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# ANALYSIS OF CAESAREAN SECTION RATE ACCORDING TO ROBSON CLASSIFICATION CRITERIA: A CROSS SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL.

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# ANALYSIS OF CAESAREAN SECTION RATE ACCORDING TO ROBSON CLASSIFICATION CRITERIA: A CROSS SECTIONAL STUDY IN A TERTIARY CARE HOSPITAL.

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## ABSTRACT

**Purpose**: The World Health Organization, recommends the Robson Ten Group Classification System (RTGCS) as a global standard for assessing, monitoring and comparing CS rates at both national and international levels. This study was aimed to analyze CS rate in Department of Obstetrics and Gynaecology MTI, LRH, Peshawar; according to RTGCS. This will help understand the major contributory groups to the overall CS rate and to formulate strategies to optimize the escalating rates.

**Methodology:** A cross-sectional study for a period of 1 year from 1st January 2021 to 31st December 2021 was conducted at a tertiary care hospital located in the capital city of KPK Province, Pakistan. Women (n=7376) who delivered during the study period, fulfilling the inclusion/exclusion criteria were included. All relevant obstetric information was entered into a structured proforma. The study population was classified into Robson 10 groups and percentages were calculated for the overall CS rate, the representation of groups and contributions of the each group to the total CS rate.

**Findings**: A total of 7376 deliveries were analyzed as per RTGCS. Of these 1679 (22.76%) were caesarean sections. According to the criteria used, Group I & III represented more than half (53.75%) of the obstetric population. The major contributor to the overall CS rate was group V (Previous caesarean delivery, single, cephalic > or equal to 37weeks), followed by group I (Nulliparous, single, cephalic > or equal to 37 weeks, in spontaneous labour), group X (All singleton, cephalic, < 37 weeks gestation pregnancies-including previous CS) and group III.

**Conclusion:** The implementation of RTGCS at MTI, LRH, Peshawar helped to identify the contribution of each group to the overall CS rate. Group V was the leading contributor to the overall CS rate. This study also revealed a high rate of CS among low risk groups i.e. group I and III.

**Recommendations:** Current study can be used to compare results among the institutions at provincial and national levels to design uniform policies throughout the Pakistan to optimize CS rate. Furthermore, education for both pregnant women and obstetricians is required to encourage and promote ECV and VBAC to avoid repeat Caesarean sections. Moreover, the instrumental vaginal delivery should be encouraged where clinically indicated and justified

**Keywords**: *Caesarean section, Robson Ten Group Classification.*

## INTRODUCTION

Caesarean Section rate (CS rate) is escalating all over the world and has become an issue of international public health concern[1,2]. At the same time, Caesarean Section rate is one of the most frequently used indicators of healthcare quality at the National and International levels for clinical governance[3]. World Health Organization stated that the acceptable CS rate should ranges from 10% to 15%[4]. However, the CS rate is rapidly increasing, both locally and globally in the previous two decades, evoking worldwide concerns. A WHO multi country survey 2010 -11 in twenty - one countries, reported a CS rate of 31.2% compared to the previous rate of 26.4% in the WHO global survey 2004-08, which is significantly higher.[5]

Simple, concise and easily applicable classification system of CS should be implemented. In 2001 came Robson's Ten Group Classification System (RTGCS) for comparing CS rates, proposed by Michael Robson in 2001[6] and has been widely used in institutions across the world[7].It categorized women into 10 groups on the basis of 5 parameters i.e. Parity, Gestational age, Onset of labour (spontaneous, induced or CS before labour), Fetal Presentation, and Number of fetuses[8,9]. A systematic review in 2011 concluded that compared to indications-based and urgency-based classifications, women-based classification systems are best for local and international use and RTGCS among these would be the most appropriate. Furthermore, RTGCS has been appreciated by World Health Organization in 2014 and International Federation of Obstetrics and Gynecology (FIGO) in 2016[10, 11,12].

According to WHO, RTGCS will help in optimization of CS use, assessment of the strategies aimed to bring down the CS rate and thus improved clinical practices and quality of care in various healthcare facilities. Furthermore, it will add in audit, analysis and comparison of CS rates across different settings [12, 1 3.]

### Objective

The objective of present study was to find out the overall CS rate in the Department of Obstetrics and Gynaecology, MTI, LRH, Peshawar and classify the study population into the ROBSON'S 10 GROUPS. This will identify which of these groups have the highest CS rates and to formulate plans for optimizing these rates.

## MATERIALS AND METHODS

This was a Cross-Sectional study, conducted in the department of Obstetrics and Gynecology, Lady Reading Hospital, Peshawar, KPK, Pakistan, from 1st January 2021 to 31st December 2021. The study was started after taking approval from Institutional Ethical and Research committee. All the women delivered during the study period fulfilling the inclusion criteria were included after taking informed consent from the women. They were reassured that their data is used for scientific research purposes and confidentiality will be maintained. However, caesarean sections performed for gross fetal structural anomalies, fetal intrauterine deaths and cases of uterine rupture were excluded. The cases with history of previous classical CS were also excluded.

### Data Collection

Medical record files of the women admitted to labour suite were reviewed prospectively to collect relevant information regarding details of index pregnancy (Parity, gestational age, onset of labour, fetal presentation, number of fetuses, and mode of delivery/ operation). History of previous

caesarean section/s was also recorded. Each medical record file was coded by trained medical staff, as per Robson Group classification in one of the 10 groups. We used the original Robson Ten Group Classification System as shown in table 1. The data was entered into a structured Performa and then into excel chart on regular basis.

**Table 1: ROBSON TEN GROUP CLASSIFICATION SYSTEM (RTGCS)**

| Groups | Description |
|---|---|
| Group I | Nulliparous, single, cephalic fetus equal to or > 37 weeks period of gestation (POG), in spontaneous labour |
| Group II | Nulliparous, single, cephalic fetus equal to or >37 weeks POG, induced or C-section before labour. |
| Group III | Multiparous (excluding previous CS), single, cephalic fetus equal to or >37 weeks, in spontaneous labour. |
| Group IV | Multiparous (excluding previous CS), single, cephalic fetus equal to or > 37 weeks POG, induced or C-section before labour. |
| Group V | Previous CS, single, cephalic fetus > 37 weeks POG. |
| Group VI | All nulliparous with a single breech. |
| Group VII | All multiparous with a single breech (including previous C-section). |
| Group VIII | All multiple pregnancies (including previous CS). |
| Group IX | All abnormal lies (including previous CS). |
| Group X | All single pregnancies, cephalic fetus < 37 weeks. |

**Data Processing and Analysis**

Data was exported to and analyzed using IBM SPSS version 22. The overall CS rate at the institution was calculated. For each Robson group, relative size to the entire obstetric population, contribution (relative and absolute) to the overall CS rate and CS rate within the group were calculated.

**RESULTS**

A total of n = 7376 deliveries fulfilling the inclusion criteria were analyzed during the study period. Total vaginal deliveries were n=5697 (77.24%) while the total CS were n=1679 (22.76%). Out of 5697 vaginal deliveries n= 197 (3.57%) were Instrumental deliveries. Total women admitted with history of previous one CS were n=415. Out of these n=226 (54.46%) had repeat CS while n=189 (45.54%) women had VBAC (Vaginal Birth after Caesarean Section) VBAC. Other characteristics of the study population are shown in table 2. While representation/ranking of each Robson group

to the study population is shown in table 4. It is evident that group I and group III together contributed to more than half (53.75%) of the study population. The contribution of each Robson group to the CS rate in descending order is as follows: Group V; (previous one CS, single, cephalic >37 weeks) n=581 (34.60%). This is followed by Group I; (Nulliparous, single, cephalic >37 weeks in a spontaneous labour n=191 (11.45 %) and Group X; single, cephalic< 36 weeks including previous CS n=186 (11.14%) and Group III; Multiparous (excluding previous CS), single, cephalic >37 weeks in spontaneous labour n=179 (10.72 %). For all the 10 groups, results are shown in table 3.

**Table 2: Characteristics of women (study population)**

| Characteristics | Frequency(n) | Percentage (%) |
|---|---|---|
| **AGE (years)** | | |
| < 20 | 750 | 10.17 |
| 20 - 35 | 5419 | 73.46 |
| 36 and above | 1207 | 16.36 |
| **PARITY** | | |
| P 0 | 2543 | 34.47 |
| P 1- 4 | 3367 | 45.64 |
| P 5 or > | 1466 | 19.87 |
| **MODE OF OPERATION** | | |
| Emergency CS | 1066 | 63.49 |
| Elective CS | 613 | 36.50 |
| PRIMARY ($1^{st}$ ) CS | 1021 | 60.81 |
| REPEAT ($2^{nd}$ or >) CS | 658 | 40.95 |

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**Table 3: Proportion of each Robson group in the study population, CS rate in each group and their relative and absolute contribution to overall CS rate at Lady Reading Hospital Peshawar Pakistan, January – December 2021**

| Robson Group | Total number of women in group | Number of CS in group | Group size (%)[a] | Group CS rate (%)[b] | Absolute group contribution to overall CS rate (%)[c] | Relative group contribution to overall CS rate (%)[d] |
|---|---|---|---|---|---|---|
| Group 1 | 1329 | 199 | 18.04 | 14.37 | 2.58 | 11.44 |
| Group 2 | 588 | 113 | 7.97 | 19.22 | 1.53 | 6.76 |
| Group 3 | 2636 | 179 | 35.73 | 6.79 | 2.43 | 10.7 |
| Group 4 | 799 | 150 | 10.83 | 18.77 | 2.03 | 8.9 |
| Group5 | 835 | 581 | 11.32 | 69.00 | 7.87 | 34.79 |
| Group6 | 143 | 55 | 1.94 | 38.46 | 0.75 | 3.29 |
| Group7 | 193 | 56 | 2.62 | 29.1 | 0.76 | 3.35 |
| Group 8 | 259 | 69 | 3.51 | 26.64 | 0.94 | 4.13 |
| Group 9 | 86 | 84 | 1.16 | 97.67 | 1.14 | 5.03 |
| Group 10 | 508 | 186 | 6.88 | 36.61 | 2.52 | 11.14 |
| Total | 7376 | 1679 | 100 | - | 22.76 | 100 |

***Note:***

[a]Group size (%) = n of women in the group/total N women delivered in the hospital × 100

[b]Group CS rate (%) = n of CS in the group/total N of women in the group × 100

[c]Absolute group contribution (%) = n of CS in the group/total N of women delivered in the hospital × 100

[d]Relative group contribution (%) = n of CS in the group/total N of CS in the hospital × 100

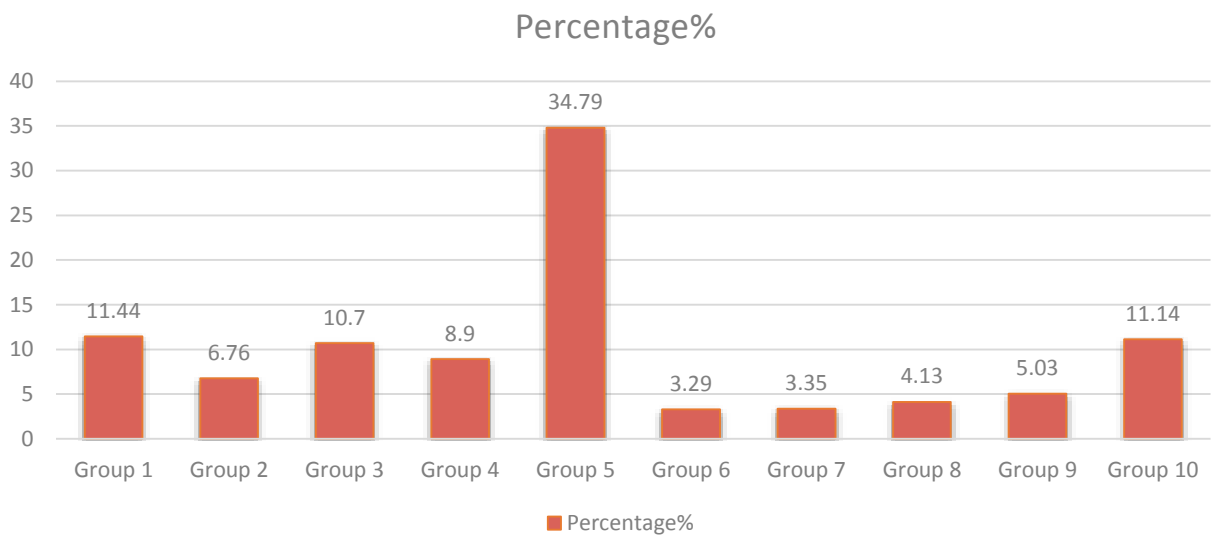


**Figure 1: Contribution of each Robson group to the total Caesarean Section Rate**

**Table 4: Ranking Robson class according to the representation of study population in each group**

| Ranking of groups | Relative size in each group | Classification of Groups |
|---|---|---|
| 1st | 35.73 % | 3 |
| 2nd | 18.01 % | 1 |
| 3rd | 11.32 % | 5 |
| 4th | 10.83 % | 4 |
| 5th | 7.97 % | 2 |
| 6th | 6.88 % | 10 |
| 7th | 3.51 % | 8 |
| 8th | 2.62 % | 7 |
| 9th | 1.94 % | 6 |
| 10th | 1.16 % | 9 |

## DISCUSSION

Caesarean section is one of the key procedures to decrease maternal and neonatal morbidity and mortality and is also one of the major indicators of the quality of maternal health services[14, 15]. At the same time, it is associated with complications such as surgical site infection, major hemorrhage, anesthesia complications and even death[1]. Hence, in 2015, WHO has proposed the RTGCS as a global standard for assessing, monitoring and comparing CS rates within and between healthcare facilities and auditing the CS rates and indications both at national and international levels[16].

In the present study, Group I and Group III represented the two largest groups contributing to more than half of the women (53.75%) undergoing labour and delivery. This finding is consistent with a study done in India where group 1 and group 3 contributed to 43.60% [17]. Similarly, studies done in Brazil, Tanzania and Italy showed group 1 and group 3 were the two most represented obstetrics groups[18,19,20]. Overall CS rate is 22.74% in the Department of Obs &Gynae MTI, LRH, Peshawar; while, WHO proposes that a population level CS rates higher than 10-15 % are not associated with reductions in maternal and new born mortality rates[5]. Our higher rates reflect the hospital CS rate and not the population CS rate. Higher CS rates at our facility could be explained by last minute referrals from government and private hospitals, unavailability of surgical procedures, blood transfusion and appropriately trained staff at the primary and secondary health facility levels. If we compare our results at National level in Pakistan, our CS rate of 22.74 % is lower than 33 % shown by Gilani et al in the year 2020 in PIMS, Islamabad [15]. Similarly, higher rates of CS of 37%, 49 % and 54% were found in studies carried out at Holy Family Hospital Rawalpindi, Fauji Foundation Hospital Rawalpindi and Combined Military Hospital Rawalpindi [10, 15]. All these hospitals are receiving high risk referrals and are not representative of community. However, comparing our CS rates at International level, CS rate in this study was lower than that shown in studies conducted in Australia ranges from 25.4%-29.5%[21], USA (31.1%) [22], Asian countries (27.3%) [23] and Iran (40%) [24].However, much lower CS rate of 13.9% has been observed in a study conducted by Kolas T et al, in Norway[25].

In this study, the highest contributing group to the CS rate is group V (Previous 1 CS, single, cephalic> or =37 weeks) n= (581) 34.79% which is comparable to 36.55 % observed in a study conducted in King Abdul Aziz Medical City Hospital, Saudi Arabia[6]. Similarly, a study conducted by Gilani S et al, showed the major contribution by group V [15] to the CS rate. Several studies in different parts of the world identified Group V as the leading contributor to the CS rate [17,18,19]. Although the safety and long term benefits of vaginal birth after CS (VBAC) are well established 54.46% of women in the study population of Group V underwent repeat CS. Therefore, it is the need of the day to evaluate the proportion of women who were offered a trail of labour after previous CS and VBAC and causes of its failure in a facility. This will help the obstetricians to tailor antenatal counseling strategies and labour management protocols to reduce the number of repeat CS by encouraging and promoting VBAC.

Group I (Nulliparous women with single cephalic pregnancy at term in spontaneous labour) constituted the second highest group n=191(11.44%) contributing to CS rate. Same results have been shown in a study by Gilani S et al[15].while Group III was the fourth highest group contributed to CS rate. In our study, Group I and Group 3 together contributed 22.14% to the CS rate. High rate of CS in both these groups is an alarming finding. As both groups represent low risk women,

therefore, further sub analysis and audit of these two groups is an effective means to assess how an institution manages labour. Hence, evaluation of labour management protocols in our hospital is warranted. It was found that Group X contributed the third highest group n=186(11.14) to the CS rate. A study done by Zimmo MW et al has shown group X as the third highest group contributing to the CS rate[26].Similarly Abubeker et al, in their study found Group X to be contributing the most to the overall CS rate[4]. In Gilani et al study group X was placed at 4th place as the contributor to overall CS rate[15].

Regarding Group X, our results are sharp in contrast with a study done at in Eastern Ethiopia, where group 10 was the 6th place contributor to the overall CS rate[27]. This variation can be explained by the fact that our study was conducted in a tertiary care hospital where high risk pregnancies with medical co morbidities are referred from all over the province. These pregnancies are likely to be at risk of iatrogenic prematurity, adding burden to our Group X CS rate. Taking into consideration the rate of CS in a particular group, we find that within a group the highest CS rate is in group IX, 97.67% followed by group V=69% and group VI 38.46%. If we want to decrease CS rate in group VI, VII and IX we have to promote ECV (External Cephalic Version) in carefully selected cases. Proper Antenatal counseling of women during antenatal period and training and education of doctors for performing ECV is an important step, if we want to reduce numbers of CS in group VI, VII and IX.

The strength of current study is the large sample size and availability of complete data for analysis. Our study is first of its type in our Province and hence results can be used as base line for monitoring the trends of CS rate over time in our hospital as well as to initiate application of Robson classification in other hospitals of the Province. This will help later on, in comparing practices in different institutions at provincial as well as at national levels. This study also had some limitations, our definition of fetal viability based on gestational age of 28 weeks may affect the rate of CS and relative size of Robson groups on the whole. This can impact the generalizability of our findings to other countries. Implementation of Robson classification in current hospital has given crystal clear insight into which groups are having higher CS rates although no answer as to why the CS are being performed in various Robson groups. Crucial variables such as indications of CS, maternal and perinatal outcomes are not incorporated in this classification system, hence limiting the extent to which conclusions can be drawn from our study based on RTGCS.

## CONCLUSION

RTGCS was used to identify specific groups that contributed the most to the overall CS in our setting. Group V was the leading contributor to the overall CS rate. This study also revealed a high rate of CS among low risk groups (Group I and III). These target groups require more in depth analysis to identify possible modifiable factors.

## RECOMMENDATIONS

Current study can be used to compare results among the institutions at provincial and national levels to design uniform policies throughout the Pakistan to optimize CS rate. Furthermore, education for both pregnant women and obstetricians is required to encourage and promote ECV and VBAC to avoid repeat Caesarean sections. Moreover, the instrumental vaginal delivery should be encouraged where clinically indicated and justified.

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