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Original Article

A Cross-Sectional Study on Caesarian Sections in Primigravida According to Robson's Criteria in A Teriary Care Centre

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ABSTRACT

Background: Cesarean section (CS) is a crucial obstetric intervention when medically indicated; however, its rising rate, especially among primigravida women, is a growing concern. The World Health Organization recommends a CS rate of 10–15%, yet rates in many tertiary care centers remain considerably higher. Robson's Ten Group Classification System (TGCS) is a standardized method to evaluate and audit cesarean section rates.
Objectives: To analyze cesarean section rates among primigravida women using Robson's Ten Group Classification System and to identify the major contributing groups, indications, and associated obstetric factors at a tertiary care center.
Methods: This observational cross-sectional study was conducted over 12 months (January 2024–December 2024) at Government General Hospital, Mahabubnagar, Telangana. All primigravida women who underwent cesarean section during the study period were included. A total of 300 primigravida CS cases were analyzed using universal sampling. Maternal demographics, gestational age, onset of labor, antenatal care visits, indications for CS, and Robson group classification were recorded. Statistical analysis was performed using descriptive statistics and Chi-square tests.
Results: The overall cesarean section rate was 60.03%, with a primigravida CS rate of 61.29%. Emergency CS accounted for 87.7% of cases. Robson Group 1 was the largest contributor (70.37%), followed by Group 2 (22.4%). Fetal compromise, cephalopelvic disproportion, and oligohydramnios were the most common indications. Significant associations were observed between gestational age, onset of labor, antenatal care visits, and the type of CS ($p < 0.05$).
Conclusion: A high cesarean section rate among primigravida women was observed, predominantly in Robson Group 1. Regular audits and improved labor management strategies are essential to reduce unnecessary primary cesarean sections.

Keywords: *Cesarean section, Primigravida, Robson classification, Tertiary care hospital.*

INTRODUCTION

Cesarean section (CS) is a life-saving surgical procedure for delivering a baby when medically necessary, reducing maternal and neonatal mortality in complicated pregnancies[1]. However, the global rate of CS has increased dramatically, often exceeding the World Health Organization (WHO) recommended threshold of 10–15%. This rise in CS is a significant concern for maternal and neonatal health. India has also witnessed a substantial increase in CS rates, particularly in urban and private healthcare settings[2]. Factors contributing to this trend include changing maternal demographics, advancements in medical technology, healthcare provider preferences, maternal requests, and financial incentives. Despite the perceived safety, CS carries higher risks of maternal morbidity and mortality, postpartum infections, longer recovery, and complications in future pregnancies, as well as neonatal risks. The Robson's Ten Group Classification System (TGCS) is

a standardized tool for auditing and monitoring CS rates[4,5,6]. This study aims to critically analyze cesarean deliveries among primigravida women at a tertiary care hospital using Robson's classification system and also other various demographic factors associated with CS deliveries.

AIMS & OBJECTIVES

The **aim** of this study was to analyze cesarean section (CS) rates among primigravida women using Robson's Ten Group Classification System (TGCS) at Government General Hospital, Mahbubnagar. The **objectives** 1. To classify cesarean section cases among primigravida women using Robson's Ten Group Classification System 2. To identify the major contributing factors and key indications for cesarean delivery 3. To help develop strategies for optimizing CS rates and improving maternal outcomes.

METHODS & MATERIALS

This is an **observational study** conducted over **12 months (January 2024 to December 2024)** at the In-Patient Department of Obstetrics and Gynecology at **Government General Hospital, Mahabubnagar** a tertiary care center in Telangana southern Indian state. All **primigravida women undergoing cesarean section** at Government general hospital Mahbubnagar during the study period were taken as study population. Universal sampling was used, and a total of **300 patients were included for analysis**. Data was collected using a **semi-structured questionnaire** and by reviewing patient medical records. Information on demographics, obstetric history, mode of onset of labour, antenatal visits, Robson's Ten Group classification, and primary indication for CS was recorded.

Inclusion Criteria:

- All primi gravida women undergoing cesarean section at Government General Hospital, Mahabubnagar.
- Antenatal women willing to provide written informed consent.

Exclusion Criteria:

- Primi gravida women unwilling to provide written consent.
- Primi gravida women who had a normal vaginal delivery.

Statistical analysis

Descriptive statistics were used to summarize demographic and obstetric characteristics. The proportion of each Robson group and its contribution to the overall CS rate were calculated. The **Chi-square test** was used to evaluate statistical significance in differences across groups. A p-value <0.05 was considered significant.

Incidence of the cesarean section= total no of cesarean sections/ total no of deliveries x 100

Incidence of the primigravida cesarean section= total no of primigravida cesarean sections/ total no of primigravida deliveries x 100

RESULTS

During the study period, the overall cesarean section (CS) rate a Government Medical College Mahabubnagar was found to be **60.03%**. Specifically, the cesarean section rate among primigravida women was even higher, at **61.29%**. This indicates that a significant proportion of deliveries, particularly first pregnancies, at this tertiary care center are performed via cesarean section.

Total number of deliveries happened during study period= 8154
No of cesarean sections happened during study period= 4895
The CS rate is 4895/8154 x 100 = 60.03 %

Incidence of the Primi-cesarean sections

Total number of primi deliveries happened during study period= 2850
Total number of primi-cesarean sections happened during study period= 1747
The CS rate among primigravida is 1747/2850 x 100 =61.29%

The study further analyzed 300 primigravida women who underwent CS, examining the distribution of elective and emergency procedures across various demographic and obstetric characteristics.

Table 1: Distribution of Elective and Emergency Cesarean Section (CS) Cases by Age category

Inference: Among primigravida women undergoing CS, the 20–24 age group had the highest representation (50%), followed by 25–29 years (28.3%). However, there was no statistically significant difference between elective and emergency CS across age categories (p = 0.88), indicating age did not influence the type of CS significantly in this cohort.

Table 2: Distribution of Elective and Emergency Cesarean Section (CS) Cases by Gestational Age at Birth

Inference: A **statistically significant difference** was found in the distribution of elective and emergency CS based on gestational age at birth ($\chi^2 = 8.2$, $p = \mathbf{0.005}$). Preterm births (<37 weeks) had a higher proportion of emergency CS, while term births (>37 weeks) had a higher proportion of elective CS.

Table 3: Onset of Labour
Inference: Primigravida women who went into spontaneous labor had significantly higher rates of emergency CS (60.1%), whereas elective CS was exclusively observed in those not in labor (100%) ($p < 0.00001$), highlighting a strong association between labor onset and CS type.

Table 4: Distribution of Elective and Emergency Cesarean Section (CS) Cases by Number of ANC Visits
Inference: Emergency CS was more prevalent among women with no or fewer ANC visits, while elective CS was more common among those with ≥2 visits ($p < 0.001$). This suggests that regular antenatal care may contribute to early identification of complications, allowing for planned (elective) CS.

Table 5: Distribution of Elective and Emergency Cesarean Section (CS) Cases by Socioeconomic Status
Inference: There was no significant association between socioeconomic status and the type of CS ($p = 0.998$). Emergency CS predominated across all socioeconomic strata, indicating that SES did not play a major role in determining the type of cesarean delivery among this population.

Table 6: Distribution of Elective and Emergency Cesarean Section (CS) Cases by Indication
Inference: Fetal compromise, cephalopelvic disproportion (CPD), and oligohydramnios were the top indications for CS in primigravida women. Emergency CS was significantly associated with fetal compromise, while elective CS was more often associated with PIH complex and oligohydramnios, indicating the value of antenatal surveillance in elective case identification.

Table 7: Distribution of Cesarean Section (CS) Cases by Robson Group
Inference: Robson Group 1 (nulliparous, singleton, cephalic, term, spontaneous labor) was the major contributor to CS rates (70.37%), followed by Group 2 (22.4%). The predominance of Group 1 highlights the need for improved labor monitoring and interventions to reduce primary CS rates in this low-risk population.

DISCUSSION

The high overall and primigravida cesarean rates of 60.03% and 61.29%, respectively, at this tertiary care center are significantly above the WHO recommendations[1,2,3,6]. The predominance of Robson Group 1 in the study population, along with a high CS rate within this group, highlights potential areas for optimizing labor management practices for nulliparous women presenting in spontaneous labor. This finding is consistent with other studies, which have also identified Group 1 as a major contributor to overall CS rates[5–9].

Significant associations were observed between socioeconomic status, antenatal care (ANC) visits, and the type of CS performed (elective vs. emergency), underscoring the complex interplay of sociodemographic and clinical factors that influence delivery outcomes[10–14]. The leading indications for CS in this study, including fetal compromise and cephalopelvic disproportion (CPD), necessitate a careful review of current diagnostic criteria and labor management protocols. The absence of Group 5 (previous CS) cases is expected in a study exclusively involving primigravida women.

Incidence of the cesarean sections

Our study conducted at Government Medical College Mahabubnagar revealed a high cesarean section (CS) rate of 60.03%, with an even higher incidence among first-time mothers (primigravida) at 61.29%. These findings place our institution among the highest in terms of cesarean delivery rates when compared with several published studies, both nationally and internationally.

When compared to other studies, the cesarean section (CS) rate in our study is notably higher. For instance, Jamir et al.[52] reported an overall CS rate of 30.79%, Ayele et al.[54] found a rate of 38.3%, and Tiwari et al.[57] noted a rate of 28.18%. Similarly, Sugianto et al.[53] and Kabra et al.[55] documented CS rates of 34.3% and 33.33%, respectively. Only Wahane et al.[56] reported a CS rate comparable to ours, at 63.89%. Thus, the overall CS rate in our study is significantly above average when compared to these findings.

The cesarean section rate among first-time mothers in our study (61.29%) is also markedly higher than those reported in most of the referenced literature. For example, Charoonwatana et al.[51] observed a 24.8% CS rate among first-time mothers with spontaneous labor, which increased to 84.4% in cases of induction or pre-labor cesarean. Sugianto et al.[53] found rates of 40.91% for spontaneous labor and 78.79% for induced or pre-labor CS in primigravidas. Jamir et al.[52] reported 13.04% in spontaneous labor and 25.75% in induced or pre-labor CS among first-time mothers. Similarly, Tiwari et al.[57] noted rates of 22.99% for spontaneous labor and 19% for induced labor.

In contrast, our study demonstrates a relatively high primigravida CS rate regardless of labor onset, suggesting a growing trend toward more frequent cesarean deliveries in first pregnancies, potentially irrespective of clear clinical indications. Only Wahane et al.[56] reported similarly high rates, with 65.8% CS in spontaneous labor and 78.6% in induced or pre-labor CS among primigravidas.

Age category

In our study conducted at Government Medical College Mahabubnagar, the distribution of cesarean sections (CS) by maternal age among 300 cases showed that the majority of CS occurred in women aged 20–24 years, accounting for 150 cases (50%) of all CS, including 19 elective CS (51%) and 126 emergency CS (48%). The next most affected group was 25–29 years, with 85 cases (28.3%), comprising 10 elective CS (26%) and 84 emergency CS (32%). The 16–19-year age group represented 28 cases (9.3%), with 3 elective CS (9%) and 26 emergency CS (10%). Women aged 30–34 years accounted for 26 cases (8.7%), including 4 elective CS (10%) and 18 emergency CS (7%), while the ≥35 years group contributed 11 cases (3.7%), with 1 elective CS (4%) and 8 emergency CS (3%). The chi-square value was 1.14, with a p-value of 0.88, indicating no statistically significant association between maternal age and the type of cesarean section (elective vs. emergency).

When comparing these findings with existing literature, Charoonwatana et al.[51] reported that the mean maternal age was 30 years in the cesarean section (CS) group and 27 years in the normal delivery group, with a significant difference. Their study highlighted that 69.3% of women aged over 35 years underwent CS, compared to 53.5% of those aged 20–34 years and 35.5% of those under 20 years, demonstrating a strong correlation between increasing maternal age and CS incidence.

Similarly, Sugianto et al.[53] found that the highest CS rate occurred in the 25–29 years age group (28.1%), followed by ≥35 years (26.2%), 30–34 years (21.8%), 20–24 years (21.3%), and the lowest in those ≤19 years (2.6%). Supporting this trend, a Denmark study[60] cited in the same discussion reported a 21% CS rate in mothers over 35 years, confirming a consistent rise in CS rates with increasing maternal age.

Ayele et al.[54] reported a median maternal age of 27 years, with most participants (78.8%) falling within the 20–34 years age group. Their regression analysis revealed that women aged 20–30, 30–40, and over 40 had significantly higher odds of undergoing a CS compared to those aged 15–20 years.

Singh et al.[58] also observed that CS was most prevalent among women aged 20–29 years, accounting for 77% of elective and 79% of emergency CS cases. Tiwari et al.[57] noted a similar pattern, with 90% of CS cases in the 20–35 years age group, and only 3.99% under 20 years and 5.99% over 35 years.

Finally, Roy et al.[59], using data from the National Family Health Survey, confirmed that increasing maternal age is directly associated with higher CS rates, reporting significantly higher odds for women aged 20–30, 30–40, and over 40 years compared to the 15–20-year group.

Gestational Age at Birth

Our study revealed that the vast majority of cesarean sections (CS) were performed at term gestational age (≥37 weeks), accounting for 291 out of 300 cases (96.9%), while only 9 cases (3.08%) occurred preterm (<37 weeks). When broken down by type, elective CS included 36 term deliveries (97.3%) and just 1 preterm case (2.7%). Emergency CS showed a similar distribution, with 255 cases (97%) at term and 8 cases (3%) preterm. A chi-square test yielded a value of 8.2 with a p-value of 0.005, indicating a statistically significant association between gestational age and the type of CS. This suggests that elective CS is predominantly performed at term, whereas emergency CS shows a slightly higher occurrence among preterm deliveries.

When compared to other studies, Charoonwatana et al.[51] reported that most cesarean sections (CS) occurred in term pregnancies, though their data indicated that 9.8% of the study population had preterm single cephalic pregnancies — more than three times the preterm rate found in our study. Jamir et al.[52], using the same gestational age cutoff of 37 weeks, reported that deliveries with a gestational age of less than 37 weeks constituted 6.35% of all deliveries, which, although still higher than our findings, was lower than many other studies.

Ayele et al.[54] similarly observed that 70.5% of mothers delivered at term, while 25.1% were preterm, again indicating a considerably higher prevalence of preterm cesarean sections compared to our cohort. Kabra et al.[55] reported that pregnancies at ≤36 weeks contributed to 3.141% of total cesarean sections, a figure closely aligned with our study's preterm CS rate of 3.08%.

Wahane et al.[56] found that pregnancies less than 37 weeks accounted for 10.25% of total deliveries, while Tiwari et al.[57] documented 2.39% of deliveries as preterm, 96.15% as term (37–42 weeks), and 0% as post-term. Tiwari et al.[57]'s results are particularly similar to ours, reflecting closely comparable rates of term and preterm deliveries.

Onset of Labour

In our study, all elective cesarean sections (CS) were conducted as planned lower segment cesarean sections (LCSC), accounting for 37 cases (100%). These procedures were performed without the onset of labor—neither spontaneous nor induced. Conversely, all emergency CS cases followed labor, with 158 cases (60.1%) occurring after spontaneous labor and 105 cases (39.9%) after induced labor. Notably, no emergency CS were planned in advance. When considering all CS cases together, 158 cases (52.7%) were preceded by spontaneous labor, 105 (35%) by induced labor, and 37 (12.3%) were planned LCSCs. A chi-square test yielded a value of 86.1 with a p-value <0.00001, highlighting a statistically significant association between the type of labor onset and the type of CS performed.

When compared with other studies, Charoonwatana et al.[51] also reported that the majority of cesarean sections (CS) performed were pre-labor, particularly in women with term cephalic singleton pregnancies, which aligns with our finding that all elective CS were planned without labor. Their study emphasized that certain factors among women with spontaneous labor were associated with CS, mirroring our data showing that emergency CS is largely linked with labor onset.

Jamir et al.[52] categorized deliveries similarly, reporting 13 cases of CS before labor and 5 cases of CS after induced labor in nulliparous women. In multiparous women with previous cesarean sections, 72 cases were pre-labor CS, while 24 followed spontaneous labor, and 1 followed induction. Their overall finding that 15% of labor inductions resulted in CS supports our observation that a considerable portion of emergency CS followed induced labor.

Ayele et al.[54] found a 59.8% CS rate in nulliparous women with induced or pre-labor delivery, and 41.4% in multiparous women, reinforcing the pattern that CS is more frequent in planned or medically initiated births.

Kabra et al.[55] observed that planned repeat lower segment cesarean sections (LCSCs) were common, with 44.24% of CS attributed to previous LCSC. They also reported that CS rates increased in women with induced labor or pre-labor CS (29.4%) compared to those in spontaneous labor (15.89%), closely aligning with our observation that emergency CS often follows labor, while elective CS is pre-labor.

Wahane et al.[56] and Tiwari et al.[57] both reported similar trends. Wahane found high CS rates in women with induced or pre-labor CS (78.6% in nulliparous, 87.7% in multiparous) and lower rates in those with spontaneous labor (65.8% in nulliparous, 17.4% in multiparous). Tiwari et al.[57] also showed higher CS rates in induced/pre-labor cases (24.21% in nulliparous, 12.51% in multiparous) than in spontaneous labor (22.99% and 6.15%, respectively).

Lastly, Singh et al.[58] found that 88% of CS were elective and 62% were emergency, suggesting a dominance of planned LCSCs in elective cases and a likely link between labor onset and emergency CS—patterns that match our findings.

Number of ANC Visits

In our study, antenatal care (ANC) visits demonstrated a clear association with the type of cesarean section (CS) performed. Among elective CS cases, 27% of women had no ANC visits, 32.4% had only one, 21.6% had two, and 18.9% had more than three visits. In contrast, among emergency CS cases, a slightly higher proportion, 30.8%, had no ANC visits, followed by 37.3% with one visit, 21.7% with two visits, and only 10.3% with more than three. When evaluating the total study population, the most common number of ANC visits was one (36.7%), followed by none (30.3%), two (21.7%), and more than three (11.3%). The chi-square test value of 42.2 with a p-value <0.001 suggests a statistically significant relationship between the number of ANC visits and the type of CS.

When compared with other studies, our findings are consistent with those of Singh et al.[58], who also observed that the number of antenatal care (ANC) visits varied significantly between elective and emergency cesarean section (CS) groups. Specifically, 45% of women in the elective CS group had more than three ANC visits, while 60% of those undergoing emergency CS had only one or no ANC visits. This reflects a similar trend to our study, where women who had elective procedures were more likely to have received regular antenatal care, while those undergoing emergency CS had more limited or no ANC follow-up. Singh et al.[58] also emphasized the importance of ANC in identifying complications early, supporting the argument that regular ANC attendance may lead to timely elective interventions rather than unplanned emergencies.

In contrast, Ayele et al.[54] reported that all 721 women in their study had at least one ANC follow-up. Their data showed that 10.7% had one or two visits, 26.6% had three visits, 55.5% had four visits, and 7.2% had five or more. Unlike our findings and those of Singh et al.[58], Ayele et al.[54] did not include participants with no ANC visits, which sets their study apart significantly. The higher rate of ANC utilization in Ayele et al.[54]'s population may suggest better access to maternal healthcare or differences in study setting and population.

Socioeconomic Status

In our study, 87.7% of cesarean sections (CS) were emergency procedures, while only 12.3% were elective CS, indicating a strong predominance of unplanned procedures. Additionally, the distribution of CS cases across different socioeconomic groups showed that the lower middle (30.7%), upper lower (27.3%), and lower class (29.0%) had the highest number of CS cases, whereas the upper (6.0%) and upper middle class (7.0%) had the lowest. However, a chi-square test ($\chi^2 = 0.12$, $p = 0.998$) showed no significant association between socioeconomic status and CS rates, suggesting that in our cohort, economic background did not play a major role in determining whether a woman underwent a cesarean section.

In contrast, findings from other studies indicate a stronger link between socioeconomic status and cesarean section (CS) rates, particularly with elective cesarean sections. Singh et al.[58] reported a significant association between higher socioeconomic status and elective CS, with 33% of women in the upper class and 35% in the upper middle class undergoing elective cesareans. Meanwhile, 47% of lower-middle-class women had emergency CS, which aligns with our study's trend of higher emergency CS rates in lower socioeconomic groups. Similarly, Roy et al.[59] found that women in the middle wealth index category were 1.62 times more likely and those in the rich category were 1.46 times more likely to have a cesarean section compared to women from poorer backgrounds. Their study also highlighted the strong influence of education, showing that higher-educated women had significantly greater odds of undergoing CS.

Additionally, Charoonwatana et al.[51] observed that having a private obstetrician and a Bachelor's education level were associated with higher CS rates. This aligns with Roy et al.[59], who found that women delivering in private facilities were 4.45 times more likely to undergo CS than those in public hospitals, reinforcing the connection between financial ability and CS rates. However, in Tiwari et al.[57], variations in CS rates were observed between high-income and low-income settings, emphasizing the broader influence of economic disparities.

Our study contrasts with these findings, particularly in the lack of statistical significance between socioeconomic status and CS rates. This could be due to differences in healthcare access, hospital policies, or demographic variations in our study population. While studies like Singh et al.[58] and Roy et al.[59] suggest a clear economic influence on CS rates, our findings indicate a more even distribution of CS across socioeconomic groups, with emergency procedures being overwhelmingly more common across all categories.

Robson Group

In our study involving 300 obstetric patients, the most striking finding was the overwhelming predominance of Group 1 (nulliparous, term, singleton, cephalic pregnancies with spontaneous labor), accounting for 70.37% of the total cohort. This is notably higher than the proportions reported in other studies, where Group 1 typically comprises a much smaller fraction. For example, Tiwari et al.[57] reported Group 1 contributing 29.45% to the cesarean section (CS) rate, while Jamir et al.[52] noted 13.04%, and Ayele et al.[54] observed 23.9%. Despite being considered a low-risk group, several studies, such as those by Charoonwatana et al.[51] and Ayele et al.[54], highlighted elevated CS rates in Group 1, suggesting a trend toward increasing interventions in spontaneous labor, possibly due to institutional or patient-related factors.

In contrast to our findings, Group 2 (nulliparous, term, singleton, cephalic with induced labor or pre-labor CS) was the second most common group in our study, representing 22.4% of cases. This group also features prominently in the literature. Jamir et al.[52] found Group 2 contributing 25.75%, Charoonwatana et al.[51] reported 14%, and Sugianto et al.[53] cited 13.51%, often highlighting it as a key contributor to overall CS rates due to the high likelihood of operative delivery following induction or elective CS.

A unique feature of our study is the complete absence of Group 3, Group 4, and Group 5, which involve multiparous women, including those with a previous cesarean. This sharply contrasts with nearly all other studies reviewed. For instance, Group 5 (previous CS, term, singleton, cephalic) was the leading contributor to CS rates in studies by Jamir et al.[52] (32.44%), Tiwari et al.[57] (32.58%), Charoonwatana et al.[51] (21.1%), Wahane et al.[56] (20.5%), and Sugianto et al.[53] (15.84%). The absence of Group 5 in our cohort may suggest a population consisting predominantly of primigravida or a setting where patients with previous cesareans are managed elsewhere.

Regarding malpresentations and special categories, our study reported 10 cases (3.47%) in Group 6 (nulliparous with breech), and only 1 case (0.2%) in Group 9 (transverse/oblique lie), which aligns with expected low frequencies for these presentations. Comparatively, Kabra et al.[55] noted a high CS rate in Group 9, while Wahane et al.[56] reported a 100% CS rate in that group. Additionally, Group 8 (multiple pregnancies) comprised 0.79% in our data, and Group 10 (singleton, cephalic, preterm) represented 3.08%. This is lower than Sugianto et al.[53], who found Group 10 had the highest relative contribution to CS (23.38%), and Ayele et al.[54], where Group 10 contributed 11%.

CONCLUSION

This study highlights a **high cesarean section rate among primigravida women**, with **Group 1 being the most prevalent Robson group**. The findings underscore the need for a critical review of labor management practices, particularly for nulliparous women in spontaneous labor, and consideration of socioeconomic and educational factors influencing the mode of delivery. Regular audits using the Robson classification system are essential for identifying key contributors to high CS

rates and for developing targeted interventions and strategies such as 1. Labour ward audit cycle 2. Multi-disciplinary team learning and training sessions 3. Structured protocols 4. Standard prescriptions have promoted safe vaginal births there by decreasing the primigravida CS rate to 47% by march 2025 at our institute Government General Hospital Mahabubnagar enhancing both maternal and fetal outcomes.

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