risk of stillbirth.

METHODS

We conducted a secondary analysis of data previously obtained.[3] Briefly, we obtained anonymized data for all provincial delivery records for the years 2000 to 2009 from the Alberta Perinatal Health Program (APHP). The year 2000 was the earliest in which fully populated data were available for the entire province. The APHP comprehensively collects perinatal data from the provincial delivery record for all hospital births and registered midwife-attended home births. Delivery record information is recorded by a health care provider (usually a nurse) when a woman presents for delivery. This information is obtained from prenatal records and/or from the patient.

Stillbirth was defined in the APHP dataset as the birth (after ≥ 20 weeks or attaining a weight of ≥ 500 g) of a fetus that had died in utero. Stillbirths were further classified as antepartum and intrapartum. During the time period of the obtained data, the diagnosis of gestational diabetes mellitus followed Canadian Diabetes Association guidelines.[4] A diagnosis of pre-existing diabetes was made from an assessment of patient history, clinical chart records, and medication records (insulin or oral hypoglycemic agents). In addition to stillbirth and diabetes, other maternal risk factors explored included age, parity, ethnicity, pre-existing hypertension, diabetes retinopathy, proteinuria, pre-gestational weight, anemia, multiple gestation, illicit drug dependence, smoking use, alcohol use, history of abortion, history of preterm infant, history of neonatal death, history of stillbirth, history of Caesarean section, history of fetal anomaly, history of small for gestational age neotate, and history of large for gestational age neonate. A detailed description of all of the included variables is provided in our previous publication.[3] For each variable included in the analysis, data were complete or nearly complete (available for 97% to 100% of pregnancies). A total of 426 945 delivery records with valid stillbirth data (gestation ≥ 20 weeks) were used.

The data were sent to Alberta Health, matched via the personal health number, and First Nations ethnicity was ascertained. Three unique and distinct populations of Canadian Indigenous people are recognized in Canada: First Nations, Métis, and Inuit. Under the federal *Indian Act of Canada*, First Nations and Inuit individuals whose nations have engaged in treaties are accorded "Registered Indian" or treaty status. The Alberta Health Care Insurance Plan Central Stakeholder Registry file includes an identifier for such individuals. Thus, women delivering in Alberta with a First Nations identifier (First Nations or Inuit) were considered "First Nations," whereas all other women (including First Nations individuals without treaty status and Métis individuals) were considered "non-First Nations" because they could not be identified. Although we recognize that these groupings are imperfect, we and other researchers are limited to the federal definitions when working with large administrative datasets. In Alberta, there are approximately 116 670 First Nations people (19 945 of these are non-registered) and 96 865 Métis people, representing approximately 3.3% and 2.7% of the total population, respectively.[5] Very few Inuit people (approximately 1600) reside in Alberta.

Annual age-adjusted prevalence values and 95% confidence intervals of stillbirth (antepartum and intrapartum) were compared by ethnicity using chi-square analysis. For the prevalence calculations, the denominator was the total number of pregnancies in which data for that variable were available for the specific group of interest. The numerator was the total number of pregnancies in which the criteria for the variable of interest were met, for the specific group of interest. Average annual percentage change values and 95% confidence intervals in stillbirth prevalence over time were compared by ethnicity using parallelism tests.[6] Statistical modelling (purposeful) using multivariable logistic regression was used to evaluate the relationships between stillbirth, diabetes in pregnancy (both gestational diabetes and pre-existing diabetes, separately), ethnicity and other possible explanatory variables. Odds ratios and 95% confidence intervals were calculated. Briefly, independent variables with a P value < 0.20 in the univariate linear regression analysis were fitted in a multivariable model. Variables with a P value > 0.05 were removed, and the potential confounding effect of each variable was assessed. The linear assumptions of continuous variables and potential interaction effects were assessed. The Hosmer–Lemeshow test was used to determine the model goodness-of-fit.

The Human Research Ethics Board of the University of Alberta approved the research.

RESULTS

The overall age-adjusted prevalence of antepartum stillbirth was significantly higher in First Nations pregnancies (1.30%; 95% CI 1.27% to 1.34%) than in non-First Nations pregnancies (0.46%; 95% CI 0.44% to 0.48%)