

See discussions, stats, and author profiles for this publication at: <https://www.researchgate.net/publication/359901816>

Maternal Determinants in Full Dilatation Caesarean Section (FDCCS): A Prospective Study in Tertiary Teaching Hospital in North Kerala

Article · January 2021

CITATIONS

0

READS

37

2 authors, including:



[Heera Shenoy](#)

KMCT Group of Institutions

35 PUBLICATIONS 27 CITATIONS

[SEE PROFILE](#)

Some of the authors of this publication are also working on these related projects:



dual burden of BMI . [View project](#)

Original Research Article

Maternal Determinants in Full Dilatation Caesarean Section (FDGS): A Prospective Study in Tertiary Teaching Hospital in North KeralaJensy Chembakassery¹, Heera Shenoy T^{2*}¹Associate Professor, Department of Obstetrics and Gynaecology, KMCT Medical College, Kozhikode, Kerala, India²Junior Resident, Department of Obstetrics and Gynaecology, KMCT Medical College, Kozhikode, Kerala, India

Received: 20-07-2021 / Revised: 11-08-2021 / Accepted: 19-09-2021

Abstract

Background: Caesarean section (CS) is the most commonly performed abdominal operation in women in both industrialised and low-income countries. CS at full cervical dilatation is a technically more challenging procedure than CS in early labour. **Material and Methods:** This prospective case-control study was conducted at a tertiary care teaching institute from Aug 1 2019 to July 31 2020. It included all women (N = 90) delivered by caesarean section. There were 103 caesareans out of which 37 were FDGS and 66 were first stage caesareans. Maternal variables included age of the mother, maternal weight, obstetric score, spontaneous or induced labour and analysed the indications of primary caesarean. The duration of surgery was defined as the time elapsed between skin incision and skin closure and measured. **Results:** Primigravidae constituted 73% in second stage caesareans and 47% of in first stage caesarean and hence a significant determinant of FDGS. Maternal and foetal weight significantly increased FDGS rates. Mean gestational age was 39.08 and 38.72 weeks in second stage and first stage group and it was comparable. We found that mean operative time was 18.4 minutes longer for FDGS when compared to first stage CS. Arrest of descent due to cephalopelvic disproportion was the most common indication in FDGS (25.2%) followed by malposition, NRFHR and Failed vacuum. Patwardhan method followed by pushing from below and breech extraction were methods adopted to deliver the impacted foetus. **Conclusion:** Decision making in second stage caesarean section is often challenging and involvement of senior obstetrician is desired for decision making and for performing second stage CS. Special attention should be provided to the patients undergoing FDGS.

Keywords: Full Dilatation Caesarean section (FDGS), second stage CS, Arrest of descent, Primary CS.

This is an Open Access article that uses a fund-ing model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

One of the main goals of every medical team dealing with childbirth, is performing a safe delivery [1]. Caesarean section (CS) is the most commonly performed abdominal operation in women in both industrialised and low-income countries. The rate of caesarean deliveries varies substantially between nations and healthcare facilities but continues to rise worldwide [2,3]. According to WHO, the ideal rate for caesarean sections is to be between 10-15%.

An emergency caesarean done at second stage has a parturient at full cervical dilatation. Incidence of second stage CS has increased from 0.9% to 2.2% [4]. Second stage CS have been reported to cause increase in trend of primary caesareans [5]. Royal College of Obstetricians and Gynaecologists (RCOG) reports that 6% of primary CS occurs at full dilatation and in 50% of these patients there was no attempt of instrumental vaginal delivery [6]. CS at full cervical dilatation is a technically more challenging procedure than CS in early labour [7]. There is also difficulty in delivery of deeply engaged head which can be delivered by Patwardhan method or by push method.

Decision making for CS in the second stage of labour is one of the greatest challenges in current obstetric practice. Involvement of a skilled obstetrician in the management of second stage CS aids in minimising the maternal and foetal morbidity and mortality. In the current scenario of increasing caesarean section rates, this hospital

Correspondence*Dr. Heera Shenoy T.**

Associate Professor, Department of Obstetrics and Gynaecology,

KMCT Medical College, Kozhikode, Kerala, India.

E-Mail: heerarprabhu@gmail.com

based comparative cross-sectional study is taken to compare the maternal and neonatal determinants of caesarean delivery in second stage of labour versus caesarean delivery in the first stage of labour.

Material and Methods

This was done as a case control study.

A caesarean section in full dilatation is referred to as Full Dilatation Caesarean Section (FDGS) and was taken as the case and designated as Group 1.

A control was defined as one who has undergone primary caesarean section in the first stage of labour. And designated as Group 2.

There were 66 cases of first stage caesarean section (5.7%) and 37 cases of second stage CS (3.2%). This study was conducted in Department of Obstetrics and Gynaecology, KMCT Medical College, Calicut over a period of 1 year (from Aug 1 2019 to July 31 2020).

Sample size: $N = Z^2 \alpha/2 \times p \times (1-p) \times D$ $E Z \alpha/2 =$ Normal deviate for two tailed hypothesis = 1.96

$P =$ Proportion Or Prevalence (From Previous Studies) (Anusha SR, Deepak AV, Jacob KJ. Maternal and neonatal outcome in second stage caesarean section versus first stage: a comparative study. Int J Reprod Contracept Obstet Gynecol 2018;7:4640-5.) $56 D =$ Design effect = 1 $E =$ Margin of error = 20% $N = 90$ (sample size) (22)

Selection criteria

Inclusion criteria

- Women with singleton fetus with vertex presentation including Primi-gravidas and multigravidas with previous vaginal delivery Gestational age > 37weeks of gestation.
- Women with spontaneous and induced onset of labour pains.

Exclusion criteria

- Women with associated obstetric complications (preeclampsia and diabetes mellitus).
- Women with major fetal structural or chromosomal abnormalities.
- Pregnancies with placenta previa, malpresentations and abruptio placentae
- Pregnancies <37 weeks of gestation

KMCT Medical College is a tertiary care centre. The precise catchments are difficult to delineate, as women attending KMCT virtually come from all over Calicut, Malappuram and Wayanad. 85-90% of these women are booked in the antenatal clinic of KMCT, while 5-10% are booked outside and less than 3% seek un-booked 'emergency delivery'. The number of KMCT antenatal care seekers who have domiciliary delivery is nil or considerably negligible. KMCT has a 24hour blood bank facilities and excellent emergency obstetric services and round the clock anaesthetic services. Our hospital has an excellent NICU which has a survival rate of 100% for gestational age >34 weeks. Relatively small percentage of affluent women come to our hospital. It mainly caters to the need of mainly lower and lower middle, mid middle classes of the population. In addition, private hospitals also refer many complicated cases to our hospital. The literacy rate attending KMCT is over 90%, majority of them having secondary or higher level education and are aware of their rights to health. The sampling frame for the study was maternal register maintained in the labour room, which consists of all the deliveries conducted in a tertiary care hospital. The cases and controls are interviewed by a structured questionnaire before discharge in wards. A detailed history regarding her age, obstetric score, and antenatal history are taken. Maternal weight was taken. Her intrapartum period including PROM and induced or spontaneous onset of labour pain were noted. Indication of caesarean delivery and birth weight in both cases and controls were looked into. The duration of surgery is measured and is defined as the time elapsed between skin incision and skin closure.

Data Management

Data was coded and entered into excel sheets. All statistical procedures were performed using Statistical Package for Social Sciences (SPSS) 20.0. Calculations for power (80%) of study will be performed before commencement of the study. All quantitative variables expressed in mean and standard Deviation. Qualitative variables were expressed in percentages. Shapiro-Wilk test was used for testing the normality assumption of the data. Chi square test was used to test the associations. g the normality assumption of the data. P value <0.05 was considered significant.

Results

Total number of deliveries during the study period was 1151. Among these, 608 cases were normal delivery and 543 cases delivered by caesarean section. Total emergency cases were 271 and primary caesarean section rate was 103 (33%). There were 66 cases of first stage caesarean section (5.7%) and 37 cases of second stage CS (3.2%).

Maternal Predictors

- **Age of the mother**

Age group distribution was comparable in both the groups. Majority of them were in the age group 20-25yrs. Mean age of group 1 was 25.17 years and in FDGS group was 26.28.

• Parity

Primigravidae constituted 73% in second stage caesareans and 47% of in first stage caesareans.

• Maternal weight

Weight of the Mother was also an important determinant of second stage caesarean section. In our study mean weight was 67.7kg for group 1 and 60.42kg for group 2.

• Labour characteristics

Gestational age at caesarean In both the groups Majority belonged to gestational age of 39wks -40wks. 62.2% and 50% of patients were at 39-40 weeks of gestation in second stage and first stage respectively.

• Onset of labour

In the present study, 64.9 % of induced labour fall in group1 and 62.1% fall in group 2.

• PROM

18.9% and 12.1 % patients had PROM in second stage and first stage respectively. Association between PROM and caesarean is proved by finding that premature rupture of membranes (PROM) was a major risk factor for arrest of descent and an important determinant of primary caesarean.

• Indication for Caesarean section

Arrest of descent due to cephalopelvic disproportion was the most common indication for second stage caesarean section accounting for 23.3% of cases. Arrest of descent due to malposition, arrest of descent with NRFHR and failed vacuum accounted for 5.8%, 3.9% and 2.9% of cases respectively. Three (2.9%) women who had undergone CS in the second stage had required an episiotomy before switching to CS due to failure of labour.

In first stage caesarean section group, the most common indication was foetal distress (NRFHR) 22.3% followed by Non progress of labour (NPOL) 20.4%. MSAF 12.6%, Arrest of dilatation 1.9% FGR with abnormal doppler 1.9%, compound presentation 1 %, Caesarean delivery at maternal request 1%, impending eclampsia 1.9% and abruptio placentae 1% contributed to the remaining first stage caesareans.

• Duration of Caesarean delivery

FDGS required longer operative time in comparison to the first stage caesareans. The mean time for was 74.05 minutes and 55.65 minute for FDGS and first stage caesarean respectively. Operative time was increased due to difficulty of delivery of deeply engaged head.

• Method of delivery of foetal head.

14 (37.8%) babies were delivered by Patwardhan method and 12 (32.4%) delivered without difficulty in FDGS. 7(18.9%) had to be delivered by pushing from below and only (4%) delivered as breech. First stage CS all are delivered without difficulty. The findings are statistically significant.

• Birth weight of neonate

Birth weights of the neonates born to mothers who had undergone CS in the second stage of the labour was heavier than the neonates born to mothers who had undergone CS in the first stage of the labour (P < 0.05). Majority of babies (51.4%) underwent FDGS are of 3.1-3.5 kg where as in first stage CS, 39.4% of 2.6-3kg. Mean birth weight in second stage is 3.32 kg and 2.97 kg in first stage

Table 1: Mean Characteristics of both groups

Variables	GROUPS		t-Value	Significance*
	Group (1FDGS)	Group 2F (IRST STAGE CS)		
MEAN Characteristics				
Maternal Age in years	25.17	26.28	-0.96	0.33
Maternal Weight in kgs	67.70	60.42	3.27	0.001*
Gestational age in weeks	39.08	38.72	1.75	0.08
Mean Duration of Surgery in minutes	74.05	55.65	8.24	0.001*

Mean birth weight in grams	3320	2970	3.75	0.001*
Mean duration of hospital stay	7.08	6.30	3.12	0.002*

p value <0.001 is highly significant.

Table 2: Obstetric Score and FDACS

Variable	Group 1 (FDACS) N=37	Group 2 (First stage caesarean section) (N=66)	X ² value	P value
Primigravida	27 (73.0)	31 (47.0)	6.53	0.03*
Multigravida	9 (24.3)	32 (48.5)		
Grand multi	1 (2.7)	3 (4.5)		

p value <0.05 is statistically significant; ** <0.001 is statistically highly significant

Table 3: Indications of caesarean (FDACS) and First stage caesarean section

Indication of caesarean delivery	FDACS (Full dilatation caesarean section) n=37	First stage CS n=66
Arrest of descent	24	-
Failed Vacuum	3	-
Arrest of descent-Malposition	6	-
Arrest of descent-NRFHR	4	-
Non-progression of labour	-	21
Non reassuring foetal heart rate-NRFHR	-	23
MSAF-Meconium stained Amniotic Fluid	-	13
Arrest of dilatation	-	2
Impending Eclampsia	-	2
Antepartum haemorrhage.(APH)	-	1
CDMR	-	1
FGR with Abnormal doppler	-	2
Compound Presentation	-	1

Table 4: Method of Delivery of Head in Two Groups

Method of delivery of head	Group1 (FDACS) N=37	Group 2(First stage CS) N=66	Chi-square	< 0.001
Without difficulty	12 (32.4)	66 (100)	58.89	
Pushing from below	07 (18.9)	0		
Patwardhan	14 (37.8)	0		
Breech	04 (10.8)	0		

p value <0.001 is highly significant.

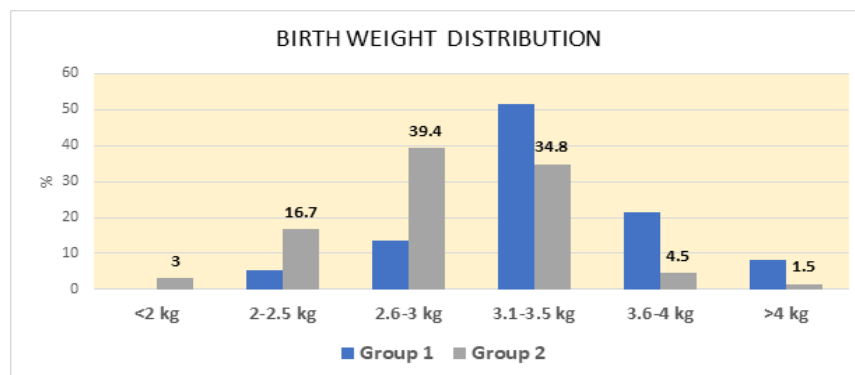


Fig 1: Birth weight Distribution across two groups

p value <0.001 is highly significant.

Discussion

Total number of deliveries during the study period was 1151. Among these, 608 cases normal delivery and 543 cases delivered by caesarean section. Total emergency cases were 271 and primary caesarean section rate was 103 (33%).

There were 66 cases of first stage caesarean section (5.7%)- GROUP 1 and 37 cases of second stage CS (3.2%).

Maternal age

Age group distribution was comparable in both the groups. Majority of them were in the age group 20-25yrs. Mean age of group 1(FDACS) was

25.17 years similar to that in Rami BD et al and Malathi et al where most of women were between 21-30 years of age (58%) [8,9]. In India maximum number of women who conceive are in this age group due to early marriage and early pregnancy.

Parity

Primigravidae constituted 73% in second stage caesareans and 47% of in first stage caesareans. In the study by Rami BD et al, maximum number (70.77%) of cases were primigravida [8]. Similar predominance of first time caesareans in primigravida (74%) were seen in Babre VM et al [10] and Unter scheider J et al [5] which could be

due to mild to moderate cephalopelvic disproportion, rigid perineum, lack of experience in labour. Same results were found in study done by Baloch Set al and Feinstein et al [11,12] This is also supported by Gupta k et al [13] in which 81% of the patients were primigravida and only 19% were multigravida as well as in Kumaresan Set al [14] where 76% of the patients were primigravidae.

Obesity

Maternal weight was also an important determinant of second stage caesarean section. In our study mean weight was 67.7 kg for group 1 and 60.42 kg for group 2. Body mass indices of the patients in the second stage of the labour (28.1 ± 4.7) were significantly greater than the patients in the first stage of the labour (24.0 ± 3.9) ($P < 0.05$) in a study by Sucack A et al [15] as well as Gaudet L et al [16] where they suggested that maternal obesity was associated with chronic conditions and macrosomic births which may result in cephalopelvic disproportion and prompting the need for caesarean birth. According to Shenoy H T et al [17], in maternal anthropometry, women more than 70 kgs had 4.2 times more risk of first time caesarean.

Labour characteristics

Gestational age at caesarean in both the groups Majority belonged to gestational age of 39wks -40wks. 62.2% and 50% of patients were at 39-40 weeks of gestation in second stage and first stage respectively. As in Samal K et al [18] there was no statistically significant difference between gestational age in both the groups. Mean gestational age was 39.08weeks and 38.72weeks in second stage and first stage group and it was comparable. However, findings of Rami et al [8] were in contrast with that in our study in which the maximum number of caesarean sections at full cervical dilatation (80%) were performed above 37 weeks of gestation.

Onset of labour

In our study 64.9 % of induced labour fall in group1 and 62.1% fall in group 2. This finding was in contrast to that by Samal K et al [18] which had statistically significant patients who underwent primary caesarean for induced labour than spontaneous labour and in Sandhya MR et al [19] in which spontaneous labour was 35.7% and induced labour was 64.2%. PROM 18.9% and 12.1 % patients had PROM in second stage and first stage respectively. According to Samal K et al [18], intrapartum factors like PROM were significant. But in the present research, patients with intact membranes and PROM had comparable rates of primary caesarean. Association between PROM and caesarean is also supported by Harper et al [20] and Handa and Laros [21] where they opined that premature rupture of membranes (PROM) was a major risk factor for arrest of descent and an important determinant of primary caesarean

Indication for Caesarean Section

In our study, arrest of descent due to cephalopelvic disproportion is the most common indication for second stage caesarean section accounting for 23.3% of cases. Arrest of descent due to malposition, arrest of descent with NRFHR and failed vacuum accounted for 5.8%, 3.9% and 2.9% of cases respectively. In first stage caesarean section group, the most common indication was foetal distress (NRFHR) 22.3% followed by Non progress of labour (NPOL) 20.4%, MSAF 12.6%, Arrest of dilatation 1.9% FGR with abnormal doppler 1.9%, compound presentation 1%, Caesarean delivery at maternal request 1%, impending eclampsia 1.9% and abruptio placentae 1% contributed to the remaining first stage caesareans. Most important indication for first stage caesarean section is failed induction 33.3% and arrest of descent due to malposition is the most common indication for second stage caesarean section (76.7%) according to Anusha et al [22]. Non progress of labour with foetal distress followed by deflexed head and deep transverse arrest (DTA) contributed to FDSC in Goswami et al [23]. The most common indications for FDSC in Kumaresan et al [14] was cephalopelvic disproportion (34.8%) and non-reassuring foetal heart rate patterns (18.4%). In contrast, most common indications for Second stage section was foetal distress followed by deep transverse

arrest (DTA) as quoted by VM Babre et al [10] as well as Rami BD et al [8]. According to Shenoy et al [24] failed induction and non-progress of labour /CPD followed by NRFHR/MSAF compromised the bulk of primary caesareans. Padma Gurung et al (25) found that CPD and NRFHR were the most common indications for CS in the second stage (53.8% and 34.9% respectively) followed by failed instrumental delivery (7.6%)

Time taken for surgery

FDSC required longer operative time in comparison to the first stage caesareans. The mean time for was 74.05 minutes and 55.65 minute for FDSC and first stage caesarean respectively. Operative time was increased due to difficulty of delivery of deeply engaged head as in Goswami et al [23] and that in Padma Gurung [25], where mean duration of surgery was 57.68 min. Mean operative time was significantly more in second stage (81 minutes) as compared to first stage (35 minutes) by Jain et al [26] and it is supported by Cebekulu et al [27] where they found significantly longer operative time is needed in second stage caesarean section was 45 minutes in contrast to 30 min in first stage caesarean section. However in South Africa, Govender et al [28] found that mean operative time taken to perform second stage caesarean section was 41.6 minutes. This study is also supported by Babre VM et al [10] where he emphasised that as the duration for second stage increases, there would be more difficulties due to oedematous lower segment, overstretched and thinned out lower segment and more impaction of presenting part in pelvis. The mean operative time was more in second stage (53.3 min) compared to first stage (41 min) Anusha et al [22].

Method of delivery of head

In our study 14(37.8%) delivered by Patwardhan method and 12(32.4%) was delivered without difficulty in FDSC. 7(18.9%) delivered by pushing from below and only (4%) delivered as breech. First stage CS all are delivered without difficulty. The findings are statistically significant. In a study by Gupta k et al [13], 44% of the babies were delivered by vertex followed by Patwardhan (31%). Rest was delivered by push method and breech extraction. This was similar with the study by Babre VM et al [10], in which deeply engaged head delivered by vertex method in 67.2%, by Patwardhan method in 23% and by push method in 9.8%. As in Bansiwal R et al [29], 71(52.6%) babies were delivered by push and pull method and remaining by Patwardhan technique.

Birth weight

Majority of babies (51.4%) underwent FDSC are of 3.1-3.5 kg where as in first stage CS, 39.4% of 2.6-3kg. Mean birth weight in second stage is 3.32 kg and 2.97 kg in first stage. This is supported by Rami et al [8] where baby weight at time of birth was 2.5 to 3.5 kg in 44 cases (67.7%). Sucack A et al [30] found that birth weights of the neonates born to mothers who had undergone CS in the second stage of the labour (3780 ± 635 g) was heavier than the neonates (3310 ± 455 g) born to mothers who had undergone CS in the first stage of the labour ($P < 0.05$). In a study by Nidhi Jain et al [26] average birth weight of babies was 200 grams heavier in second stage Caesareans. But in Victoria MA et al [31], birth weights in both the groups were comparable.

Decision making in second stage caesarean section is often challenging. So involvement of senior obstetrician is desired for decision making and for performing second stage CS. The main point of focus should be on strict monitoring of normal progression of labour, proper use of the partograph, pain relief measures and judicious use of oxytocin augmentation. Induced labour should be avoided as far as possible unless indicated[32].

Recommendations

Periodic audits regarding the rate of second stage caesarean section are required as well as formulation of an institutional protocol and training and supervision of junior obstetricians is necessary to improve the skill of conducting operative vaginal delivery and second stage caesareans.

Avoiding caesarean delivery has important implications for a woman's future obstetric career. By skilled obstetric care, we can definitely improve the reproductive health and thereby the quality of life in women.

References

- Lori JR. Cultural Childbirth Practices, Beliefs and Traditions in Liberia. Michigan: ProQuest; 2009:9
- Declercq E, Young R, Cabral H, Ecker J: Is a rising cesarean delivery rate inevitable? Trends in industrialized countries, 1987 to 2007. *Birth* 2011, 38(2):99-104.
- Betran AP, Ye J, Moller AB, Zhang J, Gulmezoglu AM, Torloni MR: The Increasing Trend in Caesarean Section Rates: Global, Regional and National Estimates: 1990-2014. *PloS one* 2016, 11(2):e0148343.
- Vousden N, Shennan AH. Caesarean section at full dilatation: incidence, impact and current management. *The Obstetrician Gynaecologist*. 2014;16(3):199-205.
- Unterscheider J, McMennamin M, Cullinane F. Rising rates of caesarean deliveries at full cervical dilatation: a concerning trend. *European J ObstetGynecol Repro Biol*. 2011;157(2):141-4.
- Thomas J, Paranjothy S. The national sentinel caesarean section audit report. *National Sentinel Caesarean Section Audit Report*. 2001.
- McKelvey A, Ashe R, McKenna D, Roberts R. Caesarean section in the second stage of labour: a retrospective review of obstetric setting and morbidity. *J ObstetGynaecol*. 2010 Apr 1;30(3):264-7.
- Rami BD et al. *Int J Reprod Contracept Obstet Gynecol*. 2020 Apr;9(4):1672-1675
- Malathi J, Sunita V. Comparison of obstetric outcome between first and second stage caesarean section in rural tertiary hospital. *International Journal of Pharmaceutical and Biomedical Research*. 2012;3:222-5
- Babre VM, Bendre KR, Niyogi G. Review of caesarean sections at full dilatation. *Int J Reprod Contracept Obstet Gynecol*. 2017;6(6):2491-3.
- Baloch S, Khaskheli M. Frequency of Second stage Intervention and its outcome in relations with instrumental vaginal delivery versus cesarean section. *J Ayub Med Coll Abbottabad*. 2008;20(1):87- 90.
- Feinstein U, Sheiner E, Levy A, Hallak M, Mazor M. Risk factor for arrest of descent during the second stage of labour. *Int J Gynaecol Obstet*. 2002;77(1):7- 14.
- Gupta K, Garg A. Fetomaternal outcome in caesarean section at full dilatation. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*.;8(8):3099.
- Kumaresan S, Loganathan M. Rising rates of second stage caesarean section and its impact on maternal outcome. *International Journal of Reproduction, Contraception, Obstetrics and Gynecology*. 2018;7(7):2682.
- Sucak A, Celen S, Akbaba E, Soysal S, Moraloglu O, Danisman N. Comparison of nulliparas undergoing cesarean section in first and second stages of labour: a prospective study in a tertiary teaching hospital. *ObstetGynecol Int*. 2011. 986506
- Gaudet L, Wen SW, Walker M. The combined effect of maternal obesity and fetal macrosomia on pregnancy outcomes. *J Obstet Gynaecol Can*. 2014;36:776-84.
- Heera Shenoy T, Sheela Shenoy T. Determinants of primary caesarean delivery and its outcome in South Kerala. *J. Evid. Based Med. Health c*. 2018; 5(32), 0000-0000. DOI: 10.18410/Jebmh /2018/000)
- Samal SK, Rathod S. Prediction of caesarean section for arrest of descent during the second stage of labour. *Int J Reprod Contracept Obstet Gynecol* 2017;6:963-5.
- Sandya MR, Shirley George, Lissy Varghese. Foeto- maternal outcome in second stage Caesarean section - An audit .*International Journal of Obstetrics and Gynaecology* 2018;6(2):207-210.
- Harper DM, Johnson CA, Harper WH, Liese BS. Prenatal predictors of caesarean section due to labor arrest. *Arch Gynecol Obstet*.1995;256:67-74.
- Handa VL ,Laros RK .Active -phase arrest in labour :Predictors of Caesarean delivery in nulliparous population *Obstet Gynaecol* 1993;81:758-63.
- Anusha SR, Deepak AV, Jacob KJ. Maternal and neonatal outcome in second stage caesarean section versus first stage: a comparative study. *Int J Reprod Contracept Obstet Gynecol* 2018;7:4640- 5.
- Goswami KD, Parmar MM, Kunjadiya AN. Study of foeto-maternal outcome in second stage caesarean section. *Int J Reprod Contracept Obstet Gynecol* 2019;8 .
- Heera Shenoy T, Sheela Shenoy T, Remash K. Determinants of primary vs previous caesarean delivery in a tertiary care institution in Kerala, India .*International Journal of Clinical Obstetrics and Gynaecology* 2019; 3(5): 229-236.
- Gurung P, Malla S, Lama S, Malla A, Singh A. Caesarean section during second stage of labor in a tertiary centre. *Journal of Nepal Health Research Council*. 2017 Sep 8;15(2):178-81.
- Jain N, Lal P. A retrospective comparative study of foeto-maternal outcome in first and second stage caesarean section. *Int J Reprod Contracept ObstetGynecol* 2016;5:2282-6.
- Cebekulu L, Buchmann EJ. Complications associated with C/ S in the second stage of labour. *Int J Gynaecol Obstet* 2006;95:110-114. 67.
- Govender V, Panday M, Moodley J. Second stage caesarean section at a tertiary hospital in South Africa. *J Maternal-Fetal Neon Medi*. 2010 Oct 1;23(10):1151-5.
- Bansiwat R, Anand HP, Jindal M. Safety of Patwardhan technique in deeply engaged head. *Int J Reprod Contracept Obstet Gynecol*. 2016;5:1562-5
- Sucak A, Celen S, Akbaba E, Soysal S, Moraloglu O, Danisman N. Comparison of nulliparas undergoing cesarean section in first and second stages of labour: a prospective study in a tertiary teaching hospital. *Obstet Gynecol Int*. 2011. 986506
- Victoria MA, Colleen M, Thomas FB. Maternal and perinatal morbidity of caesarean delivery at full cervical dilatation compared with caesarean delivery in the first stage of labour. *BJOG*. 2005;112:986-90.
- Menon VPS, Rajan R. A comparative study of socio demographic profile, clinical profile and maternal outcome of caesarian section done in second stage of labour with elective caesarean section. *Int J Res Med Sci* 2016;4:4735- 41.

Conflict of Interest: Nil

Source of support: Nil

