**Original Research Article**

# The burden of caesarean section and its determinants from a tertiary care hospital, Thrissur, Kerala, India

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**ABSTRACT**

**Background:** Caesarean section is a surgical procedure done when vaginal delivery is contraindicated. The prevalence of caesarean section in Kerala showing an increasing trend. Even though the caesarean section is an emergency lifesaving procedure, various other factors like socio-demographic determinants, economic factors and patient's or clinician's preferences also influence this increasing trend. The present study was undertaken to compare the various determinants of caesarean section with normal delivery from a tertiary care hospital in Thrissur district.

**Methods:** A hospital-based case control study was done taking mothers who had undergone caesarean section as cases and mothers who had undergone normal delivery as controls during two-month period. The sample size was calculated using the formulae: $(Z\alpha + Z\beta)2x2xPQ/d2$, and the calculated sample size was 88. The various determinants used were socio-demographic, obstetrics and cultural determinants.

**Results:** In this study, it was found that the most common indications for C-section were previous C-section, PPROM and foetal distress. There was a statistically significant association between obstetrics determinants like complications during pregnancy, number of USG taken, period of gestation with mode of delivery. The present study also shows that mothers with educational status up to graduate/PG have lesser incidence of caesarean section. There was a statistically significant association between delivery date close to holidays/festival days and C-section.

**Conclusions:** It is necessary to have health awareness sessions to pregnant mothers about the complication of pregnancy, benefits of normal delivery and complications of C-sections in-order to reduce the patients' preference for C-section.

**Keywords:** Caesarean section, Determinants, Thrissur

## INTRODUCTION

Caesarean section is a surgical procedure done when vaginal delivery is contraindicated in which incisions are made through a woman's abdomen and uterus to deliver her baby.[1] The appropriate care at delivery is crucial for both maternal and perinatal health. One way of reducing maternal mortality is by improving the availability, accessibility, quality and use of services for the treatment of complications that arise during pregnancy and childbirth which are collectively known as emergency obstetric care (EmOC) services. The caesarean section is one among emergency obstetric care and common indications reported from various studies were previous Caesarean Sections, failure of labour to progress, foetal distress and obstructed labour. As per WHO guidelines, no region is to have a caesarean section rate higher than 10-15%.[2] But the world is witnessing an increasing rate of Caesarean Sections for the past few years in many countries. In India, according to NFHS 4 data, the

average caesarean section rate is 17.2%. and there exists a wide urban rural disparity in the caesarean rate, which showed 28.3% in urban area and 12.9% in rural area.[3] The health status of Kerala state is comparable with that of developed countries. Here the rate of caesarean section has increased up to 35.8% in NFHS 4 compared with NFHS 3 data which was 30.1%.[3,4]

Even though caesarean section is a lifesaving procedure, they are not free of complications. Caesarean sections affect maternal morbidity by adversely affecting breast feeding, and by causing infections. Other maternal complications include haemorrhage, injury to internal organs including the bladder, anaesthetic complications, paralytic ileus, respiratory complications, pelvic thrombophlebitis, incisional hernia, scar endometriosis, and placenta praevia in subsequent pregnancies. It also causes antibiotic resistance due to indiscriminate use of antibiotics during and after the delivery periods.[5] Incidence of respiratory distress syndrome in neonates is higher following caesarean section than in vaginal delivery. Children borne surgically are at double the risk of obesity in childhood, with a higher risk of developing type 1 diabetes mellitus and bronchial asthma.[6,7] It also causes economic burden to families. In Kerala a rising trend in CS rates, were shown from previous studies.[8] The previous study done by Divyamol N showed a higher prevalence as 37.7% from rural area of Thrissur district. Out of all caesarean sections more than half 55.1% were elective and 44.9% were emergency caesarean section.[9] An increasing caesarean rate can be due to many factors apart from clinical indications. These may include various economic and socio demographic factors, patient and physician preferences. Now a day's caesarean section has become a modern way to have a baby, involving the use of technology which can be scheduled on a lucky birthday or time. For an anxious mother, a caesarean section avoids the need for a baby to make the journey through the birth canal and it can maintain a high degree of professionalism. Hence the present study was undertaken to compare the various determinants of caesarean section with normal delivery from a tertiary care hospital in Thrissur district.

**METHODS**

A hospital-based case control study was done taking mothers who had undergone caesarean section as cases and mothers who had undergone normal delivery as controls during 2-month period from June 2018 to July 2018. The sample size was calculated taking difference in proportion of caesarean deliveries among graduated mothers and mothers with educational status lesser than graduation from previous study done from a rural area in Thrissur district.[9] Proportion of caesarean deliveries among graduated mother as - 50% and Proportion of caesarean section among mothers with educational status lower than graduation as 29.3%, using the formulae $(Z\alpha + Z\beta)$ 2 x 2 x PQ/ d2 , taking p1 - 50, p2 -29.3, P = p1 +p2 /2 39.65, Q -100-P, d - (p1-p2) 50-29.3 = 20.7, 18760/428.49 = 44 in each group, total sample size was

88. The consecutive sampling technique was used and all mothers who had given consent for the study were included. Data was collected from mothers during their postpartum period from obstetrics wards, or from SICU using a semi structured questionnaire. Mothers were interviewed using an interview schedule and socio-demographic details including mode of delivery and indication for caesarean section were collected. The various determinants used for this study were classified as:

Socio-demographic determinants which include age, religion, educational status of pregnant women, occupation, Socio-economic status and type of family.

*Obstetrics determinants* - parity, complications during pregnancy, no of USG taken and gestational age.

*Cultural determinants* - delivery date closeness to holiday or festival days (2 days prior or 2 days after holidays).

***Statistical analysis***

The collected data was entered in Microsoft excel and statistical software SPSS version 23 was used for analysis. The appropriate statistical methods like rate, mean and standard deviation, chi-square and Fischer's exact methods were used for analysis.

**RESULTS**

A total of 88 mothers were included in the study, out of which 44 had undergone normal delivery and 44 had undergone caesarean section.

**Table 1: Socio demographic details of study population.**

| Parameters | Classification | Number (88) | Percentage (100%) |
|---|---|---|---|
| Religion | Hindu | 23 | 26.1% |
| | Christian | 48 | 54.5% |
| | Muslim | 17 | 19.3% |
| Educational status | High school | 7 | 8% |
| | Higher secondary | 12 | 13.6% |
| | Degree | 57 | 64.8% |
| | Post graduate | 12 | 13.6% |
| Occupation | Professional | 19 | 21.6% |
| | Skilled | 18 | 20.5% |
| | Home maker | 51 | 58% |
| Type of family | Nuclear | 30 | 34.1% |
| | Joint | 7 | 8% |
| | Three generation | 51 | 58% |

The mean and standard deviation of age of mothers participated in the study was 25.99±4.26 ranging from minimum age 19 and maximum age 38. In this study, a more than half of the mothers belong to Christians religion 48 (54.5%) and 23 (26.1%) of mothers belong to

Hindu religion and rest 17 (19.3%) belong to Muslim religion. Out of 88 mothers, majority 57 (64.8%) of mothers had completed their degree education and 12 (13.6%) had post graduate degree and only 7 mothers (8%) had educational status up to high school. There were 37 (42.1%) of mothers who were employed and more than half 51 (58%) were home makers. All mothers belonged to APL status and 51 (58%) lived in a three-generation family and only 7 (8%) belonged to joint family. The socio-demographic details of mothers were given in Table 1.

**Table 2: Obstetrics determinants of mothers.**

| Obstetric determinants | Classification | Number (88) | Percentage (100%) |
|---|---|---|---|
| Parity | 1 | 54 | 61.4% |
| | 2 | 29 | 33% |
| | 3 | 5 | 5.7% |
| Complications in pregnancy | No | 50 | 56.8% |
| | Yes | 38 | 43.2% |
| Number of USG | ≤3 | 47 | 53.4% |
| | >3 | 41 | 46.6% |
| Period of gestation | Pre-term | 6 | 6.8% |
| | Term | 81 | 92% |
| | Post term | 1 | 1.1% |
| Birth weight of babies | Normal birth weight | 76 | 86.4% |
| | Low birth weight | 12 | 13.6% |

Among the participants, majority of mothers were primi para 54 (61.4%) and 29 (33%) were second para. About 50 mothers (56.8%) had complications during their pregnancy period. Most of the mothers 41 (46.6%) did USG for more than or equal to 3 times. Out of total 88 mother's majority 81 (92%) mothers had undergone term delivery and only 6 (6.8%) of mothers had pre-term delivery and only 12 (13.6%) babies were born underweight. The obstetrics determinants are shown in the Table 2.
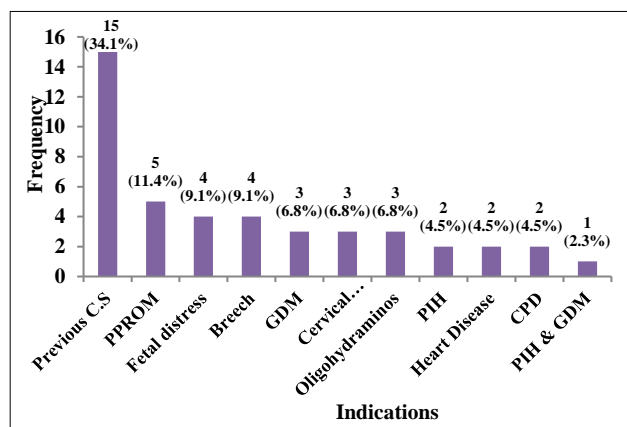


**Figure 1: Indications for caesarean section.**

Out of 44 mothers who had undergone caesarean section the various indications for C - section was Previous caesarean section 15 (34.1%) followed by PPROM 5 (11.4%) and foetal distress 4 (9.1%). Out of 44 caesarean deliveries majority 33 (75%) of mothers had elective C-section and only 11 (25% had emergency C-section. The

Figure 1 shows the various indications for caesarean section.

In this study 43 (49%) of the deliveries occurred close to festival/ holiday days. i.e. 2 days prior or on the day of festival or 2 days after the festival/holiday. This may be due to various reasons like patients or physician's preferences like getting lucky stars, obstetricians' comfort etc.

The socio-demographic determinants of mothers undergone caesarean section were compared with normal delivery. It was found that among total 23 mothers who belonged to Hindu religion, majority 14 (60.9%) of mothers had undergone C-section and out of total 48 Christian mothers only 23 (47.9%) had undergone C-section and only 7 (41.2%) of mothers among Muslim religion undergone C-section. But this difference was not statistically significant (P value -0.42). There were only 33.3% of mothers with Post graduate degree had undergone C-section, and there were 57.1% of mothers with educational status up to high school undergone C-section. But this difference is also not statistically significant. The present study shows that as the education status of the mothers increased, the number of caesarean section had reduced Table 3.

Out of 38 deliveries with complications during pregnancy, majority 28 (73.7%) had undergone caesarean section and out of total 50 mothers without any complication in pregnancy only 16 (32%) of them had undergone C- section. This difference is statistically significant (p-value < 0.001) There was also statistically significant association between number of USG taken by

pregnant mothers and mode of delivery (p value -0.005) when the period of gestation was compared among normal delivery and caesarean section, it was shown that all preterm and post term mothers had undergone caesarean section and only 37 (45.7%) of mothers with term gestation undergone C-section. This difference is statistically significant. The mean birth weight of babies 2.86±0.416 ranging from 1.75 to maximum weight 3.6 kg. The mean birth weight of babies born in normal delivery was 2.94±0.402 and babies born in caesarean section was 2.78±0.41. Out of total 12 mothers with LBW babies 8 (66.7%) of had undergone caesarean section and only 3 (33.3%) had undergone normal

delivery. But this difference was not statistically significant (p-value -0.21) The present study compared the cultural determinant (delivery close to holiday/ festival day) among normal delivery and caesarean section. It was found that out of total 43 deliveries close to festival/holiday, more than half 32 (72.7%) were caesarean deliveries and out of total 45 deliveries not close to holiday/ festival only 12 (27.3%) were normal delivery and this difference was statistically significant. Out of 32 C-section close to festival/holiday, majority 26 (81.25%) had undergone elective procedure and only 6 (18.75%) of mothers undergone emergency C-section, (p-value <0.001) Table 4.

**Table 3: Comparison of socio demographic determinants of normal deliveries and caesarean section.**

| Socio- demographic determinants | Classification | Mode of delivery | | Total | Statistical significance |
| --- | --- | --- | --- | --- | --- |
| | | Normal (44) | Caesarean section (44) | | |
| Religion | Hindu | 9 (39.1%) | 14 (60.9%) | 23 (100%) | Chi-square value- 17, P-value -0.42 |
| | Christian | 25 (52.1%) | 23 (47.9%) | 48 (100%) | |
| | Muslim | 10 (58.8%) | 7 (41.2%) | 17 (100%) | |
| Educational status | High School | 3 (42.9%) | 4 (57.1%) | 7 (100%) | Fischer's exact value - 1.90 P-value -0.15 |
| | Higher secondary | 4 (33.3%) | 8 (66.7%) | 12 (100%) | |
| | Degree | 29 (50.9%) | 28 (49.1%) | 57 (100%) | |
| | Post graduate | 8 (66.7%) | 4 (33,3%) | 12 (100%) | |
| Occupation | Professional | 11 (57.9%) | 8 (42.1%) | 19 (100%) | Chi-square value - 0.65 P-value- 0.72 |
| | Skilled | 9 (50%) | 9 (50%) | 18 (100%) | |
| | House wife | 24 (47.1%) | 27 (52.9%) | 51 (100%) | |
| Type of family | Nuclear | 15 (50%) | 15 (50%) | 30 (100%) | Fischer's exact value - 0.01 P-value -0.9 |
| | Joint | 3 (42.9%) | 4 (57.1%) | 7 (100%) | |
| | Three generation | 26 (51%) | 25 (49%) | 51 (100%) | |

**Table 4: Comparison of obstetrics determinants among normal deliveries and caesarean section.**

| Obstetric determinants | Classification | Mode of delivery | | Total | Statistical significance |
| --- | --- | --- | --- | --- | --- |
| | | Normal (44) | Caesarean section (44 | | |
| Complications during pregnancy | Yes | 10 (26.3%) | 28 (73.7%) | 38 (100%) | Chi-square value - 15, P-value - < 0.001 |
| | No | 34 (68%) | 16 (32%) | 50 (100%) | |
| No of USG taken | <3 | 30 (63.8%) | 17 (36.2%) | 47 (100%) | Chi-square value- 7.71, P-value- 0.005 |
| | >3 | 14 (34.1%) | 27 (65.9%) | 41 (100%) | |
| Period of gestation | Preterm | 0 | 6 (100%) | 6 (100%) | Fischer's exact value - 10.3 P-value - 0.006 |
| | Term | 44 (54.3%) | 37 (45.7%) | 81 (100%) | |
| | Post term | 0 | 1 (100%) | 1 (100%) | |
| Birth weight of baby | Normal weight | 40 (52.6%) | 36 (47.4%) | 76 (100%) | Chi-square value- 1.54, P-value - 0.21 |
| | Low birth weight | 4 (33.3%) | 8 (66.7%) | 12 (100%) | |

## DISCUSSION

The results of present study were compared with previous study done by Divyamol, and the major indications for caesarean section, were previous caesarean sections (40.44%), failure of labour to progress (22.47%) and

foetal distress (14.6%) were similar to this study.[9] Another study done by Unnikrishnan b et al at Mangalore and by Khairum Naharin Mymensing Medical College Hospital Dhaka, the major indication for caesarean sections was previous caesareans followed by foetal distress and obstructed labor.[10,11] Another study done by

Ghosh S, observed a higher number of caesarean section delivery among mothers with high educational background in India.[12] But in our study as the educational status increases, the rate of caesarean section was decreasing. Significant association observed between USG done > 3 times and caesarean sections can be explained by the fact that pregnancy with complications are likely to have a greater number of USGs done. Similar result was obtained in the study by Hemachandran K in Kerala.[13] Most of the comparison results go hand in hand with the published study. The most significant determinants are obstetrics determinants cultural determinants also play an important role. Apart from socio-demographic and obstetric determinants, personal preferences of either pregnant woman or the obstetrician or both also play an important role in currently increasing rate of caesarean section.

Limitations of this study were since the present study was a hospital-based study, all pregnant mothers where from APL criteria, we could not find out association between socio-economic status of mother and mode of delivery. Another limitation of this study was on calculation of number of caesarean sections and normal delivery occurring close to festival/holiday. It can depend on consultants OP days and theatre days.

## CONCLUSION

From the study, it has been concluded various determinants like obstetric determinants and cultural determinants influence the caesarean section. As the educational status of mother increases the rate of caesarean section was decreasing. The present study also revealed a statistically significant difference between mode of delivery and obstetrics and cultural determinants. Proper counselling to pregnant mother help in reducing the anxiety and fear about normal delivery. it is necessary to have a health awareness session to pregnant mothers about the complication of pregnancy, benefits of normal delivery and complications of caesarean sections in every hospitals in-order to reduce the patient's preference for C-section.

## ACKNOWLEDGMENTS

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