Outcomes in Multiple Gestation Pregnancies among Canadian Women Age 35 Years and Older

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Abstract

Multiple gestations are associated with an increased risk of maternal morbidity and mortality independent of maternal age. Previous reports by the Canadian Institute for Health Information established the overall association between advanced maternal age and complications related to pregnancy and childbirth. This article takes a more focused look at the association between advanced maternal age and maternal outcomes in multiple gestation pregnancies. We found, for mothers aged 35 years and older carrying multiples – after adjusting for mothers' parity, neighbourhood income and residence (rural/urban) – an increased risk of pregnancy complications including pre-existing hypertension, gestational hypertension, pre-eclampsia/eclampsia, gestational diabetes and placenta previa and an increased risk for Caesarean delivery.

Multiple gestations are pregnancies in which more than one fetus develops simultaneously in the mother's womb, with the subsequent delivery of multiple neonates. Rates of multiple births have been increasing in the past three decades in industrialized countries (Urquia et al. 2006). In Canada, the rate of multiple births rose by 18% between 1993 and 2002 (Qiu et al. 2008) and by 32% between 2000 and 2008 (Statistics Canada 2009b).

Like other developed countries, the average maternal age in Canada has been increasing as more babies are born to women aged 35 years and older. Between 1998 and 2007, the proportion of live births in this age group rose by more than 20% (Statistics Canada 2009a).

Mother's age accounts for about one third of the increase in multiple pregnancies as women of advanced maternal age are physiologically more likely to have multiples (Beemsterboer et al. 2006; Martin et al. 2009). The remaining growth in the rate of multiples has been attributed to the availability of assisted reproductive technologies (Martin and Park 1999). Since women 35 years old and over may face difficulty conceiving, they are more likely to undergo fertility treatment, which, in turn, increases the chance of multiple gestations.

To date, most research on the impact of advanced maternal age has not focused on multiple gestations. In this study, we examined the characteristics of mothers with multiple gestations and explored the association between advanced maternal age and adverse pregnancy complications and delivery interventions.

Data Sources and Methods

The study population was mothers 20 years of age and older with multiple gestations. All records of maternal delivery leading to multiple live births in Canadian hospitals between fiscal years 2006–2007 and 2008–2009 were included. Data were from the Canadian Institute for Health Information (CIHI) Discharge Abstract Database (DAD) and Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux du Québec. All maternal records were selected based on the discharge date.

Multiple gestations were defined as delivery leading to two or more births in the same episode. Mothers 20–34 years of age with multiples made up our reference group, while those 35 years and older with multiples were our study group. We further categorized women 35 years and older with multiples into two groups: those between 35 and 39 years of age, and those 40 years and older.

The pregnancy complications and delivery interventions examined included pre-existing and gestational hypertension, pre-eclampsia/eclampsia, pre-existing and gestational diabetes, placenta previa and Caesarean section. Odds ratios were calculated to compare mothers 35–39 and 40 years and older with those between 20 and 34 years of age, with adjustment for mothers' parity, neighbourhood income quintile and place of residence (urban/rural). Analysis of parity in our study was limited to the seven jurisdictions (Ontario, Manitoba, Saskatchewan, Alberta, Yukon Territory, Northwest Territories and Nunavut) that report this information to the CIHI databases. The Postal Code Conversion File (PCCF) from Statistics Canada was used to assign mothers to neighbourhood income quintile and urban/rural residence based on the 2001 census.

Findings

During the study period, there were over one million (1,023,959) live births in Canada to women 20 years of age and older (Table 1). Among them, 17,399 mothers gave birth to babies in sets of two or more. The highest proportion of multiple births was among mothers 40 years and over (2.7%).

Urban and Rural Residences and Neighbourhood Income Quintile

More than 90% of mothers who were 35 years and older with multiples lived in urban areas, compared with 82.5% of mothers aged 20–34 years with multiples (see Table 1). Also, women of advanced maternal age carrying multiples were more likely to live in more affluent neighbourhoods: 30.8% of mothers 40 years and older lived in the most affluent neighbourhoods. In the reference group of mothers aged 20 to 34 years, 17.2% lived in the most affluent neighbourhoods.

Pregnancy Complications and Delivery Risks

After adjusting for mothers' parity, neighbourhood income quintile and rural/urban residence, mothers aged 35–39 years with multiples were at an increased risk for pre-existing hypertension, gestational hypertension, pre-eclampsia/eclampsia, gestational diabetes and placenta previa when compared with the reference group (Table 2). For mothers aged 40 years and older with multiples, the risks were even higher. Mothers 35–39 with multiples were also at an increased risk for Caesarean section compared with the reference group and, again, mothers aged 40 years and older were at even greater risk.

TABLE 1.

Characteristics of mothers, in Canada, 2006–2007 to 2008–2009

Variables	Maternal Age (y)		
	20–34	35–39	40+
Total no. of mothers with live births	833,775	159,035	31,149
Characteristics of mothers with multiples*			
No. of mothers with multiple births (%)	12,907 (1.6)	3,640 (2.3)	852 (2.7)
Percent by parity			
Nulliparous mother (no previous live births)	30.6	28.2	28.6
Parous mother	31.3	35.3	31.1
Not reported	38.1	36.5	40.3
Percent by neighbourhood income quintile			
Q1 (least affluent)	21.1	14.0	15.2
Q5 (most affluent)	17.2	26.7	30.8
Percent urban residents	82.5	90.3	92.9

*Parity information was available for residents of Ontario, Manitoba, Saskatchewan, Alberta and the territories but was not reported in other provinces. Urban/rural and neighbourhood income quintile information was not available in 0.59% and 0.8% of mothers, respectively.

Sources: Discharge Abstract Database, Canadian Institute for Health Information; Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux.

TABLE 2.

Odds ratios for maternal complications and interventions associated with maternal age in multiple gestations, in Canada, 2006–2007 to 2008–2009*

Pregnancy Complications	Maternal Age Groups (OR Relative to 20–34 y)				
	20–34	35–39		40+	
	Rate per 100	Rate per 100	OR (95% CI)	Rate per 100	OR (95% CI)
Pre-existing hypertension	0.8	1.4	1.87 (1.32–2.64)	2.4	3.24 (1.98–5.28)
Gestational hypertension	7.5	8.9	1.24 (1.09–1.42)	13.5	2.03 (1.62–2.5)
Pre-eclampsia/eclampsia	4.5	5.6	1.32 (1.12–1.56)	6.2	1.41 (1.05–1.89)
Pre-existing diabetes	0.6	0.7	NS	0.7	NS
Gestational diabetes	5.0	8.9	1.88 (1.63–2.17)	14.3	3.16 (2.56–3.90)
Placenta previa	0.8	1.4	1.68 (1.19–2.37)	2.0	2.40 (1.42–4.04)
Caesarean section	60.8	68.0	1.38 (1.28–1.5)	71.9	1.64 (1.41–1.92)

CI = confidence interval; NS = not significant; OR = odds ratio.

*Analyses were adjusted for parity, neighbourhood income quintile and rural/urban residence of mother.

Sources: Discharge Abstract Database, Canadian Institute for Health Information; Fichier des hospitalisations MED-ÉCHO, ministère de la Santé et des Services sociaux.

Discussion

When compared with the reference group, the risks of pregnancy complications and Caesarean section were elevated for mothers aged 35 years and older with multiples, and the risk was higher for mothers aged 40 years and older. Fox et al. (2009) and Salihu et al. (2005) reported a similar association between advanced maternal age and Caesarean section in multiple gestations. The research literature is mixed, however, with respect to the association between advanced maternal age and pregnancy complications among multiples. A study by Salihu et al. (2005) of triplet births found that diabetes, pre-eclampsia, eclampsia and chronic hypertension were significantly associated with advanced maternal age. In contrast, Fox et al. (2009) reported that they did not find that gestational hypertension, pre-eclampsia and gestational diabetes rates were significantly different between mothers younger than 35 years and those 35 years and older with multiples. This conflicting result in Fox et al.'s study may be attributable to the limited sample size (n = 145) and specialty-practice based data. By contrast, the CIHI analysis included over 17,000 multiple pregnancies over three years from across Canada.

Some studies of advanced-age mothers with multiple pregnancies have identified complications not just for the mothers but for the babies as well (Prapas et al. 2006; Usta and Nassar 2008). These included preterm and small-for-gestational-age births, leading to significantly longer hospital stays and increased healthcare costs (Henderson et al. 2004; Lim et al. 2009). With an increasing number of Canadian women delaying childbirth (Statistics Canada 2009a) and accessing assisted reproductive technologies, the numbers of multiple births to advanced-age mothers will continue to increase. Given the risks of increased pregnancy complications and Caesarean section for mothers 35 years and older, it may be helpful to review current pre-conception, prenatal and maternal care practices to ensure that services across the care continuum are responsive to the needs of these mothers and that information is available for mothers and their caregivers on the risks and how they can be managed.

There are inherent limitations in analyses that use administrative data. We were unable to control for potential confounders not captured in the data – specifically individual behaviours, such as smoking, alcohol or drug use or prenatal care history – all of which may affect maternal health and pregnancy outcomes (Goodwin et al. 2011). In addition, the study was limited to gestations with at least one live birth. The exclusion of terminated pregnancies may have resulted in some selection bias. HQ

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