Original Article

Analysis of Cesarean Sections According to Robson Ten Group Classification in a Private Tertiary Care Hospital, Lahore

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Abstract

Objective: To determine the frequency of Cesarean -sections and categorize them according to Robson's Ten Groups Classification System (TGCS) to regularly audit Casern section (CS) rates and provide feedback to obstetric teams to ensure quality improvement in Obstetrics and Gynecology Department of a private tertiary care hospital, Lahore.

Methodology: A descriptive cross-sectional study was conducted in the Obstetric Department of a private hospital, Lahore from April to June 2024, included all women who delivered after 28 weeks of gestation either vaginally or by CS. Outcome variable was rate of C- section in all groups of Robson 10 classification. Independent variables were age, educational status and occupation with Robson Classification Group as dependent variable. A pretested questionnaire collected sociodemographic data and classified patients into Robson10 groups.

Results: The total deliveries reported during three months were 568, out of which, 376 (66.1%) were Caesarean sections with the highest rate in group 5 (n=143, 38.03%) followed by group 2 (n=85,22.60 %) and group -10 (n=84, 22.34%) whereas groups 3,6,7,8, & 9 had contributed less than 2%.

Conclusion A notably high rate of CS was depicted in group 5,2 and 10. Out of total 568 deliveries ,376(66.1%) were C-sections with the rates from highest to lowest in group5(38.08%), group 2(22.60%) and group 10(22.34%) respectively whereas group 3,6,7,8&9 had contributed less than 2%.

Key words Cesarean section, the Robson classification, Gestation, Obstetrics, Global standard

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Introduction

A Cesarean section (CS) is a surgical procedure in Obstetrics done to lower the risk of complications for both mother and baby. The rate of cesarean sections performed is widely recognized as a measure of the overall maternal health services quality.[1] World Health Organization (WHO) has recommended that birth rate by C-section should be between 10-15% on average.[1] There are considerable differences in a woman's access to CS facility across the globe. In the least developed countries, about 8% of women give birth by CS with only 5% in sub-Saharan Africa, indicating a concerning lack of access to this lifesaving surgery.[2]

Conversely, in Latin America and the Caribbean, rates are as high as 4 in 10 of all births. In countries like Brazil, Cyprus, Dominican Republic, Egypt and Turkey caesarean sections now exceed vaginal deliveries.[2]

Although a CS is a vital and life-saving procedure, however if performed without medical necessity, it can put women and newborns at avoidable risk of short- and long-term health problems. Research conducted by WHO reported that Cesarean section rate is on rise worldwide to more than 21% of all childbirths [3] The rate will continue to increase to 29% by the year 2030.[3] Rates of cesarean delivery vary widely from country to country, ranging from 0.6% in South Sudan to 55.5% in Brazil. According to the Centers for Disease Control and Prevention (CDC), over 30% of births in the America are by C-section.[4]

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The world-wide increase in the rate of CS has become an alarming issue in public health.[5] Several bibliographic electronic databases were used in the scoping assessment of the study, and articles providing hospital-based CS rates in Bangladesh, India, Nepal, and Pakistan were searched from December 2011 to 2018.[6] The analysis showed that in all four of the countries, the rate of CS was rising. These rates were extremely low in rural areas and extremely high in private and metropolitan hospitals.[6] The factors which are linked to CS are age, education, women's socioeconomic level, living in urban area and distance for health facility. Higher rates of CS are found in private hospitals in South Asian countries among highly educated, wealthy metropolitan women.[6] Drs. Molina and Haynes conducted the first thorough examination of CS rates for all WHO nations in a single year, and results showed that the percentage of C-sections has climbed to 19%, which has led to a drop in the rates of maternal and newborn death.[7] No additional decrease in the rates of maternal and newborn mortality was seen above 19%. The 1-year strategy circumvents the bias resulting from utilizing data from different years, as mortality and C-section rates fluctuate over time.[7]

In Pakistan approximately one in five babies is delivered via CS, According to latest Pakistan Demographic and Health Survey (PDHS) the rates of C-Section deliveries has risen significantly increasing from 14% in 2012-13 to 22% in 2017-18.[8] Enhancing the appropriate application of cesarean sections (CSs) is a key worldwide priority. The Robson classification system has received WHO endorsement in recent years and a guidebook for application was released in 2017.[9] The Robson classification is implemented in accordance with the Robson classification manual of WHO, which also offers useful tools for standardizing, dependable, consistent, and action-oriented analysis of computer science practice.[10]

According to a study conducted in the obstetric department of a hospital in Karachi in 2013 CS rate of 30.7%was found in an initial audit by using Robson classification. A three prong strategy was implemented and an audit was conducted again in 2016,it showed reduction of CS rate to 26,.4% [11] Two other studies conducted in Brazil [12] and Sweeden [13] also reported a decrease in CS rates by implementing various interventions on target groups identified by Robson classification.

This study aims to assess cesarean section (CS) rates using the WHO-endorsed Robson 10-Group Classification System in a private tertiary care hospital in Lahore. By identifying groups with disproportionately high CS rates, the study will support evidence-based decision-making, optimize obstetric care, and promote safe delivery practices. The findings will contribute to policy development and quality improvement initiatives for maternal and neonatal healthcare in Pakistan.

The classification groups all women into one of ten distinct, non-overlapping categories that collectively cover all possible cases. The categories are determined by 6 fundamental obstetric characteristics that are commonly recorded in all maternity settings: parity, number of fetuses, previous caesarean section, onset of labor, gestational age, and fetal presentation. [10]

Methodology

A descriptive study cross-sectional in nature was carried out over three months (April -June 2024) period in Obstetric Department of a private hospital, Lahore after Institutional Review Board Approval Ref no FMH-05/01/2024-IRB-135.2. Non probability purposive sampling was used and all the women who delivered after 28 weeks of pregnancy either vaginally or by Cesarean section were included. All women who delivered before 28 weeks of gestation were excluded.

The independent variables were age, educational status and occupation with Robson Classification Group as dependent variable. Operational definitions based on Robson classification included labor onset, number of fetuses, prior CS, parity, gestational age at admission and fetal presentation. A pretested questionnaire was used covering sociodemographic details and six core questions for classifying patients into Robson10 group classification**.** The designated house officers working in the three units of Obstetric and Gynae department collected data round the clock. Data analysis was done manually according to the formulas given in Robson Classification System (RCS) Manual[10]

Results

Of 568 women, 241(42.4%) were aged between23-28 years followed by 206 (36.3%) with the mean age 28.56± 4.74 years. Almost all 549 (96.7%) were non-working. According to Robson Classification, 145 (25.5%) belonged to the Group 5 (Previous C-section, single, cephalic≥ 37 weeks) 108(19.0%) to group 2

Table I: Categorization of Ten groups of Robson Classification System.[10]

S.No.	Robson's Ten Groups Classification System
1.	Nulliparous, single cephalic≥37 weeks, in spontaneous labour
2.	Nulliparous, single cephalic≥, induced or Caesarean section (CS) before labour
3.	Multiparous (excluding previous CS) single cephalic ≥37 weeks, in spontaneous labour
4.	Multiparous (excluding previous CS) single cephalic, >37 weeks, induced or CS before labour
5.	Previous CS, single cephalic, ≥37 weeks
6.	All Nulliparous breeches
7.	All multiparous breeches (including previous CS)
8.	All multiple pregnancies (including previous CS
9.	All abnormal lies (including previous CS
10.	All single cephalic <37 weeks (including previous CS)

(Nulliparous, single cephalic ≥37 weeks induced or C/S before labor) and 114(20.07%) to group 10. In relation to obstetric variables of Robson classification, 354 (62.3%) were multipara, 440 (77.5%) had gestational age over 37weeks and 361(63.7%) had no history of previous Caesarean section (Table II). The total deliveries reported during three months was 568, out of which, 376 (66.1%) were Caesarean sections with the highest rate in group 5(n=143, 38.03%) followed by group 2 (n=85,22.60 %) and group -10 (n=84,22.34%) whereas groups 3,6,7,8, & 9 had contributed less than 2% (Table III).

Discussion

According to WHO guidelines three crucial steps are essential for the understanding of report table as per the Robson classification(RC) .[10] The first step for data quality that must be ensured is that total number of CS

Table II: Obstetric variables used in Robson's Classification.

Variables	N	%
Parity		
Nullipara	214	37.7
Multipara	354	62.3
Previous Caesarean section		
Yes	207	36.3
No	361	63.7
Gestational age		
>28 weeks&<37 weeks	128	22.5
>37 weeks	440	77.5
Foetal Presentation		
Cephalic	546	96.1
Breech	17	3.00
Transverse lie	5	0.88
Onset of Labour		
Pre-labour C-section	229	40.3
Induced	123	21.7
Spontaneous	216	38.0
No. of Foetus		
Singleton	556	97.9
Multiple	12	2.1

and deliveries should be the same which is correct in our study. WHO recommends that size of group 9 should be less than 1% and have a 100% CS rate. [10] In our study group 9 meets these criteria with a size of 0.88% and 100% CS rate however a study from Indonesia reported the size of group 9 above 1% and 98.5% CS rate probably due to incorrect Robson group classification. [14] Whereas a study of Nigeria reported 100% C/S in group 9 thus corroborating to our study.[15]

The next step involves assessing the type of population. According to WHO, group 1 plus group 2 size should be around 35-42%[10] whereas in the current

Table III: Robson groups and Caesarean rates.

Robson group	No. of C/S in groups	Total No. of women in group	a) Group size (%) of women	b) Group CS rate (%)	c)Absolute group contribution to overall CS Rate (%)	d)Relative group contribution to overall CS rate (%)
1	26	55	9.68	47.27	4.57	6.91
2	85	108	19.01	78.70	14.96	22.60
2a lab. Indu	59	82	14.43	71.9	10.38	15.69
2b PrelabCS	26	26	4.57	100	4.57	6.91
3	6	79	13.90	7.59	1.05	1.59
4	11	41	7.21	26.82	1.93	2.92
4a lab.ind	5	35	6.16	14.28	0.88	1.32
i4bPrelabCS	6	6	1.05	100	1.05	1.59
5	143	145	25.52	98.62	25.17	38.03
6	6	9	1.58	66.66	1.05	1.59
7	4	4	0.70	100	0.70	1.06
8	6	8	1.40	75	1.05	1.59
9	5	5	0.880	100	0.880	1.32
10	84	114	20.07	73.68	14.78	22.34
Total	376	568	100			100

study it is about 28.6% likely due to higher proportion of the multiparous women in our population unlike the findings from an Indonesian study (36.6%). [14] The total size of group 3&4 recommended by WHO should be 30%[10] but in our study it was 21.1% as group 5 size was very high (25%) accompanied by a high overall CS rate (98.62%). An Indonesian study also reported a higher size of 39.3%. [14] The recommended group 5 size by WHO is 7.2% whereas in the current study, this size is 25% as there had been a high CS rate in the past years mainly in Groups 1& 2 so size could be more than15%.[10] These results are comparable with Indonesian [14] and Nigerian[15] studies respectively .In the recent study, the group size of 6 & 7 was 2.28% lower than recommended 3-4%.[10] The group size of group 8 is 1.5 to 2% recommended by WHO[10] but in our study it was slightly lower (1.40%). The size of group 10 was 20.07% (recommended size is less than 5%[10]). As it is a tertiary care facility, the population it serves may be at high risk for preterm deliveries, which could explain the high rate.

The suggested ratio of the size of group 1 to group 2 is 2:1 or greater but in our study, it is inverted (1: 2). If the data quality is reliable as it is, the lower ratio may suggest an issue of high induction/prelabour CS rate indicating a high-risk population in nulliparous women and likely leading to elevated CS rates. [10]

The size of group 3 should generally be more than double of group 4 but in our study it is close to 2:1 which may be due to larger group 4b resulting from poor previous maternal experience in vaginal delivery and increased preference for pre-labor CS in multiparous women.[10] Regarding the ratio of the size of group 6 versus group 7, WHO reports it usually 2:1 ratio· but in this study it is slightly less than 2:1 which may be due to an unusual nullipara/multipara ratio.[10]

The third step is CS rate assessment which was 66.19% in our study compared to WHO's recommended rate 10-15%.[10] CS rates vary widely among tertiary care hospitals. A study from Islamabad reported CS rate 64% comparable to our study.[16] Whereas studies conducted in Peshawar and Karachi reported the overall CS rate as 22%[17] and 37%[18] respectively. Studies conducted in other parts of world like Srinagar, Brazil, Indonesia and Nigeria reported CS rates as 36.1%,[19] 42.9%,[20] 48.08%,[21] and 51.2%[15] respectively. These differences indicate that although the Robson criteria offer a standardized way to assess and compare and CS rates, Variations are likely influenced by factors such as healthcare practices, patient demographics, and institutional protocols.

In our study, Group 5(98.62%), Group 2 (78.70%) and Group10(73.68%) are the main contributors to CS respectively accounting for 55%collectively. These results align with another Pakistani study where group 5, 2, and 10 contributed 47.5%,18.5% and 12.8% respectively.[16] whereas a study from Singapore also showed similar results.[22] Likewise a review of about 16 studies in Pakistan related to Robson classification observed a high CS rate in group 5 ranging from 57% to 98%.[23] According to WHO guidelines, the C-section rate for group 5 is around 50-60% provided the hospital has good maternal and perinatal outcome. A reported C/S rate in group 5 was 50.5%[24] in a study from Rawalpindi. A significant reason for high C/S rate in the current study could be due to a policy of scheduling pre labor C/S for all women with a prior uterine scar without offering a trial of labor.

Efforts should prioritize reducing primary cesarean rates and encouraging vaginal birth after cesarean (VBAC) when appropriate which may lower overall cesarean rates. Understanding how often a trial of labor with a previous CS is offered and reasons for its failure will help to improve prenatal counseling and labor management practices to lower repeat CS by supporting VBAC. One of the reasons due to which doctors avoid to offer VBAC is the latest literature reporting less success rate of VBAC.[25] The group 2 includes women who are nulliparous with ≥ 37 weeks of pregnancy single cephalic induced or C/S before labor.

The CS rate in group 2 is 78.70% contributing 22.60% to the overall CS rate,16% was due to failure of induction. (Table III). According to WHO, the CS rate should be around 20-35%. The size of group 2b is small as compared to group 2a then high rates indicate poor success rates of labor induction. The WHO recommends that labor should be induced only when there is a clear medical need and when anticipated benefits outweigh any potential risks.[26] Over the past 20 years the induction rate has doubled,1 in 4 women undergoing this procedure.[27] Consequently leading to rise in the rate of the cesarean section if the induction is unsuccessful.[28]

The CS rate in the current study was 73.68% in group 10 contrary to the WHO's indicated rate of 30%, a higher percentage usually results from several high-risk cases, including fetal growth restriction / preeclampsia that need preterm prelabour C/S. The studies

conducted in Karachi (50.2%)[18] and Multan(51%)[29] reported the same group 10 to be the largest contributor among all, similar to a study from Ethiopia[30] conducted in a tertiary referral hospital with maternal-fetal medicine unit. A considerable number of serious high risk mothers who required interventions were treated increasing the likelihood of iatrogenic prematurity.[30]

The C/S rate in group 8 was 75% above the recommended value of 60% depending upon the twin pregnancy type and nulliparous/multiparous ratio with or without a prior scar.[10] One studyfrom India reported CS rates of42.1%[31] whereas two researches from Indonesia reported CS rate of 63.16%[21] and 76.6%[14] respectivelyin group 8 comparable to our conclusion.

The relative contribution of Group.1,2 & 5 is 66% of all C/S performed in most hospitals whereas the absolute contribution of these three groups is 44.70% in present study. The hospitals aiming to reduce the overall CS rate should concentrate on these three groups with particular emphasis on group 1.[10] Contrary to our results, a Bangladesh study reported that the combined relative contribution of groups 1, 2 & 5 is 38%[32] whereas a study from Karachi reported this contribution to be 50%.[18]

In group 3, the CS rate was 7.59% more than the recommended value of 3.0%. The reason could be tubal ligation procedure due to maternal preference and limited access to contraception. A study of India reported CS rate of 2.92%[28] whereas a study of Nigeria[15] showed higher (17%) CS rate.

In group 4, CS rate was 26.82% vs the WHO value of 15%. A study from Karachi reported it as 29.3%[18] comparable to our result, also Caesarean delivery rates in group 4 were higher than the recommended Robson's guidelines in a review conducted In Pakistan.[23] Whereas even higher rates were shown in a study of Indonesia (85.4%).[14]

According Robson 10 classification, CS rates in group 4 represent the combined outcomes of subgroups 4a and 4 b In the current study, the size of Group b is smaller, high CS rate in group 4 might be an indicator of meager success of induction or suboptimal patient selection for induction, contributing to higher CS rates in Group 4a.There might be increased maternal preference for CS, even after a previous vaginal delivery, possibly due to a traumatic or prolonged labor in the past or a desire for tubal ligation in settings where access to contraception is limited.[10]

Conclusion:

A notably high rate of CS was depicted in group 5,2 and 10. Out of total 568 deliveries ,376(66.1%) were C-sections with the rates from highest to lowest in group5(38.03%), group 2(22.60%) and group 10(22.34%) respectively whereas group 3,6,7,8&9 had contributed less than 2% (Table -II)

Recommendations:

It is crucial that Government and all other stake holders should understand and endorse the value of adopting the Robson Classification System (RCS). At inception of any initiative, technical meetings to generate awareness, to define concrete roles and responsibilities and to map a plan for scale-up and sustainability with all key stake holders to be done.

The role of donors, UN agencies, NGOs should be understood as capacity building and support.

There is a need to embed an RCS resource cell within an existing Continuous Quality Improvement (CQI) entity in the relevant health departments.

The action- oriented use and report of RCS should be mandated in every unit that perform CS and the Government should prepare policies /legislation for enforcement.

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