

ORIGINAL ARTICLE

RELATIONSHIP BETWEEN CERVICAL DILATATION AT WHICH WOMEN PRESENT IN LABOR AND SUBSEQUENT RATE OF CAESARIAN SECTION

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Background: Increasing rate of caesarean section is becoming an epidemic worldwide. This study was conducted to compare rate of caesarean section between women presenting in labor with cervical dilatation less than 4 cm to those with cervical dilatation 4 cm or more. **Methods:** This study was conducted at Aga Khan Hospital for Women, Karimabad. Women with singleton pregnancy and cephalic presentation at term in spontaneous labour were included. Patients were divided in two groups: early presenters with cervical dilatation less than 4 cm and late presenters with cervical dilatation of 4 cm or more. Primary outcome measured was rate of caesarean section, while secondary outcomes were duration of labour, APGAR score and any neonatal complication. **Results:** Medical records of 442 women were reviewed. Difference in mean age of women presenting early in labour was of 2 years (26.8±4.7 vs 28.4±4.5) which was significant (p -value 0.01). More than two thirds of primiparas presented early (69.0% vs 31%) in labour and early presenters had longer labour (p -value <0.001). 62% of early presenters had artificial rupture of membrane compared to 41% of late presenters and nearly 73% required analgesia (p -value <0.001). Caesarean section rate was 10.5% in early and 1.8% in late presenters that was significant (p -value <0.001). APGAR score of both groups was comparable. **Conclusion:** Integrated midwifery services and antenatal classes may help in education of labouring women and their understanding of labour process and so that low risk women can be monitored at home and come to hospital in active labour.

Keywords: Caesarean section; Cervical dilatation; Spontaneous labor

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INTRODUCTION

Caesarean delivery is one of the most common surgical procedures for women in the child-bearing years. Within the past three decades, the caesarean section rate has risen in many countries.¹ In some the rate has even quadrupled. In the United States of America the incidence increased from 4.5% in 1965 to 32.6% in 2014^{2,3} with over one third of the four million live births by Caesarean section⁴. According to CDC “In 2000, of all births in the United States, 23% were caesarean, approximately 37% of which were repeat Caesarean births”. Seventy-eight percent of the caesareans were emergency procedures.^{5,6} Same is the condition in many other countries with rates varying from as low as 11.9% in Sweden to 21.4% in United Kingdom, 22.4% in Italy⁷, 32.6% in India⁸. Conditions are no different in Pakistan. A retrospective analysis of carried out at a teaching hospital in Pakistan to examine the factors responsible for the high caesarean section rate between 1985–1996 showed a rate of 24.1%.⁹

In 1985, the World Health Organization examined national caesarean section rates and maternal and perinatal mortality rates from

various countries and concluded that there was no additional health benefits associated with a caesarean section rate above 10–15%.¹⁰

This rise in caesarean section rate can be explained by advancement in obstetrical technology such as foetal monitoring, changes in the characteristics of the pregnant population like conception at an older age or desire to avoid a vaginal delivery. These may be legitimate indications, but a large number of caesarean deliveries are performed for less sound reasons. A rising trend in the primary caesarean section rate is inevitably paralleled by increasing total caesarean section rate. The management of the first-time mother with a singleton cephalic pregnancy at term seems to account for much of the increase in rates of caesarean section and, perhaps more importantly, much of the variation between individual obstetricians, delivery units and countries.^{11,12}

The increased incidence of caesarean section in many countries is a matter of great concern because apart from the financial and psychosocial disadvantages, the immediate and long-term maternal morbidity and mortality rates of caesarean section are much higher than those

of vaginal delivery. The rate of maternal death associated with caesarean section is 6/100 000, which is three to seven times that associated with vaginal delivery.¹³

The major complications which contribute to the higher maternal morbidity and mortality are haemorrhage, anaesthetic complications, postoperative infection, thromboembolism, sub fertility, placenta previa¹⁴ and the complications of a scarred uterus in a subsequent delivery, namely, scar rupture, morbidly adherent placenta and repeat caesarean section¹⁵.

It has been shown in the literature that the rate of caesarean section is high in early presenters, that is if they attend at less than 4cm cervical dilatation and it is less in late presenters that is if they present at more than 4cm cervical dilatation.^{16,17} Different studies have shown that timing of admission in labouring patient has a great impact on rate of caesarean section. Patients who are admitted in latent phase of labour have higher rate of caesarean section as those who get admitted in active phase of labour.^{18,19}

This study was planned to identify cervical dilatation as an intrapartum predictor of caesarean section. Since there is limited research in this part of world on outcome of patients who comes in spontaneous labour, this study will help us to identify the factors leading to increased rate of caesarean section that can be modified by giving appropriate care to the patients.

MATERIAL AND METHODS

It was a retrospective analytical study and data source was patient's medical record. Data collection and analysis was done after approval from Ethical Review Committee of Aga Khan University. It was conducted at Aga Khan Hospital for Women, Karimabad, a secondary care maternity hospital. Patients without any comorbidity delivered during study time period were taken in the study. Study time period was from Jan 2016 till Jun 2017.

Patients presenting in spontaneous labour with singleton pregnancy and cephalic presentation from 37–42 weeks of pregnancy were included in the study. Patients excluded were with multiple pregnancies, Pre labour rupture of membranes, previous caesarean section, with medical Comorbid, and Intra-Uterine Growth Retardation.

Primary outcome measured was rate of caesarean section, while secondary outcomes were duration of labour, maternal complications like post-partum haemorrhage, endometritis,

blood transfusion, wound infection, Urinary tract infection. Neonatal outcomes such as APGAR score, referral to Neonatal intensive care unit, or developing any neonatal complication like Respiratory Distress Syndrome, pneumonia, sepsis, birth asphyxia or encephalopathy were also recorded.

To calculate the sample size EPI info version 6 is used. The reported rate of Caesarean delivery is 15% taking the rate of C-section in late phase 12%, and 22% in early phase (keeping a difference of 10% among both groups). Keeping power 80%, alpha 5%, and sample size required is 221 women with early phase and 221 with late phase. Non-probability, convenience sampling was done. The history and labour progress of patients with spontaneous labour delivering by caesarean section was recorded in predesigned *proforma* from medical record. Demographic features, maternal, neonatal and labour outcomes were recorded. Descriptive analysis was done by estimating means and standard deviations for continuous variables and proportions for categorical variables. Univariate analysis was done by using chi-square for categorical and student t-test for continuous variables. Multivariable analysis was done by logistic regression and *p*-value of <0.05 was considered significant. All data was analysed using SPSS version 19.

Operational definitions

Early Presenters: Cervical dilatation less than 4 cm

Late Presenters: Cervical dilatation 4 cm and more.

Caesarean section - a surgical operation for delivering a baby by cutting through the mother's abdominal walls

Vaginal birth after caesarean (VBAC) – an occurrence of a patient delivering vaginally after having previously delivered by Caesarean.

RESULTS

Medical records of 442 women were reviewed (early presenter 221; late presenter 221). Difference in mean age of women presenting early in labour was of 2 years (26.8±4.7 vs 28.4±4.5) which was significant (*p*-value 0.01). More than two thirds of primiparas presented early (69.0% vs 31%) in labour (*p*-value <0.001) and early presenters have longer labour than late presenters. Body mass index and gestational age at presentation was not different among two groups. (Table-1)

Sixty two percent of women presenting at cervix dilatation of less than 4 cm had artificial

ruptured of membrane compared to 41% in late group and nearly 73% required analgesia (p -value < 0.05). CTG findings and presence of meconium during labour were non-significant in both the groups (p -value >0.05). However, vaginal delivery was more common in late presenters (98.2% vs 89.5%).

Except 11 babies, none of the baby had any complication in either group. APGAR score of nearly all babies was more than 7 at one and two minutes in both groups. In total 5 babies (3 in early presenter, 2 in late) were admitted to nursery. No baby was referred to intensive care unit in early presenters whereas 3 babies from late presenter groups were referred. However, the difference was not statistically significant (p -value 0.24). Length of stay at hospital for 10% of the babies born to mothers presenting in early labour was more than 3 days compared to only 1% in late presenting mothers and this difference was highly significant (p -value < 0.001).

Proportion of mothers who experienced complications during and after child birth was not different across both groups. Length of stay of mothers also was longer in early presenters compared to late presenters. But nearly all mothers were stable when discharged.

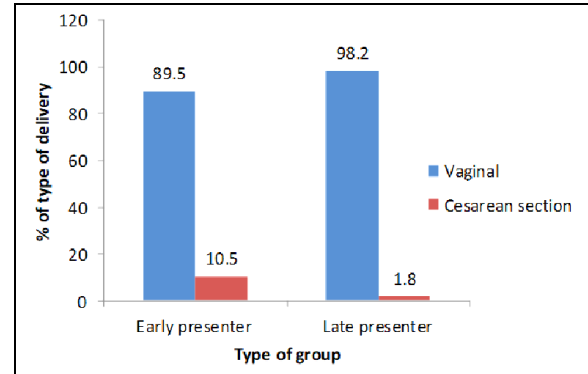


Figure-1: Comparison of mode of delivery between women presented early in labor vs late

Table-1: Comparison of baseline characteristics of women who presented early in labour vs late

Variables	Early presenter n=220 n (%) Mean (SD)	Late presenter n= 221 n (%) Mean (SD)	p-value
BMI	26.0 (5.8)	26.3 (4.4)	0.47
Maternal age	26.8 (4.7)	28.4 (4.5)	0.01
Gravida	1.9 (1.2)	2.4 (1.1)	<0.001
Para	.77 (1.0)	1.2 (.99)	<0.001
Parity:			<0.001
Primipara	107 (48.6)	48 (21.7)	
multipara	113 (51.4)	173 (78.3)	
Gestational age at presentation:			0.09
37-37.6	26 (11.8)	21 (9.5)	
38-38.6	72 (32.7)	61 (27.6)	
40-40.6	38 (17.3)	26 (11.8)	
41	2 (0.9)	3 (1.4)	
Length of labour	9.9 (6.8)	4.0 (4.0)	<0.001

Table-2: Comparison of labour features among participants presented early vs late in labour

Variables	Early presenter n=220 n (%) Mean (SD)	Late presenter n= 221 n (%) Mean (SD)	p-value
Amniotomy:			<0.001
SROM	82 (37.8)	130 (59.1)	
ARM	135 (62.2)	90 (40.9)	
Meconium:			0.40
Present	22 (10.0)	17 (7.7)	
Absent	198 (90.0)	203 (92.3)	
CTG at admission:			0.71
Reassuring	217 (98.6)	208 (98.6)	
Non-reassuring	2 (0.9)	1 (0.5)	
Pathological	1 (0.5)	2 (0.9)	
Use of analgesia:			<0.001
Yes	160 (72.7)	83 (37.9)	
No	60 (27.3)	136 (62.1)	
Indications of caesarean section:			*
No progress	15 (55.6)	1 (12.5)	
Foetal distress	11 (40.7)	5 (62.5)	
Others	1 (3.7)	2 (25.0)	
Mode of delivery:			<0.001
Vaginal	197 (89.5)	217 (98.2)	
Caesarean section	23 (10.5)	4 (1.8)	

*p-value cannot be calculated due to sparse data

Table-3: Comparison of neonatal complications among participants presented early vs late in labour

Variables	Early presenter n=220 n (%) Mean (SD)	Late presenter n= 221 n (%) Mean (SD)	p-value
Neonatal complications:			
No	214 (97.7)	214 (97.3)	0.76
Yes	5 (2.3)	6 (2.7)	
Type of neonatal complications:			
MAS	1 (20.0)	1 (16.7)	*
Sepsis	1 (20.0)	1 (16.7)	
Asphyxia	0 (0.0)	2 (33.3)	
IUD	0 (0.0)	1 (16.7)	
Birth injury	1 (20.0)	1 (16.7)	
TTN	2 (40.0)	0 (0.0)	
APGAR at 1 minute:			
<7	1 (0.5)	4 (0.8)	0.37
≥7	219 (99.5)	217 (98.2)	
APGAR at 2 minutes:			
<7	1 (0.5)	3 (1.4)	0.62
≥7	219 (99.5)	218 (98.6)	
Referral to NICU:			
Yes	0 (0.0)	3 (1.4)	0.24
No	219 (100)	217 (98.6)	
Admission to nursery:			
Yes	3 (1.4)	2 (0.9)	0.68
No	216 (98.6)	218 (99.1)	
Length of stay (days):			
<3	201 (91.4)	217 (98.6)	<0.001
≥3	19 (8.6)	3 (1.4)	

*p-value cannot be calculated

Table-4: Comparison of maternal complications among participants presented early vs late in labour

Variables	Early presenter n=220 n (%) Mean (SD)	Late presenter n= 221 n (%) Mean (SD)	p-value
Maternal complications:			
Yes	10 (4.5)	3(1.4)	0.05
No	210 (95.5)	216(98.6)	
Types of maternal Complications:			
PPH			*
Infections	5 (50.0)	3 (60.0)	
Urine retention	4 (40.0)	0 (0.0)	
Vaginal hematoma	1 (10.0)	0 (0.0)	
Shoulder dystocia	0 (0.0)	1 (20.0)	
	0 (0.0)	1 (20.0)	
Length of stay of mother (days):			
<3	198 (90.0)	217 (98.2)	<0.001
≥3	22 (10.0)	4 (1.8)	
Status of mother on discharge:			
Stable	219 (99.5)	221 (100.0)	0.49
Unstable	1 (0.5)	0 (0.0)	

*p-value cannot be calculated

DISCUSSION

In this study it was found that patients who present early in labour had higher incidence of caesarean section than those who presented late in labour. These patients also had prolonged labour; prolong hospital stay, increased requirement for analgesia. More than two third of the primigravida who presented early in labour had longer labour than multigravida and so had increased interventions that may lead to increased rate of caesarean section as

shown in our study. Primigravida usually present early as they had no previous experience of labour, are more apprehensive and had longer labour. Patients who present late had a shorter labour and therefore decreased need for analgesia and lower rate of interventions that lead to successful normal deliveries. This is in accordance to other studies that showed comparable results in early and late presenters.²⁰

In early presenters' caesarean section in nulliparous women was four times more common

than in multiparous women and most of these primigravida had caesarean section due to cervical dystocia. Whereas in late presenters the reverse was seen, i.e., multigravida ended up in caesarean sections and the reason for caesarean was other than cervical dystocia. Keisuke Tanaka had reported 11.9% caesarean section in nulliparous and 2.9% in multiparous.²⁰ While Michal Robson reports 7.1% in nulliparous and 1.2 & in multigravida patients.²¹

Therefore, in low risk women admission of labouring women can be deferred until they come in established labour so as to decrease the rate of caesarean section, interventions and overall cost as well. Primigravida having no previous experience of labour pains, more anxious, mostly have low threshold for pains and therefore reports repeatedly in triage with Braxton Hicks contractions in third trimester and not in true labour. Since patients are at term and sometimes in early labour, they are admitted in latent phase of labour, which may be prolonged to many hours. The patients who present early may also have dysfunctional labour.²² The apprehension of patient and family increases and count down starts from time of admission. This in turn increases the anxiety of obstetrician who either offers the patient to augment the labour with or to discharge her and to come in established labour. To take a patient home in latent phase is not always considered safe by attendants and by the obstetrician herself and so a cascade of events starts from augmentation of labour with unfavourable Bishop that may end up in abdominal delivery as seen in our study.

Lack of integrated community midwifery services with home visits results in repeated admissions of patients in early labour and then subsequently increased rate of interventions.²³ Mary Ann Davy also showed that care by midwives at home result in admission to hospital in advanced labour and so decreased rate of interventions and decreased rate of caesarean sections. (19.4% compared to 24.9%).²⁴

Antenatal classes significantly reduces the rate caesarean section.²⁵

CONCLUSION

Integrated midwifery services and antenatal classes may help in education of labouring women and their understanding of labour process and so that low risk women can be monitored at home and come to hospital in active labour.

AUTHORS' CONTRIBUTION

NA: Literature search, conceptualization of study design, data collection, data interpretation, write up, proof readings. ZM: Data interpretation, proof

reading. SS: Data analysis, data interpretation. UN: Data collection.

REFERENCES

1. Barber EL, Lundsberg L, Belanger K, Pettker CM, Funai EF, Illuzzi JL. Contributing indications to the rising caesarean delivery rate. *Obstet Gynecol* 2011;118(1):29.
2. Taffel SM, Placek PJ, Liss T. Trends in the United States caesarean section rate and reasons for the 1980-85 rise. *Am J Public Health* 1987;77(8):955-9.
3. Kochanek KD, Murphy SL, Xu J. National vital statistics reports. *Natl Vital Stat Rep* 2016;65(4):1.
4. Curtin SC, Gregory K, Korst L, Uddin S. Maternal Morbidity for Vaginal and Cesarean Deliveries, According to Previous Cesarean History: New Data from the Birth Certificate, 2013. *National vital statistics reports: from the Centers for Disease Control and Prevention, National Center for Health Statistics. Natl Vital Stat Syst* 2015;64(4):1-13.
5. Yudkin PL, Redman CW. Caesarean section dissected, 1978-1983. *Br J Obstet Gynaecol* 1986;93(2):135-44.
6. Cnattingius R, Cnattingius S, Notzon FC. Obstacles to reducing caesarean rates in a low-caesarean setting: the effect of maternal age, height, and weight. *Obstet Gynecol* 1998;92(4 Pt 1):501-6.
7. Souza J, Betran AP, Dumont A, De Mucio B, Gibbs Pickens C, Deneux-Tharoux C, *et al.* A global reference for caesarean section rates (C-Model): a multicountry cross-sectional study. *BJOG* 2016;123(3):427-36.
8. Sreevidya S, Sathiyasekaran BW. High caesarean rates in Madras (India): a population-based cross-sectional study. *BJOG* 2003;110(2):106-11.
9. Najmi RS, Rehan N. Prevalence and determinants of caesarean section in a teaching hospital of Pakistan. *J Obstet Gynaecol* 2000;20(5):479-83.
10. Betran AP, Torloni MR, Zhang J, Ye J, Mikolajczyk R, Deneux-Tharoux C, *et al.* What is the optimal rate of caesarean section at population level? A systematic review of ecologic studies. *Reprod Health* 2015;12(1):57.
11. Vogel JP, Betran AP, Vindeoghel N, Souza JP, Torloni MR, Zhang J, *et al.* Use of the Robson classification to assess caesarean section trends in 21 countries: a secondary analysis of two WHO multicountry surveys. *Lancet Glob Health* 2015;3(5):e260-70.
12. Nippita TA, Lee YY, Patterson JA, Ford JB, Morris JM, Nicholl MC, *et al.* Variation in hospital caesarean section rates and obstetric outcomes among nulliparae at term: a population-based cohort study. *BJOG* 2015;122(5):702-11.
13. Häger RM, Daltveit AK, Hofoss D, Nilsen ST, Kolaas T, Øian P, *et al.* Complications of cesarean deliveries: rates and risk factors. *Am J Obstet Gynecol* 2004;190(2):428-34.
14. Mone F, Harrity C, Mackie A, Segurado R, Toner B, McCormick TR, *et al.* Vaginal birth after caesarean section prediction models: a UK comparative observational study. *Eur J Obstet Gynecol Reprod Biol* 2015;193:136-9.
15. Van der Voet L, Bij de Vaate A, Veersema S, Brölmann H, Huirne J. Long-term complications of caesarean section. The niche in the scar: a prospective cohort study on niche prevalence and its relation to abnormal uterine bleeding. *BJOG* 2014;121(2):236-44.
16. Holmes P, Oppenheimer LW, Wu Wen S. The relationship between cervical dilatation at initial presentation in labour and subsequent intervention. *BJOG* 2001;108(11):1120-4.
17. Kjærgaard H, Olsen J, Ottesen B, Nyberg P, Dykes AK. Obstetric risk indicators for labour dystocia in nulliparous women: a multi-centre cohort study. *BMC Pregnancy Childbirth* 2008;8(1):45.
18. Janna JR, Chowdhury SB. Impact of timing of admission in labour on subsequent outcome. *Community Based Med J* 2013;2(1):21-8.

19. Albassam AN. The outcome of latent phase vs. Active phase admission to labour room of low risk nulliparous women in labour. *J Fac Med* 2010;52(2):149–53.
20. Tanaka K, Mahomed K. The ten-group robson classification: a single centre approach identifying strategies to optimise caesarean section rates. *Obstet Gynecol Int* 2017;2017:5648938.
21. Robson MS. Can we reduce the caesarean section rate? *Pract Res Clin Obstet Gynaecol* 2001;15(1):179–94.
22. Caughey AB, Cahill AG, Guise JM, Rouse DJ. Safe prevention of the primary cesarean delivery. *Am J Obstet Gynecol* 2014;210(3):179–93.
23. NICE. Clinical Guideline 190: Intrapartum Care for Healthy Women and Babies. National Institute for Health and Care Excellence 2014.
24. Neal JL, Lamp JM, Buck JS, Lowe NK, Gillespie SL, Ryan SL. Outcomes of nulliparous women with spontaneous labor onset admitted to hospitals in preactive versus active labor. *J Midwifery Womens Health* 2014;59(1):28–34.
25. Cantone D, Lombardi A, Assunto DA, Piccolo M, Rizzo N, Pelullo CP, *et al.* A standardized antenatal class reduces the rate of cesarean section in southern Italy: A retrospective cohort study. *Medicine (Baltimore)* 2018;97(16):e0456.

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