
Impact of Maternal Age, Parity, and Birth Weight Distribution on Primary Cesarean Delivery Rates

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ABSTRACT

Background: The effect of maternal characteristics including age, parity, and birth weight on cesarean delivery rates were shown to be important factors which determine the pregnancy and neonatal outcome.

Objective: To examine the effect of maternal age, birth weight on cesarean delivery rates in primiparous and multiparous women.

Study design: A cross-sectional study.

Patients and Methods: The sample was collected from Al-Yermouk teaching hospital in Baghdad from January 2009 through January 2010. The study population included 500 pregnant women were randomly selected (primiparous and multiparous women) who delivered by cesarean section, maternal age range from 15 to ≥ 40 years old. Women who had prior cesarean delivery, breech or other mal-presentation, placenta previa, prolapsed cord, fetal anomalies and maternal medical diseases like hypertension, preeclampsia, diabetes mellitus were excluded, The risk for primary cesarean delivery stratified by parity, maternal age and birth weight.

Results: Primary cesarean section rates in primiparous women of teenage are 23.2% and older age group is 28.4%, especially in those who delivered infants of ≥ 4000 gm is 14.4%. For multigravida the rate of cesarean delivery increases for women 40 years and older (28.4%) mainly those with infant birth weight of ≥ 4000 gm which is 12%. Both results are statistically highly significant (P-value 0.0005).

Conclusion: The overall primary cesarean delivery rates are high among adolescent and older primiparous women, while in multiparous women higher rates in older ones. These findings suggest the importance of using maternal age, birth weight, and parity when comparing primary cesarean delivery rates across population and over time.

Keyword: maternal age, cesarean delivery, parity, birth weight.

Introduction

The World Health Organization has determined an "ideal rate" of all cesarean deliveries around 5-15% for a population.

One surgeon's opinion is that there is no consistency in this ideal rate, and artificial declarations of an ideal rate should be discouraged⁽¹⁾

Goals for achieving an optimal cesarean delivery rate should be based on maximizing the best possible maternal and neonatal outcomes, taking into account available medical and health resources and maternal preferences.

This opinion is based on the idea that if left unchallenged, optimal cesarean delivery rates will vary over time and across different populations according to individual and social circumstances⁽²⁾.

Cesarean section is recommended when vaginal delivery might pose a risk to the mother or baby.

Not all of the listed conditions represent a mandatory indication, and in many cases the obstetrician must use discretion to decide whether a cesarean is necessary^(1,2).

Some of those indications are prolonged labor or a failure to progress (dystocia), fetal distress, cord prolapse, hypertension, placental problems (placenta praevia, placental abruption or placenta accreta), abnormal presentation (breech or transverse positions), failed instrumental delivery by forceps or ventouse, large baby, and contracted pelvis⁽²⁾.

The occurrence of cephalopelvic disproportion is more prevalent with increasing fetal size and contributes to both an increased rate of operative

vaginal delivery and cesarean delivery for macrosomic fetuses compared with fetuses of normal weight. Depending on many factors, the optimal range for birth weight is thought to be 3000-4000 grams^(3,5).

Both low birth weight (<2500 g) and high birth weight (>4000 g) are fetal conditions that are associated with increased risks of peripartum morbidity and mortality.

Although the absolute risk that fetuses with birth weights of 2000-2500 grams and 4000-4500 grams will have major peripartum complications is not overwhelming, the risk of such complications increases substantially with both decreasing and increasing birth weight relative to these lower and upper limits.

Thus, birth weight and gestational age are both important determinants of peripartum outcome. As always, the problem is knowing the fetal weight with sufficient accuracy in advance of delivery^(4,5).

The overwhelming majority of studies, in obstetric literature describe significantly higher rate of cesarean deliveries in older women.

It is unclear why there was no one specific indication for cesarean delivery, although others consider that major indications in women aged 40 and over were fetal distress, mal-presentation and failure to progress in labour⁽⁶⁾.

Also stillbirth doubles with advancing age from early 20s to the late 30s and quadruples by mid 40s, as a result of congenital birth defect and fetoplacental dysfunction.

Therefore, the prevalence of maternal complications rises with age, and many complications are associated with an increased risk of cesarean deliveries⁽⁷⁾.

The aim of the study was to examine the effect of maternal age, birth weight on cesarean delivery rates in primiparous and multiparous women.

Patients and Methods:

This cross-sectional study was conducted at the department of obstetrics and gynecology in Al-Yermouk Teaching hospital during the period from January 2009 through January 2010.

The study population included 500 pregnant women who delivered by cesarean section were randomly selected, primiparae and multiparae with singleton live births of gestational age between 36 and 42 weeks. Women with previous cesarean delivery were excluded from the study. Also this study excludes women who had cesarean delivery because of abnormal presentation placenta previa, prolapsed cord, fetal anomalies and other maternal medical disease, like diabetes mellitus, preeclampsia, eclampsia, and haemorrhage from premature separation of placentae.

The delivered ladies by primary cesarean section were divided into two groups; each group included 250 women (primiparae and multiparae). Indications for primary cesarean section were calculated for each group which includes fetal distress, failure of

progress in first stage of labour, and failure of descent in the second stage. Primary cesarean delivery rates were stratified by three demographic risk factors for cesarean birth, maternal age, parity and birth weight. Indications of cesarean delivery used in this study were collected. Other variables were examined for possible confounding effects: birth weight (<2500, 2500 through 3499, 3500 through 3999, and \geq 4000 gm).

Statistical analysis

Continuous data were presented as mean and standard deviation. Categorical variables were presented as number and percentage. T-student test was used to compare continuous variables, while Chi-square test (χ^2 test) was used to compare categorical variables.

P-value \leq 0.05 was considered as significant. Software statistical packages of SPSS (statistical packages for social sciences- version 11) were used for statistical calculation.

Results:

Table 1: shows the patients characteristics used in this study including maternal age, gestational age, birth weight with their mean \pm standard deviation and P-value. There is statistically significance is shown of maternal age parameter in both groups and P-value is 0.0003.

Table 1: The patient's characteristics

	Group 1 Primipara (no 250) Mean \pm SD	Group 2 Multipara (no 250) Mean \pm SD	P-Value
Maternal age (year)	28.236 \pm 8.22327	31.12 \pm 9.55	0.0003
Gestational age (week)	38.38 \pm 1.42	38.16 \pm 1.61	0.107
Birth weight(gm)	3359 \pm 789.79	3448 \pm 671.91	0.1763

Table 2: Includes indications of cesarean delivery used in the study which show the highest rate of cesarean delivery in primiparous women due to failure of progress in 1st stage which is 40% mostly

those women of age 15-19 years and 35-39 years (10% and 23%) respectively, but there was no statistically significant deference in indications of cesarean delivery in relation to maternal age

Table 2: Indications of primary cesarean delivery in primiparous women in relation to maternal age.

	15-19 No.	%	20-24 No.	%	25-29 No.	%	30-34 No.	%	35-39 No.	%	40-45 No.	%	Total No.	%	P- value
Fetal distress	20	8	12	4.8	10	4	15	6	10	4	23	9.2	90	36	0.3837 (Ns)
Failure of progress in 1st stage	25	10	7	2.8	10	4	15	6	23	9.2	20	8	100	40	0.388 (Ns)
Failure of descent in 2nd stage	15	6	8	3.2	8	3.2	8	3.2	10	4	11	4.4	60	24	0.9707 (Ns)
total	60	24	27	10.8	28	11.2	38	15.2	43	17.2	54	21.6	250	100	

The Table (3): presents the indications of cesarean delivery in multiparous women which shows that the most common cause is due to failure of descent in 2nd stage of labour is 38%, mainly those of age group ≥ 40 years old is 8%, also there was no statistically significant difference in indications of cesarean delivery in relation to maternal age.

Table 3: Indications of cesarean delivery in multiparous women in relation to maternal age.

	15-19 No.	%	20-24 No.	%	25-29 No.	%	30-34 No.	%	35-39 No.	%	40-45 No.	%	Total No.	%	P- value
Fetal distress	8	3.2	4	1.6	8	3.8	10	4	10	4	15	6	55	22	0.579 (Ns)
Failure of progress in 1st stage	15	6	12	4.8	10	4	14	5.6	18	7.2	24	9.6	95	38	0.538 (Ns)
Failure of descent in 2nd stage	20	8.8	15	6	13	5.2	15	6	17	6.8	20	8	100	40	0.452 (NS)
total	47	17.2	31	12.4	31	13	39	15.6	35	18	59	23.6	250	100	

Table (4): Shows primary cesarean delivery rates in different maternal age among primiparous and multiparous women. The rate of cesarean deliveries is highest in both primiparous and multiparous women of age group ≥ 40 years old is 33.2% and 28.4% respectively, both results were not statistically significant difference. In comparison with teenage group of 15-19 years old in two groups which is 23.2% and 8.4%, it was statistically highly significant difference (P-value 0.001). The least rates of cesarean delivery in young age women of 25-29 years which is 7.2% in primiparous and 14% in multiparous women, both results were statistically significant difference (p-value 0.013).

Table 4: Primary cesarean delivery rates in different maternal age among primiparous and multiparous women.

Maternal age (year)	Primigravida (no 250)	%	Multigravida (no 250)	%	P-Value
15-19	58	23.2	21	8.4	0.001
20-24	21	8.4	26	10.4	0.44
25-29	18	7.2	35	14	0.013
30-34	20	8	30	12	0.17
35-39	50	20	67	26.8	0.14
≥ 40	85	33.2	71	28.4	1.00

Table (5): Includes Primary cesarean deliveries by maternal age and birth weight among primiparous women, which shows that women aged 20 through 29 years old who delivered infants weighing 2500-3999 gm has the lowest rate of primary cesarean deliveries is 2.8%. While those women of ≥ 40 years of age who delivered infant of higher body weight ≥ 4000 gm had the highest rate is 14.4% (p- value is ≤ 0.0017).

Table 5: Primary cesarean delivery rates among primiparous women of different maternal age birth weight

Maternal age(y)	Birth weight (gm)						Total	%	Pvalue		
	<2500	%	2500-3499	%	3500-3999	%				≥ 4000	%
15-19	20	8	10	4	10	4	18	7.2	58	23.2	0.07
20-24	6	2.4	4	1.6	4	1.6	7	2.8	21	8.4	0.72
25-29	4	1.6	3	1.2	3	1.2	8	3.2	18	7.2	0.28
30-34	4	1.6	4	1.6	4	1.6	8	3.2	20	8	0.48
35-39	10	4	7	2.8	8	3.2	25	10	50	20	0.0005
≥ 40	18	7.2	15	6	16	6.4	36	14.4	85	36	0.0017
Total	60		43		45		102		250	100	<0.0001

Table (6): Presents primary cesarean delivery rates by maternal age and birth weight among multiparous women .The least rate of cesarean delivery for women age 15-19 years of age is 8.4% mainly of those women who delivered infants weighing <2500 gm which is 1.2%, but there was no statistically significant deference. The higher rates for women 35-39 and ≥ 40 years old is 26.8% and 28.4% respectively who delivered infants of higher birth weight ≥ 4000 gm is 12%, (P- value 0.0005 and 0.0001) respectively.

Table 6: Primary cesarean delivery rates among multiparous women of different maternal age birth weight

Maternal age (y)	BIRTH WEIGHT (gm)						Total	%	p value		
	<2500	%	2500-3499	%	3500-3999	%				≥ 4000	%
15-19	3	1.2	4	1.3	8	3.2	7	2.8	21	8.4	0.257
20-24	3	1.2	5	2	7	2.8	11	4.4	26	10.4	0.13
25-29	5	2	6	2.4	12	4.8	12	4.8	35	14	0.16
30-34	5	2	7	2.8	8	3.2	10	4	30	12	0.61
35-39	7	2.8	15	6	15	6	30	12	67	26.8	0.0005
≥ 40	15	2	16	6.4	20	8	30	12	71	28.4	0.0002
Total	16	11.2	52	24.8	70	30	100	40	250	100	<0.0001

Discussion:

The overall primary cesarean deliveries in this study among primiparous women of teenage group 15-19 years is 23.2%, and 40 years and older is 33.2% versus 7.2% in age group 25-29 years old while in multiparous women of 40 years or older have highest rates and least in 15-19 years old (28.4% versus 8.4 %) respectively.

Similar results reported by Skazink⁽⁸⁾ et al who found that primiparous women aged 35 years or older had cesarean section three times as often as women 20-30 years of age. So they had a conclusion that primiparous women age ≥ 35 are at an increased risk of complications in pregnancy and higher rate of surgical deliveries compared with younger women.

Another study reported by Milietic⁽⁹⁾ et al and Jane Cleary-Goldman⁽⁶⁾ et al, they found that cesarean delivery rates increases in women age 40 years and older whether primiparae or multiparae (p value < 0.05). A number of factors have been hypothesized to contribute to this increase including the disproportion numbers of large for gestational age and small for gestational age infants, uterine dysfunction and a lower threshold among patients and providers to perform cesarean deliveries in older women.

A similar study conducted in Aretaiarian hospital Greece by Creates et al⁽¹⁰⁾, on adolescent pregnancy and their consequences. They found that among 5398, (7.53%) cases occurred in adolescent mothers, 9.6% were delivered by cesarean sections in which 78% of cases were primigravidae. It was a common belief that teenage mothers are more likely to experience fetopelvic disproportion as a consequence of incomplete development of the bony pelvis which might lead to increase risk of prolonged labour and operative delivery compared with older women.

Qublan H. et al⁽¹¹⁾ found that of 7671 deliveries conducted, a statistically significant increased cesarean delivery rates with increased maternal age and parity.

In the present study the main indication of primary cesarean delivery among primiparous women is failure to progress in 1st stage of labour, and failure of progress in 2nd stage among multiparous women, both results are not statistically significant.

Salah et al⁽¹²⁾ reported that there is increase in cesarean delivery rates due to fetal distress 33.3% especially among primiparae. While Sultana et al⁽¹³⁾ reported that cesarean delivery was 11.8% of which failure of progress in 1st stage is the main cause of primary cesarean delivery being 13.3% in both primiparous and multiparous women..

In this study we found the rate of cesarean sections in primiparous women is highest with infant birth weight ≥ 4000 gm is 14.4% and in multiparae the rate is 12% of the same birth weight.

A study reported by Gurel S.A et al⁽¹⁴⁾ in agreement with this study which concluded that the rate of cesarean delivery for large for date infants is higher than that of average size baby in both primiparous and multiparous women. Another study of Jastrow et al⁽¹⁵⁾ concluded that birth weight and especially macrosomia are linked with increased rate of cesarean sections.

The increase in medical complications by maternal age explains part of the corresponding increase in cesarean delivery rates. However, after excluding women with medical complications, we still found a pattern of increasing rates of cesarean delivery associated with increasing age.

Conclusion:

- The overall cesarean delivery rates are higher among adolescent and older primiparous women, while in multiparous women among older ones.
- Increasing birth weight is associated with higher cesarean delivery rates.

Recommendation:

Special care to high risk group of pregnant ladies that of older age, teenage, primiparae and those of higher birth weight infants; must be started from antenatal care clinic to detect and prevent complications to both mother and fetus.

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