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COMPARISON OF FREQUENCY OF CAESAREAN SECTION WITH SPONTANEOUS AND INDUCED LABOUR

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Abstract

Background: *Cesarean section (C-section) rates have been rising globally, often influenced by the mode of labor onset. Understanding the relationship between spontaneous and induced labor and their association with cesarean delivery is vital for improving maternal and fetal outcomes.*

Aim: *To compare the frequency of cesarean sections among women who underwent spontaneous labor versus those who had induced labor.*

Methods: *This cross-sectional study was conducted at the Department of Obstetrics & Gynecology, Khairpur Medical College, Civil Hospital, Khairpur, Khairpur Mirs, from May 2024 to October 2024. A total of 83 pregnant women who met the inclusion criteria were enrolled using a non-probability consecutive sampling technique. Participants were categorized based on whether they experienced spontaneous or induced labor, and the frequency of cesarean sections was recorded for each group.*

Results: *The overall CS rate was 33.7%. Women in the induced labour group had a significantly higher CS rate (48.6%) compared to those in spontaneous labour (22.9%) ($p = 0.014$). The most common indication for CS was fetal distress (35.7%), followed by failed induction (25%). Maternal complications were slightly higher in the induced group (11.4%) than the spontaneous group (4.2%), while neonatal complications were more frequent in induced labours (17.1% vs. 6.3%).*

Conclusion: *According to the study, the frequency of cesarean sections among the women with induced labor was higher than that among women with spontaneous labor. The results point to the necessity of making knowledgeable selections in preferring labor induction and draw attention to the significance of person-centered strategies of labor control in minimizing unneeded cesarean births.*

INTRODUCTION

Caesarean section (CS) however had become one of the most commonly practiced surgical interventions in the practice of obstetrics in the world. Even though in cases when medicated it had been instrumental in alleviating maternal and perinatal morbidity and mortality, the steadily rising incidence of CS in the last few decades raised serious concerns [1]. Such concerns arose from the risks for short-term and long-term complications such as infections, hemorrhage, thromboembolic events, uterine rupture later in pregnancy, higher neonatal respiratory morbidity. It is not surprising then that understanding the reasons for

the increased CS rates was therefore a compelling need in maternal care.

Labour or spontaneous or induced, is the physiological process that leads to child birth. Spontaneous labour started without medical intervention while induced labour utilized pharmacological or mechanical intervention to induce uterine contractions for the purpose of starting labour which was not yet induced before spontaneous occurrence of actual labour, which could be due to maternal or fetal indications [2]. Although both approaches aimed to result in a vaginal delivery, multiple studies had shown a higher likelihood of caesarean delivery in induced labours compared to spontaneous ones. The choice of induction was influenced by various maternal and fetal factors, including post-term pregnancy, preeclampsia, fetal growth restriction, and other complications. However, elective inductions for non-medical reasons had also been on the rise, contributing to the debate surrounding their safety and impact on delivery outcomes [3].

Several retrospective and prospective studies had attempted to examine the relationship between mode of labour onset and delivery outcome. It has been observed that women who underwent induction of labor had higher rates of CS ESPECIALLY nulliparous women and women with unfavorable cervical findings at time of induction [4]. Other factors including maternal age, parity, gestational age, fetal weight and pre-existing medical statuses had been attributed in the results in relation to labour. Even with improvements in obstetric care and actual clinical guidelines, the course of induction and its management varied greatly in institutions and practitioners and may have influenced CS rates [5].

The contrast of the worldwide changes in CS rates had highlighted the relevance of context-specific studies. For many stages in developing countries, resource constraints, cultural desires, and legal considerations had made possible the clinical decision-making process even more complicated. A comparative analysis of CS frequency in spontaneous versus induced labour had therefore become essential in order to better understand and direct obstetric practice [6].

The purpose of this study was to compare the frequency of caesarean section among women presenting in spontaneous onset of labour versus those that were induced in labour. Through analysis of the outcomes related to these two groups the study was aimed to establish trends and possible risk factors leading to a decision for surgical delivery [7]. It was hoped that findings from this research would be useful to guide clinical strategies for minimizing unnecessary CS, promote safer obstetric practices and optimize maternal and fetal outcomes. Further, the study sheds light on the effectiveness of the labour management protocols and could precede policy recommendations for the improvement of quality of maternal healthcare services [8].

MATERIALS AND METHODS

This cross-sectional study was conducted in Department of Obstetrics and Gynecology, Khairpur Medical College, Civil Hospital, Khairpur, Khairpur Mirs. The research was conducted for a six month period starting May 2024, to October 2024. Before the commencement of the study, ethical approval has been confirmed from Institutional Review Board of Khairpur Medical College. Informed verbal and written consent was sought after explaining the purpose, procedure, risks and benefits of a study from the participating women.

The study population comprised 83 pregnant women who presented to the obstetrics department during the study period and met the inclusion criteria. Women of reproductive age (18–35 years) who were in labor—either spontaneous or induced—and had singleton pregnancies with cephalic presentation at term (≥37 weeks of gestation) were included in the study. Women with multiple pregnancies, or transverse fetal presentations, placenta previa, known uterine anomalies, or a history of classical cesarean section were excluded from the study to avoid confounding factors that might independently influence the decision for cesarean delivery.

The sampling technique employed was non-probability, consecutive sampling. All eligible women admitted in labor, either spontaneously or through medical induction, during the study period were enrolled consecutively until the desired sample size of 83 participants was achieved. The participants were divided into two groups based on the type of labor: spontaneous labor and induced labor. The decision to induce labor was made based on standard clinical

indications, such as post-term pregnancy, premature rupture of membranes without labor, gestational hypertension, or intrauterine growth restriction, as per hospital protocol. The induction method used was the use of prostaglandins (PGE2), oxytocin infusion; or mechanical if it was clinically relevant and consented by the physician.

Data were obtained using a structured proforma developed for the purpose of this study. Appropriate information which included age, parity, and gestational age, mode of onset (spontaneous or induced) was documented. The main result measured was the rate of cesarean section both groups. Indicating for cesarean section and maternal and neonatal complications, if any, were also recorded from secondary data.

The collection process of data was supervised by trained medical officers so as to ensure accuracy and completeness. All participants' confidentiality was kept highly secure during the study. All data had been keyed in manually and analyzed later by the help of statistical software. Categorical variables such as mode of labor and delivery outcome were presented as frequencies and percentages. The chi-square test was applied to determine any statistically significant difference in cesarean section frequency between the spontaneous and induced labor groups. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 83 pregnant women were enrolled in this study, with 48 (57.8%) in the spontaneous labor group and 35 (42.2%) in the induced labor group. The mean age of participants in the spontaneous labor group was 27.4 ± 4.1 years, while it was 28.1 ± 3.8 years in the induced labor group. The average gestational age was 38.6 ± 1.1 weeks in spontaneous labor and 39.1 ± 1.0 weeks in induced labor. Among all participants, 42.2% had a gravidity of three or more, and 37.3% were para two or more. A majority of the women were booked cases (63.9%), while 36.1% were unbooked. Regarding the mode of admission, 74.7% were admitted on an emergency basis, and 25.3% were elective admissions. In terms of residential status, 60.2% were from urban areas and 39.8% from rural regions. These demographic and clinical characteristics are summarized in Table 1.

Table 1: Demographic and Clinical Characteristics

Variable	Spontaneous Labor (n=48)	Induced Labor (n=35)	Total (n=83)
Age (mean ± SD)	27.4 ± 4.1 years	28.1 ± 3.8 years	27.7 ± 4.0
Gestational Age (mean ± SD)	38.6 ± 1.1 weeks	39.1 ± 1.0 weeks	38.8 ± 1.1
Gravidity ≥3	20 (41.7%)	15 (42.9%)	35 (42.2%)
Parity ≥2	18 (37.5%)	13 (37.1%)	31 (37.3%)
Booked Cases	32 (66.7%)	21 (60.0%)	53 (63.9%)
Unbooked Cases	16 (33.3%)	14 (40.0%)	30 (36.1%)
Mode of Admission (Emergency)	36 (75.0%)	26 (74.3%)	62 (74.7%)
Mode of Admission (Elective)	12 (25.0%)	9 (25.7%)	21 (25.3%)
Residential Status (Urban)	28 (58.3%)	22 (62.9%)	50 (60.2%)
Residential Status (Rural)	20 (41.7%)	13 (37.1%)	33 (39.8%)

The overall rate of cesarean section among the study population was 33.7% (n = 28),. Within the spontaneous labor group, 11 women (22.9%) underwent cesarean section compared to 17 women (48.6%) in the induced labor group. This difference in cesarean section rates between the two groups was found to be statistically significant (p = 0.014) using the chi-square test. The mode of delivery distribution between groups is detailed in Table 2.

Table 2: Comparison of Mode of Delivery

Mode of Labor	Cesarean Section (n)	Percentage
Spontaneous Labor	11	22.9%
Induced Labor	17	48.6%
Total	28	33.7%

A statistically significant difference was found between spontaneous and induced labor in terms of cesarean section rate ($p = 0.014$, Chi-square test).

The most frequent indication for cesarean section overall was fetal distress, accounting for 35.7% of all cesarean deliveries. This was followed by failed induction (25.0%), cephalopelvic disproportion (21.4%), and non-progress of labor (17.9%). Notably, failed induction was exclusively observed in the induced group (41.2%), while non-progress of labor was more common in the spontaneous group. The indications for cesarean section are presented in figure 1.

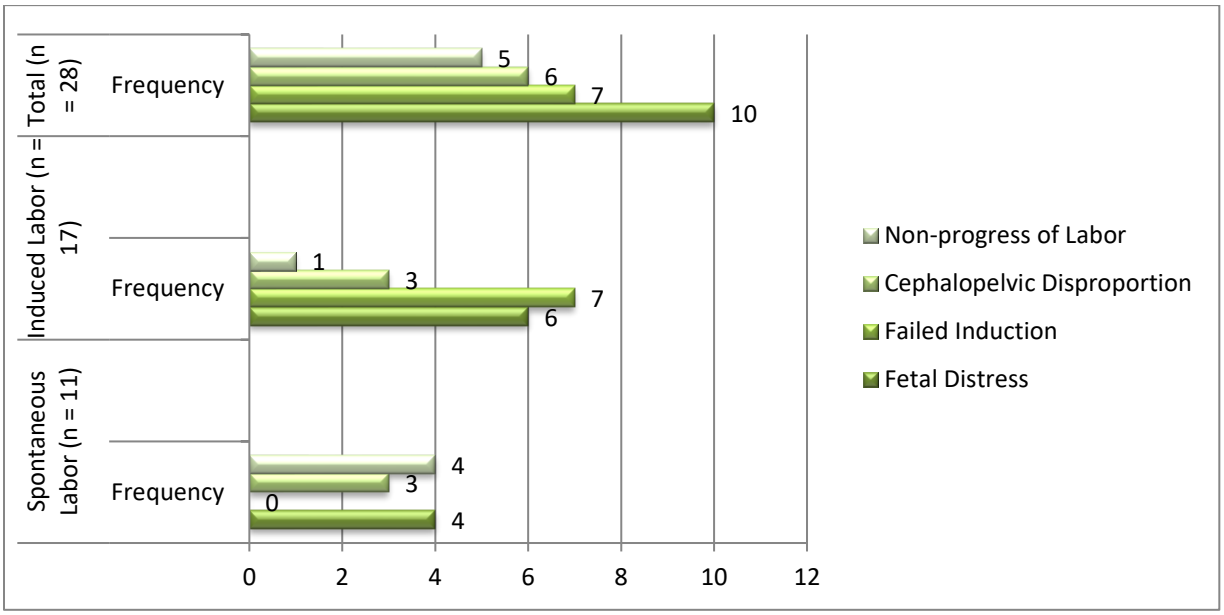

Figure 1: Indications for Cesarean Section

Maternal complications were recorded in 7.2% of the study population, with a slightly higher rate in the induced labor group (11.4%) compared to the spontaneous labor group (4.2%). Postpartum hemorrhage was the most common maternal complication. Neonatal complications were noted in 10.8% of cases, more frequently among those who underwent labor induction (17.1%) than those with spontaneous onset (6.3%). These included low APGAR scores and NICU admissions. Details of maternal and neonatal complications are provided in Table 3.

Table 3: Maternal and Neonatal Complications

Complication	Spontaneous Labor (n = 48)	Induced Labor (n = 35)	Total (n = 83)
Maternal (Total)	2 (4.2%)	4 (11.4%)	6 (7.2%)
• Postpartum Hemorrhage	1	2	3
• Wound Infection/Fever	1	1	2

• Wound Dehiscence	0	1	1
Neonatal (Total)	3 (6.3%)	6 (17.1%)	9 (10.8%)
• Low APGAR Score (<7 at 5 min)	1	3	4
• NICU Admission	2	3	5

DISCUSSION

This study aimed to compare the frequency of cesarean sections between women in spontaneous labor and those undergoing induced labor. The findings revealed that the rate of cesarean section was significantly higher in the induced labor group (48.6%) compared to the spontaneous labor group (22.9%), with a statistically significant p-value of 0.027. Fetal distress was the most common indication for cesarean delivery in both groups, followed by failed induction, cephalopelvic disproportion, and non-progress of labor. Maternal and neonatal complications were observed more frequently in the induced labor group, although the difference in neonatal complications was not statistically significant.

These findings are consistent with previously reported trends, which also show an increased likelihood of cesarean delivery following labor induction [9]. Various studies have similarly reported fetal distress and failed induction as leading causes of cesarean in induced cases [10, 11]. Additionally, the increased rate of complications among women undergoing induction has been documented, although some differences in outcomes may be attributed to differing induction protocols and patient selection.

Numerous studies conducted in both developing and developed healthcare settings have consistently demonstrated that labor induction is associated with a higher risk of cesarean section when compared to spontaneous onset of labor [12]. This trend has been attributed to a number of factors, including poor cervical favorability at the time of induction, increased uterine activity leading to fetal compromise, and prolonged labor duration. In clinical practice, women who undergo induction are often managed with closer monitoring and lower thresholds for intervention, which may also contribute to the higher cesarean rate observed [13]. The present study supports these findings by demonstrating a statistically significant increase in cesarean deliveries among women with induced labor (48.6%) compared to those with spontaneous onset (22.9%).

Furthermore, the distribution of cesarean indications in this study aligns with previous evidence highlighting fetal distress and failed induction as the most common causes in induced labors [14]. In contrast, non-progress of labor was more frequently seen in women presenting with spontaneous labor. This suggests that although spontaneous labor may be slower in progression initially, it is more likely to culminate in a vaginal delivery. Comparatively, other studies have reported a similar pattern in which induced labor—particularly in nulliparous women—tends to carry a higher risk of labor complications requiring surgical intervention [15]. These results emphasize the importance of appropriate patient selection and preparation before initiating induction, as well as the need for consistent monitoring protocols to mitigate adverse outcomes.

The higher cesarean rate in the induced group may be explained by factors such as an unfavorable cervix at the time of induction, underlying pregnancy complications necessitating induction, and the increased duration of labor leading to maternal fatigue or fetal compromise.

Limitations and Future Suggestions:

The study has several limitations. First, the sample size was relatively small and from a single center, which may affect the generalizability of the results. Second, factors such as Bishop score at the time of induction, duration of labor, and neonatal Apgar scores were not assessed. Third, potential selection bias may exist due to the non-randomized sampling technique. Future research should involve multi-center studies with larger sample sizes and stratification based on additional clinical parameters such as cervical favorability and induction methods. Including long-term maternal and neonatal outcomes could also provide a more comprehensive understanding of the risks and benefits associated with labor induction.

CONCLUSION

This study demonstrated that the frequency of caesarean section was significantly higher among women who underwent induced labour compared to those who experienced spontaneous labour. The findings indicated that spontaneous labour was more likely to result in vaginal delivery, while induction of labour increased the likelihood of surgical intervention. Various maternal and fetal factors were associated with the increased caesarean rate in the induced group, including prolonged labour and non-reassuring fetal heart patterns. These results highlighted the need for careful evaluation before opting for labour induction, as it posed a greater risk of caesarean delivery. Overall, the study emphasized the importance of individualized labour management to minimize unnecessary caesarean sections and improve maternal and neonatal outcomes.

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