

Grand Multiparity and Pregnancy Related Complications among Women Who Gave Birth at Jimma University Specialized Hospital, Jimma, Southwest Ethiopia

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Abstract

Introduction: The term 'Grand-multiparity' was introduced by Solomon (1934), who called it the "dangerous multipara" [1]. Since then grand multiparity has been considered as a risk factor for both mother and the fetus [1-4]. The International Federation of Gynecology and Obstetrics define grand multiparity as delivery of the fifth or more newborn and in this study grand multiparity is defined when a pregnant woman have five or more births above the gestational age of 28 weeks [2]. The objective of this study is to compare maternal and perinatal outcome in grand multiparity and low parity. In developing countries grand multiparity is very common while in developed countries rare.

Methods and materials: Prospective cross sectional comparative study was done in Jimma University specialized Hospital in 2015. Data was collected from 119 grand multiparous (parity ≥ 5) and 238 low parity (parity 2-4) women who gave birth in the hospital and data were analyzed by using statically package social science (spss) 20.3. p-value < 0.05 considered significant.

Result: There were 357 parous women participated in the study, among then 125 were grand multiparous making the incidence 8%. Grand multiparty was associated with anemia (3.5; 1.5-8.4), nonreassuring fetal condition intrapartum (3.2; 1.3-8.0) and perinatal mortality (5; 1.7-7.4).

Conclusion: Grand multiparty was associated both maternal and perinatal mortality and morbidity. Limiting parity might decrease both maternal and perinatal mortality and both at community and health facility family planning awareness should be made.

Keywords: Grand multiparity; Perinatal mortality; Jimma; Ethiopia

Introduction

Grand-multiparty was introduced by Solomon (1934), who called it the "dangerous multipara" [1]. Grandmultiparity has been considered a risk factor for mother and fetus [1,3,4]. The international federation of gynecology and obstetrics defined grandmultiparity is delivery of more than five births after fetal viability and this study grand multiparty is defined five or more births after gestational age of 28 weeks or fetal weight 1000 gm and above [2,4].

The incidence is 2-4% in developed countries where as very common in developing countries as high as 18.5% [5]. There were several Studies undertaken to evaluate the impact of grandmultiparity on obstetric outcome in a low and resource setting revealed that grandmultiparity continues to be of grave concern with an adverse impact on obstetric and perinatal outcome [6-13].

Although the older literature tends to suggest that multiparty is a risk factor for negative birth and maternal outcomes but more recent reports are not supportive. Comparison across studies was further complicated by confounding factors like maternal age, socioeconomic status, and levels of prenatal care, as well as by variations in study designs and in the definition of parity itself [14,15]. The aim of this study was to compare the maternal and perinatal outcome of grand multiparous and low parity (parity 2-4) and the incidence in south west Ethiopia.

Methods and Materials

Prospective comparative correctional study was done in Jimma University specialized Hospital from May to September 2015.

The study population were all singleton low parity [2-4] and grandmultiparty in the study period. The exclusion criteria multiple

gestations, pregnant women with currently medical problem, women who delivered in other health institution and who were not accepted consent not included in the study whereas gravid women with low parity and parity five and above included in the study.

Sample size

The sample size was computed using OpenEpi, Version 3. The researcher used a secondary outcome parameter from a previously published study in order to avoid having smaller sample size. The Minimum required sample size was 323 with 10% non-responding rate making sample size 357 where the estimated ratio of unexposed (a lower parity) -to-exposed (grand multiparas) group is 2:1. Based on the power of the study ($1-\beta$) of 80% (confidence interval (CI), 95%) with least extreme odds ratio of 2.00 (Table 1).

Sampling technique

Beginning from the first date of data collection, all grand multiparous that full fill the inclusion and exclusion criteria were taken as a case and

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For:	Two-sided confidence level (1-alpha)	95
	Power (% chance of detecting)	80
	Ratio of Controls to Cases	02:01
	Hypothetical proportion of controls with exposure	40
	Hypothetical proportion of cases with exposure:	57.14
	Least extreme Odds Ratio to be detected:	2
	Kelsey Fleiss	Fleiss with CC
Sample Size - Cases	100	99
Sample Size - Controls	199	198
Total sample size:	299	297
		108
		215
		323

Table 1: Sample Size for Unmatched Case-Control Study using OpenEpi, Version 3.

for each case the next two consecutive low parity mothers who full fill the inclusion criteria considered as control. Data were collected using questionnaire containing maternal sociodemographic characteristics, antenatal profile, intrapartum and postpartum condition of the mother and newborn by trained midwife and neonatal outcome checked by phone on the 7th day birth for those who were discharged before. The principal investigators and other supervisor resident checked quality of the data before discharging a patient.

Data were analyzed using statistical package for social science (SPSS) version 20.3 software. To calculate the mean difference in continuous outcome variables between the two groups, student's independent t-test were used. In the test of association between the predictor- and outcome-variables, the effects of potential confounders were controlled using Generalized Linear Models with a linear regression. Furthermore, for the categorical outcome variables association for each predictor variables was calculated using chi-square. When association was found with chi square between predictor variables and categorical outcome variables, binary logistic regression was used to measure association using Odd ratios with 95% CI and potential confounders were controlled by running multivariable logistic regression. Mean differences and tests of association had 95% Confidence Intervals as an indicator of statistical significance and precision. Adjusted P -Values less than or equal to 0.05 was considered statistically significant.

An official letter obtained from Jimma university ethical review board committee and oral consent was asked before interviewing and extraction of data from patient card.

Results

Socio-demographic/economic characteristics

A total of 357 pregnant mothers (119 grand multiparas and 238 with low parity (control)) participated in this research during the study period. The mean age among grand multiparas was 31.7 ± 4.1 years whereas that of control (low parity) was 27 ± 4.1 years. Majority of grand multiparas 98 (82.4%) and low parity 154 (64.7%) are Oromo by ethnicity and almost all grand multiparas 116 (97.5%) and low parity 236 (99.2%) were married. 106 (89.1%) and 141 (59.1%) among grand multiparas and low parity were living rural area respectively. Most of grand multiparas 103 (86.6%) and majority of low parity 156 (65.5%) are Muslim by religion. Majority of grand multiparas 88 (73.9%) were not able to read and write; however, only 72(30%) of low parity groups cannot read and write. Regarding to occupational status, 58(48.7%) and 140(58.8%) grand multiparas and controls are house wife respectively. The mean monthly income of grand multiparas is 1295.8 ± 958.6 Ethiopian birr whereas 1974.5 ± 1355.4 Ethiopian birr for low parity. Table 1 shows sociodemographic characteristics of study subject.

There were 1572 deliveries in the study period in Jimma university specialized Hospitals. There were 125 grand multiparas out of this 6 were

having twin deliveries and excluded. The hospital grand multiparous delivery prevalence was 8 % during the study period (Table 2).

Antepartum complications: From a total of 119 grandmultiparas women 64 (53.8%) had anemia as antepartum complication whereas 40 (16.8%) of low parity mothers had anemia. Antepartum hemorrhage was identified in 24 (20.2%) and 18 (7.6%) of grand multiparas and low parity respectively. Hypertensive disorders of pregnancy reported in 13 (10.9%) of grand multiparas where as 16 (6.7%) in low parity group. Malpresentation was detected in 39 (32.8%) and 32 (13.4%) of grandmultiparas and low parity groups respectively. Regarding to IUFD, it is observed in 26 (21.8%) and 18 (7.6%) of grandmultiparas and low parity respectively. Identification of at least one of antepartum complication was recorded in 85 (71.4%) and 78 (32.8%) grandmultiparas and low parity respectively. Anemia was the commonest complication in grand multiparous women which three to four times that of low parity during antepartum but there is no deference in malpresentation, hypertension disorders and antepartum hemorrhage between the groups (Table 3).

Variable	Grand multiparas		Low parity		
	Category	Frequency	%	Frequency	%
Age	<20	0	0	5	2.1
	20-24	2	1.7	50	21.0
	25-29	29	24.4	111	46.6
	30-34	43	36.1	53	22.3
	>34	45	37.8	19	8.0
	Mean age \pm SD		31.7 ± 4.1		27 ± 4.1
Ethnicity	Oromo	98	82.4	154	64.7
	Amhara	5	4.2	47	19.7
	Gurage	5	4.2	7	2.9
	Dawuro	7	5.9	27	11.3
	Tigre	1	0.8	1	0.4
	Others	3	2.5	2	0.8
Marital status	Married	116	97.5	236	99.2
	Divorced	1	0.8	1	0.4
	Widowed	2	1.7	0	0
	Single	0	0	1	0.4
Residence	urban	13	10.9	97	40.8
	Rural	106	89.1	141	59.2
Religion	Orthodox	10	8.4	65	27.3
	Muslim	103	86.6	156	65.5
	Protestant	6	5.0	16	6.7
	Others	0	0	1	.4
Educational status	Cannot read and write	88	73.9	72	30.3
	Primary or can read and write	22	18.5	102	42.9
	Secondary	6	5.0	52	21.8
	Collage and above	3	2.5	12	5.0
Occupational status	Farmer	49	41.2	40	16.8
	House wife	58	48.7	140	58.8
	Government employee	6	5.0	38	16.0
	Student	1	0.8	2	0.8
	Merchant	5	4.2	17	7.1
	Daily laborer	0	0	1	0.4
Monthly income (mean \pm SD)		1295.8 ± 958.6		1974.5 ± 1355.4	

Table 2: Socio-demographic characteristics of grandmultiparity and low parity groups at JUSTH, south west Ethiopia from May 2015 to September 2015.

Intrapartum complications: When we look at the intra partum complication identified in study groups, the reported mean duration of labor is 12.4 and 13 hours in grandmultiparas and low parity respectively. Labor abnormality is noticed in majority of grandmultiparas 64 (56.6%) and 65 (29.4%) of low parity groups and meconium stained amniotic fluid observed in 37 (40.2%) of grandmultiparas and 42 (25.2%) of low parity mothers. Fetal heart beat abnormality was detected 25 (26.9%) of grandmultiparous mother during labor and 32 (14.5%) in low parity groups. Intra partal uterine rupture was found in 17 (14.3%) and 5 (2.1%) of grandmultiparas and control multiparas respectively. Majority of grandmultiparas 74 (62.2%) and 113 (47.5%) of low parity groups gave birth with major operations. Most of grandmultiparas 100 (84%) and majority 132 (55.5%) of mothers with low parity have at least one intrapartum complication. Grand multiparous women had been associated with 2.7(CI: 1.4-5.3) times intrapartum complication as to compared to low parity, specifically non reassuring fetal heart status (NRFHS) three times more common in grand multiparous laboring mother but when compare risk of uterine rupture, operative delivery and meconium stained amniotic fluid aren't any difference (Table 4).

Postpartum complications: PPH was diagnosed in 26 (21.8%) of grandmultiparous and in 27 (11.3%) of low parity groups. Puerperal sepsis was seen in 28 (23.5%) of grandmultiparous and 20 (8.4%) of low parity groups. Blood was transfused for 19 (16%) and 11(4.6%) of grandmultiparous and control groups respectively. The mean duration of hospital stay for grand multiparous was 4.5 days whereas 2.9 days for low parity groups. Genital tract injury was encountered in 52 (21.8%) of low parity groups while 13(10.9%) of grandmultiparous. Having at least

one postpartum complication observed in 80 (67.2%) and 87 (36.6%) of grandmultiparous and other multiparas controls respectively.

Grand multiparous women 60% less likely faced genital injuries compare to low parity women whereas grandmultiparous three times (CI, 1.5-6.3) more likely develop postpartum complications. In this paper the postpartum hemorrhage, puerperal sepsis and hospital stay are not associated with poor outcomes grandmultiparity (Table 5).

Neonatal complications: Regarding the neonatal outcome, low 5th minutes Apgar score recorded in 23 (24.7%) and 15 (6.8%) of grandmultiparous and low parity groups respectively. Perinatal mortality was 34 (28.6%) among grand multiparous while 22 (9.2%) in low parity mothers. Low birth weight measured in 14 (11.8%) newborns of grand multiparous and 12 (5%) of low parity babies. Macrosomic baby was 21 (17.6%) among grand multiparous and 16 (6.7%) among low parity groups. Preterm delivery has complicated 19 (19%) and 14 (6.1%) of grandmultiparous and low parity deliveries respectively. NICU admission was observed in 27 (29%) for grandmultiparous women babies and 25 (11.4%) for low parity new born. Macrosomia is three times common in grand multiparous than in low parity whereas 5th minute APGAR score, perinatal mortality (PMR), morbidity and low birth weight are the same outcomes. Perinatal outcomes in between the two parity groups are demonstrated in (Table 6) below and perinatal mortality, low 5th minutes APGAR, low birth weight, NICU admissions and preterm newborns are higher among grand multiparous compare to low parity, however, which are not significantly associated. Macrosomic babies three times more likely to be delivered from grand multiparous

Variables	Grandmultiparous n=119 N (%)	Low parity n=238 N (%)	p	COR (95% CI)	p*	AOR(95%CI)
Anemia	64 (53.8)	40 (16.8)	<0.001	5.8(3.5-9.5)	<0.001	3.5(1.5-8.4)**
APH	24 (20.2)	18 (7.60)	<0.001	3.1(1.6-6.0)	0.89	1.0(0.3-2.7)
Hypertensive disorders of pregnancy	13 (10.9)	16 (6.7)	0.18	1.7(0.8-3.7)		
Malpresentation including intrapartum	39 (32.8)	32 (13.4)	<0.001	3.1(1.8-5.4)	0.54	1.3 (0.5-3.1)
IUFD including intrapartum	26 (21.8)	18 (7.6)	<0.001	3.4(1.8-6.5)	0.71	1.6 (0.1-17.5)
At least one antepartum complication	85 (71.4)	78 (32.8)	<0.001	5.1(3.2-8.3)	<0.001	3.2(1.8-5.6)* **

* - after adjusting for socio-demographic factors, ANC profile and pre-existing Problems.

** - statistically significant at p-value <0.05 after confounders including socio-demographic factors, ANC profile and pre-existing Problems APH and IUFD are controlled with multivariable logistic regression.

***. statistically significant at p-value <0.05 after adjusting for socio-demographic factors, ANC profile and pre-existing Problems using chi square and multivariable logistic regression.

Table 3: Association of parity with antepartum complications of pregnancy at JUSTH, south west Ethiopia from May 2015 to September 2015.

Variables	Grandmultiparous=119 N (%)	Low parity n=238 N (%)	p	COR(95% CI)	p*	AOR(95%,CI)
Duration of labor(mean)	12.4 ± 6.2	13.0±5.7	0.37	0.68(-1.9-0.7)		
Labor abnormality	64(56.6)	65(29.4)	<0.001	3.1(2.0-5.0)	0.81	1.0(0.4-1.9)
MSAF	37(40.2)	42(25.2)	0.02	1.9(1.1-3.3)	0.73	1.1(0.6-2.1)
NRFHRP	(25)26.9	32(14.5)	0.01	2.2(1.2-4)	0.01	3.2(1.3-8.0)**
Uterine rupture	17(14.3)	5(2.1)	<0.001	7.8(2.8-21.6)	0.99	1.1(0.2-4.7)
Vaginal delivery	45(37.8)	125(52.5)	<0.001	0.5(0.3-0.7)	0.76	1.0(0.4-1.9)
Major operative delivery	74(62.2)	113(47.5)	<0.001	2.1(1.3-2.30)	0.84	1.0(0.4-2.2)
At least one intrapartum complications	100(84)	132(55.5)	<0.001	4.2(2.4-7.3)	0.002	2.7(1.4-5.3)***

* -after adjusting for socio-demographic factors, ANC profile, preexisting problems identified and major specific antepartum complications.

** Statistically significant at p-value<0.05 after adjusting for socio-demographic factors, ANC profile, preexisting problems identified, labor abnormality, MSAF, gestational age using chi square and multivariable logistic regression.

*** Statistically significant at p-value<0.05 after adjusting for socio-demographic factors, ANC profile, preexisting problems identified using chi square and multivariable logistic regression.

Table 4: Association of parity with Intrapartum complications at JUSTH, south west Ethiopia from May 2015 to September 2015.

Variables	Grandmultiparous n=119 N (%)	Low parity n=238 N (%)	p	COR(95% CI)	p*	AOR(95%CI)
Postpartum hemorrhage	26(21.8)	27(11.3)	0.01	2.2(1.2-3.9)	0.84	1.0(0.2-3.3)
Puerperal sepsis	28(23.5)	20(8.4)	<0.001	3.4(1.8-6.3)	0.8	1.1(0.3-4.0)
Genital tract injury	13(10.9)	52(21.8)	0.01	0.4(0.2-0.8)	0.046	0.4(0.2-0.9)**
Need for transfusion	19(16)	11(4.6)	<0.001	3.9(1.8-8.5)	0.1	3.6(0.6-20.3)
hospital stay(mean)	4.5 ± 3.3	2.9 ± 3.1	<0.001	1.6(0.9-2.3)		
At least one postpartum complication	80(67.2)	87(36.6)	<0.001	3.6(2.2-5.7)	0.001	3.1(1.5-6.3)***

*-adjusting for socio-demographic factors, ANC profile, preexisting problems, antenatal and intrapartum complications.

** Statistically significant at p-value<0.05 after adjusting for socio-demographic factors, ANC profile, labor abnormality, instrumental delivery using chi square and multiple logistic regression.

*** Statistically significant at p-value<0.05 after adjusting for socio-demographic factors, ANC profile, preexisting problems, using chi square and multiple logistic regression.

Table 5: Association of parity with postpartum maternal complications at JUSTH, south west Ethiopia from May 2015 to September 2015.

Variables	Grandmultiparous n=119 N (%)	Low parity n=238 N (%)	p	COR(95% CI)	p*	AOR(95%CI)
Low 5th minutes APGAR score	23(24.7)	15(6.8)	<0.001	4.5(2.2-9.1)	0.5	1.4(0.5-4)
Perinatal mortality	34(28.6)	22(9.2)	<0.001	3.9(2.1-7.1)	0.56	1.4(0.5-4.2)
Low birth weight	14(11.8)	12(5)	0.03	2.5(1.1-5.6)	0.7	1.6(0.9-27.9)
Macrosomia	21(17.6)	16(6.7)	<0.001	3.0(1.5-6.0)	0.03	2.9(1.1-7.8)**
Preterm	19(19)	14(6.1)	<0.001	3.6(1.7-7.5)	0.96	1.0(0.2-3.2)
NICU	27(29)	25(11.4)	<0.001	3.2(1.7-5.9)	0.32	1.5(0.7-3.3)
PMR	34(28.6)	22(9.2)	<0.001	7(1.6-11.2)	0.02	5(1.7-7.3)

Table 6: Association of perinatal outcomes between grandmultiparity and low parity at JUSTH, south west Ethiopia from May 2015 to September 2015.

ladies compare to low parity groups which is significant (p=0.03, OR-2.9) (95% CI 1.1-7.8).

Perinatal outcomes in between the two parity groups are demonstrated in Table 5 below and perinatal mortality, low 5th minutes APGAR, low birth weight, NICU admissions and preterm newborns are higher among grandmultiparous compare to low parity, however, which are not significantly associated. Macrosomic babies three times more likely to be delivered from grandmultiparous ladies compare to low parity groups which is significant (p=0.03, OR-2.9) (95%CI 1.1-7.8).

Discussion

The prevalence of grandmultiparity in our study population was 8%, which is lower compare to other similar hospital based study done in Ethiopia twenty-two years back in this hospital (16%) as well in Nigeria (18.5%) however, it is still higher than from South Africa retrospective case control hospital based study finding (5%). In most developed countries like USA (2-4% of all pregnancies) [16-26]. This decrement in the prevalence of grand multiparous from developed countries is due to the advancement of family planning. In our studies also we found lower contraceptive use before the index pregnancy among grandmultiparous compare to the control multiparous [27,28].

Regarding antepartum complication in grand multiparous women, anemia during pregnancy was three to four times more common in grand multiparous women than in low parity. This fact also supported by number of other studies [29-35]. On the contrary, there are finding that showed no difference between the two groups [2,9]. The finding that more grandmultiparous women had low hematocrit (<33%) antenatal 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 [36-40].

Even if some study support increase antepartum complications like antepartum hemorrhage, hypertensive disorder of pregnancy, malpresentation, premature rupture of membrane and antepartum fetal death, there was no significant difference in in these complication in grand multiparous and low parity.

In this study there was no significant maternal intrapartum

complication unlike other study done in Sweden and Israel obstructed labor was significant. The logic behind is true even this paper, because of number of residence in involved in labor management that might not be progressed in to complication. But there was three times significant fetal intrapartum fetal heart beat abnormality compared to low parity group. This is explained by most grand multiparous women had anemia and this may contribute to fetal heart beat abnormally. There was no significant difference in terms of labor abnormality, intrapartum infection, meconium stained liquors and mode of deliveries like other study done Saudi Arabia, Lebanese [41-43].

As to the mode of delivery there was no significant association between the two groups in our study, and this finding similar to studies conducted in Tanzania and India [1,2]. There was no in rate of operative delivery, and indication difference in our study unlike study done Saudi Arabia, Australia [10,13]. In the above cited studies majority of grandmultiparous had previous scar.

Such fact also supported by our finding indirectly as the genital tract injury in grandmultiparas was significantly fewer compared to low parity groups which in consistent with other studies.

Risk of uterine rupture is higher among grandmultiparous but it is not statistical significant while it is found to be significant in other studies. This might be explained by the presence of good intrapartum monitoring in the study hospital.

Even though postpartum hemorrhage is found to be increased among grand multiparous in number of studies conducted in Asia, Africa and Ethiopia but in this study showed that there was no difference in immediate postpartum hemorrhage which similar finding study done in Jordan by Abu-Heija et al. The reason might be the study area teaching hospital with number of obstetric residence, medical intern and midwifery student who actively managed active third stage of labor and reduce postpartum hemorrhage caused by uterine atony. Being multiparous reduces genital laceration which is similar finding to other studies [6,8].

In this study there were two maternal deaths from all study population who full fill the inclusion criteria's and both occurred among grand multiparous group. In other number of study as parity increased

maternal mortality also increased which is supported by study in Nigeria, Ethiopia [6,9]. This mainly because of grand multiparous had old age, low educational status and poor antenatal care follow up and late arrival to labor and delivery unit so that those complication would occur and contribute for maternal mortality.

Even though, there were number of study concluded that grand multiparty was risk factor for low birth weight and the other hand number of studies including this paper and meta-analysis showed that grand multiparty was not risk factor for low birth weight if other antepartum maternal complication controlled. The other significant finding in this study was macrosomia three times more in grand multiparous than low parity which is similar to other study in developed countries in Israel, Belgium and USA.

Low 5th minutes APGAR score was comparable in both groups which goes to the finding by Nassar AH et al. Lebanon where as other studies found that neonates delivered from grand multiparas were more closely associated with a low Apgar score compared with lower-parity women [1,3]. Similarly NICU admission found to be high among grand multiparous; however, it was not statistical significant unlike other studies where they observed to be higher among grandmultiparous group compare to low parity mothers.

The finding in this paper regarding perinatal mortality showed that five-fold increased perinatal mortality in grand multiparas compare to the low parity, it was the same other study finding in Tanzania, Scandinavians, Belgium hospital based studies. This high number of mortality due to associated intrapartum fetal heart beat abnormality, macrosomia and other high number of neonate with low APGAR score and neonatal intensive care admission.

The limitation of this study is doesn't control antepartum factors like nutrition and other postpartum maternal and new born condition after 7th day of delivery.

In conclusion, the incidence of grandmultiparity still common and grand multiparty increases both maternal and neonatal complications. Grand multiparty is associated with increased with anemia in antepartum, fetal heart abnormality and genital injury in postpartum. The perinatal mortality was very high as compared to low parity. Increasing awareness in community as well as in healthy institution about family planning and provision and quality of intrapartum and postpartum care might improve both maternal and new born outcome.

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