

Obstetrics and perinatal outcome of grand multiparity in Jordan: a case-control study

F. Thekrallah¹, A. Alnadi¹, A. Almajali¹, N. Muhaidat¹, A. Al-qatawneh¹, E. F. Badran²

¹Feto-Maternal Division, Department of Obstetrics and Gynecology, Faculty of Medicine, The University of Jordan, Amman

²Neonatal Division, Department of Pediatrics, Faculty of Medicine, The University of Jordan, Amman (Jordan)

Summary

Purpose of investigation: The impact of grand multiparity on perinatal outcomes remains unknown. The authors aimed to assess perinatal outcomes in grand multiparous women in Jordan. **Materials and Methods:** In this retrospective case-control study of 161 grand multiparous and 163 multiparous women, maternal and neonatal outcomes were assessed. Statistical analysis included logistic regression with adjustment for age and booking status. **Results:** The prevalence of grand multiparity was 1.8%. Grand multiparous women had a significantly higher risk of gestational hypertension, diabetes, preterm delivery, and cesarian section, but significantly lower risk of requiring labor augmentation and perineal tears. Neonates of grand multiparous had a significantly higher risk of low birth-weight (LBW) and requiring NICU admission. However, after adjustment, none of these retained statistical significance. **Conclusion:** Risk of gestational diabetes, hypertension, preterm labor, cesarean section, LBW, and NICU admission were primarily related to advanced maternal age rather than grand multiparity in Jordanian women.

Key words: Age-adjusted analysis; Grand multiparity; Jordan; Obstetric outcome; Perinatal outcomes.

Introduction

Grand multiparity is considered an obstetric hazard for both a pregnant mother and her newborn [1]. The perinatal risks associated with grand multiparity include gestational diabetes mellitus [2], gestational hypertension [3], fetal mal-presentation [1], postpartum hemorrhage [4-6], preterm labor [7], and stillbirth [8, 9]. Indeed, neonates of grand multiparous women have been reported to have lower Apgar scores [1], a higher risk for low-birth-weight (LBW) status, neonatal intensive care unit (NICU) admission [7], and fetal macrosomia [4, 10]. Developed countries report a decline in the incidence and severity of adverse outcomes in grand multiparity, reflecting the improvement in standard obstetric and perinatal care; moreover, such complications are primarily and independently associated with increased maternal age alone [11].

Grand multiparity remains prevalent in many developing countries [12] and is considered a major burden in obstetric care provision. The prevalence of grand multiparity varies in different parts of the world, ranging from 0.6% in Croatia to 36% in the United Arab Emirates [2, 3, 13-15]. While the prevalence of grand multiparity is usually lower in developed countries, the number of children in the family is not always related to the country's income or economy. The high rate of grand multiparity could also reflect a lower education level, reduced access to modern contra-

ceptive methods, and the lack of legislation permitting the artificial interruption of pregnancy [16].

Despite the fact that Jordan is a middle-income country, large families with numerous children are widespread with no significant change in the total fertility rates (children born/woman) over the past decade (3.44 in 2000 vs. 3.18 in 2012), according to the Jordan Population and Family Health Survey [17]. However, there is a paucity of data regarding the prevalence of grand multiparity and its related complications in Jordan.

The authors aimed to assess maternal and perinatal outcomes in grand multiparous women managed at a high-volume primary and tertiary referral hospital in Jordan and to determine the impact of such outcomes on obstetric care provision in this middle-income country.

Materials and Methods

The study conforms to the provisions of the Declaration of Helsinki (as revised in Tokyo in 2004), and ethical approval was obtained from the Institutional Review Board at Jordan University Hospital (JUH) and the Deanship of Scientific Research at The University of Jordan.

This was a retrospective case-control study covering a 24-month period between January 1st, 2011 and December 31st, 2012 that recruited women managed at JUH (Amman, Jordan). The JUH Obstetric and Neonatal center is a modern academic tertiary referral center providing optimal guideline-based perinatal health-care based on consistent protocols in addition to modern family

Revised manuscript accepted for publication January 15, 2018

planning services.

Data for this study was extracted from existing medical records as well as from operative notes and anesthetic charts if operation and/or anesthesia support had been indicated. The data was entered into a unified computer database and analyzed by the research team.

The source population included 9,012 mothers who delivered during the study period. Of these, only multiparous women who gave informed consent were selected for this study. The exclusion criteria were multiple gestation pregnancy and pregnancy resulting from assisted reproductive procedures. The women were then stratified into two groups according to parity, namely grand multiparity ($n=161$) and multiparity that does not qualify as grand multiparity ($n=163$). Multiparity was defined as having 2–4 previous deliveries at a gestational age of ≥ 24 weeks, whereas grand multiparity was defined as having had ≥ 5 deliveries at a gestational age of ≥ 24 weeks [18].

The main outcomes of the study included maternal and perinatal factors (demographic characteristics, gestational diabetes mellitus, gestational hypertension, placental abruption, anemia, postpartum hemorrhage, perineal tears, cesarean hysterectomy, and preterm labor), as well as fetal and neonatal factors (polyhydramnios/oligo-hydramnios, fetal death, mode of delivery, one- and five-minute Apgar scores, meconium-stained liquor, neonatal birth weight, and NICU admission).

Postpartum hemorrhage was defined as the loss of ≥ 500 mL of blood within 24 hours of delivery [19]. Anemia was defined as a packed red blood cell volume of less than 30% [20]. Hypertension was defined as a systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg taken on two occasions at least six hours apart [21]. “Unbooked” status was defined as inadequate antenatal screening (careful history taking, routine screening, regular follow-up with full physical examination including routine urine tests, weight measurement, and blood pressure estimation) at a peripheral health center, hospital, or private medical practice. “Booked” status was defined as adequate antenatal screening [22]. Preterm delivery was defined as delivery at < 37 completed weeks of gestation [23]. The present analysis included data from both spontaneous and induced preterm deliveries.

Statistical analysis was performed using SPSS version 20. The *t*-test was used to compare the means of quantitative variables. The chi-square test with analysis of contingency tables was used to assess the differences in the values for categorical variables. Fisher’s exact test (*p*) was applied for frequencies of less than 5. Unconditional logistic regression was used to assess the risk for adverse maternal and neonatal outcomes in grand multiparous women. Afterwards, age was entered into the regression model as a potential confounder and the same potential risk factors identified by the unadjusted analysis were further analyzed after age adjustment. In addition, booking status was entered as a confounder into the regression model and was analyzed. Both unadjusted and adjusted risks were expressed in terms of odds ratios (ORs) with 95% confidence intervals (95% CIs), expressing the risk of grand multiparous women relative to that of multiparous women. The threshold for statistical significance was set at $p < 0.05$.

Results

Between 2011 and 2012, the prevalence of grand multiparity was 1.8% (161 cases out of 9,012). The total number of pregnancies among grand multiparous women was 1,287, with a median of seven children/woman compared to approximately half that number among multiparous women (603 pregnancies, with a median of three children/woman).

The majority of grand multiparous women (127/161, 78.9%) were aged 35–44 years, whereas the majority of multiparous women (139/163, 85.3%) were aged 25–39 years. Maternal age was significantly higher among grand multiparous women than among multiparous women (37.6 ± 3.7 vs. 31.2 ± 5.6 years, $p < 0.001$) as was maternal body mass index (30.8 ± 5.5 vs. 27.9 ± 3.8 , $p < 0.001$). Moreover, grand multiparous women were significantly more likely to be unbooked (32.3% vs. 17.8% in multiparous women, $\chi^2 = 8.8$, $p = 0.003$). There was no statistically significant difference between the two groups in the level of maternal education. Maternal characteristics are summarized in Table 1.

About half of the grand multiparous women had previously had one or more miscarriages, and this percentage was significantly higher than that of multiparous women (47.2% vs. 28.6%, $\chi^2 = 11.1$, $p < 0.001$). There was no significant difference between the groups in terms of the incidence of ectopic pregnancies (1.9% vs. 3.1%, $\chi^2 = 0.13$, $p = 0.718$) or cesarean section (CS) delivery (23.6% vs. 19.6%, $\chi^2 = 0.54$, $p = 0.462$) (Table 1).

Compared to multiparous women, grand multiparous women were more likely to have pregnancy complications such as hypertension (unadjusted OR[uOR] = 3.16, 95% CI = 1.30–7.70, $p = 0.008$) and diabetes mellitus (uOR = 5.90, 95% CI = 1.29–27.1, $p = 0.010$). There was no difference between the groups in the prevalence of anemia or antepartum hemorrhage, and all cases of antepartum hemorrhage occurred secondary to placenta previa and placental abruption (Table 2).

An overview of labor characteristics and perinatal complications is provided in Table 3. The gestational age at delivery was significantly lower in grand multiparous than in multiparous women (37.64 ± 2.81 vs. 38.43 ± 1.46 weeks, $p = 0.002$). As expected, grand multiparous women had a significantly lower risk of requiring labor augmentation by oxytocin (uOR = 0.29, 95% CI = 0.18–0.47, $p < 0.001$) or prostaglandin E2 (uOR = 0.22, 95% CI = 0.07–0.66, $p = 0.004$) and for sustaining perineal tears (uOR = 0.29, 95% CI = 0.17–0.49, $p < 0.001$). Nevertheless, the prevalence of spontaneous preterm delivery was significantly higher in grand multiparous women (uOR = 4.36, 95% CI = 1.73–11.02, $p = 0.001$). There was no significant difference between the groups regarding the incidence of induced labor, poly- and oligohydramnios, or meconium-stained liquor.

Compared to multiparous women, grand multiparous women were more likely to require CS delivery (80/161, 49.7% vs. 56/163, 34.4%) (uOR = 1.89, 95% CI = 1.21–2.95, $p = 0.007$). In both grand multiparous and multiparous women, the most frequent indication for CS delivery was multiple previous CS (24/80, 30.0% vs. 15/56, 26.8%, respectively; $\chi^2 = 0.02$, $p = 0.888$) followed by patient request after a previous CS (23/80, 28.7% vs. 10/56, 17.8%, respectively; $\chi^2 = 1.44$, $p = 0.230$). There was no difference

Table 1. — Maternal characteristics in grand multiparous and multiparous women

Characteristic	Grand multipara	Multipara	Total	χ^2	p-value
Age group, n (%)					
<25 years	0 (0.0)	16(9.8)	16(4.9)		
25–29 years	5 (3.1)	54 (33.1)	59 (18.2)	46.45	<0.001
30–34 years	26 (16.1)	48 (29.4)	47 (22.8)	7.89	0.006
35–39 years	74 (46.0)	37 (22.7)	111 (34.3)	16.91	<0.001
40–44 years	53 (32.9)	6 (3.7)	59 (18.2)	43.91	<0.001
>45 years	3 (1.9)	2 (1.2)	5 (1.5)		0.684
Parity, mean±SD	5.98±1.2	2.28±1.06			<0.001
Age, y, mean±SD	37.6±3.7	31.2±5.6			<0.001
BMI, kg/m ² , mean±SD	30.8±5.5	27.9±3.8			<0.001
Booking status, n (%)					
Booked	109 (67.7)	134 (82.2)	243 (75)		
Unbooked	52 (32.3)	29 (17.8)	81(25)	8.80	0.003
Level of education, n (%)					
≤12 years	65 (40.4)	55 (45.8)	120(37.0)		
>12 years	72 (44.7)	87 (54.7)	159(49.1)	2.40	0.295
Unknown	24 (14.9)	21 (12.8)	45(13.9)		
Abortions, n (%)	76 (47.2)	46 (28.6)	122 (37.6)	11.1	<0.001
Ectopic pregnancy, n (%)	3 (1.9)	5 (3.1)	8 (2.5)	0.13	0.718
Previous caesarean section, n (%)					
Yes	38 (23.6)	32 (19.6)	70 (21.6)		
No	123 (76.4)	131 (80.4)	254 (78.4)	0.54	0.462
Total, n (%)	161 (100)	163 (100)	324 (100)		

BMI, body mass index

Table 2. — Pregnancy complications

Complication, n (%)	Grand multipara	Multipara	Total, n	uOR (95%CI)	p-value
Gestational diabetes	11 (6.8)	2 (1.2)	13	5.90 (1.29–27.1)	0.010
Gestational hypertension	20 (12.4)	7 (4.3)	27	3.16 (1.30–7.70)	0.008
Anemia	31 (19.3)	22 (13.5)	53	1.53 (0.84–2.77)	0.161
Antepartum hemorrhage	4 (2.5)	1 (0.6)	5	4.13 (0.46–37.33)	0.172
Total	161 (100)	163 (100)	324 (100)		

uOR, unadjusted odds ratio; 95%CI, 95% confidence interval

Table 3. — Overview of complications

Event/Characteristic	Grand multipara, n (%)	Multipara, n (%)	uOR (95%CI)	p-value
Mean gestational age at delivery, mean±SD	37.64±2.81	38.43±1.46		0.002
Induction of labor, n (%)	12 (7.4%)	21 (12.9%)	0.54 (0.26–1.15)	0.106
Prostaglandin E2, n (%)	4 (2.5%)	17 (10.4%)	0.22 (0.07–0.66)	0.004
Polyhydromnios, n (%)	10 (6.2%)	3 (1.8%)	3.5 (0.95–13.10)	0.050
Oligohydromnios, n (%)	10 (6.2%)	13 (8.0%)	0.76 (0.32–1.8)	0.540
Oxytocin, n (%)	36 (2.2%)	81 (5.0%)	0.29 (0.18–0.47)	<0.001
Meconium-stained liquor, n (%)	13 (8.1%)	13 (8.1%)	1.01 (0.45–2.26)	0.970
Preterm birth, n (%)	23 (14.3%)	6 (3.7%)	4.36 (1.73–11.02)	0.001
Method of delivery, n (%)				
Vaginal delivery	81 (43.0%)	106 (57.0%)	0.54 (0.35–0.85)	0.007
Cesarean section	80 (58.8%)	56 (41.2%)	1.89 (1.21–2.95)	0.007
Intrapartum complications, n (%)				
Perineal tear	23 (14.3%)	60 (3.7%)	0.29 (0.17–0.49)	<0.001
Ruptured uterus	1 (0.62%)	0 (0.0%)	Undefined	0.313
Postpartum complications, n (%)				
Postpartum hemorrhage	3 (1.9%)	2 (1.2%)	1.53 (0.25–9.27)	0.643
Blood transfusion	7 (4.3%)	3 (1.8%)	2.42 (0.62–9.54)	0.192
Intraoperative features, n (%)				
Bladder injury	2 (1.2%)	0 (0.0%)	Undefined	0.153
Hysterectomy due to intrapartum hemorrhage	1 (0.62%)	0 (0.0%)	Undefined	0.313
Bilateral tubal ligation	16 (3.7%)	2 (1.2%)	8.88 (2.00–39.30)	0.001

uOR, unadjusted odds ratio; 95%CI, 95% confidence interval

between grand multiparous and multiparous women regarding the incidence of fetal death (3/161, 3.8% vs. 4/163, 7.1%, respectively), failure to progress in labor (6/161, 7.5% vs. 3/163, 5.4%, respectively), fetal malpresentation (8/161, 10.0% vs. 8/163, 14.3%, respectively), or placenta previa (2/161, 2.5% vs. 2/163, 3.6%)($p > 0.05$ for all). The frequency of hydrocephalus (one case among grand multiparous women), placental abruption (two cases among grand multiparous women), intrauterine growth restriction (one case among multiparous women), and previous history of myomectomy (one case among multiparous

women) were too small to allow meaningful between-group comparison. When summing up the frequencies of these conditions, no between-group difference was noted ($p = 0.639$). Therefore, the authors concluded there was no statistically significant difference between grand multiparous women and multiparous women regarding the prevalence of the main indications for CS ($p > 0.05$) (Table 4).

While grand multiparous women were more likely to have bladder injury (1.2%), hysterectomy (0.62%), and rupture of a previous uterine scar (0.62%), the between-group differences were not statistically significant ($p >$

Table 4. — *Indications for cesarean section*

Indication	Grand multipara, n (%) N = 80	Multipara, n (%) N=56	χ^2	p-value
Fetal death	3 (3.8%)	4 (7.1%)		0.599
Failure to progress	6 (7.5%)	3 (5.4%)		0.738
Previous CS or patient request	23 (28.7%)	10 (17.8%)	1.44	0.230
Multiple scars after previous CS	24 (30.0%)	15 (26.8%)	0.02	0.888
Fetal malpresentation	8 (10.0%)	8 (14.3%)	0.28	0.597
Placenta previa	2 (2.5%)	2 (3.6%)		0.624
Other indication†	3 (3.8%)	2 (3.6%)		0.639

†Other indications for CS included hydrocephalus, intrauterine growth restriction, placental abruption, and previous history of myomectomy CS, cesarean section

Table 5. — *Neonatal outcomes*

Neonatal outcome	Grand multipara N=156	Multipara N=162	uOR (95%CI)	p-value
Birth weight, kg, mean±SD	3.17±0.69	3.14±0.48		0.096
Low birth weight (<2.5 kg), n (%)	16 (10.2%)	5 (3.1%)	3.58(1.28–10.05)	0.010
High birth weight (>4.0 kg), n (%)	9 (5.8%)	4 (2.5%)	2.42(0.73–8.02)	0.137
1-min Apgar score, mean±SD	7.85±0.79	7.95±0.28		0.147
5-min Apgar score, mean±SD	8.9±0.41	9.0±0.11		0.118
Admission to NICU, n (%)	18 (11.5%)	6 (3.7%)	3.39(1.31–8.78)	0.008
Fetal death, n (%)	3 (3.8%)	4 (7.1%)	0.51(0.11–2.36)	0.378

uOR, unadjusted odds ratio; 95%CI, 95% confidence interval; NICU, neonatal intensive care unit; SD, standard deviation

0.05). Bilateral tubal ligation was significantly more common in grand multiparous women ($p = 0.002$). The prevalence of postpartum hemorrhage and blood transfusion did not show any statistically significant difference between the two groups ($p > 0.05$) (Table 3).

Neonatal outcomes are summarized in Table 5. Compared to neonates born to multiparous women, those born to grand multiparous women were significantly more likely to be LBW (uOR = 3.58, 95%CI = 1.28–10.05, $p = 0.010$) and required NICU admission (uOR = 3.39, 95%CI = 1.31–8.78, $p = 0.008$); however, there was no between-group difference in the prevalence of increased neonatal birth weight. Neonates born to grand multiparous and multi-

parous women did not differ in terms of the mean one-minute Apgar score (7.85 ± 0.79 vs. 7.95 ± 0.28 , respectively; $p = 0.147$) or five-minute Apgar score (8.90 ± 0.41 vs. 9.00 ± 0.11 , respectively; $p = 0.118$).

After adjusting for maternal age, no statistically significant between-group difference was found for any of the factors highlighted by the unadjusted analysis including gestational diabetes, gestational hypertension, preterm delivery, rate of CS, and bilateral tubal ligation during CS ($p > 0.05$ for all). Furthermore, there was no difference between neonates born to grand multiparous and those born to multiparous women in terms of incidence of LBW or NICU admission rate ($p > 0.05$ for both). Booking status-adjusted

Table 6. — Age-adjusted and booking status-adjusted risk for perinatal outcomes in grand multiparous women versus multiparous women

Outcome	Age-adjusted analysis		Booking status-adjusted analysis	
	OR (95%CI)	p-value	OR (95%CI)	p-value
Gestational diabetes	2.03 (0.18–22.91)	1.000	10.70 (1.35–84.9)	0.010
Hypertension during pregnancy	1.27 (0.33–4.94)	1.000	2.89 (1.09–7.62)	0.026
Preterm delivery	7.67 (0.92–64.06)	0.060	3.74 (1.34–10.46)	0.008
Cesarean section delivery	0.76 (0.37–1.57)	0.580	2.07 (1.27–3.37)	0.003
Bilateral tubal ligation	1 (0.14–7.31)	1.000	7.08 (1.57–32.01)	0.008
Low-birth-weight neonate (<2.5 kg)	5.31 (0.60–46.66)	0.209	2.31 (0.78–6.82)	0.122
Admission to the neonatal intensive care unit	3.19 (0.62–16.37)	0.275	3.00 (1.05–8.59)	0.032

OR, age-adjusted odds ratio; 95%CI, 95% confidence interval

analysis showed that LBW in grand multiparous women was associated with unbooked status ($p = 0.122$). Age-adjusted and booking status-adjusted perinatal outcomes are summarized in Table 6.

Discussion

Jordan is a middle-income country where good-quality modern medical services and simple access to modern contraceptive methods are available for all sectors of the population. Nevertheless, religion and traditions in Jordan affect the decision to have a large family with many children, which is supported by an official ban on induced abortion.

To date, the magnitude of problems associated with multiparity and grand multiparity in countries such as Jordan has not been reported adequately. Only two reports on this issue are available, dating back to 1998 [18, 24]. To the best of the present authors' knowledge, the present study is the first to report the prevalence of grand multiparity and related pregnancy complications and perinatal outcomes in Jordan. In this study, the prevalence of grand multiparity was approximately 1.8%, which is lower than previous observations from regional studies (2–36%) [2, 8, 16, 25] but relatively close to the prevalence of grand multiparity reported in developed countries (3–4%) [13, 14]. A possible explanation for this finding is that the current study was conducted in a tertiary, university-affiliated referral hospital that provides better healthcare services to both mothers and children. The population catered to by this hospital has better access to modern contraceptive methods and typically has an above-average level of education [26, 27]. Indeed, most of the grand multiparous women included in this study had antenatal care follow-up as a result of increased health insurance coverage and simple access to modern healthcare services. However, one-third of grand multiparous women remained unbooked. This finding is consistent with the

observations of Adeniran *et al.* who reported that grand multiparous women had a significantly higher rate of late antenatal booking or were unbooked [7].

The safety of pregnancy and delivery in grand multiparous women remains a challenging issue. Documenting perinatal risk factors and potential adverse outcomes at the time of booking or during the course of prenatal follow-up helps predict complications and allows for the adaptation of management strategies to reduce potential morbidities during follow-up. The present unadjusted analysis revealed that gestational diabetes, gestational hypertension, and preterm birth were the most common pregnancy-related complications in both groups, but the risk was significantly higher among the grand multiparous women than among multiparous women (more than six, three, and four times, respectively), which is consistent with previous observations [4, 7]. However, the CIs for uORs were extremely wide, suggesting that while there is indeed a higher risk for such complications, the cause is unclear; specifically, the authors suspected either there were additional effects related to the combination of risk factors or there were certain limitations or errors in this analysis. Therefore, the authors performed an age-adjusted analysis, which revealed no statistically significant differences between the groups regarding the prevalence of such morbidities. In other words, the occurrence of pregnancy-related complications in this study sample was influenced mainly by maternal age, which is supported by evidence from other studies where pregnancy-related complications were not directly associated with grand multiparity per se and where grand multiparity was not associated with major risks for either the mother or the fetus [2, 28]. Similar findings were reported by Nordin *et al.* and Humphrey [29, 30]. Moreover, the prevalence of anemia in grand multiparous women was shown to be half that of the average prevalence in pregnant women in Amman (19.3% vs. 41%) [31]. Therefore, the present authors conclude that there is no association between gesta-

tional anemia and higher parity.

The present unadjusted analysis demonstrated that an indication for CS occurred twice as frequently in grand multiparous women. However, the main indications for CS (patient request after previous CS and previous multiple CS) were similar between the groups and were not associated with any potential maternal or fetal complications, indicating that the incidence of CS is not directly associated with grand multiparity, which is consistent with other published observations [2, 29, 32-35].

In this study, the incidence of intraoperative bladder injury and postpartum complications (hemorrhage and blood transfusions) was similar in both groups, which might be due to the categorization of grand multiparous women as a higher risk group with more vigilant management of the active third stage of labor overseen by senior staff to avoid in-hospital postpartum complications.

The present authors found no statistically significant difference between the groups regarding neonatal Apgar scores. However, unadjusted analysis demonstrated an increased prevalence of LBW and NICU admission among neonates born to grand multiparous women, which could be attributed to a significantly higher rate of preterm delivery among these women. Adeniran *et al.* reported similar findings [7], whereas other studies showed no association between grand multiparity and neonate LBW or rate of NICU admission [2, 8, 33, 35]. After adjusting for maternal age, no increase in neonatal risk (including for LBW and NICU admission) was found in the group of grand multiparous women, which is consistent with many published observations, indicating that grand multiparity is not necessarily associated with neonatal risks [2, 28]. However, after adjusting for booking status, no association between LBW and grand multiparity was revealed. The present authors found no similar studies in the literature. They found that grand multiparous women are more likely to go into labor spontaneously, as the incidence of induced labor was lower in grand multiparous than in multiparous women. Although this difference was not statistically significant, the finding is consistent with the observations of Humphrey [30] but contradicts those of Nordin *et al.* [29] who pointed out that the increased rate of induced labor was due to an increased risk of hypertension. Careful administration of oxytocin during labor according to the standard protocol in this maternity unit could explain the lower incidence of uterine rupture in grand multiparous women, while the laxity of the perineum explains the lower risk of perineal tears, which is consistent with other observations [29].

The present findings indicate that pregnancy complications such as severe hypertension, diabetes mellitus, and bleeding due to placenta previa and placental abruption, as well as complications during delivery and in the postpartum period, were primarily due to maternal age rather than grand multiparity. While grand multiparous women had

higher rates of CS (primarily indicated by multiple uterine scars), the prevalence of surgical trauma and the rate of hysterectomy were similar to those of women with lower parity. Additionally, the authors found no differences between grand multiparous and multiparous women in terms of neonatal outcomes or the rate of perinatal morbidity and mortality.

This was a retrospective chart-review study conducted in a single facility that covered the Northern region of Jordan, thus the results might not be representative of the entire population. Furthermore, some relevant clinical variables (e.g., maternal and neonatal blood test results, ultrasonography findings) were not included in the analysis. A high percentage of women were unbooked, which could affect the outcome as some pregnancy complications could have been managed during pregnancy; however, there was not enough data to provide such an analysis in the framework of this study. Some differences between these findings and the findings of earlier studies can be attributable to different definitions of variables, study design, and inclusion and exclusion criteria. Finally, the follow-up period was limited by the short-term maternity hospital stay, which precluded collection of data regarding the late postpartum and entire neonatal period.

Conclusion

While the present authors found a relatively low prevalence of grand multiparity among Jordanian women, the literature suggests grand multiparity is a potential risk factor for gestational diabetes and hypertension, as well as preterm labor, CS delivery, and adverse neonatal outcomes such as LBW and NICU admission [2, 3, 7]. However, the present findings indicate that such risks are primarily associated with maternal age, and LBW is also related to the unbooked status of women. Thus, grand multiparous women of advanced maternal age should be considered high risk and should be offered advanced monitoring and antenatal care, as well as specialist care by means of modern obstetric management during delivery and the postpartum period. Future studies are warranted to assess the impact of grand multiparity in Jordan.

Acknowledgements

The authors express their gratitude to the healthcare staff of the hospital's Department of Obstetrics and Gynecology and to Miss Elham Abu Khader who was involved in data collection and entry into the database. Additionally, they would like to thank the pregnant mothers who participated actively in this study.

References

- [1] Mgaya A.H., Massawe S.N., Kidanto H.L., Mgaya H.N.: "Grand multiparity: Is it still a risk in pregnancy?". *BMC Pregnancy Childbirth*, 2013, 13, 241.
- [2] Alsammani M.A., Ahmed S.R.: "Grand multiparity: Risk factors and outcome in a tertiary hospital: a comparative study". *Mater. Sociomed.*, 2015, 27, 244.
- [3] Omole-Ohonsi A., Ashimi A.O.: "Grand multiparity: Obstetric performance in Aminu Kano Teaching Hospital, Kano, Nigeria". *Niger. J. Clin. Pract.*, 2011, 14, 6.
- [4] Vaswani P.R., Sabharwal S.: "Trends in the occurrence of antenatal and perinatal complications with increasing parity". *J. Obstet. Gynaecol. India*, 2013, 63, 260.
- [5] Reyes O.A.: "Risk of postpartum hemorrhage in grand multiparous patients: Retrospective, descriptive, observational study". *Clin. Invest. Gin. Obst.*, 2011, 38, 169.
- [6] D'Souza K., Monteiro F.N.P., Jayaprakash K., Bhagavath P., Krishnan S.: "Spectrum of grand multiparity". *J. Clin. Diagn. Res.*, 2011, 15, 1247.
- [7] Adeniran A.S., Fawole A.A., Fakeye O.O., Ijaiya M.A., Adesina K.T.: "Grand multiparity: Evaluating obstetric and neonatal outcomes after eliminating confounders". *Niger. Postgrad. Med. J.*, 2014, 21, 34.
- [8] Agrawal S., Agarwal A., Das V.: "Impact of grand multiparity on obstetric outcome in low resource setting". *J. Obstet. Gynaecol. Res.*, 2011, 37, 1015.
- [9] Geidam A.D., Audu B.M., Oummate Z.: "Pregnancy outcome among grand multiparous women at the University of Maiduguri Teaching Hospital: A case control study". *J. Obstet. Gynaecol.*, 2011, 31, 404.
- [10] Teguede I., Maiga A.W., Leppert P.C.: "Maternal and neonatal outcomes of grand multiparas over two decades in Mali". *Acta Obstet. Gynecol. Scand.*, 2012, 91, 580.
- [11] Abasiattai A.M., Utuk N.M., Udoma E.J., Umoh A.V.: "Grand multiparity: Outcome of delivery in a tertiary hospital in southern Nigeria". *Niger. J. Med.*, 2011, 20, 345.
- [12] Goldman G.A., Kaplan B., Neri A., Hecht-Resnick R., Harel L., Ovardia J.: "The grand multipara". *Eur. J. Obstet. Gynecol. Reprod. Biol.*, 1995, 61, 105.
- [13] Severinski N.S., Mamula O., Severinski S., Mamula M.: "Maternal and fetal outcomes in grand multiparous women". *Int. J. Gynaecol. Obstet.*, 2009, 107, 63.
- [14] Hamilton B.E., Martin J.A., Osterman M.J., Curtin S.C., Matthews T.J.: "Births: Final data for 2014". *Natl. Vital Stat. Rep.*, 2015, 64, 1.
- [15] Afolabi A.F., Adeyemi A.S.: "Grand-multiparity: Is it still an obstetric risk?". *Open J. Obstet. Gynecol.*, 2013, 3, 411.
- [16] Idoko P., Nkeng G., Anyawu M.: "Reasons for current pregnancy amongst grand multiparous Gambian women-a cross sectional survey". *BMC Pregnancy Childbirth*, 2016, 16, 217.
- [17] Department of Statistics (Amman, Jordan). Jordan Population and Family Health Survey 2012. 2013 Oct. [Cited 30 Apr 2017.] Available at: <https://dhsprogram.com/pubs/pdf/FR282/FR282.pdf>
- [18] Abu-Heija A.T., Chalabi H.E.: "Great grand multiparity: Is it a risk?". *Int. J. Gynecol. Obstet.*, 1997, 59, 213.
- [19] World Health Organization: "WHO recommendations the for prevention and treatment of postpartum hemorrhage", 2012. Available at: http://apps.who.int/iris/bitstream/10665/75411/1/9789241548502_eng.pdf.
- [20] Kjeldsberg, C.R.: "Practical Diagnosis of Hematologic Disorders". 3rd ed. Chicago: ASCP Press, 2000.
- [21] Chobanian A.V., Bakris G.L., Black H.R., Cushman W.C., Green L.A., Izzo J.L. Jr., et al.: "The seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure". *Hypertension*, 2003, 42, 1206.
- [22] Gcaba R., Brookes H.B.: "The unbooked maternity patient in an academic hospital in Durban". *Curationis*, 1992, 15, 43.
- [23] World Health Organization: "WHO recommendations on interventions to improve preterm birth outcomes", 2015. Available at: http://apps.who.int/iris/bitstream/10665/183037/1/9789241508988_eng.pdf.
- [24] Gharaibeh M.K., Oweis A., Shakhathreh F.M., Froelicher E.S.: "Factors associated with contraceptive use among Jordanian Muslim women: Implications for health and social policy". *J. Int. Womens Stud.*, 2011, 12, 168.
- [25] Shahida S., Islam M., Begum S., Hossain M., Azam M.: "Maternal outcome of grand multipara". *Mymensingh Med. J.*, 2011, 20, 381.
- [26] The World Bank: "Project appraisal document on a proposed loan in the amount of US\$25 million to the Hashemite Kingdom of Jordan for a higher education reform for the Knowledge Economy Project", 2009. Available at: <http://documents.worldbank.org/curated/en/707511468040481758/pdf/468230PAD0P102101Official0Use0Only1.pdf>.
- [27] Department of Statistics, ORC Macro: "Jordan Population and Family Health Survey 2002: Key findings". 2003. Available at: <https://dhsprogram.com/pubs/pdf/SR111/SR111.pdf>.
- [28] Nassar A.H., Fayyumi R., Saab W., Mehio G., Usta I.M.: "Grand multiparas in modern obstetrics". *Am. J. Perinatol.*, 2006, 23, 345.
- [29] Nordin N.M., Fen C.K., Isa S., Symonds E.M.: "Is grand multiparity a significant risk factor in this new millennium?" *Malays. J. Med. Sci.*, 2006, 13, 52.
- [30] Humphrey M.D.: "Is grand multiparity an independent predictor of pregnancy risk? A retrospective observational study". *Med. J. Aust.*, 2003, 179, 294.
- [31] Salahat A., Ibrahim I.: "Prevalence of anemia among Jordanian pregnant women and the effect of early pregnancy on alkaline phosphatase activity". *Jordan J. Biol. Sci.*, 2012, 5, 65.
- [32] Ozkan Z.S., Atilgan R., Goktolga G., Simsek M., Sapmaz E.: "Impact of grand multiparity on perinatal outcomes in eastern region of Turkey". *J. Matern. Fetal. Neonatal Med.*, 2013, 26, 1325.
- [33] Al J.: "Grand multiparity: a potential risk factor for adverse pregnancy outcomes". *J. Reprod. Med.*, 2011, 57, 53.
- [34] Ikeako L., Nwajiaku L.: "Grand multiparity: experience at Awka, Nigeria". *Niger. J. Clin. Pract.*, 2010, 13, 301.
- [35] Nijiru J., Biryabarema C., Kagawa M.: "Fetal outcomes among grand multiparous and multiparous women in Mulago Hospital, Uganda". *East Afri. Med. J.*, 2013, 90, 84.

Corresponding Author:
 F. THEKRALLAH, M.D.
 Feto-Maternal Division
 Department of Obstetrics and Gynecology
 Faculty of Medicine, The University of Jordan
 P.O. Box 2289, Amman 11910 (Jordan)
 e-mail: fidaaymen@hotmail.com