Original article

Analysis of Cesarean Section Rates Based on ROBSON Classification System in a Tertiary Care Hospital in West Coast of Gujarat, India

Dr. Preeti Punatar [1], Dr. Bhakti Pattani [*2]

[1]Additional Professor, Department of Obstetrics and Gynecology, Shri M. P. Shah Medical College, Jamnagar, Gujarat, India.
[2]Post Graduate Student and Resident Doctor, Department of Obstetrics and Gynecology, Shri M. P. Shah Medical College, Jamnagar, Gujarat, India.

*Corresponding author: Dr. Bhakti Pattani; *bhaktipattani@gmail.com*

Abstract

Background with objectives: Because of growing concern over the increasing C-Section worldwide, WHO proposes the ROBSON classification system as a global standard for assessing, monitoring and comparing caesarean section rates. Objective of present study is to investigate CS rates according to ROBSON classification system and to determine area of concern to decrease overall C-section rates. **Methods:** This study is a retrospective descriptive cohort study done with all caesarean sections delivered in a tertiary teaching hospital in the west coast of Gujarat, India from January 2022 to December 2022. **Results:** In current study, total CS rate was 28.47%. The major contributor to total CS rate was ROBSON I group (34.09%) followed by ROBSON V (26.34%). Major indications for ROBSON I group include fetal distress due to meconium-stained liquor (25%), Cephalo-pelvic disproportion (CPD) stage1(18%). Major indications for ROBSON group V includes CPD 1(31%), scar tenderness(23%) and previous 2 LSCS(14%). **Conclusion:** ROBSON I and V being major contributors to total CS suggest to focus on these groups to reduce total CS rate. Art of proper labor monitoring is to be rejuvenated to reduce ROBSON I group, more trial of labor after cesarean should be performed to reduce ROBSON V group.

Introduction

A Cesarean-Section (C-Section) is a high-quality life-saving surgical procedure that allows pregnant women, their offspring, and their families to continue leading healthy productive lives. A C-Section is amongst the common major surgical procedures with rising rates both locally and internationally. The number of C-Sections as a percentage of all live births is used as an indicator for measuring the availability and utilization of this life saving obstetric service. Recently there has been a growing concern over the increasing rates of C-Section both in developed and developing countries. As the caesarean sections are associated with increased maternal morbidity and mortality compared to vaginal delivery, the alarming increase in C-Section rates has become a major public health concern.

As per ROBSON classification implementation manual by WHO [1], WHO proposes the Robson Classification system as a global standard for assessing, monitoring and comparing caesarean section rates within healthcare facilities over time, and between facilities. The classification is simple, robust, reproducible, clinically relevant, and prospective.

Table 1: The ROBSON Classification with subdivisions

Group	Obstetric population
1	Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour
2	Nulliparous women with a single cephalic pregnancy, ≥37 weeks gestation who had labour induced or were delivered by CS before labour
2a	Induced Labour
2b	Pre-labour CS
3	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation in spontaneous labour
4	Multiparous women without a previous CS, with a single cephalic pregnancy, ≥37 weeks gestation who had labour induced or were delivered by CS before labour
4a	Labour induced
4b	Pre-labour CS
5	All multiparous women with at least one previous CS, with a single cephalic pregnancy, ≥37 weeks gestation
5.1	With one previous CS
5.2	With two or more previous CSs

6	All nulliparous women with a single breech pregnancy
7	All multiparous women with a single breech pregnancy including women with previous CS(s)
8	All women with multiple pregnancies including women with previous CS(s)
9	All women with a single pregnancy with a transverse or oblique lie, including women with previous CS(s)
10	All women with a single cephalic pregnancy < 37 weeks gestation, including women with previous CS(s)

Various studies have been undergone in various countries worldwide and in different parts of India to analyse caesarean section rates based on this classification to aid in optimisation of caesarean section use, assessment of strategies to decrease C-section rates and improve clinical practice. The current study has the following objectives:

- To determine CS rates for the year 2022 at a Tertiary Teaching Hospital in west coast of Gujarat, India.
- To classify patients who underwent CS according to ROBSON classification and establish CS rates in each group.
- To Identify and analyse the groups of women which contribute the most and the least to overall CS rates with possible reasons.
- To look for possible recommendations to reduce CS rates according to ROBSON groups.

Methodology

The current study is retrospective descriptive cohort type of study, conducted at Tertiary Teaching Hospital in west coast of Gujarat, India, serving as a referral maternity hospital and a tertiary health center in the region for the duration of twelve months (1st January 2022 to 31st December 2022). All patients who delivered via cesarean section during the study duration were studied.

Exclusion criteria:

1. All mothers who delivered via C-Sections outside the study area.
2. Gestational age <28 weeks (including miscarriages and ectopic pregnancies.)

Data was collected and analysed using statistical measures like percentage and proportion. Descriptive statistical analysis was done.

Results

In current study, out of total 2528 cases, Mean age of patient was 25.2 years. (Range- 18-40 years). Maximum number of patients belonged to 21-25 years (40%), followed by less than 20 years (23%), more than 30 years (19%) and between 26-30 years (18%). Majority of patients were illiterate (47%), while 45% patients were educated upto primary level and only 8% were educated upto secondary and higher secondary level. Majority of patients came from lower socioeconomic class (63%), followed by middle class (34%) and a small amount (3%) by upper class. Majority of patients belonged to Hindu (48%) and Muslim (43%) followed by minor contribution (9%) by other religions. In present study, 78% patients were booked patients, while 22% were unbooked patients. In present study, 86% of patients were primary admission to this hospital and rest of 14% patients were referred from other peripheral rural areas.

Considering the obstetric characteristics of the study population, in current study, 47% patients had taken more than 3 ANC visits, followed by 32% patients who had taken only one ANC visit, 16% had taken 2 antenatal visits and 5% had taken 3 ANC visits. In the current study, majority of patients were multigravida with =>3 parity (38.7%), followed by second para (34.6%), nullipara (15.2%) and lastly primipara (12.5%). In present study, out of total cesarean sections, 63% were emergency cesarean sections and 37% were elective cesarean sections. Regarding quality of liquor intraoperatively, in present study, clear straw clored liquor noted in

80% cases, followed by meconium-stained liquor in 19% cases and in 1% cases, blood-stained liquor noted. In the present study, in majority of cesarean sections, baby weight was between 2.5-2.9kg, followed by =>3kg in 20% CS and <2.5kg in 14% CS.

In current study, the total CS out of total deliveries (8879), total CS was 2528 with total CS rate of 28.47%.the major contributor to total CS rate was ROBSON I group (34.09%) followed by ROBSON V (26.34%). Some contribution by ROBSON VII (11.11%) and ROBSON II (7.9%) to total CS rate was noticed. A minor contribution by ROBSON VI (5.93%), ROBSON III (4.94%), ROBSON VIII (3.56%), ROBSON X (2.25%), ROBSON IV (2.25%) and ROBSON IX (1.58%) was noticed. (Table-2)

Table 2: Contribution of various ROBSON groups to total CS rates in current study:

ROBSON groups	No. of patients	Percent
ROBSON I	862	34.09%
ROBSON II	200	7.9%
ROBSON III	125	4.94%
ROBSON IV	57	2.25%
ROBSON V	666	26.34%
ROBSON VI	150	5.93%
ROBSON VII	281	11.11%
ROBSON VIII	90	3.56%
ROBSON IX	40	1.58%
ROBSON X	57	2.25%
Total	2528	100%

Discussion

During the study period of one year from January 2022 to December 2022, in a tertiary teaching hospital in west coast of Gujarat, India; out of total deliveries (8879), total CS was 2528 with total CS rate of 28.47%. The total CS rate was in downward trend in last four years (In 2021, total CS rate was 33.65%; In 2020, it was 33.28% and in 2019, it was 33.04%).

In comparison to other studies; in Sneha Bawde Dhodapkar study done at Puducherry, India [8], the total CS rate was 32.6%; In Arpita De et al study done in Delhi, India [9], it was 31.29%; In Thirukumar Markandu study done in Battocalao, Srilanka [10], it was 25.13%. In Tshering Tamang et al study done in Mongar, Bhutan [11], it was 34.4%.

ROBSON I is the highest contributing group to overall CS rates in this study. The indications for this group of CS includes fetal distress due to meconium-stained liquor (25%), CPD 1(18%), oligohydramnios (12%), PROM (10%), NPL (8%), CPD II (3%) etc.

In comparison to other studies conducted in other parts of India, in Sneha Bawde Dhodapkar study [8], ROBSON I contribution to total CS is 24%, In Arpita de et al study [9], it was 22.86%. While In studies conducted in other countries, Thirukumar Markandu study [10] and Tshering Tamang et al study [11], it was around 10%.

In present study, this contribution indicates that correct diagnosis of fetal distress is required; The routine use of cardiotocography for low-risk women on entrance to the labor ward could be associated with an increase in CS rates. In decision making in cases of suspicious CTG, fetal scalp stimulation or fetal scalp blood sampling may be used [2]. National Institute for Health and Care Excellence (NICE) guidelines agree that fetal scalp blood sampling and blood gas analysis can be an alternative tool to rule out acidosis and fetal compromise, preventing up to 90% of CS and operative interventions [3,4]. Also increase in usage of oxytocin

infusion pumps reduces incidence of hyperstimulation of uterus and thus also fetal distress due to uterine hyperstimulation. Apart from this, all meconium-stained liquors or all non-reassuring fetal heart rate patterns do not necessarily need a caesarean. Repeated training of residents and staff for decision making in these cases are needed.

Avoidance of first CS is important for better future obstetric implementation. The patient should be counselled and explained about advantage of normal delivery, remove fear, explain about importance of antenatal exercise to avoid caesarean section on demand. Easy availability of epidural analgesia can make patient more compliant to go through labor pains. Use of low forceps or ventouse for second-stage delay, allow the second stage 3 hours in nulliparous before saying arrest in the second stage of labor should be followed. The accurate assessment and monitoring of power, passage and passenger for diagnosis for CPD 1 & 2 should be done.

ROBSON group V constitutes the second largest contribution to overall CS rates. (26.34%) for this study. The major indications for ROBSON group V include CPD I (31%), scar tenderness (23%), previous 2 cs (14%) and MSL with FD (12%), PROM (9%) etc.(chart-3).

In comparison to other studies conducted in other parts of India, in Sneha Bawde Dhodapkar study [8], ROBSON V contribution to total CS is 40.1%, In Arpita de et al study [9], it was 32.52%. While In studies conducted in other countries, Thirukumar Markandu study [10] and Tshering Tamang et al study [11], it was around 30% and 28% respectively.

Proper diagnosis of CPD and scar dehiscence is required. Most of the time scar was found to be intact/ not thinned out, which indicates not to rely on patients' perception, rather clinical lead should be followed for diagnosis of scar dehiscence. The patients should be get counselling, awareness and education for benefits of VBAC, so that when patient goes into labor, she remains self-motivated for trial of scar.

It is seen that in CS belonging to ROBSON V group, because they are previously operated, there are more incidence of adhesions, advancement of bladder (and thus high chances of bladder injury), more blood loss and and thus increase in maternal morbidity.

It should be noted that although numerous studies have demonstrated that vaginal birth after previous CS (VBAC) is a safe alternative to repeat CS in carefully selected patient [5], the urgency of intervention in patients undergoing a trial of labor needs to be in high alert as the avoidance of emergency CS might pose risks for mother and fetus, and increase requirements of general anesthesia and problems in futures pregnancy [6]. Thus, mastering and understanding the indications and contraindications of the trial of labour after caesarean (TOLAC) was the key to success [7].

Nulliparous breech trial is not practiced in present institute, therefore all these category of patients get delivered by CS either elective or emergency. Practicing external cephalic version near term in selected low risk patients and give trial of normal labor in low baby weight upto 2.5kg. to reduce ROBSON VI and VII.

Because of rising IVF procedures and other assisted reproductive techniques, the incidence of multiple pregnancies also rises and because they are precious pregnancies, they are considered for elective caesarean sections. To reduce ROBSON VIII group, training health care personnels the art of delivering twins pregnancies should be done.
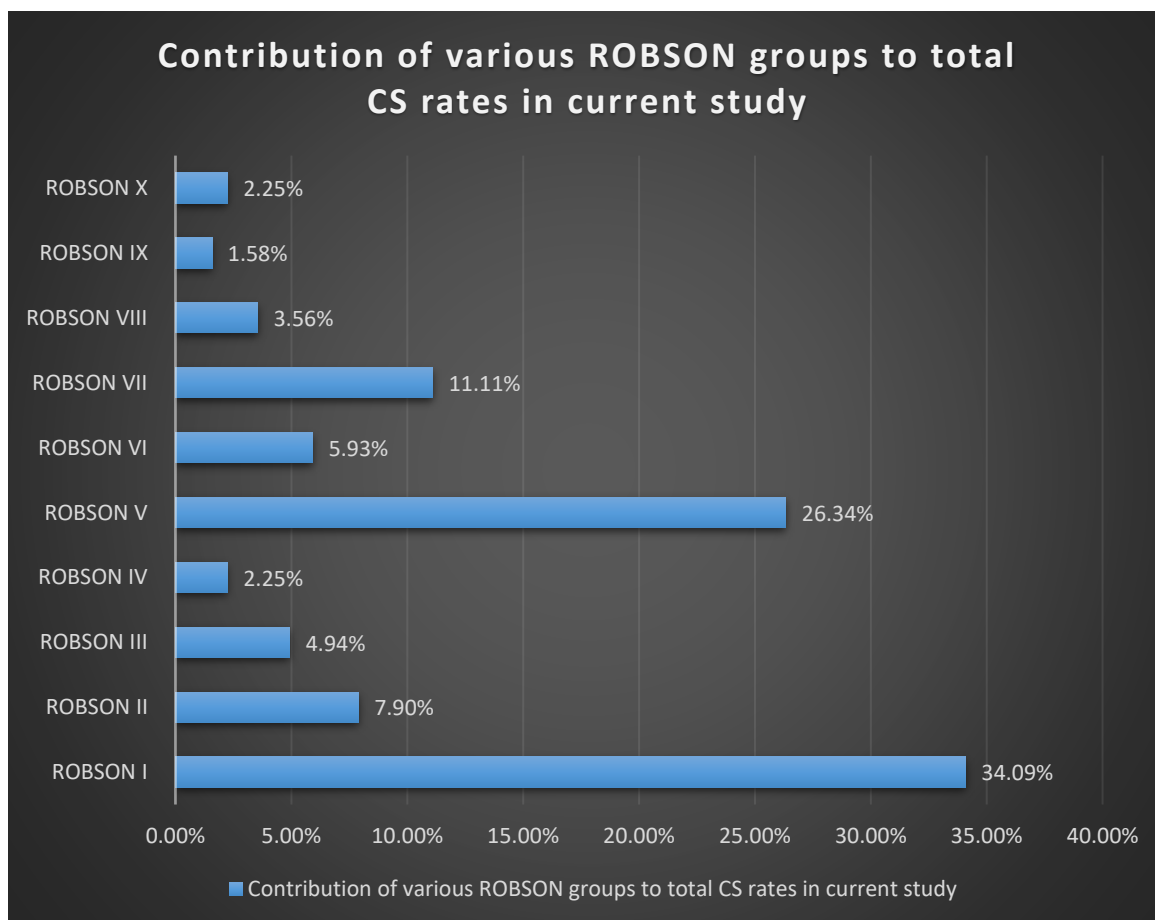

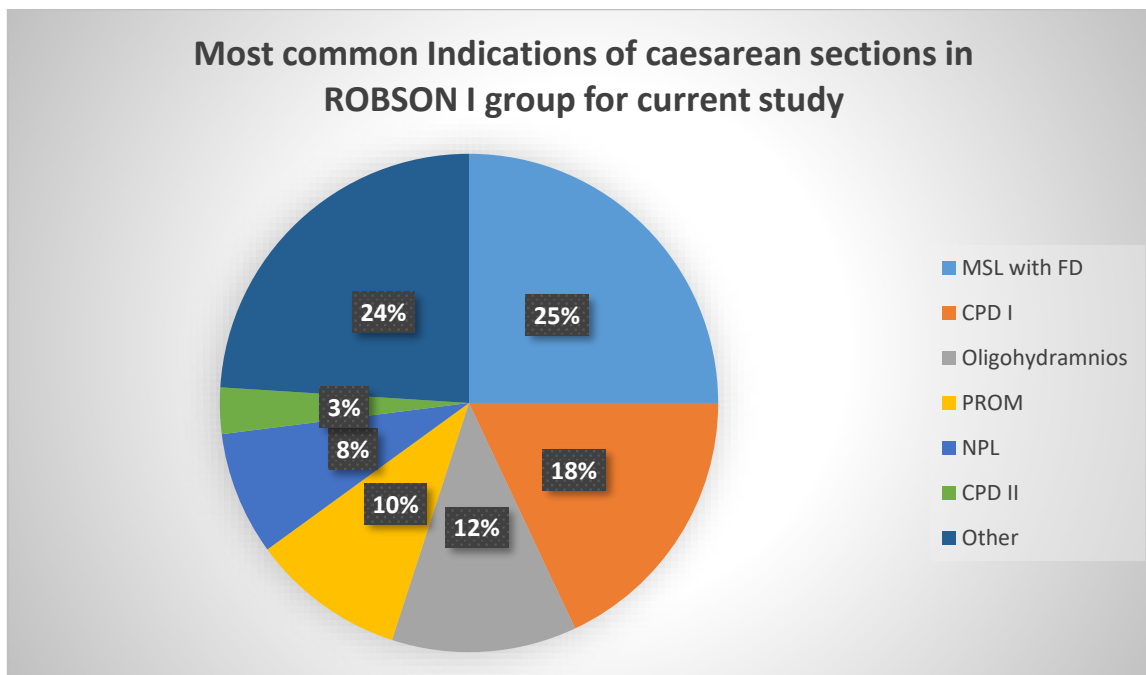**Chart 1: Contribution of various ROBSON groups to total CS rates in current study**

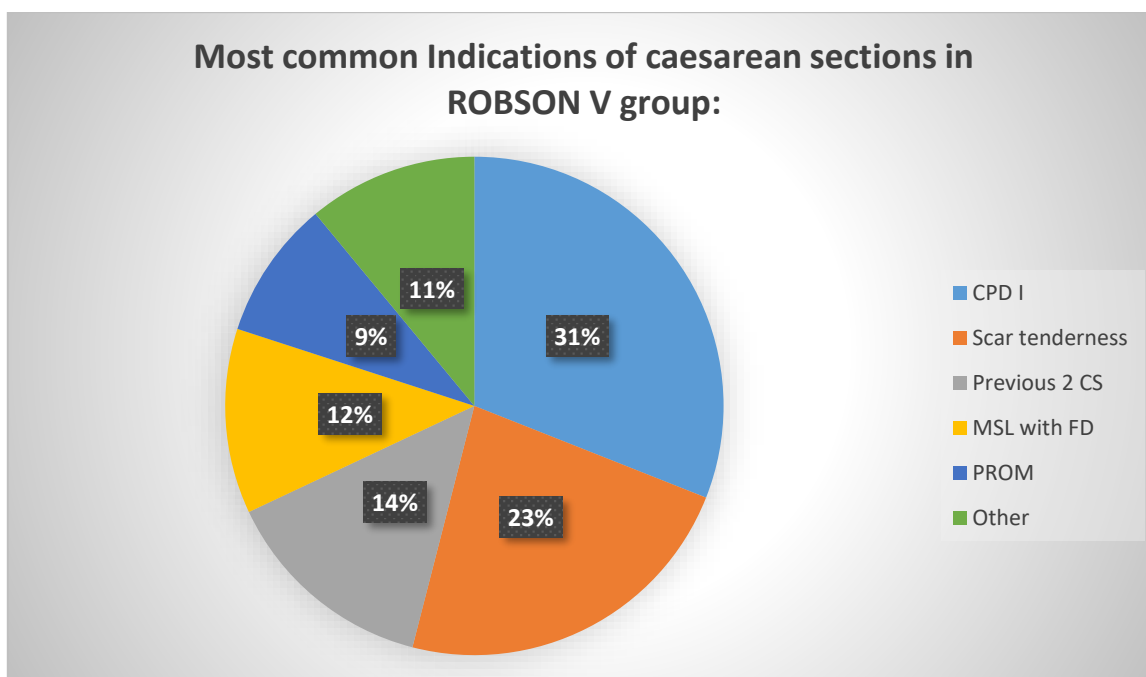**Chart 2: Most common Indications of caesarean sections in ROBSON I group for current study**

Chart 3: Most common Indications of caesarean sections in ROBSON V group

Recommendations

- Art of proper labor monitoring is to be rejuvenated and to be religiously followed.
- Instrumental vaginal deliveries are to be promoted.
- Use of fetal scalp electrodes and judicious use of oxytocics should be practiced.
- Prenatal education of patients during her antenatal visits to address her stress and queries regarding normal labor and caesarean section should be provided.

Conclusion

The total CS rate in current study was found to be 28.47%, with downward trend in last 4 years in the study area, with ROBSON I and V being major contributors. The ROBSON classification is found to be useful tool for analysis of CS rates to find out corrective measures to reduce it.

Data Availability

The data supporting the findings of this study cannot be available due to issue of confidentiality.

Conflict of interest

No conflict of interest has been declared by the authors.

Source of funding

The authors confirm that no funds were spent during this study.

Abbreviations

CS- caesarean section, WHO- world health organization, CPD-cephalo-pelvic disproportion, NPL- Non progression of labor, PROM- premature rupture of membranes

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