



PATTERN OF CESAREAN SECTION DELIVERIES AND ASSOCIATED INDICATIONS: A HOSPITAL-BASED STUDY

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ABSTRACT

Background: Cesarean section rates have escalated globally, raising concerns about appropriateness of indications and implications for maternal-neonatal health. Understanding institutional patterns is essential for optimizing surgical delivery practices.

Objective: To determine the pattern of cesarean section deliveries and identify associated indications among women at a tertiary care teaching hospital.

Methods: A hospital-based descriptive cross-sectional study was conducted at Gian Sagar Hospital & Medical College, Patiala, from July 2021 to December 2021. Using consecutive sampling, 148 women who underwent cesarean delivery were enrolled. Data were collected through structured questionnaires and medical record review, capturing sociodemographic characteristics, obstetric parameters, cesarean section indications, and maternal-neonatal outcomes. Descriptive statistics were employed for data analysis using SPSS version 20.0.

Results: The majority of participants were aged 20-30 years (74.3%), with 41.9% being primigravida. Emergency cesarean sections predominated (75.7%). Previous cesarean section emerged as the leading indication (32.4%), followed by fetal distress (21.6%), cephalopelvic disproportion (12.2%), malpresentation (10.1%), and failure to progress in labor (8.1%). Most neonates (68.9%) had normal birth weight, and 89.2% achieved satisfactory APGAR scores (≥ 7). Maternal complications occurred in 17.6% of cases, predominantly postpartum hemorrhage (9.5%) and wound infection (5.4%). Hospital stay was ≤ 5 days for 66.2% of participants.

Conclusion: Previous cesarean section and fetal distress constituted the predominant indications, with emergency procedures outnumbering elective surgeries. Maternal-neonatal outcomes remained generally favorable. Implementing evidence-based protocols and promoting vaginal birth after cesarean section could optimize cesarean delivery rates while maintaining safety standards.

Keywords: Cesarean section; indications; previous cesarean delivery; fetal distress; maternal outcomes; tertiary care hospital

INTRODUCTION

Cesarean section (CS) represents one of the most frequently performed surgical interventions in obstetric practice worldwide, serving as a life-saving procedure for both mothers and neonates when vaginal delivery poses substantial risks. The procedure involves the delivery of the fetus through

surgical incisions made in the abdominal wall and uterus, thereby circumventing the natural birth canal. Over the past several decades, the global incidence of cesarean deliveries has witnessed an unprecedented rise, transforming from an emergency procedure reserved for complicated cases to a commonly performed obstetric intervention (Betran et al., 2016). This escalating trend has generated considerable debate within the medical community regarding the appropriateness of indications, the medicalization of childbirth, and the implications for maternal and neonatal health outcomes.

The World Health Organization has consistently maintained that the ideal cesarean section rate should range between 10% and 15% of all deliveries, suggesting that rates exceeding this threshold may not be associated with improved maternal or neonatal outcomes and could potentially indicate unnecessary surgical interventions (World Health Organization, 2015). However, contemporary epidemiological data reveals substantial geographical variations in CS rates, with some developed nations reporting rates exceeding 30%, while several developing countries continue to struggle with inadequate access to emergency obstetric care, resulting in suboptimal CS rates that fall below recommended thresholds (Betrán et al., 2007). In the Indian context, caesarean section rates have demonstrated remarkable heterogeneity across different states and healthcare settings, with private institutions typically reporting significantly higher rates compared to public sector facilities (Neuman et al., 2014).

The indications for cesarean section encompass a broad spectrum of obstetric, fetal, and maternal factors that necessitate surgical delivery to prevent potential complications. Traditional absolute indications include complete placenta previa, cephalopelvic disproportion, transverse lie, certain cases of breech presentation, and previous uterine surgery with classical incision. However, contemporary obstetric practice has witnessed the emergence of relative indications that account for the majority of cesarean deliveries, including previous cesarean section, fetal distress, failure to progress in labor, and elective maternal request (Mylonas & Friese, 2015). The interpretation and application of these indications demonstrate considerable inter-institutional and inter-practitioner variability, contributing to the observed disparities in CS rates across different healthcare facilities.

Previous cesarean section has emerged as the single most common indication for repeat cesarean delivery in many healthcare settings, reflecting the historically entrenched obstetric dictum "once a cesarean, always a cesarean" (Guise et al., 2010). Although vaginal birth after cesarean section (VBAC) represents a safe alternative for appropriately selected candidates, numerous institutional and medicolegal factors have contributed to declining VBAC rates and increasing repeat cesarean deliveries. Fetal distress, characterized by abnormal fetal heart rate patterns suggestive of fetal hypoxia or acidosis, constitutes another frequent indication for emergency cesarean section. However, the subjective nature of fetal heart rate interpretation and the limitations of electronic fetal monitoring have raised concerns regarding potential over-diagnosis and unnecessary interventions (Alfirevic et al., 2017).

Failure to progress in labor represents a heterogeneous category encompassing prolonged latent phase, protracted active phase, secondary arrest of dilatation, and arrest of descent. The diagnosis of labor dystocia remains inherently subjective and is influenced by institutional protocols, practitioner experience, and tolerance for prolonged labor (Zhang et al., 2010). Malpresentation, including breech presentation, transverse lie, and face or brow presentation, accounts for a significant proportion of cesarean deliveries, particularly in settings where external cephalic version and vaginal breech delivery are not routinely practiced. Additionally, pregnancy-induced hypertensive disorders, including preeclampsia and eclampsia, frequently necessitate cesarean delivery when maternal or fetal conditions deteriorate or when cervical ripening and labor induction prove unsuccessful (Dodd et al., 2008).

The escalating cesarean section rates have significant implications for healthcare systems, maternal morbidity, and long-term reproductive outcomes. Cesarean delivery is associated with increased risks of maternal complications, including hemorrhage, infection, thromboembolic events, and anesthetic complications, compared to vaginal delivery (Liu et al., 2007). Furthermore, women who undergo cesarean section face increased risks in subsequent pregnancies, including placenta previa, placenta accreta spectrum disorders, and uterine rupture. The economic burden of cesarean

deliveries substantially exceeds that of vaginal births, imposing considerable financial strain on healthcare systems and individual families, particularly in resource-limited settings (Gibbons et al., 2010).

Hospital-based descriptive studies examining the patterns and indications of cesarean section deliveries provide valuable insights into institutional practices, facilitate quality assurance initiatives, and enable evidence-based policy formulation. Such investigations help identify potentially modifiable factors contributing to rising CS rates and provide opportunities for implementing interventions aimed at optimizing cesarean delivery rates while ensuring maternal and neonatal safety. Understanding the local epidemiology of cesarean section indications is essential for developing context-specific guidelines and protocols that balance the imperative to provide timely surgical intervention when medically necessary against the potential risks associated with unnecessary cesarean deliveries. This study aimed to comprehensively examine the pattern of cesarean section deliveries and their associated indications at a tertiary care teaching hospital in Northern India, thereby contributing to the existing body of knowledge regarding obstetric practices in similar healthcare settings.

The aim of this study was to determine the pattern of cesarean section deliveries and identify the associated indications among women who underwent cesarean delivery at Gian Sagar Hospital & Medical College, Patiala, during the study period.

METHODOLOGY

Study Design

A hospital-based descriptive cross-sectional study design.

Study Site

The study was conducted at Gian Sagar Hospital & Medical College, Patiala, which functioned as a tertiary care teaching institution providing comprehensive obstetric and gynecological services to the population of Patiala and surrounding districts of Punjab.

Study Duration

The study was conducted over a period of six months, extending from July 2021 to December 2021.

Sampling and Sample Size

The study employed a non-probability consecutive sampling technique wherein all women who underwent cesarean section deliveries at Gian Sagar Hospital & Medical College during the study period and met the predefined inclusion criteria were enrolled in the investigation until the desired sample size was achieved. The sample comprised 148 women who delivered through cesarean section during the six-month study period. The sample size was determined based on the average monthly cesarean delivery load at the institution, feasibility considerations, and the time constraints of the study.

Inclusion and Exclusion Criteria

The study included all pregnant women of any age and parity who underwent cesarean section delivery, whether emergency or elective, at Gian Sagar Hospital & Medical College during the designated study period from July 2021 to December 2021. Both primigravida and multigravida women were eligible for inclusion, irrespective of their gestational age at the time of cesarean delivery, provided the pregnancy had reached viability. Women with singleton and multiple pregnancies who required cesarean section for various obstetric, fetal, or maternal indications were included in the study. The exclusion criteria eliminated women who were admitted to the hospital but delivered vaginally, those who were referred to other institutions before delivery, cases with incomplete or missing medical records that prevented adequate data extraction, and women who did not provide consent for participation in the study. Additionally, women who were admitted for

cesarean section but did not ultimately undergo the procedure due to various reasons were excluded from the final analysis.

Data Collection Tools and Techniques

Data collection was performed using a pre-designed, structured, and validated questionnaire that was specifically developed for this study following extensive review of relevant literature and consultation with subject matter experts in obstetrics and gynecology. The data collection instrument comprised multiple sections that systematically captured sociodemographic information, detailed obstetric history, clinical presentation, indications for cesarean section, intraoperative findings, and immediate postoperative outcomes. Sociodemographic variables included maternal age, educational status, occupation, socioeconomic status, and residential location, while obstetric parameters encompassed parity, gestational age, previous obstetric history including prior cesarean deliveries, antenatal care utilization, and pregnancy complications. The questionnaire incorporated both closed-ended and open-ended questions to ensure comprehensive data capture while maintaining standardization across all study participants. Data were collected through direct interviews with participants, supplemented by meticulous review of medical records, antenatal cards, labor room registers, operation theater records, and discharge summaries. Data collection occurred at multiple time points, including admission, preoperative assessment, intraoperative period, and prior to hospital discharge, ensuring complete and accurate information retrieval.

Data Management and Statistical Analysis

The collected data were systematically coded, entered, and stored in a computerized database using Microsoft Excel spreadsheet software, with subsequent transfer to Statistical Package for the Social Sciences (SPSS) version 20.0 for comprehensive statistical analysis. Descriptive statistical analysis was employed as the primary analytical approach, given the descriptive nature of the study objectives. Categorical variables, including indications for cesarean section, type of cesarean section (emergency versus elective), maternal age groups, parity categories, and socioeconomic status, were summarized using frequencies and percentages, with presentation in tables and charts for enhanced visualization and interpretation. Continuous variables such as maternal age, gestational age, birth weight, and duration of hospital stay were expressed as mean and standard deviation when normally distributed, or as median and interquartile range for skewed distributions. The various indications for cesarean section were categorized into major groups including previous cesarean section, fetal distress, cephalopelvic disproportion, malpresentation, failure to progress in labor, antepartum hemorrhage, pregnancy-induced hypertension, and other miscellaneous indications. Cross-tabulation was performed to examine the relationship between cesarean section indications and various sociodemographic and obstetric characteristics. Appropriate graphs, pie charts, and bar diagrams were constructed to visually represent the distribution of cesarean section indications and facilitate interpretation of findings. All statistical tests were conducted at a significance level of 0.05, and p-values were reported where applicable for inferential statistical procedures.

Ethical Considerations

The study protocol received approval from the Institutional Ethics Committee of Gian Sagar Hospital & Medical College, Patiala, prior to the commencement of data collection activities, ensuring compliance with ethical principles governing human subject research. Written informed consent was obtained from all study participants after providing detailed information regarding the study objectives, procedures, potential risks and benefits, voluntary nature of participation, and the right to withdraw from the study at any point without affecting their medical care.

RESULTS

Table 1: Sociodemographic Characteristics of Study Participants (N=148)

Characteristic	Category	Frequency (n)	Percentage (%)
Age Group (years)	<20	12	8.1
	20-25	58	39.2
	26-30	52	35.1
	31-35	21	14.2
	>35	5	3.4
Educational Status	Illiterate	18	12.2
	Primary	32	21.6
	Secondary	45	30.4
	Higher Secondary	38	25.7
	Graduate and above	15	10.1
Occupation	Housewife	118	79.7
	Working	30	20.3
Residence	Rural	89	60.1
	Urban	59	39.9
Socioeconomic Status	Lower	42	28.4
	Lower Middle	56	37.8
	Upper Middle	38	25.7
	Upper	12	8.1

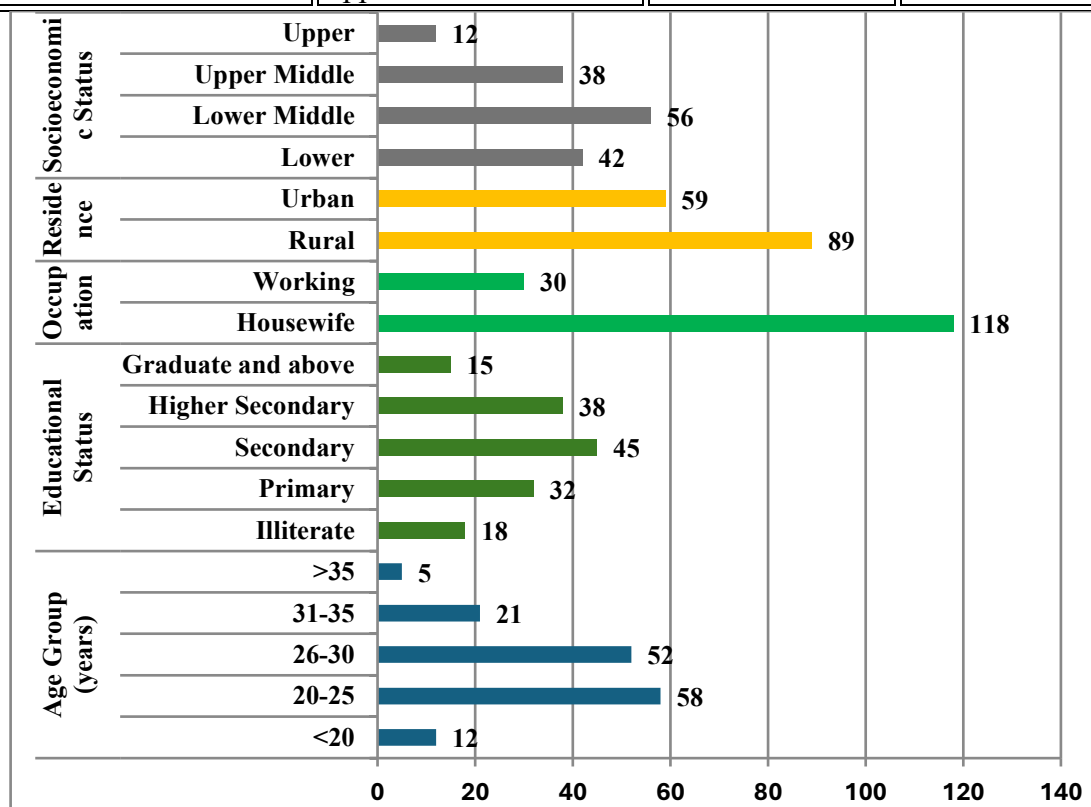


Figure:1

Table 2: Obstetric Characteristics of Study Participants (N=148)

Characteristic	Category	Frequency (n)	Percentage (%)
Parity	Primigravida	62	41.9
	Gravida 2	54	36.5
	Gravida 3	24	16.2
	Gravida 4 and above	8	5.4
Gestational Age (weeks)	<37	22	14.9
	37-40	108	73.0
	>40	18	12.1
Antenatal Care	Regular (≥ 4 visits)	95	64.2
	Irregular (<4 visits)	38	25.7
	No ANC	15	10.1
Type of CS	Emergency	112	75.7
	Elective	36	24.3
Pregnancy Type	Singleton	142	95.9
	Twin	6	4.1
Previous CS History	Yes	48	32.4
	No	100	67.6

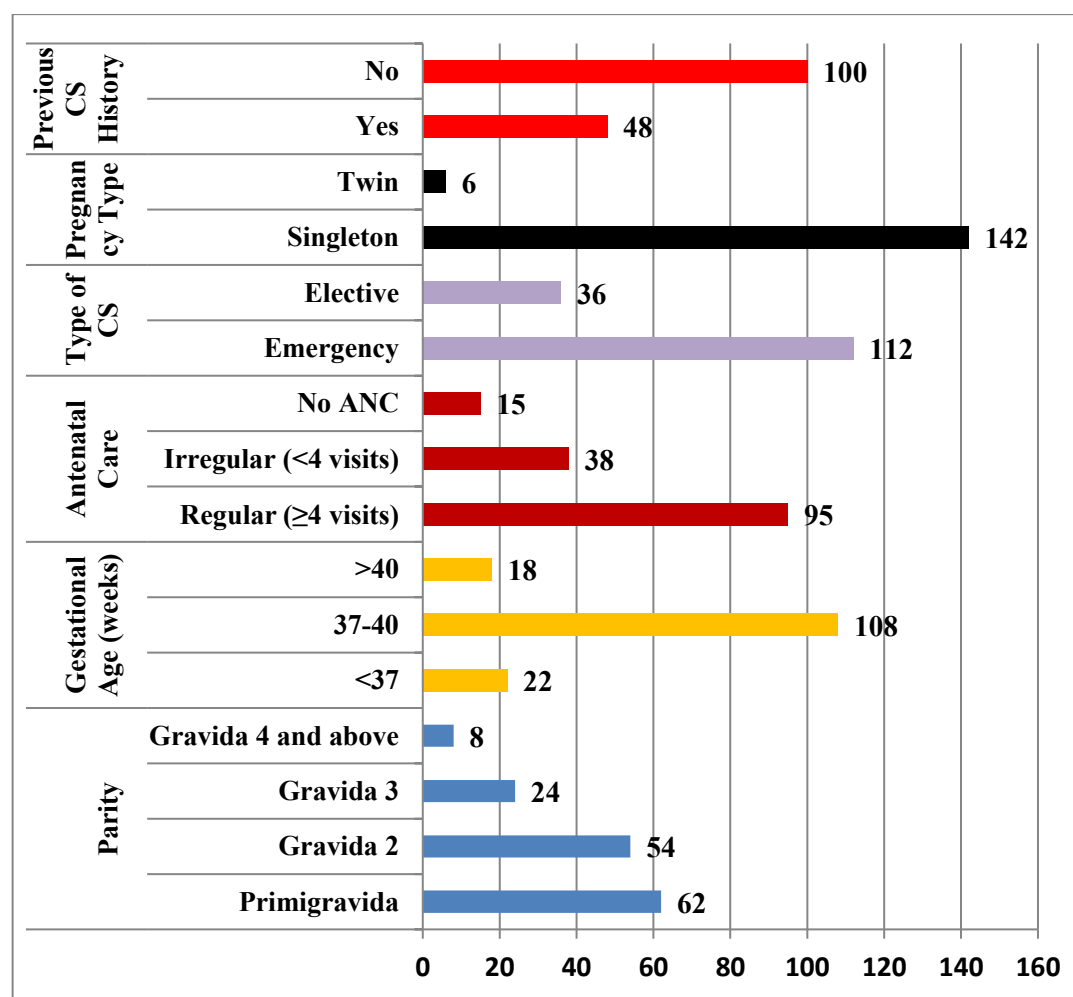
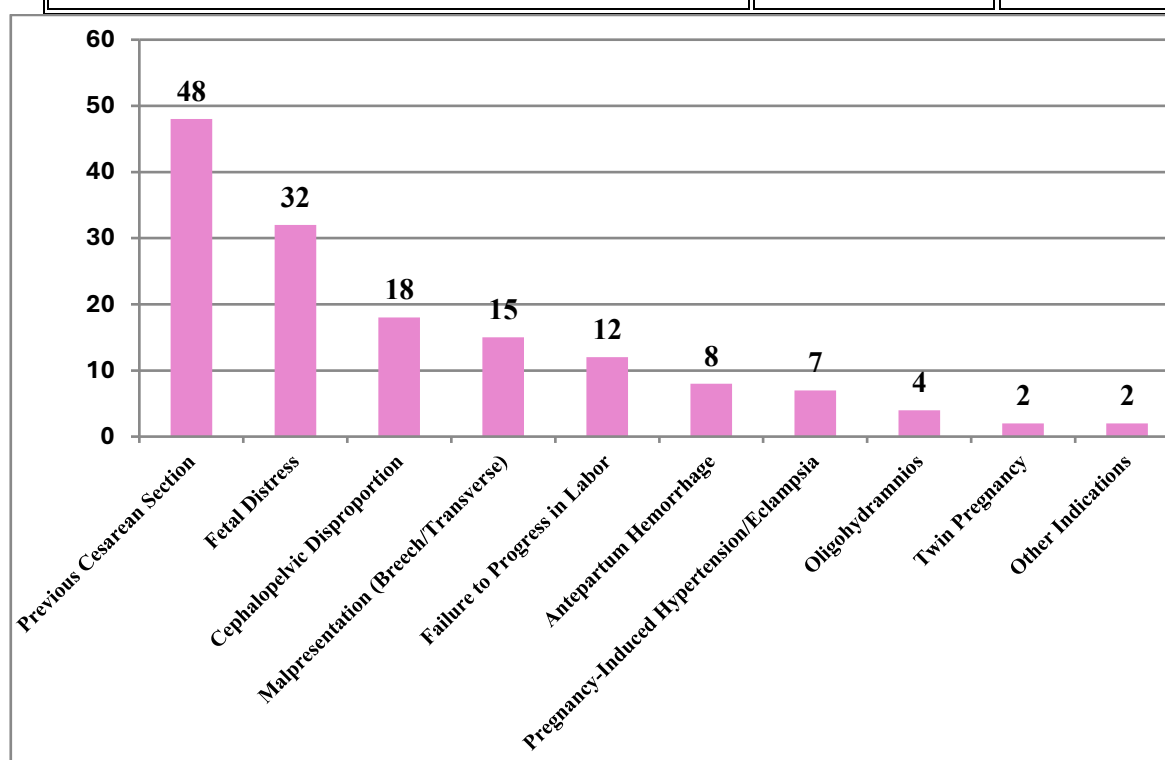
**Figure:2**

Table 3: Distribution of Indications for Cesarean Section (N=148)

Indication	Frequency (n)	Percentage (%)
Previous Cesarean Section	48	32.4
Fetal Distress	32	21.6
Cephalopelvic Disproportion	18	12.2
Malpresentation (Breech/Transverse)	15	10.1
Failure to Progress in Labor	12	8.1
Antepartum Hemorrhage	8	5.4
Pregnancy-Induced Hypertension/Eclampsia	7	4.7
Oligohydramnios	4	2.7
Twin Pregnancy	2	1.4
Other Indications	2	1.4
Total	148	100.0

**Figure:3****Table 4: Maternal and Neonatal Outcomes Following Cesarean Section (N=148)**

Outcome Variable	Category	Frequency (n)	Percentage (%)
Birth Weight (kg)	<2.5	28	18.9
	2.5-3.5	102	68.9
	>3.5	18	12.2
APGAR Score at 5 min	<7	16	10.8
	≥7	132	89.2
Neonatal Outcome	Live birth	145	98.0
	Stillbirth	3	2.0
Maternal Complications	None	122	82.4

Outcome Variable	Category	Frequency (n)	Percentage (%)
	Hemorrhage	14	9.5
	Wound Infection	8	5.4
	Other complications	4	2.7
Duration of Hospital Stay	≤5 days	98	66.2
	6-7 days	42	28.4
	>7 days	8	5.4

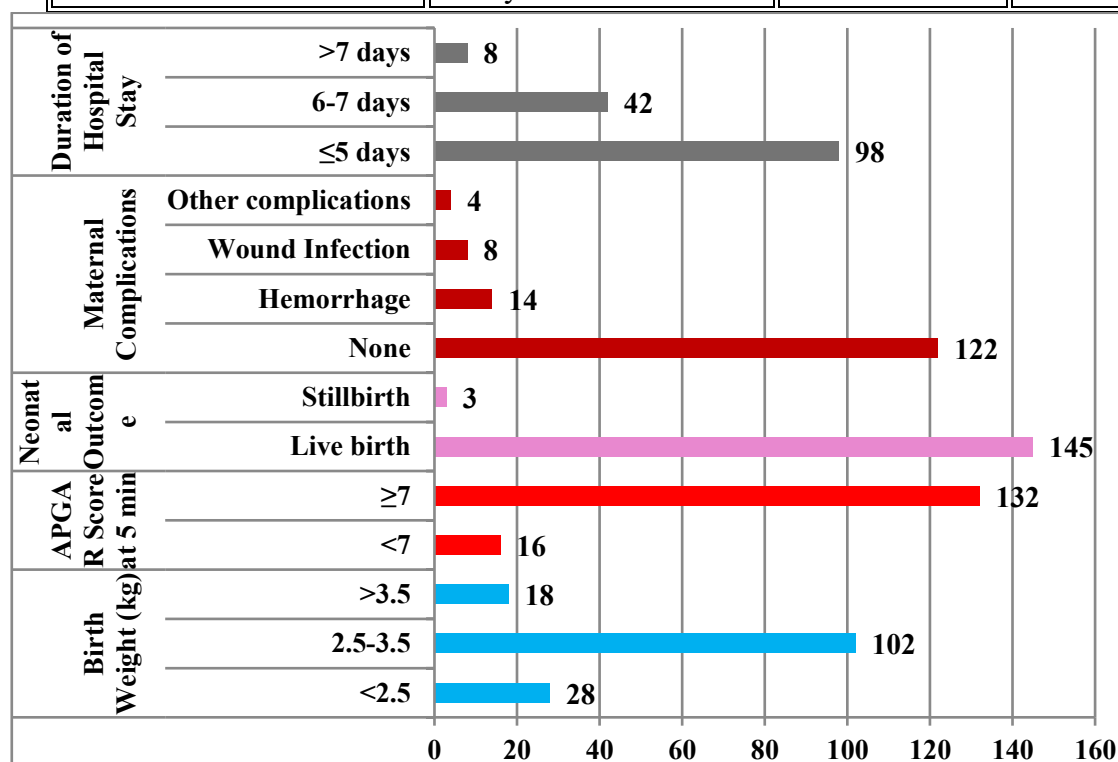


Figure:4

Table 5: Association Between Parity and Type of Cesarean Section (N=148)

Parity	Emergency CS n (%)	Elective CS n (%)	Total n (%)
Primigravida	52 (83.9)	10 (16.1)	62 (100.0)
Gravida 2	38 (70.4)	16 (29.6)	54 (100.0)
Gravida 3	16 (66.7)	8 (33.3)	24 (100.0)
Gravida 4 and above	6 (75.0)	2 (25.0)	8 (100.0)
Total	112 (75.7)	36 (24.3)	148 (100.0)

DISCUSSION

The present study revealed that the majority of women who underwent cesarean section belonged to the age group of 20-30 years (74.3%), with a mean maternal age representing the reproductive prime. This finding aligns with the observations of Betran et al. (2016), who documented that women in their twenties constitute the largest proportion of deliveries globally and consequently represent the predominant age group undergoing cesarean sections. The relatively lower proportion of teenage pregnancies (8.1%) and advanced maternal age pregnancies (3.4%) in our study reflects improving reproductive health awareness and family planning practices in the region. However, Neuman et al. (2014) highlighted that maternal age remains a significant determinant of cesarean

delivery, with both extremes of reproductive age associated with increased cesarean section rates due to biological and obstetric complications.

The educational profile of participants demonstrated that nearly one-third possessed secondary education, while 12.2% remained illiterate. Educational attainment has been consistently associated with healthcare-seeking behavior and birth outcomes across multiple studies. The predominance of housewives (79.7%) among study participants reflects traditional gender roles prevalent in North Indian society and suggests potential economic dependence that may influence healthcare decision-making processes. The rural-urban distribution revealed that 60.1% of participants resided in rural areas, indicating that the tertiary care facility served as an important referral center for surrounding rural populations. This finding corresponds with the observations of Gibbons et al. (2010), who emphasized the role of tertiary care institutions in providing specialized obstetric services to underserved rural populations in developing countries.

The distribution of parity among study participants demonstrated that primigravida women constituted 41.9% of cesarean deliveries, followed by second gravida (36.5%). This pattern suggests that nulliparous women face heightened risks necessitating surgical intervention, consistent with findings from Zhang et al. (2010), who documented that primigravid women experience longer labor duration and higher rates of labor dystocia compared to multiparous women. The substantial proportion of emergency cesarean sections (75.7%) compared to elective procedures (24.3%) indicates that most surgical interventions occurred in response to acute obstetric complications rather than planned procedures, reflecting the unpredictable nature of labor and delivery complications.

The gestational age distribution revealed that 73.0% of cesarean deliveries occurred at term (37-40 weeks), while 14.9% were preterm deliveries. Preterm cesarean sections often result from maternal or fetal complications necessitating early delivery, including preeclampsia, placental abnormalities, and fetal growth restriction. The antenatal care utilization pattern demonstrated that 64.2% of participants received regular antenatal care with four or more visits, while 10.1% received no antenatal care whatsoever. Adequate antenatal care facilitates early identification and management of risk factors, potentially preventing emergency cesarean sections. This observation resonates with the findings of Dodd et al. (2008), who emphasized the critical role of comprehensive antenatal surveillance in optimizing pregnancy outcomes and reducing unnecessary surgical interventions.

The present investigation identified previous cesarean section as the most common indication, accounting for 32.4% of all cesarean deliveries. This finding parallels global trends documented by Guise et al. (2010), who identified prior cesarean delivery as the leading contributor to rising cesarean section rates worldwide. The persistence of the "once a cesarean, always a cesarean" paradigm, despite evidence supporting vaginal birth after cesarean section in appropriately selected cases, continues to drive repeat cesarean deliveries. Institutional policies, medicolegal concerns, and patient preferences collectively contribute to the low uptake of trial of labor after cesarean section, perpetuating the cycle of repeat surgical deliveries.

Fetal distress emerged as the second most frequent indication (21.6%), reflecting concerns regarding fetal well-being during labor. However, Alfrevic et al. (2017) highlighted the limitations of continuous electronic fetal monitoring, noting that subjective interpretation of fetal heart rate patterns may contribute to over-diagnosis of fetal compromise and potentially unnecessary cesarean interventions. The diagnosis of fetal distress requires careful clinical correlation with additional assessment parameters including fetal scalp blood sampling or lactate measurement when available. Cephalopelvic disproportion accounted for 12.2% of cesarean deliveries in our study, representing mechanical obstacles to vaginal delivery resulting from maternal pelvic anatomy or fetal macrosomia.

Malpresentation, including breech and transverse lie, constituted 10.1% of indications, consistent with contemporary obstetric practice where external cephalic version success rates remain modest and vaginal breech delivery skills have declined among practitioners. Mylonas and Friese (2015) documented similar proportions of malpresentation as cesarean indications across European hospitals, emphasizing the role of routine ultrasound assessment in identifying abnormal fetal

presentations. Failure to progress in labor represented 8.1% of indications, encompassing prolonged latent phase, protracted active phase, and arrest disorders. The subjective nature of diagnosing labor dystocia and variations in institutional labor management protocols contribute to inter-institutional differences in this indication category.

Antepartum hemorrhage (5.4%) and pregnancy-induced hypertensive disorders (4.7%) represented serious obstetric complications necessitating urgent delivery to prevent maternal and fetal morbidity. Liu et al. (2007) emphasized that these conditions represent appropriate indications for cesarean section when maternal or fetal stability cannot be maintained or when vaginal delivery would pose unacceptable risks. The relatively smaller proportion of these absolute indications suggests that the majority of cesarean sections in our study were performed for relative indications, raising questions about potential opportunities for reducing cesarean rates through implementation of evidence-based labor management protocols.

The birth weight distribution demonstrated that 68.9% of neonates fell within the normal weight range (2.5-3.5 kg), while 18.9% were low birth weight and 12.2% were macrosomic. The APGAR score assessment revealed that 89.2% of neonates achieved satisfactory scores (≥ 7) at five minutes, indicating favorable immediate neonatal adaptation. The overall live birth rate of 98.0% with 2.0% stillbirths reflects reasonably good perinatal outcomes, although stillbirth rates remain higher than desired targets. Betrán et al. (2007) documented that appropriate utilization of cesarean section for genuine medical indications contributes to improved perinatal survival, while unnecessary cesarean deliveries do not confer additional benefits and may introduce iatrogenic risks.

Maternal complications occurred in 17.6% of cases, with postpartum hemorrhage (9.5%) and wound infection (5.4%) representing the most frequent complications. These complication rates align with existing literature documenting increased maternal morbidity associated with cesarean delivery compared to vaginal birth. The World Health Organization (2015) emphasized that cesarean section should be performed only when medically necessary, given the associated risks of surgical complications, anesthetic complications, and increased morbidity in subsequent pregnancies. The duration of hospital stay analysis revealed that two-thirds of women (66.2%) were discharged within five days, reflecting uncomplicated postoperative recovery in the majority of cases.

The association between parity and type of cesarean section demonstrated that primigravida women underwent emergency cesarean section more frequently (83.9%) compared to multigravida women. This pattern reflects the unpredictable nature of first labor, where complications such as failure to progress, cephalopelvic disproportion, and fetal distress emerge more commonly than in subsequent pregnancies. Conversely, the proportion of elective cesarean sections increased progressively with parity, from 16.1% in primigravida to 33.3% in gravida 3, primarily driven by previous cesarean section as an indication for repeat surgical delivery. This observation underscores the long-term implications of primary cesarean section on subsequent pregnancy management and delivery route decisions.

The overall cesarean section rate at the study institution during the study period exceeded the WHO-recommended threshold of 10-15%, consistent with rising cesarean rates observed across India and globally. Neuman et al. (2014) documented substantial heterogeneity in cesarean section rates across South Asian countries, with private sector facilities demonstrating significantly higher rates compared to public institutions. The pattern of indications observed in our study demonstrates both similarities and differences compared to international data. While previous cesarean section dominated as the leading indication in our study (32.4%), studies from high-income countries have reported even higher proportions exceeding 40%, reflecting more widespread performance of primary cesarean sections in those settings.

The substantial proportion of emergency cesarean sections (75.7%) in our study suggests that most women attempted labor prior to surgical intervention, contrasting with elective cesarean section trends observed in some developed nations where maternal request cesarean sections have gained acceptance. Gibbons et al. (2010) highlighted the economic implications of rising cesarean rates, noting that unnecessary cesarean deliveries impose substantial financial burdens on healthcare systems without corresponding improvements in maternal or neonatal outcomes. The relatively

favorable neonatal outcomes in our study, with 89.2% achieving satisfactory APGAR scores, suggest appropriate timing and indication assessment for cesarean interventions, although opportunities for optimization remain.

CONCLUSION

The study revealed that previous cesarean section (32.4%), fetal distress (21.6%), and cephalopelvic disproportion (12.2%) constituted the predominant indications for cesarean delivery at Gian Sagar Hospital & Medical College, Patiala. The preponderance of emergency cesarean sections (75.7%) indicated that most surgical interventions responded to acute obstetric complications rather than elective procedures. Maternal and neonatal outcomes remained generally favorable, with low complication rates and satisfactory APGAR scores in the majority of cases. However, the substantial proportion of previous cesarean section as an indication underscores the cascading effect of primary cesarean delivery on subsequent pregnancies and highlights the necessity for judicious decision-making regarding primary cesarean sections to prevent unnecessary repeat surgical deliveries in future pregnancies.

RECOMMENDATIONS

Healthcare institutions should develop and implement evidence-based protocols for cesarean section indications to optimize surgical delivery rates while ensuring maternal and fetal safety. Promoting vaginal birth after cesarean section in appropriately selected candidates could reduce repeat cesarean deliveries. Continuous professional development programs focusing on intrapartum fetal monitoring interpretation, labor management, and alternative delivery techniques should be instituted. Enhanced antenatal care coverage and quality improvement initiatives may facilitate early risk identification and appropriate delivery planning, potentially reducing emergency cesarean sections attributable to preventable complications.

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