

Research Article

Assessing Cesarean Section Rates and Indications in Saudi Arabia: A Robson Classification Analysis for Maternity Care Improvement

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Abstract

Study aim: Cesarean section (CS) rates have been on the rise globally, including in Saudi Arabia. This study examines the use of Robson's classification system to analyze CS rates, indications, and opportunities for improvement in maternity care.

Methods: A retrospective analysis was conducted on 784 CS cases in a tertiary hospital in Jeddah, Saudi Arabia, using Robson's classification. The study categorizes women based on obstetric characteristics such as parity, gestational age, fetal presentation, and previous CS.

Results: The primary indication for cesarean section in our study population was a history of previous cesarean section (63.65%). According to Robson's classification, Group 5, consisting of multiparous women with at least one previous uterine scar and a single cephalic pregnancy beyond 37 weeks, contributed the most to the overall CS rate (54%). Groups 9 (single pregnancy with transverse or oblique lie, including women with previous scars) and 7 (multiparous women with a single breech, including women with previous scars) were the second and third most common groups (23.10%) and (14.90%) of the cases, respectively.

Conclusion: Robson's classification provides valuable insights into CS indications. Efforts should focus on reducing the CS rate, particularly among nulliparous women. Regular monitoring and evidence-based interventions are recommended to enhance safe childbirth practices in Saudi Arabia.

INTRODUCTION

Cesarean section (CS) rates have seen a significant surge globally over the past few decades, sparking critical discussions within the healthcare community. This escalating trend, particularly pronounced in high-income countries, has raised questions about the appropriateness and necessity of CS procedures. While the World Health Organization (WHO) once recommended regional CS rates of 10% to 15%, the validity of this guideline has been challenged as CS rates continue to climb [1,2]. Saudi Arabia, in particular, stands as an emblematic case with a consistently high CS rate of approximately 10%, well above the WHO's threshold [3]. This nation confronts pressing questions regarding maternal healthcare practices and the well-being of both mothers and infants, given the multifaceted factors contributing to this upward trajectory, such as maternal age, primiparity, and healthcare provider preferences [4,5].

Robson's classification system offers a valuable framework for categorizing CS data based on critical obstetric characteristics,

including parity, gestational age, fetal presentation, and previous CS [6]. By examining the CS rates and indications through the lens of Robson's classification, this study endeavors to furnish valuable insights that can inform strategies to optimize maternity care in Saudi Arabia.

Cesarean section trends worldwide have experienced a consistent upward trajectory, sparking debates on the appropriateness and necessity of the procedure. Historically, the WHO recommended regional CS rates of 10% to 15% [1], but the validity of this guideline has been questioned as CS rates continue to rise, particularly in high-income countries [2]. Saudi Arabia, emblematic of this global trend, grapples with questions surrounding maternal healthcare practices and the well-being of mothers and infants [4]. Several factors contribute to this phenomenon, including advanced maternal age, primiparity, and physician preferences [5,6].

A key development in understanding CS rates and indications has been the implementation of Robson's classification system. This system provides a valuable framework for categorizing CS

data based on obstetric characteristics such as parity, gestational age, fetal presentation, and previous CS [7]. Robson's system has been recognized by the WHO as a global standard for measuring and comparing CS rates, offering benefits such as mutual exclusivity, comprehensiveness, and prospective applicability [8].

Saudi Arabia exhibits unique characteristics in terms of maternal health. The nation boasts generally good maternal health, with the majority of women receiving antenatal, prenatal, and postnatal care [9]. The maternal mortality rate per 10,000 live births was 1.4 in 2009 [10]. Approximately 90% of births occur in hospitals [11]. Despite these positive indicators, the CS rate remains persistently high [3].

Studies have shown significant variations in CS rates both within Saudi Arabia and globally. In Saudi Arabia, these rates vary significantly among different cities, ranging from 16.9% to 34.1% [12]. Similarly, international studies have revealed variations across different regions and healthcare facilities [13]. This variability underscores the need for a comprehensive classification system such as Robson's to dissect CS rates and indications, as well as to identify opportunities for improvement.

A systematic review by Betrán et al. synthesized user experiences with Robson's classification in over 33 million women from 31 countries [14]. Users praised the system for its simplicity, robustness, dependability, and adaptability. However, challenges include missing data, misclassification, and a lack of consensus on classification characteristics. Several proposed improvements, especially in the group covering women with previous CS, emphasize the system's capacity for refinement [14].

The utility of Robson's classification system has been demonstrated in various countries. A study conducted by Parveen et al. in Pakistan used Robson's classification to analyze trends in CS rates and found that groups 10 and 5 contributed the most to total deliveries [15]. These experiences highlight the global applicability of Robson's classification system.

METHODS

Study aim

This study employed a retrospective analytical comparative design to assess CS rates and indications in King Abdulaziz University Hospital in Jeddah, Saudi Arabia. The retrospective approach allowed us to analyze a large dataset of CS cases from a tertiary hospital in Jeddah, Saudi Arabia.

Study Duration

Data collection for this study spanned February 15, 2022, to April 30, 2022. This timeframe was chosen to ensure an adequate sample size while capturing a representative snapshot of CS cases within the hospital.

Study Setting

The study was conducted at a single healthcare center in Jeddah, Saudi Arabia. The choice of this specific healthcare

center was based on its accessibility and the availability of comprehensive medical records.

Study Population

The study focused on women who underwent cesarean section procedures at the selected healthcare center during the study period. Inclusion criteria required that the medical records of these women contained complete follow-up data.

Selection Criteria

Inclusion criteria

- Women who underwent CS procedures at the healthcare center.
- Medical records with complete follow-up data.

Exclusion criteria

- Women with incomplete data records.
- Women with chronic medical conditions that could potentially affect pregnancy or mode of delivery.

Data Collection

Data were collected from electronic health records (EHRs) and paper-based medical records using a structured data collection form. The form included the following variables: patient demographics (age, sex), maternal medical history (including any chronic conditions), date of admission, management plan (including indications for CS), type of CS (primary or repeat), date of CS, and follow-up data.

Ethical considerations

The study was conducted in compliance with ethical principles and was granted approval by the Institutional Review Board (IRB) of the King Abdulaziz University. The study only utilized deidentified data, ensuring the privacy and confidentiality of patient information. No personal identifying information, such as names, contact information, or addresses, was included in the dataset.

Statistical Analysis

Data were analyzed using appropriate statistical software (e.g., SPSS, R). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize the demographic and clinical characteristics of the study population. Robson's classification system was employed to categorize the data into mutually exclusive groups based on obstetric characteristics. These groups were subsequently analyzed to determine CS rates and indications.

RESULTS

Demographic Characteristics

A total of 784 CS deliveries were included in the analysis.

Table 4: Methods used for induction of labor

The mean age of the participants was 32.9 years (± 5.4), with the majority falling within the 20 to 35 years age group, comprising 509 individuals (64.90%). Of the study population, 681 (86.70%) were multigravida, while 103 (13.13%) were primigravida (Table 1).

Gestational Age and Fetal Presentation

Gestational age analysis revealed that 353 cases (45.03%) occurred in term pregnancies (37 to 42 weeks). Singleton pregnancies constituted the majority, with 737 cases (94.00%), while twins and triplets accounted for 44 (5.60%) and 3 (0.40%) cases, respectively. Cephalic fetal presentation was predominant, with 603 cases (76.91%), followed by breech presentation in 141 cases (17.98%). Regarding the onset of labor, 229 cases (29.20%) experienced spontaneous labor, while 121 cases (15.40%) were induced (Table 2).

Indications for Cesarean Section

The primary indication for cesarean section in our study population was a history of previous cesarean section, with 499 cases (63.65%). Other significant indications included multiple gestations, accounting for 36.99% of cases. Fetal distress, while a substantial factor, was the primary indication in only specific groups.

Robson's Classification Groups

Robson's classification system was applied to categorize the data into mutually exclusive groups. Group 5, consisting of multiparous women with at least one previous uterine scar and a single cephalic pregnancy beyond 37 weeks, contributed the most to the overall CS rate, with 423 cases (54%). Groups 9 (single pregnancy with transverse or oblique lie, including women with previous scars) and 7 (multiparous women with a single breech, including women with previous scars) were the second and third most common groups, with 181 (23.10%) and 117 (14.90%) cases, respectively. Group 1, encompassing nulliparous women with a single cephalic pregnancy beyond 37 weeks in spontaneous labor, had the least contribution (Table 3) (Figure 1).

Fetal Presentation in Singleton Pregnancies

Within the subset of singleton pregnancies (737 cases), cephalic presentation remained predominant at 80.2%. Notably, breech presentation was more frequent among twins, accounting for 39.1% of cases, compared to singletons and triplets (Table 4) (Figure 2).

DISCUSSION

Interpretation of Findings

Our study examined CS rates and indications in Saudi Arabia using Robson's classification system, shedding light on the distribution of CS among various obstetric groups. The results reveal several significant trends that warrant careful consideration.

Table 1: Characteristic of studied women (n=784)

Variables	Frequency (N) (Total N=784)	Percentage%	CI 95%
Maternal Age (years)			
Mean \pm SD	32.9 \pm 5.4		
<20	7	0.90%	0.4-1.8
20-35	509	64.90%	61.5-68.3
>35	268	34.20%	30.9-37.6
Gravidity			
Primigravida	103	13.13%	10.9-15.7
Multigravida	681	86.70%	84.3-89.2
Parity			
Nulliparous	103	13.13%	10.9-15.7
Multiparous	681	86.70%	84.3-89.2
History of ectopic pregnancy			
No	775	98.90%	97.8-99.5
Yes	9	1.10%	0.5-2.2
Number of previous CS			
0	254	32.40%	29.1-35.8
1	223	28.44%	25.3-31.7
2	193	24.62%	21.6-27.8
3	78	9.95%	7.9-12.3
4	28	3.57%	2.4-5.1
5	6	0.77%	0.2-1.7
7	2	0.26%	0.03-0.9

Table 2: Obstetrics characteristics of studied women (n=784).

Variables	Frequency (N) (Total N=784)	Percentage%	CI 95%
Gestational Age (weeks)			
<37	78	9.95%	7.9-12.3
37-40	353	45.03%	41.5-48.6
>40	332	42.35%	38.9-45.9
Number of Neonates			
singleton	737	94.00%	92.1-95.6
twins	44	5.60%	4.1-7.5
triplets	3	0.40%	0.08-1.1
Fetal Lies			
Breech	603	76.91%	73.8-79.8
Cephalic	141	17.98%	15.4-20.9
all abnormal	38	4.85%	3.5-6.6
Onset of Labor			
Spontaneous	229	29.20%	26.1-32.5
Induction of Labor	121	15.40%	12.9-18.2
Pre-labor Cesarean Section	434	55.40%	51.8-58.9
Cause of CS			
Previous Cs	499	63.65%	60.2-67.0
Multiple Gestation	29	36.99%	2.5-5.3
Fetal Distress	59	7.53%	5.8-9.6
Failure to progress	34	4.34%	3.0-6.0
Malpresentation	71	9.06%	7.1-11.3
Abnormal Placenta	10	1.28%	0.6-2.3
other	82	10.46%	8.4-12.8

Robson's Classification and Group Contributions

Robson's classification system provided a comprehensive framework for categorizing CS data based on obstetric characteristics. Group 5, comprising multiparous women with at least one previous uterine scar and a single cephalic pregnancy beyond 37 weeks, emerged as the primary contributor to the overall CS rate. This finding is consistent with the literature, emphasizing the importance of addressing CS rates among women with a previous CS history [15].

Table 3: Frequency of studied women according to Robson classification system (n=784).

Robsons	Classification	Description	Frequency (N) (Total N=784)	Percentage %	CI 95%
Group 1		Nulliparous, single, cephalic pregnancy >37 weeks in spontaneous labor	17	2.20%	1.3-3.5
Group 2		Nulliparous, single, cephalic pregnancy >37 weeks who had labor induced or delivered before labor by CS	41	5.20%	3.8-7.0
Group 3		Multiparous, without previous uterine scar with single, cephalic pregnancy >37 weeks in spontaneous labor	27	3.40%	2.3-5.0
Group 4		Multiparous, without previous uterine scar with single, cephalic pregnancy >37 weeks who had labor induced or delivered before labor by CS	42	5.40%	3.9-7.2
Group 5		All multiparous with at least one previous uterine scar, with single cephalic pregnancy >37 weeks	423	54.00%	50.4-57.5
Group 6		All nulliparous with a single breech pregnancy	24	3.10%	1.9-4.5
Group 7		All multiparous with a single breech including women with previous scars	117	14.90%	12.5-17.6
Group 8		All women with multiple pregnancies including those with uterine scars	47	5.90%	4.4-7.9
Group 9		All women with a single pregnancy with transverse or oblique lie including women with previous scars	181	23.10%	20.2-26.2
Group 10		All women with single, cephalic <37 weeks including women with previous scars	36	4.60%	3.2-6.3

Table 4: Frequency of different fetal lies according to number of neonates (n=784).

Fetal Lies	Singleton (N=737)	Twins (N=44)	Triplets (N=3)	P-Value
Cephalic (N;%)	591; 80.2%	12; 27.2%	0; 0%	<0.001
Breech (N;%)	138; 18.7%	3; 39.1%	0; 0%	
All abnormal (N;%)	8; 1.1%	27; 61.4%	3; 100%	

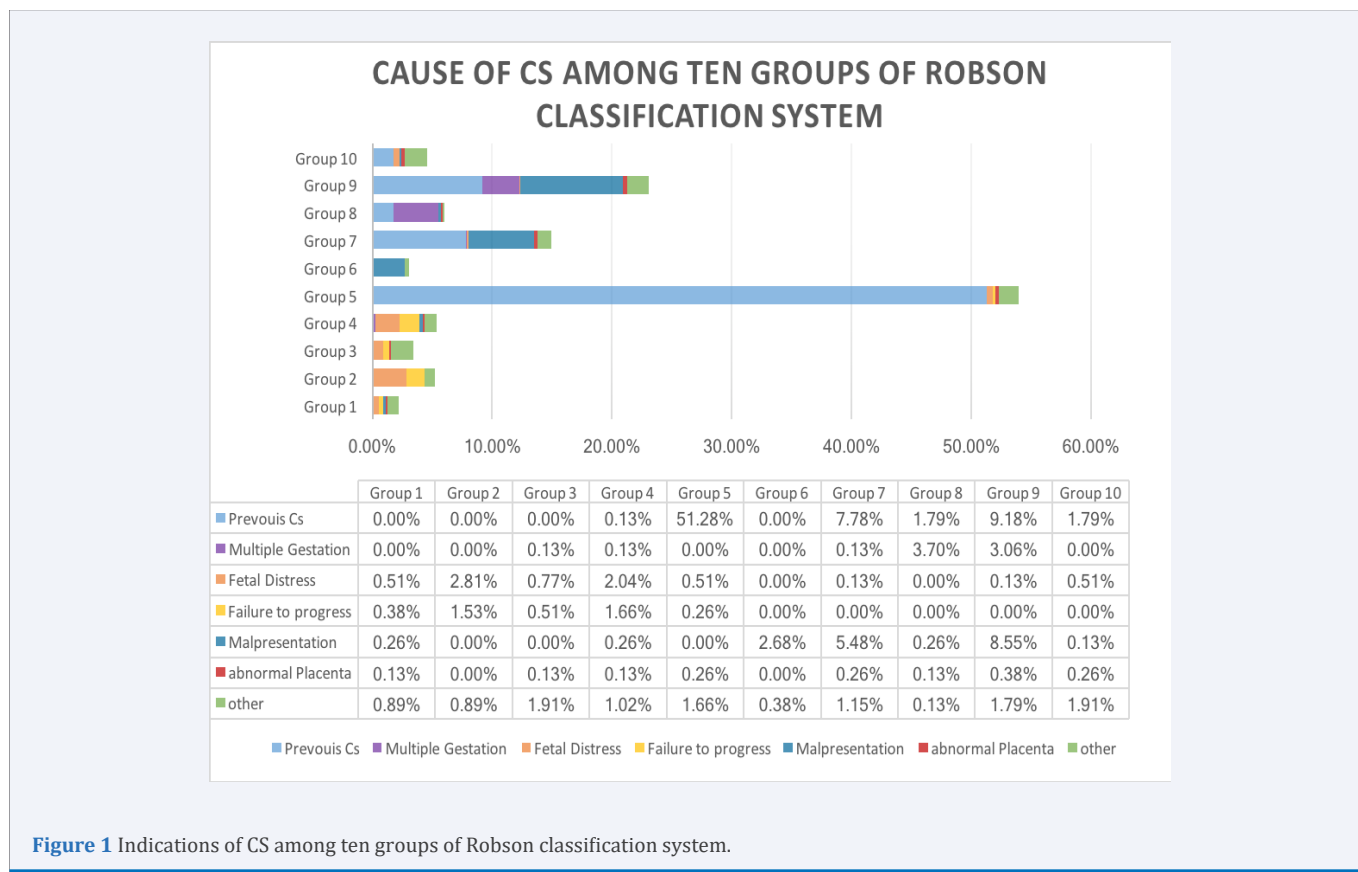


Figure 1 Indications of CS among ten groups of Robson classification system.

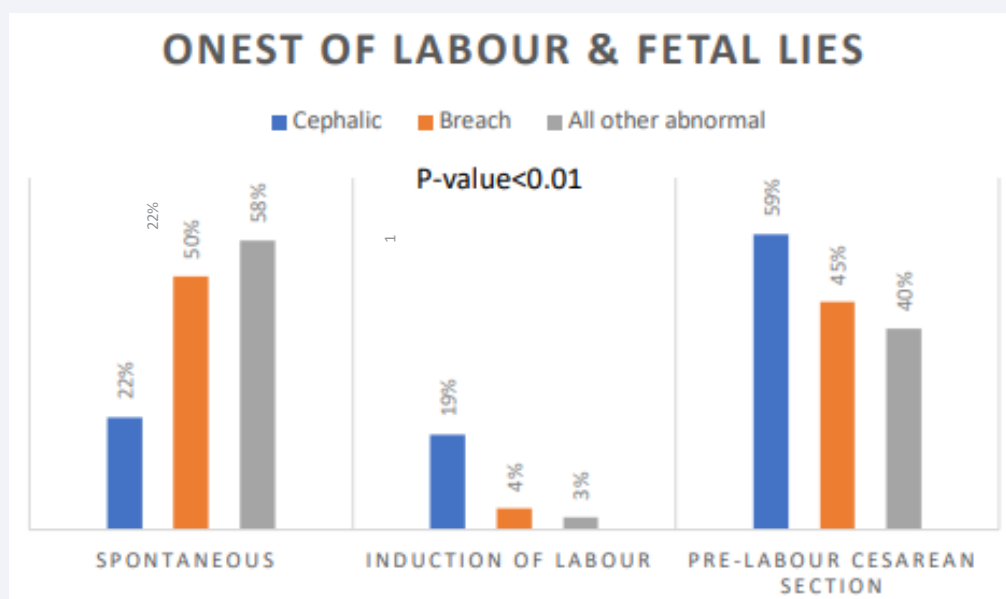


Figure 2 Fetal lies in association with onset of labor (n=784).

Indications for Cesarean Section

Our study identified a history of previous CS as the primary indication for CS, accounting for a substantial proportion of cases. This echoes the global trend where a prior CS is often a crucial factor in the decision for CS delivery [16]. These findings underscore the necessity of exploring strategies to reduce unnecessary CS among women with previous uterine scars while ensuring maternal and neonatal safety.

Comparative Analysis and Variation

Our results also contribute to the broader discourse on CS rates by comparing them to international trends. While the global rise in CS rates has raised concerns, our study confirms that Saudi Arabia is not an exception to this phenomenon [3]. The variation in CS rates among different cities within Saudi Arabia aligns with similar disparities observed in other countries [12]. Further investigations are warranted to explore regional differences in CS rates and potential underlying factors.

Clinical Implications

The clinical implications of our findings are substantial. While CS can be life-saving in certain situations, their overuse can lead to increased healthcare costs, longer recovery times, and potential complications for both mothers and infants [17]. Our study highlights the importance of evidence-based decision-making in obstetric care to balance the benefits and risks of cesarean delivery. Targeted interventions and improved communication between healthcare providers and expectant mothers may help reduce the reliance on CS, particularly among women with a history of previous CS.

LIMITATIONS

We acknowledge several limitations in our study. First, the data were collected from a single healthcare center in Jeddah, which may not fully represent the national context. Second, retrospective data collection is subject to inherent limitations, such as missing or incomplete records. Additionally, the study did not explore the specific reasons for the high CS rates in Saudi Arabia, which is an avenue for future research.

Future Directions

Future research should delve into the underlying factors contributing to the high CS rates in Saudi Arabia, considering variables such as maternal age, education, socioeconomic status, and healthcare provider preferences. Comparative studies across different regions of Saudi Arabia can uncover region-specific patterns and inform targeted interventions. Moreover, investigating the quality of antenatal and intrapartum care can shed light on potential areas for improvement in maternity services.

CONCLUSION

In this study, utilizing Robson's classification system, we identified multiparous women with a prior CS history (Group 5) as the primary contributors to the overall CS rate in Saudi Arabia. The predominant indication for CS was a history of previous CS. To address this, we recommend the implementation of evidence-based guidelines, an emphasis on vaginal birth after CS when appropriate, and improved communication between healthcare providers and expectant mothers.

Future research should explore factors contributing to high CS rates, considering variables such as maternal age, education, socioeconomic status, and provider preferences. Additionally, comparative studies across different regions within Saudi Arabia can provide valuable insights. In conclusion, our study informs efforts toward a more evidence-based and patient-centered maternity care approach in Saudi Arabia, with the overarching goal of ensuring the well-being of both mothers and newborns.

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