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Original Article

Analysis of Cesarean Section According to Robson Ten Group Classification in Chittagong Medical College Hospital

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ABSTRACT

Background: The global rate of cesarean section (CS) has increased markedly over recent decades, raising concerns about unnecessary procedures and associated maternal and neonatal complications. The Robson Ten Group Classification System provides a standardized and widely accepted method to evaluate, compare, and monitor CS rates across healthcare facilities. Aim of the study: To analyze cesarean section cases according to the Robson Ten Group Classification System at Chittagong Medical College Hospital, Bangladesh, and identify the major contributing obstetric groups to the overall CS rate. **Methods & Materials**: This cross-sectional observational study was conducted in the Department of Obstetrics and Gynecology at Chittagong Medical College Hospital from November 2019 to April 2020. A total of 253 women who underwent cesarean delivery were included using convenient sampling. Participants were categorized according to the Robson Ten Group Classification System based on parity, gestational age, fetal presentation, number of fetuses, and onset of labor. Data were collected using structured forms from patient interviews, clinical examinations, and hospital records. Statistical analysis was performed using SPSS version 25.0. Categorical variables were expressed as frequency and percentage, while continuous variables were presented as mean ± standard deviation or median with interquartile range **Result**: The majority of patients were aged 21–25 years (34.39%), followed by 26–30 years (30.04%). Most participants were multiparous (57.71%), and 82.21% had term pregnancies. Cephalic presentation was observed in 86.96% of cases. Regular antenatal care was reported by only 18.58% of women. According to the Robson Ten Group Classification System, Group 5 (multiparous women with previous CS, singleton, cephalic, ≥37 weeks) contributed the largest proportion of cesarean deliveries (26.48%), followed by Group 2 (18.58%) and Group 1 (16.60%). Smaller contributions were observed from Groups 3 and 4 (9.49% each), while Groups 6–10 accounted for comparatively lower proportions. **Conclusion**: The study demonstrated that previous cesarean section (Robson Group 5) was the major contributor to the overall CS rate. Application of the Robson Ten Group Classification System provides a practical and standardized approach for monitoring cesarean deliveries and identifying target groups for reducing unnecessary CS. Strengthening antenatal care and promoting appropriate labor management strategies may help optimize cesarean section rates and improve maternal health outcomes.

Keywords: *Cesarean section, Robson Ten Group Classification, obstetric classification, maternal health, cesarean rate analysis, Bangladesh.*

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INTRODUCTION

There has been an increase in rate of cesarean section over last five decades. This is a matter of international public health concern as it increases the cesarean section related maternal morbidity [1]. Over the last few decades, the global caesarean section (CS) rate has significantly increased and reached an unprecedented level [2]. CS is performed when vaginal delivery is not possible or contraindicated [3]. In such cases, not performing a CS could endanger the life of the mother and the fetus. However, CS is also performed without medical reasons or with imprecise indications such as obstructed labor [4]. Caesarian section has become increasingly common in both developing and developed countries. When medically justified, a CS can effectively prevent maternal and perinatal mortality and morbidity [5]. Immediate and long-term complications of CS including increased risk of maternal mortality and morbidity, increased need for blood transfusion, longer hospitalization, postpartum infections, retained placenta, stillbirths and postpartum hemorrhage were reported [6-8]. Recent data indicate that one in five women undergo caesarean section (CS), and in most regions of the world, CS rates continue to rise [2]. There is no justification for Caesarean Section (CS) rates higher than 10–15% at population-level to positively impact maternal and neonatal health outcomes [9]. National maternal mortality survey data from Bangladesh has documented the CS rate as 31% in 2016, with significant variation across the country and between private and public sectors. The CS rate for urban women was double (36%) that of rural women (18%), and delivering in private for-profit health facilities was identified as the strongest determinant [10-13]. Quality assurance in labor and delivery is needed. The method must be simple and consistent, and be of universal value. It needs to be clinically relevant, robust, and prospective, and must incorporate epidemiological variables. The 10-Group Classification System (TGCS) is a simple method providing a common starting point for further detailed analysis within which all perinatal events and outcomes can be measured and compared. TGCS is used as a global standard for assessing, monitoring, and comparing cesarean delivery rates within and between healthcare facilities [14].

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The rise in CS rate is associated with maternal and perinatal morbidity. There is a need for an internationally accepted classification system for caesarean sections that would allow meaningful and relevant comparison of CS rates. Among the classification systems available, the 'Robson' system has been widely used in various countries [15]. It consists of 10 patient population categories that are mutually exclusive and totally inclusive. The categories are based on 5 basic obstetric characteristics: parity, onset of labor, gestational age, fetal presentation and number of fetuses [14]. The purpose of this study was to analyze cesarean section by Robson classification in Chittagong Medical College Hospital that may considerably lead to aid in optimization of the cesarean section use, assessment of the strategies aimed to decrease the cesarean section rate and thus improve the clinical practices and quality of care in various health care facilities.

METHODS & MATERIALS

This was a cross-sectional observational study conducted in the Department of Obstetrics and Gynecology at Chittagong Medical College Hospital (CMCH). The study was carried out over a six-month period from November 2019 to April 2020. The study population consisted of all patients who were admitted to the department and selected for cesarean section during the study period. Participants were recruited using a convenient sampling technique. According to availability of patients, 253 sample were taken for this study.

Inclusion Criteria:

- Patients selected for caesarean section during the given period will be included and classified according to Robson's 10 group classification system.
- Patients who will give informed written consent for the study.

Exclusion Criteria:

- Patients who delivered vaginally either normal or instrumental.

Ethical Considerations

Ethical approval for the study was obtained from the institutional ethical review committee prior to the commencement of the study. Informed written consent was obtained from all participants before their inclusion in the study. The participants were informed about the purpose and procedures of the study, and their participation was completely voluntary. Confidentiality and privacy of all collected information were strictly maintained, and the data were used only for research purposes. Participants were assured that they could withdraw from the study at any time without affecting their medical care.

Data Collection

Data were collected using a structured data collection sheet prepared according to the study objectives and variables. Data were collected directly by the researcher during duty hours, and during off-duty periods other residents informed the researcher to ensure complete data collection. All relevant clinical information and investigation findings were obtained from patient interviews, clinical examinations, and hospital records. The collected data were carefully checked and rechecked by the researcher to minimize errors and ensure accuracy. No specific confounding variables were considered applicable in this study. The study variables included both dependent and independent variables. The main outcome (dependent) variables consisted of maternal information and fetal information. The independent variables included socio-demographic characteristics, antenatal history, obstetric history, gynecological history, and findings from general examination.

Robson Classification System[14]

- Class 1: Nullipara, equal to or >37 weeks, single, cephalic, spontaneous labor
- Class 2: Nullipara, equal to or >37 weeks, single, cephalic, induced labor or CS before labor i. 2a: induced labor ii. 2b: CS before labor
- Class 3: Multipara, equal to or >37 weeks, single, cephalic, spontaneous labor (excludes previous CS)
- Class 4: Multipara, equal to or >37 weeks, single, cephalic, induced or CS before labor (excludes previous CS) i. 4a: induced labor ii. 4b: CS before labor
- Class 5: Multipara, previous CS, equal to or >37 weeks, single, cephalic
- Class 6: Nullipara, single, breech
- Class 7: Multipara, single, breech (including previous CS)
- Class 8: Multiple pregnancy (with or without previous CS)
- Class 9: Singleton pregnancy, oblique/transverse lie (with or without previous CS)
- Class 10: Single, cephalic <37 weeks (including previous CS)

Statistical Analysis

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 25.0. Categorical variables were expressed as frequency and percentage, while continuous variables were presented as mean ± standard deviation (SD). Non-normally distributed variables were expressed as median and interquartile range (IQR). The results were presented using tables, and a p-value <0.05 was considered statistically significant.

RESULT

Among all patients, the largest proportion belonged to the 21–25 years age group (34.39%), followed by 26–30 years (30.04%), ≤20 years (21.34%), 31–35 years (9.88%), and >35 years (4.35%). Most participants had primary education (66.40%). The majority were housewives (95.26%), and most lived in rural areas (65.61%) *Table I*.

Table I
Socio-demographic characteristics of the patients (*n*=253).

Characteristics	Frequency (n)	Percentage (%)
Age (years)		
≤20	54	21.34
21-25	87	34.39
26-30	76	30.04
31-35	25	9.88
>35	11	4.35
Educational qualification		
Illiterate	3	1.19
Primary	168	66.40
SSC	71	28.06

HSC	10	3.95
Graduation	1	0.40
Occupation		
Housewife	241	95.26
Employed	12	4.74
Residence		
Rural	166	65.61
Urban	86	33.99
Slum area	1	0.40

The median duration of marriage among respondents was 5 years (IQR: 1–10). More than half were multiparous (57.71%). The median gravida was 2 (IQR: 1–3). Additionally, the median age of the last child was 4.5 years, with an interquartile range of 3–7 years (*Table II*).

Table II
Obstetrics profile of respondents (*n*=253).

Characteristics	Frequency (n)	Percentage (%)
Married for (years)		
Median (IQR)	5 (1-10)	
Para		
Nulliparous	107	42.29
Multiparous	146	57.71
Gravida		
Median (IQR)	2 (1-3)	
Age of last child (years)		
Median (IQR)	4.5 (3-7)	

Regular ANC booking was reported in 18.58% of cases, 47.83% had irregular visits and 33.60% had no ANC. Most pregnancies were term (82.21%), with 17.79% preterm. Nearly all pregnancies were spontaneous (99.60%). Cephalic presentation was most common (86.96%), followed by breech (7.91%) and transverse/oblique (5.14%). Labour onset was absent in 48.62%, spontaneous in 41.50%, and induced in 9.88% (*Table III*).

Table III
Antenatal history of the study subjects (*n*=253).

Characteristics	Frequency (n)	Percentage (%)
ANC booking		
Regular	47	18.58
Irregular	121	47.83
No	85	33.60
Gestational age		
Preterm	45	17.79
Term	208	82.21
Type of pregnancy		
Spontaneous	252	99.60
Induced	1	0.40
Fetal presentation		
Cephalic	220	86.96
Breech	20	7.91
Transverse/Oblique	13	5.14
Onset of labour		
Absent	123	48.62
Spontaneous	105	41.50
Induced	25	9.88

The mean height of the patients was 154.355 ± 3.464 cm. Most had a BMI of 18–24.9 kg/m² (54.94%), obesity (30–39.9 kg/m²) was observed in 3.56% and underweight in 0.40%. Anemia was present in 13.44% of cases. The majority were normotensive (73.12%), whereas 26.88% were hypertensive (*Table IV*).

Table IV
Clinical presentation of the patients (*n*=253).

Characteristics	Frequency (n)	Percentage (%)
Height (cm), Mean±SD	**154.355±3.464**	
BMI (kg/m²)		
<18	1	0.40

18-24.9	139	54.94
25-29.9	104	41.11
30-39.9	9	3.56
Anemia		
Anemic	34	13.44
Non-anemic	219	86.56
Blood pressure		
Normotensive	185	73.12
Hypertensive	68	26.88

Maternal infection was present in 1.19% of cases, while 98.81% had no infection. Pregnancy-induced hypertension was observed in 24.11% of the mothers. Gestational diabetes mellitus was reported in 1.98% of cases. Multiple pregnancy was rare, occurring in only 1.19% (*Table V*).

Table V
Maternal and fetal information of the study subjects (*n*=253).

Variables	Frequency (n)	Percentage (%)
Maternal infection		
Present	3	1.19
Absent	250	98.81
Pregnancy induced hypertension		
Present	61	24.11
Absent	192	75.89
GDM		
Present	5	1.98
Absent	248	98.02
Multiple pregnancy		
Yes	3	1.19
No	250	98.81

The distribution of participants according to the Robson Ten Obstetric Classification showed that Group 5 constituted the largest proportion of cases (67, 26.48%), after Group 2 (47, 18.58%) and Group 1 (42, 16.60%). Group 10 accounted for 29 (11.46%) cases, Groups 3 and 4 each represented 24 (9.49%) cases. Smaller proportions were observed in Group 2a (6.72%), Group 2b (11.86%), Group 4a (2.37%), Group 4b (7.11%), Group 6 (1.58%), Group 7 (2.37%), Group 8 (0.40%), and Group 9 (3.56%) *Table VI*.

Table VI
Distribution of Robson ten obstetric groups among participants (*n*=253).

Robson group	Frequency (n)	Percentage (%)
1	42	16.60
2	47	18.58
2a	17	6.72
2b	30	11.86
3	24	9.49
4	24	9.49
4a	6	2.37
4b	18	7.11
5	67	26.48
6	4	1.58
7	6	2.37
8	1	0.40
9	9	3.56
10	29	11.46

DISCUSSION

Caesarean section (CS) rates have been increasing worldwide and have caused concerns. For meaningful comparisons to be made World Health Organization (WHO) recommends the use of the Ten-Group Robson classification as the global standard for assessing CS rates [16]. In this present study, most of the women were in the age group of 21-25 years 34.4%. A recent study conducted Begum et al. (2019) reported that the largest proportion of mothers giving birth (normally and by CS) were in their twenties, and less than 10% were teenagers [17]. Tura et al. stated that the mean age of participants was 26.3 (±5.7) years and 86.7% patients were in the age group of 20-35 years [18]. The majority (57.7%) were multiparous. Begum et al. revealed that more than half of mothers were multiparous (having more than one child) [17]. In present study, 58.5% women were multigravida and median (IQR) gravida was 2 (1-3) (range: 1-6). Gilani et al. reported that 66.8% women were multigravida in their study. Median (IQR) period of their married life was 5 (1-10) years (range: 1-24 years) and median

(IQR) age of last child was 4.5 (3-7) years (range: 1-12 years) [19]. Regarding gestational age, 82.2% patients were at term pregnancy. Similarly, Begum et al. stated that over 50% gave birth at 37 completed gestational weeks [17]. Tura et al. reported that the mean gestational age was 37.7 (±2.2) weeks among the patients [18]. ANC visit was taken irregularly by 47.8% patients. Most of the cases (99.6%) had spontaneous pregnancy. Maximum (87%) fetal presentation was cephalic. Onset of labour was absent among 48.6% patient. Only 1.2% had multiple pregnancy. Similarly, Begum et al. found almost all gestations were singletons with cephalic presentation among the study subjects [17]. Gilani et al. describe that the CS rate among women with induced labour was 172(17.7%) [19]. The distribution of Robson ten obstetric groups shows that 26.5% patients were in group 5, 18.6% patients were in group 2 (6.7% in group 2a and 11.9% in group 2b), 16.6% patients were in group 1 and 11.5% patients were in group 10. The least contribution to overall CS rate was 0.4% for group 8. Gilani et al. (2020) revealed that major contributor to the CS rate was group 5 (13.8%), followed by group 1 (4.8%), group 2 (4.2%), group 4 (2.7%), and group 3 (2%). Groups 6-10 contributed 24% CS cases. The least contribution to overall CS rate was 0.16% for group 9 [19]. Begum et al. concluded that, the obstetric sub-groups of women having highest CS rate were elective groups comprising Robson five (previous CS), Robson 10 (preterm) and "Robson two & four" combined (elective term) [17]. There was an increased contribution of cesarean section by group 5 (multiparous with prior cesarean section, singleton, cephalic, ≥37 weeks) and 2 (nulliparous, singleton, cephalic, ≥37 weeks, induced labor or cesarean section before labor) which was 36 and 36.71 percent respectively as seen in present study. The rate of caesarean section increases in patients with previous caesarean section (group 5) [1].

LIMITATIONS

- No comparison groups.
- Single centered study.
- No blinding was done.
- Due to time constrain, sample size may be inadequate to give a definite overview of actual scenario.

CONCLUSION & RECOMMENDATIONS

Limiting the CS rate in low-risk pregnancies is key to lowering the trend of increased CS. The Robson ten group classification was found to be a feasible and useful tool for identifying the obstetric groups of women contributing to elevated CS rates. Possible reasons for the increase in CS among groups 1 and 2 should be explored to decrease overall CS rate and repeat caesarean in the future (group 5). The obstetric sub-groups of women having highest CS rate were elective groups comprising Robson five (previous CS), Robson 10 (preterm) and "Robson two & four" combined (elective term). However, none of these three groups are recommended candidates for CS according to international clinical guidelines.

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CONFLICT OF INTEREST

None declared

ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

REFERENCES

1. Kant A, Mendiratta S. Classification of cesarean section through Robson criteria: an emerging concept to audit the increasing cesarean section rate. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2018 Nov 1;7(11):4674-8.
2. Betrán AP, Ye J, Moller AB, Zhang J, Gülmezoglu AM, Torloni MR. The increasing trend in caesarean section rates: global, regional and national estimates: 1990-2014. PloS one. 2016 Feb 5;11(2):e0148343.
3. World Health Organization. Reproductive Health. Managing complications in pregnancy and childbirth: a guide for midwives and doctors. World Health Organization; 2003.
4. Rijken MJ, Meguid T, van den Akker T, van Roosmalen J, Stekelenburg J. Global surgery and the dilemma for obstetricians. The Lancet. 2015 Nov 14;386(10007):1941-2.
5. Jayaprakash M. TMC (Thrissur Medical College) modified Robson criteria for caesarean sections. Int J Reprod Contracept Obstet Gynecol. 2017;6:5039.
6. Belachew J, Cnattingius S, Mulic-Lutvica A, Eurenius K, Axelsson O, Wikström AK. Risk of retained placenta in women previously delivered by caesarean section: a population-based cohort study. BJOG: An International Journal of Obstetrics & Gynaecology. 2014 Jan;121(2):224-9.
7. Kok N, Ruiter L, Hof M, Ravelli A, Mol BW, Pajkrt E, Kazemier B. Risk of maternal and neonatal complications in subsequent pregnancy after planned caesarean section in a first birth, compared with emergency caesarean section: a nationwide comparative cohort study. BJOG: An International Journal of Obstetrics & Gynaecology. 2014 Jan;121(2):216-23.
8. Villar J, Carroli G, Zavaleta N, Donner A, Wojdyla D, Faundes A, Velazco A, Bataglia V, Langer A, Narváez A, Valladares E. Maternal and neonatal individual risks and benefits associated with caesarean delivery: multicentre prospective study. Bmj. 2007 Nov 15;335(7628):1025.
9. Betran AP, Torloni MR, Zhang J, Ye J, Mikolajczyk R, Deneux-Tharaux C, Oladapo OT, Souza JP, Tunçalp Ö, Vogel JP, Gülmezoglu AM. What is the optimal rate of caesarean section at population level? A systematic review of ecologic studies. Reproductive health. 2015 Jun 21;12(1):57.
10. Mortality BM. Health Care Survey 2016: Preliminary Report. National Institute of Population Research and Training. 2017.
11. Calverton M. National Institute of population research and training (NIPORT). Mitra and associate and ORC macro. 2005.
12. Begum T, Rahman A, Nababan H, Hoque DM, Khan AF, Ali T, Anwar I. Indications and determinants of caesarean section delivery: Evidence from a population-based study in Matlab, Bangladesh. PloS one. 2017 Nov 20;12(11):e0188074.
13. Rahman MM, Haider MR, Moinuddin M, Rahman AE, Ahmed S, Khan MM. Determinants of caesarean section in Bangladesh: Cross-sectional analysis of Bangladesh Demographic and Health Survey 2014 Data. PloS one. 2018 Sep 12;13(9):e0202879.
14. Robson M, Murphy M, Byrne F. Quality assurance: The 10-Group Classification System (Robson classification), induction of labor, and cesarean delivery. International Journal of Gynecology & Obstetrics. 2015 Oct;131:S23-7.
15. Robson MS. Classification of caesarean sections. Fetal and maternal medicine review. 2001 Feb;12(1):23-39.
16. Tanaka K, Mahomed K. The Ten-Group Robson Classification: A Single Centre Approach Identifying Strategies to Optimise Caesarean Section Rates. Obstetrics and gynecology international. 2017;2017(1):5648938.
17. Begum T, Nababan H, Rahman A, Islam MR, Adams A, Anwar I. Monitoring caesarean births using the Robson ten group classification system: a cross-sectional survey of private for-profit facilities in urban Bangladesh. PloS one. 2019 Aug 8;14(8):e0220693.
18. Tura AK, Pijpers O, De Man M, Cleveringa M, Koopmans I, Gure T, Stekelenburg J. Analysis of caesarean sections using Robson 10-group classification system in a university hospital in eastern Ethiopia: a cross-sectional study. BMJ open. 2018 Apr 1;8(4):e020520.
19. Gilani S, Mazhar SB, Zafar M, Mazhar T. The modified Robson criteria for Caesarean Section audit at Mother and Child Health Center Pakistan Institute of Medical Sciences Islamabad. JPMA. The Journal of the Pakistan Medical Association. 2020 Feb 1;70(2):299-303.