

# Is grand multiparity an independent predictor of pregnancy risk? A retrospective observational study

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THE HISTORICAL ORIGINS of the term “grand multiparity” are uncertain, and a number of definitions have been used (mostly four<sup>1</sup> or five<sup>2</sup> previous viable births). The term has been used to denote a group of pregnant women considered at particular risk of poor outcome, especially malpresentation, preterm birth, abnormalities of the third stage of labour, and perinatal death. While some authors present evidence for this higher risk,<sup>1-5</sup> it remains uncertain because of the relationship between advanced parity and risk factors such as advanced maternal age, ethnicity and previous caesarean section.<sup>6-10</sup>

The aim of this study was to determine the effects of grand multiparity on risk independent of potential confounding factors, to better inform birth-suite protocols on grand multiparity.

## METHODS

This was a retrospective observational study at Cairns Base Hospital, a 280-bed regional hospital with a referral obstetric unit, in far north Queensland. The study was approved by the Cairns Health Services District Ethics Committee.

### Data source

Data on births between 1992 and 2001 were de-identified and extracted from the hospital's maternity database. This computerised database contains antenatal, intrapartum and postnatal information on all public patients and is recorded by medical staff of the Obstetric Department as routine clinical practice. The database is used to produce patient discharge letters and summaries, and to facilitate statistical reporting and other audits.<sup>11</sup>

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## ABSTRACT

**Objective:** To determine whether high maternal parity has any effect on pregnancy outcome independent of other maternal characteristics.

**Design and setting:** Retrospective observational study using the database of a referral obstetric unit in a 280-bed regional hospital in far north Queensland.

**Participants:** All 15 908 women who had singleton births between 1992 and 2001, comprising 653 women with grand multiparity ( $\geq 5$  previous births at gestation  $\geq 20$  weeks) and 15 255 women with lower parity.

**Main outcome measures:** Spontaneous vaginal birth, postpartum haemorrhage (estimated blood loss  $> 500$  mL), placental retention requiring manual removal, blood transfusion associated with the birth, and perinatal death.

**Results:** Women with grand multiparity were significantly older than those with lower parity, more likely to be Indigenous, not to have had antenatal care, to have smoked during pregnancy and to have had one or more previous caesarean sections. On univariate analysis, women with grand multiparity were more likely to have a postpartum haemorrhage (9.2% v 5.3%) and blood transfusion (2.8% v 1.5%). However, multivariate logistic regression analysis of women who began labour (ie, did not have an elective caesarean section) showed that grand multiparity was not significantly associated with postpartum haemorrhage or blood transfusion when other maternal characteristics were included in the model (regression coefficients [95% CI], 1.36 [0.99–1.87] and 1.09 [0.59–2.02], respectively). However, they remained more likely to have a spontaneous vaginal birth (regression coefficient [95% CI], 2.10 [1.56–2.74]).

**Conclusions:** Women with grand multiparity do not have an increased likelihood of poor pregnancy outcomes. Birth-suite protocols which dictate extra interventions as routine during labour in these women should be revised.

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### Definitions

Grand multiparity was defined for the study as five or more previous births at a gestation of 20 or more weeks. Retained placenta was defined as placental retention requiring manual removal under anaesthesia, and postpartum haemorrhage as visually estimated blood loss exceeding 500 mL. Blood transfusion was defined as a transfusion of packed cells or whole blood associated with the birth process. Alcohol use and tobacco smoking

were defined as any use reported by the patient during pregnancy.

### Statistical analysis

The data were analysed using SPSS version 10.0.<sup>12</sup> Analysis was restricted to singleton pregnancies. Categorical variables were compared with the  $\chi^2$  test, and continuous variables with Student's *t* test. The data for women who began labour (ie, did not have an elective caesarean section) were analysed using multivariate logistic regression analysis, examining the end-points of spontaneous vaginal birth, postpartum haemorrhage, retained placenta and blood transfusion. This analysis was performed to determine whether grand multiparity

**1: Comparison of women with grand multiparity and those with lower parity at Cairns Base Hospital, 1992–2001\***

Variable	No. of previous viable births		P†
	≥ 5 (n=653)	≤ 4 (n=15255)	
<b>Characteristic</b>			
Mean maternal age in years (95% CI)	32.4 (32.0–32.8)	26.6 (26.5–26.7)	< 0.001
Mean months of gestation at delivery (95% CI)	38.4 (38.2–38.6)	38.9 (38.8–38.9)	< 0.001
Indigenous	459 (70.3%)	4224 (27.7%)	< 0.001
No antenatal care	28 (4.3%)	195 (1.3%)	< 0.001
One or more previous caesarean sections	131 (20.1%)	1702 (11.2%)	< 0.001
Tobacco smoking during pregnancy	286 (43.8%)	5447 (35.7%)	< 0.001
Alcohol use during pregnancy	156 (23.9%)	3427 (22.5%)	0.21
Induction of labour	85 (13.0%)	2277 (14.9%)	0.10
<b>Outcome</b>			
Spontaneous vaginal birth	509 (77.9%)	11028 (72.3%)	0.001
Retained placenta requiring manual removal	17 (2.6%)	375 (2.5%)	0.44
Postpartum haemorrhage	60 (9.2%)	815 (5.3%)	< 0.001
Blood transfusion	18 (2.8%)	232 (1.5%)	0.02
Perinatal death	6 (0.9%)	200 (1.3%)	0.49

\*Values are number of women (%) unless otherwise indicated. † Comparison by *t* test (maternal age and months of gestation) or  $\chi^2$  test (all other characteristics and outcomes).

remained associated with each end-point when included in a model with potential confounding factors.

**RESULTS**

Of the 15 908 singleton births in the 10-year study period, 653 (4.1%) were to women classified with grand multiparity, 8809 (55.4%) were to women with one to four previous viable births, and 6446 (44.5%) to nulliparous women.

Univariate analysis showed that women with grand multiparity were significantly older than women with lower parity and significantly more likely to be Indigenous, not to have had antenatal care, to have had one or more previous caesarean sections and to have smoked during pregnancy (Box 1). Comparison of outcomes showed that women with grand multiparity were more likely to have a spontaneous vaginal birth, postpartum haemorrhage and blood trans-

fusion, but not a retained placenta or perinatal death.

Multivariate regression analysis of data for the 14 085 women who began labour showed that those with grand multiparity were twice as likely to have a spontaneous vaginal birth when other variables were included in the model (Box 2). Grand multiparity was not significantly associated with postpartum haemorrhage or blood transfusion when other variables were included. This indicates that confounding variables were responsible for the higher incidence of these end-points in women with grand multiparity.

**DISCUSSION**

This study does not support the traditional view that women with grand multiparity are more likely to have complicated deliveries, higher perinatal mortality rates and poor maternal outcomes, particularly abnormalities of the third stage of labour.

After the effects of confounding variables were removed, the women with grand multiparity who began labour were more likely than women with lower parity to have a spontaneous vaginal birth, despite their higher incidence of previous caesarean section. In addition, they were not more likely to have a postpartum haemorrhage or blood transfusion. The incidence of perinatal death was similar in the two groups.

Although the end-point of postpartum haemorrhage depended on a sub-

**2: Multivariate logistic regression analysis of the 14 085 women who began labour (including 582 with grand multiparity)**

Variable	Spontaneous vaginal birth		Perinatal death		Postpartum haemorrhage		Blood transfusion	
	$\beta^*$ (95% CI)	P	$\beta^*$ (95% CI)	P	$\beta^*$ (95% CI)	P	$\beta^*$ (95% CI)	P
Grand multiparity	2.01 (1.56–2.74)	< 0.001†	0.38 (0.13–1.09)	0.07	1.36 (0.99–1.87)	0.06	1.09 (0.59–2.02)	0.79
Maternal age	0.99 (0.98–0.99)	< 0.001†	1.02 (0.99–1.05)	0.29	1.00 (0.99–1.01)	0.90	1.01 (0.98–1.03)	0.70
Indigenous ethnicity	1.19 (1.07–1.33)	0.002†	1.35 (0.91–2.01)	0.14	1.83 (1.56–2.14)	< 0.001†	2.62 (1.92–3.58)	< 0.001†
Lack of antenatal care	1.26 (0.83–1.92)	0.28	1.29 (0.57–2.93)	0.54	1.25 (0.76–2.06)	0.38	1.68 (0.76–3.72)	0.20
Previous caesarean section	0.32 (0.28–0.37)	< 0.001†	0.95 (0.47–1.92)	0.89	1.44 (1.11–1.86)	0.006	2.18 (1.44–3.72)	0.001†
Tobacco smoking	1.26 (1.14–1.39)	< 0.001†	0.87 (0.59–1.29)	0.49	0.73 (0.62–0.86)	< 0.001†	0.56 (0.40–0.78)	0.001†
Alcohol use	0.92 (0.82–1.02)	0.12	0.97 (0.62–1.52)	0.90	0.84 (0.69–1.01)	0.06	0.99 (0.68–1.43)	0.95
Induction of labour	0.46 (0.41–0.51)	< 0.001†	2.54 (1.71–3.77)	< 0.001†	1.20 (0.99–1.44)	0.06	1.40 (0.99–1.98)	0.06
Gestation at delivery	1.03 (1.01–1.05)	0.002†	0.68 (0.65–0.70)	< 0.001†	1.02 (0.99–1.05)	0.30	0.96 (0.92–1.01)	0.09
Spontaneous vaginal birth	NA		1.08 (0.71–1.66)	0.71	0.94 (0.78–1.13)	0.50	0.46 (0.34–0.62)	< 0.001†

\*  $\beta$  = regression coefficient. † Regression coefficient was significantly different from 1, and 95% CIs did not include unity, indicating that the variable was significantly associated with that outcome.

jective estimate of blood loss, there was no reason to believe that such estimation was applied selectively. The maternity unit at Cairns Base Hospital cares for more Indigenous women than most other Australian maternity units (29.4% over the study period, compared with 3.4% for all Australian births in 2000<sup>13</sup>). While these women had a high incidence of grand multiparity, the logistic regression analysis suggested that Indigenous ethnicity was a risk factor for postpartum haemorrhage independent of grand multiparity.

Over the study period, women with grand multiparity at this hospital were considered high risk and advised to have intravenous cannulation during labour, with particular emphasis on the offer of ergometrine-oxytocin (routinely offered to all women regardless of parity) as part of third-stage management to avoid the complication of postpartum haemorrhage.

In the most recent Australian study on grand multiparity, Bai et al examined the dataset of all births in New South Wales from 1992 to 1997, and classified women as nulliparous, low parity (giving birth to the second to fourth baby) and high parity (giving birth to the fifth to ninth baby).<sup>1</sup> They found that women with high parity had an increased risk of poor pregnancy outcome but noted that their results contradicted those of other studies, such as

those of Seidman et al<sup>8</sup> and Babinski et al.<sup>9</sup> The latter studies were conducted in single hospitals, as was my study, while Bai et al's study involved women from numerous maternity units with differing protocols and levels of care.

It appears that the poor obstetric outcomes attributed to higher parity in some studies are likely to have been caused by confounding factors, and that women with grand multiparity are being inappropriately classified as "high risk", with a consequent increase in inconvenient, unnecessary and costly interventions during labour. The conclusions from this and other observational studies need to be examined by a prospective randomised controlled trial with a sample size sufficient to reach an incontrovertible conclusion regarding the appropriate care of this group of women in labour.

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#### COMPETING INTERESTS

None identified.

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