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RESEARCH ARTICLE

FREQUENCY AND INDICATIONS OF CAESAREAN-SECTION IN FEMALES UNDERGOING INDUCTION OF LABOR

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ABSTRACT

Objective: *To determine the frequency of caesarean section and to identify the common indications leading to caesarean delivery in females undergoing induction of labor.*

Study Design: *A descriptive cohort study*

Place and Duration of Study : *This study was conducted at Hameed Latif Hospital from 05 June 2024 to 20 December 2024.*

Patients and Methods: *Five hundred pregnant women admitted for induction, selected via convenient sampling. Descriptive statistics were applied to analyze both qualitative and quantitative variables, with stratification for effect modifiers such as age and BMI, followed by post-stratification chi-square test.*

Results: *The study revealed that 45.2% of participants underwent caesarean section, while 54.8% achieved vaginal delivery. Prolonged labor was the most prevalent indication for caesarean section (40.1%), followed by fetal distress (29.9%), failed labor (19.8%), and patient refusal of further induction (10.2%). The caesarean section rate was notably elevated in the 31-35 years age group (42.4%) and in women with higher BMI (49.2%).*

Conclusion: *Induction of labor is associated with a moderate risk of caesarean section, particularly in primigravida women and those with an unfavorable cervix. The most common indications for caesarean section include failed induction, fetal distress, and failure to progress. Careful selection of patients and proper monitoring during induction can help reduce the rate of unnecessary caesarean deliveries.*

Keywords: *Body Mass Index, Caesarean Section, Fetal Distress, Labor Induction, Post-Partum Hemorrhage*

INTRODUCTION

Caesarean section (CS), the delivery of a fetus via abdominal and uterine incision after 20 weeks of gestation, presents a complex obstetric challenge. While potentially life-saving in certain situations, CS carries both immediate and long-term risks for the mother and infant.[1] World Health Organization (WHO) recommends a CS rate of 10-15%, [2] yet global rates have been steadily increasing, raising public health concerns, particularly in countries like Pakistan.[3,4]

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Received:13 Aug 2025; revision received: 26 Mar 2026; accepted: 17 Apr 2026

DOI: https://doi.org/10.33897/fumj.v8i1.241

How to Cite: Frequency and indications of caesarean-section in females undergoing induction of labor. Foundation University Medical Journal. 2026; 8(1): 35-39

There is a greater likelihood of labor induction in primigravida's (49.8%). The rate of caesarean sections is elevated in this group compared to those who have had previous pregnancies. The occurrence of labor induction has steadily risen over time. The percentage ranges from 9.5% to 33.7% of pregnancies each year. In developed nations, this procedure is performed in about 25% of pregnancies.[5] While induction serves as a treatment approach, it is a medical intervention that could result in adverse effects such as higher caesarean delivery rates, postpartum hemorrhage, fetal distress, inefficient prolonged labor, elevated instances of instrumental vaginal delivery, neonatal jaundice, and the immediate care required for the newborn.[6]

Inducing labor involves the artificial stimulation of uterine contractions as a therapeutic intervention before the natural onset of labor, particularly when the advantages of a normal vaginal delivery prevail over the risks associated with prolonging the pregnancy. [7]

Indications for CS are diverse, encompassing fetal factors like distress, cord prolapse, twin, post-term pregnancy, and decreased fetal movement, malpresentation, and macrosomia, as well as maternal factors such as cephalo-pelvic disproportion, dystocia, and antepartum hemorrhage.[8] Increasingly, maternal requests for CS, often driven by a desire to avoid prolonged labor or concerns for fetal well-being, also contribute to the trend.[9]

In Pakistan, CS rates are reportedly high, with some institutions reporting rates up to 40%. The role of labor induction in this context remains debated. While some advocate for induction to reduce CS rates and improve neonatal outcomes, evidence suggests it can also lead to uterine hyperstimulation, operative deliveries, and ultimately CS.[9] The increasing frequency of maternal requests for CS further underscores the need for careful patient selection and a thorough evaluation of the risks and benefits of labor induction. Understanding the frequency of CS and the factors that contribute to it following labor induction is crucial for optimizing obstetric practices and improving maternal and neonatal outcomes.

The purpose of this study was to determine the frequency of caesarean section and to identify the common indications leading to caesarean delivery in females undergoing induction of labor.

PATIENTS AND METHODS

This retrospective cohort study was conducted from 05 June 2024 to 20 December 2024 after approval from the IRB committee of the Hameed Latif Hospital and Islam Medical College with the Ref. No. HLH/IRB/2024-014 dated 20 April 2024 and Ref. No. IRB-2024-78 dated 25 April 2024 respectively. Sampling technique was convenient sampling, and sample size was 500, which was calculated by G-power software with the effect size 0.1, α error = 0.27, and power (1-β) = 0.72.

After taking obstetric history and conducting an obstetric examination, patients underwent crucial laboratory tests such as blood grouping and cross-matching, anti-hepatitis C virus antibodies testing, hepatitis B surface antigen testing, complete blood counts, urine analysis, blood glucose level assessments, ultrasounds, and cardiotocography (CTG). Informed consent was obtained from patients. Comprehensive personal details, last menstrual period, and the gestational age (weeks) were recorded. Body Mass Index (BMI) was also calculated.

Labor was induced using Prostaglandins or Misoprostol. At the time of the initial induction, the Bishop score was <4 cm. A second dose of induction agents was administered at least 4-6 hour later. Cervical dilation progressed to 10 cm, allowing for vaginal delivery in the majority of patients. However, those who did not achieve full dilation were selected for C-section.

Singleton pregnancy, cephalic presentation, gestational age > 37 weeks, and having evidence supporting indications for induction. After approving the inclusion criteria, selected women were enrolled in the study. Women with malpresentation, premature rupture of membranes, placenta previa, previous myomectomy, and cervical dilatation greater than or equal to 4 cm were excluded. Women who had a history of previous C-sections were also excluded.

STATISTICALANALYSIS

Data analysis was done by using SPSS software version 26. Descriptive statistics were applied to evaluate both categorical and continuous variables. Quantitative variables, including age, BMI, and gestational age, were reported as means and standard deviations. Qualitative variables were represented as frequencies and percentages. Effect modifiers, such as age, diabetes mellitus, hypertension, and BMI, were managed through stratification. The chi-square test was used to check the association between variables. The p-value of $\leqslant$ 0.05 was considered statistically significant.

RESULTS

The mean age of women was 32 years with the mean gestational age 38.71 weeks, and their BMI was 26.3 ± 3.52 kg/m^2. Total of 500, 297 (59.4%) women were primiparous and 203 (40.6%) were multiparous. 310 (62%) women had no abortion history. (Table I)

The most common indication of labor was Post term 213 (42.6%), PROM was second most common indication accounting for 105 (21%) cases, hypertension, GDM and oligohydramnios were less common in our patients but still significant. Women's age was categorized in to 4 categories, $\leqslant$ 25 years, 26-30 years, 31-35 years and > 35 years. In both groups, most of women belonged to 31-35 years (42.4% v/s 39.7%). In group A, 188 (83.1%) women admitted at 37-38 weeks of gestation and 38 (16.8%) were at 39-40 weeks. Most of women in group A,111(49.2%) were obese and in group B, mostly women 120 (43.7%) were overweight.

In 274(54.8%) women induction was successful done which led to vaginal birth, while 226 (45.2%) had failed induction resulting in emergency CS due to fetal distress

(meconium and cord prolapse were also included) was 29.9%, prolonged labor (40.1%), failed labor (19.8%), and 10.2% patients were refused for induction. (Table II) Out of 226 women, 70% had not post-operative complications, 12.3 % had anemia, 7.9% had Post-Partum Hemorrhage (PPH) and 9.8% had wound infection.

Table I: Distribution of age, gestational age, BMI, parity, mode of delivery, and indication

Characteristics	**(mean ± S.D)**
Age (years)	32.1 ± 4.76
Gestational Age (weeks)	38.7 ± 0.38
BMI (kg/m^2)	26.3 ± 3.52
Parity	**n (%)**
Primiparous	297 (59.4)
Multiparous	203 (40.6)
Previous abortion	
Yes	120 (24)
No	380 (76)
Mode of delivery	
Cesarean	226 (45.2)
Normal	274 (54.8)

BMI= Body Mass Index

Table II: Indications of C-Section

n=226	**n (%)**
Prolong labor	91 (40.1)
Fetal distress	68 (29.9)
Failed labor	44 (19.8)
Refusal for induction	23 (10.2)

Table III: Fetal weight Outcome and APGAR score of Infants

Fetal Weight Outcome (grams)	**n (%)**
<500	26 (5.2)
500-2500	265 (53)
> 2500	209 (41.8)
APGAR Score	
< 4	23 (4.6)
4-6	106 (21.2)
> 6	371 (74.2)

APGAR = Appearance (skin color), Pulse (heart rate), Grimace (reflex irritability), Activity (muscle tone), and Respiration (breathing)

DISCUSSION

In this study, women who experienced labor induction and subsequently had unplanned caesarean deliveries were examined. This research revealed that the reasons for labor induction had a minimal impact on the increased risk of caesarean delivery after labor induction. The caesarean section rate was 45% in our study which was higher than the WHO criteria. The results suggested that various factors contribute to the CS rates. This rate is considerably greater than those reported in prior research, although some studies indicated even higher rates of C-section, as 69.7% and 48.98%, respectively. [10]

The ages of the women who underwent caesarean delivery in our study ranged from 23 to 35 years, with almost 39% of those falling into the 31-35 age bracket, while 33% were aged 29-30 years. A study reported that C-section rates increased with age. The higher occurrence of caesareans among younger women in our research might be associated with the cultural norm of early marriage prevalent in Pakistan. Jadoon et al. found that caesarean rates increased with age, reporting 26.2% for ages 20-34, 35.9% for those aged 35-40, and 43.1% for individuals over 40.[4]

The frequency of pregestational obesity was 21.4%, and the incidence of CS was 34.8% (33% of which corresponded to elective, 46% to emergency, and 21% to medically necessary CS deliveries). Pregestational obesity increased the risk of CS as well as the risk of elective and emergency CS. The population attributable risk of pregestational obesity for CS was 32%.[11] In our study total of 226 women, 111 (49.2%) were obese and had CS.

At this time, there is no evidence indicating that elective CS is safer than vaginal births; the majority of research suggests that CS comes with higher risks. Therefore, healthcare professionals must promote vaginal delivery as the preferred approach. [12] In our study, most of the women 274 (54.8%) delivered vaginally, and 226 (45.2%) of women had CS.

Moreover, various complications during pregnancy contribute to the increasing rate of CS. According to our data, the leading causes for caesarean sections included fetal distress (including meconium and cord prolapse at 29.9%), prolonged labor (40.1%), and failed labor (19.8%), with 10.2% of patients being denied for dosage. These results align with multiple studies conducted in low- and middle-income nations.[4]

According to Negese K. et al, 90 (24.5%) maternal complications that developed after the CS were significant. The most prevalent complication was surgical site infection (SSI) at 10.3%, followed by anemia (6.5%), postpartum hemorrhage (PPH) (3%), wound dehiscence (3.0%), respiratory tract infection (RTI) (1.10%), fistula (0.3%), and other complications (0.3%) respectively.[13] In our finding 70% had no post-operative complications, 12.3% had anemia, 7.9% had PPH and 9.8% had wound infection.

A study found that out of 38,705 neonates, 98.6% achieved a normal (⩾ 7) Apgar score, 439 (1.1%) registered an intermediate score (4–6), and 114 (0.3%) received a low score (0–3). The incidences of low and intermediate five-minute Apgar scores were strongly linked to the mode of delivery and poorer neonatal outcomes.[14] In our study regarding the fetal weight, 265 (53%) infants were normal in weight (500-2500 g), and 209 (41.8%) were above 2500 g, 26 (5.2%) were below 500 g. The most of infants, 371 (74.2%) with APGAR score >6, 161 (21.2%) with 4-6 APGAR score and 23 (4.6%) had < 4.

LIMITATION

The study acknowledges limitations due to a small sample size, which restricts the generalizability of findings concerning CS trends among Pakistani women.

CONCLUSION

Induction of labor is associated with a moderate risk of caesarean section, particularly in primigravida women and those with an unfavorable cervix. The most common indications for caesarean section include failed induction, fetal distress, and failure to progress. Careful selection of patients and proper monitoring during induction can help reduce the rate of unnecessary caesarean deliveries.

ACKNOWLEDGEMENT

We would like to extend our heartfelt gratitude to Dr. Rashid Latif Khan for his invaluable support, Ms. Rameen Nisar and Ms. Saba Sardar for their assistance with the statistical analysis.

Conflict of interest: None

Funding: The authors received no financial support for this research, authorship, and/or publication of this article.

Authors' contributions:

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Fauzia Tabbasum Cheema: Design & Drafting, Experimentation / Study Conduction

Rabia Bashir: Analysis / Interpretation / Discussion

Amminah Azmat: Analysis / Interpretation / Discussion

Rabia Javaid: Critical Review

Khola Butt: Manuscript Writing

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