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Grandmultiparae in a modern setting

G.J. Bugg*, G.S. Atwal, M. Maresh

Objective To compare the incidence of antenatal and intrapartum complications and neonatal outcomes among women who had previously delivered five or more times (grandmultiparous) with that of age-matched control women who had previously delivered two or three times (multiparous).

Design A matched cohort study.

Setting An inner city university maternity hospital in the United Kingdom.

Sample Three hundred and ninety-seven grandmultiparous women were compared with three hundred and ninety-seven age-matched multiparous women.

Methods Data on the subjects were obtained from a computerised maternity information system (SMMIS). Characteristics and complications occurring in the two groups were compared. Data validation was performed with a 10% randomised sample of the casenotes in both groups. Nineteen relevant data fields were abstracted and compared with the matched SMMIS record.

Results The overall incidence of intrapartum complications for grandmultiparous women was 16% compared with 18% in the control multiparous women (odds ratio 0.9, 95% CI 0.6–1.3). Grand multiparity was associated with a significantly higher body mass index at booking ($P < 0.01$) and the last antenatal clinic ($P < 0.05$), an increased incidence of antenatal anaemia (22% *vs* 16%, odds ratio 1.8, 95% CI 1.2–2.8) and a decreased incidence of elective caesarean section (6% *vs* 11%, odds ratio 0.5, 95% CI 0.3–0.9). Agreement was greater than 95% in all the data fields reviewed except three. In the 14 categorical variables reviewed the Cohen's kappa results were in excess of 0.6.

Conclusion This study suggests that in a developed country with satisfactory health care conditions, grandmultiparity should not be considered dangerous, and risk assessment should be based on past and present history and not simply on the basis of parity.

INTRODUCTION

In his 1934 article[1], entitled 'The dangerous multiparae', Bethel Solomons wrote: ''my main object is to remove if possible once and for all, the idea that a primigravida means a difficult labour but a multiparae means a easy one. It is altogether a mistake to suppose that in childbearing, practice makes perfect''. Solomons' concern for the multiparae was prompted by a study at the time from the Department of Health for Scotland which showed the maternal mortality rate associated with multiparity increasing ''steadily and speedily'' from the fifth pregnancy until women bearing their tenth child or more had a mortality rate five times as high as all women bearing children.

Intrapartum complications such as fetal malpresentation, placental abruption, dysfunctional labour, and postpartum haemorrhage are commonly linked to grandmultiparity. A number of studies have been reported from various parts of the world. These include studies of largely Hispanic women of generally low socio-economic status in the USA[2], women with generally high socio-economic status from Israel[3–6], women with a poor socio-economic background from Hong Kong[7] and women from a largely orthodox Jewish community in New York, USA[8]. The literature contains contradictory data about the risks associated with grandmultiparity. The definition of grandmultiparity varies from study to study and it remains unclear how the differing definitions contribute to the differing observations. King *et al.*[7] considered grandmultiparae to be women who gave birth after five or more previous deliveries (the definition we used), other authors[3–6] define a grandmultiparae as women who have seven children whereas Toohey *et al.*[2] used the definition of a parity greater or equal to five. The International Federation of Gynecology and Obstetrics (1993) define grandmultiparity as delivery of the fifth to ninth infant, whereas women who are undergoing their tenth (or more) delivery are considered to be great-grandmultiparaes[8]. Other possible reasons for the contradictory data are that some studies are longitudinal in design and other are cross sectional, of which not all are matched for important variables such as age.

The main purpose of this study was to examine whether grandmultiparous women from a city in the United Kingdom with a multiethnic population were at increased risk of complications particularly in the intrapartum period.

St Mary's Hospital, Manchester, UK

* **Correspondence**: Dr G. J. Bugg, 16 Old Towns Close, Tottington, Bury BL8 3LH, UK.

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As terminology can be confusing we decided to focus on a relevant clinical question: are women at increased risk of complications having previously delivered five or more babies in comparison with women having previously given birth to two or three babies?

As the data were collected on the St Mary's Maternity Information System[9] (SMMIS) (Ciconia, UK) a subsidiary objective was to examine the quality of the data collected in this way. Research performed by obtaining data from SMMIS[10] has been criticised in the past[11,12] on the grounds that such a database may be insufficiently accurate to support research. Cleary *et al.*[13] addressed this issue by retrospectively comparing 892 maternity casenotes and matched SMMIS records and found that out of 17 data items compared there was 95% agreement or better for 10 items and all except two exceeded 80%. By performing a validation exercise in the current study we would not only strengthen the conclusions of the study, but also add to the literature on the validation of computerised maternity information systems.

METHODS

All women who were delivered between April 1996 to December 1998 who had previously given birth five or more times (grandmultiparae) were identified from SMMIS. Each was matched with a control woman, selected by identifying the first woman matched for age, delivering within the same month as the index case who had previously delivered two or three times before (multiparae). If a woman had more than one delivery during the time period, only the last delivery was selected for analysis. Women with multiple pregnancies were excluded.

Intrapartum complications commonly associated with grandmultiparity were compared. These included placental abruption, dysfunctional labour (defined as oxytocin augmentation of a woman in active labour), malpresentation, and postpartum haemorrhage (blood loss >500ml after delivery). Antenatal complications such as anaemia (defined as a haemoglobin <10g/dL) and pre-eclampsia (defined as a diastolic blood pressure >90mmHg and + protein on more than one occasion) were also compared, as were neonatal complications.

In order to detect an increase in the incidence of intrapartum complications from 20% to 30% among grandmultiparous women with 95% confidence at a power of 80, three hundred and thirteen women would be needed in each group.

To ensure the data entered on SMMIS agreed with the clinical data found in the casenotes, 10% of the women in the study and control group were selected randomly. Nineteen data fields were selected on the basis that they were representative of the information studied in the project as a whole and that they contained both numerical quantities and categorical fields. Each casenote was abstracted for the data fields by one of the authors (G.S.A.) and then agreement or disagreement was noted for the same data fields on the matched SMMIS record.

Data was analysed using the Confidence Interval Analysis software[14], Excel 97 and SPSS (Version 9). Differences in proportions were presented as percentages complete with the 95% confidence interval for difference. Comparisons between complication rates and outcomes are presented as odd ratios with 95% confidence intervals. Matched *t* tests were used to compare continuous variables. For each of the selected variables, percentage agreement between matched cases from SMMIS and the casenote abstracts was calculated. For categorical fields, Cohen's kappa was also calculated.

RESULTS

There were 397 grandmultiparous women identified during the time period and matched with controls. The

Table 1. Antenatal characteristics and complications. BMI = body mass index.

Characteristics/complications	No. pairs with data	Grandmultip *n* (%)	Multip *n* (%)	OR (95% CI)
Established diabetes	383	3 (0.8)	2 (0.5)	—
Gestational diabetes on insulin	375	2 (0.5)	6 (1.5)	—
Known hypertensive	377	9 (2.3)	6 (1.5)	—
Pre-eclampsia	352	4 (1.0)	3 (0.8)	—
Booking Hb < 10g/dl	352	24 (6.0)	11 (2.7)	2.0 (0.9–4.8)
Any antenatal Hb < 10g/dl	346	86 (22)	62 (16)	1.79 (1.2–2.8)
Known renal disease	374	5 (1.3)	6 (1.5)	0.80 (0.3–3.7)
	No. pairs with data	Mean (SD)	Mean (SD)	*P*
BMI at booking	137	34.7 (19.3)	27 (10.6)	<0.01*
BMI at last antenatal visit	137	39 (21.3)	35 (12.4)	<0.05*
Height (cm)	228	161 (7.7)	161.4 (7.5)	0.21*

Odds ratios remain undefined (–) when the denominator was zero.

* Matched *t* test.

Table 2. Intrapartum complications. ELLSCS = elective lower segment caesarean section; EMLSCS = emergency lower segment caesarean section.

Complications	No. data pairs	Grandmultiparae *n* (%)	Para 2–3 *n* (%)	OR (95% CI)
Abruption	354	2 (0.5)	2 (0.5)	—
Dysfunctional labour	395	21 (5.3)	24 (6.0)	0.90 (0.5–1.8)
Postpartum haemorrhage	394	23 (5.8)	19 (4.7)	1.18 (0.6–2.4)
Malpresentation	392	20 (5.0)	24 (6.0)	0.79 (0.4–1.5)
One more complications	396	64 (16)	70 (18.0)	0.90 (0.6–1.3)
ELLSCS	395	23 (5.8)	42 (10.6)	0.49 (0.3–0.9)
EMLSCS	394	28 (7.0)	33 (8.3)	0.82 (0.5–1.4)
Instrumental delivery	395	3 (0.8)	13 (3.3)	—
Epidural	383	42 (10.6)	57 (14.4)	0.7 (0.5–1.1)

Odds ratios remain undefined (–) when the denominator was zero.

average age of each group was 34.3 years at time of the delivery and this ranged from 23 years to 46 years. The median number of previous deliveries among the grandmultiparae was six with a range of five to 15. Antenatal outcomes were compared between the two groups (Table 1). Grandmultiparous women were significantly more likely to have a haemoglobin <10g/dL antenatally than ordinary multiparous women. The mean body mass index at booking and the last recorded antenatal visit was significantly higher in the grandmultiparous group when compared with the multiparous group, no such difference was noted for body mass index at the last visit, but data were missing.

Intrapartum complications most commonly thought to be associated with grandmultiparity are shown in Table 2. No significant difference was observed in the incidence of placental abruption, dysfunctional labour, malpresentation, or postpartum haemorrhage.

Overall, grandmultiparous women had an intrapartum complication incidence of 16%, which was not significantly different from the 18% rate observed in the multiparous group. There were no uterine ruptures or maternal deaths in either group. There were significantly fewer elective caesarean sections in the grandmultiparous group (5.8% *vs* 10.6%), but there was no significant difference in the incidence of emergency caesarean section (7.0% *vs* 8.3%) between the two groups.

There was one stillbirth and two neonatal deaths in the grandmultiparous group and two stillbirths and three neonatal deaths in the multiparous group. Mean birthweights were 3329g (720) in the grandmultiparous group and 3307g (695) in the multiparous group. No significant differences in neonatal outcomes were found between the two groups (Table 3).

Out of the 19 data fields reviewed there was 100% agreement between data observed on SMMIS and that abstracted from the casenotes for 10 variables in the study group and nine variables in the control group. Agreement was >95% in all the other data fields reviewed except for three (Table 4). In the 14 categorical variables reviewed the Cohen's kappa results were in excess of 0.6, indicating good agreement[15].

DISCUSSION

The study demonstrates that in this population, women who had previously delivered five or more babies do not have a significantly increased incidence of complications particularly in the intrapartum period compared with women who had previously delivered two or three babies.

Our study confirmed the findings in Israel[3,4] which did not find increased complication rates among grandmultiparae. These studies were conducted in ultra orthodox Jewish communities with high socio-economic background and equal access to medical care. High socio-economic backgrounds, however, are not a prerequisite for favourable results; both Toohey *et al.*[2] and King *et al.*[7] reported highly favourable outcomes in a group of women with low socio-

Table 3. Neonatal outcomes. SCBU = special care baby unit.

Outcome	No. pairs with data	Grandmultiparae *n* (%)	Multiparae *n* (%)	OR (95% CI)
Preterm delivery <37 weeks	385	36 (9.1)	35 (8.8)	1.01 (0.6–1.7)
Birthweight <10th centile[17]	377	41 (10.3)	44 (11.0)	0.9 (0.6–1.5)
Birthweight >90th centile[17]	375	45 (11.0)	56 (14.0)	0.71 (0.4–1.1)
Admissions to SCBU	381	43 (10.8)	38 (9.6)	1.0 (0.6–1.7)
Intubation at birth	394	14 (3.5)	16 (4.0)	—
Apgars <7 at 5 min	381	7 (1.8)	4 (1.0)	—
Breast feeding initiated	374	182 (45.8)	187 (47.0)	0.93 (0.7–1.3)

Odds ratios remain undefined (–) when the denominator was zero.

Table 4. Values given as percentages of agreement between SMMIS and the abstracted casenotes data for categorical fields (Cohen's Kappa).

Variables	Grandmultiparae ($n = 39$)	Multiparae ($n = 40$)
Abruption	100 (1.0)	100 (1.0)
Augmentation	100 (1.0)	100 (1.0)
Breech	100 (1.0)	100 (1.0)
Cephalic	100 (1.0)	97.5 (0.7)
Established diabetes	100 (1.0)	100 (1.0)
Chronic hypertension	100 (1.0)	100 (1.0)
Maximum antenatal BP (mmHG)	54	65
Haemoglobin at booking (g/dl)	92.3	95
Lowest antenatal haemoglobin (g/dl)	79.5	77.5
Induction	97.4 (0.9)	97.5 (0.9)
EMLSCS	97.4 (0.8)	97.5 (0.7)
Ventouse	100 (1.0)	100 (1.0)
Epidural	100 (1.0)	100 (1.0)
Birthweight (g)	97.4	97.5
Admission to SCBU	97.4 (0.9)	100 (1.0)
Meconium staining	95 (0.9)	95 (0.8)
Neonatal deaths	100 (1.0)	100 (1.0)
Height (cm)	100	97.5
Estimated blood loss (ml)	97.4	97.5

economic status. In contrast two other studies from Israel reported an increase in classical complications said to be associated with grandmultiparity[5,6]. This difference may be because neither study used aged matched controls and advanced maternal age has been associated with a higher incidence of chronic hypertension, diabetes, and other antepartum complications which may also influence intrapartum events. Babinski *et al.*[8] did match for age and socioeconomic status. They found that high parity groups have their own risk factors, but the rate of some complications decreases with higher parity. Thus in conclusion our study adds weight to the overall view that in a modern healthcare setting, grandmultiparity is not associated with a significant increased risk of the classic complications said to be associated with grandmultiparity.

A number of other significant results in our study might have been anticipated. The lower rate of elective caesarean delivery in the grandmultiparous group is likely to reflect women with a number of previous caesarean sections being advised against having large number of pregnancies. The significantly higher mean body mass index at booking clinic and also the last antenatal clinic in the grandmultiparous group when compared with the matched control group is likely to be caused by the difficulty some women have in repeatedly losing the additional physiological weight gain of pregnancy. Certainly parity has previously been reported to be independently associated with maternal body mass index[16]. However, many women had some missing height or weight data so that the number who had paired values was reduced. The finding that more grandmultiparous women had low haemoglobins (<10g/dL) antenatally in comparison with multiparous women might be because women having repeated pregnancies do not have time to replenish their iron stores before their next pregnancy.

There are reassuringly high levels of agreement between data recorded in the computerised maternity information system (SMMIS) and that abstracted from the casenotes. Disagreement was greatest for the variables maximum antenatal BP and lowest antenatal haemoglobin. This is likely to be caused by data for these two variables being found in a variety of places, in both handheld maternity notes and hospital notes, reducing the likelihood of observer agreement. There were high levels of missing data in the data fields 'weight at booking', 'weight at last antenatal clinic' and 'height', reducing the number of data pairs available for analysis. One reason for this is that much of the height and weight data were recorded in imperial measures in the casenotes, which did not facilitate data entry in SMMIS as it requires metric measures. However, with these exceptions we found SMMIS to be a useful and reliable research tool. To improve future reliability staff should be better trained so that they are familiar with databases and competent at data entry, case notes should be designed to facilitate efficient data entry of the highest quality and the accuracy of SMMIS should be regularly audited in a similar way as described in this study.

CONCLUSION

This study suggests that in a developed country with satisfactory health care conditions, grandmultiparity should not be considered dangerous; instead risk should be attributed on the basis of past and present history and not simply on the basis of parity. The study also confirms that carefully designed maternity information systems may be useful for clinical research purposes.

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