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Research Article

Analysis of Cesarean Section Rates in Minia University Maternity and Child Hospital Using Robson Classification; A cross–section study

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Abstract

Background: The rate at which caesarean sections are performed is widely recognised as an indicator of the overall quality of maternal health services. The World Health Organization has recognised the Robson ten-group categorization system as the definitive method for assessing the frequency of caesarean sections. The purpose of this research was to calculate the C-section rate and analyse it using the Robson grading scale. **Methods:** Minia University's Mother and Child Hospital served as the study's cross-sectional site. The information for all births that occurred between April and October of 2022 was gathered from medical records. **Result:** The total rate of caesarean sections was determined, and women's births were categorised into one of eleven Robson categories. As an end result, we looked at data from 3,860 births. There were 2188 caesarean sections (56.6% of total births) and 1672 spontaneous vaginal delivery deliveries (43.3%). The highest proportion of C-sections come from Group 5, which has been isolated as a major clientele for the procedure. The Robson method indicated that high-risk groups had a much higher incidence of caesarean section. **Conclusion:** It is important to do in-depth research on the Robson groups of interest in order to identify potentially risk factors as well as to take advantage of targeted interventions in order to reduce the prevalence of caesarean sections. Better outcomes may be achieved by a combination of auditing existing treatment methods and areas for further research on caesarean section reason and outcomes.

Key words: Caesarean, vaginal, Robson Classification System, delivery.

Introduction

Rates of caesarean section (CS) delivery have changed greatly from 0.4% to 50% during the previous several decades [(1)]. At the national and international levels, the most accurate CS values have been assigned using a variety of standards and methods **[(2–6)].** The World Health Organization decided that 15% was an adequate maximum limit in 1985. **[(2)].** This was calculated using the CS rates of those nations with the lowest rates of maternal and newborn death at the time (10%). Due to the fact that this percentage was calculated from data collected in industrialised nations, the WHO ultimately decided to increase the CS rate to 15%.**[(3)].** This was rationalised on the grounds that emerging nations had more people in need of CS because to higher rates of vulnerability [(3)].

Two primary ideas informed the WHO's recommendation: first, CS rates should really be defined using an outcome-based but instead of input-based approach, and second, different rates may be reported in various groups. There is a growing need for CS to treat pregnancy and labour difficulties because to the rising number of women who are at high risk for these problems [(3)]. Few studies have looked at how CS prevalence affects health outcomes in industrialised nations, and those that have found either no correlation[(3)] or associations limited to certain categories, respectively **[(5)].** To the best of our knowledge, no prior studies have examined the effects of or the connection between CS rate and health outcomes. Likewise, this has been taken into account in

the vast majority of CS correlation studies, which have accounted for it by adjusting for local population case mix rather than worldwide comparisons [7].

For CS to be more effective, it is necessary to determine which types of pregnancies are responsible for the rise in the overall operation rate, and then to devise tactics and manoeuvres to specifically target these types of pregnancies. According to a 2011 WHO systematic review, the Robson categorization system is the best method for assessing CS rates and consequences within a gender-specific framework[8]. The Robson classification divided pregnant women into 10 categories based on these six factors: parity, prior CS, gestational age, time of labor's beginning, foetal appearance, and the number of babies [9-10]. Each pregnant woman may only be classified as belonging to one of the aforementioned categories. It is easy to use, dependable, and clinically relevant; it has received support from the World Health Organization; and these are only some of the benefits that have led to its recent worldwide adoption [10-11].

This research set out to examine the CS rate over a 6-month period and analyse the results using the 10-category Robson categorization system.

Patients and methods

This cross-sectional research was carried out between April 2022 and October 2022 at Minia Prenatal University Hospital. G*Power 3[12] was used to determine the necessary sample size based on the following parameters: alpha = 0.05, power = 95%, and a CS rate of 15%.[10]. The original target number of cases was 3624, however this was increased to 3860.

Women between the ages of 16 and 46 who had a live delivery with a birth weight of at least 500 grammes and/or a gestational age of at least 28 weeks were included in the research population. Each of the participating hospitals has two investigators working on the project to provide constant communication and assistance.

Statistical analysis:

The study's organisers invited the designated researchers to a training session on how to use the Robson Classification. The variables needed to classify the women into the 10 Robson categories were obtained using the predefined preform. Each lady had been placed into one of four distinct Robson categories using the aforementioned factors and a flowchart, as per the recommendations of the Robson Manual.

The maternal and newborn outcomes for each group were calculated using statistical methods. The Excel Sheet was used to compile the data necessary to complete the categorization. The lead investigator used IBM-SPSS 24.0 to analyse the data [13]. Report tables with statistical analyses of each group's results were emailed or faxed to study coordinators on a monthly basis. Statistics were presented in a variety of ways, including mean and SD, median, range, recurrence, and percentage.

Ethical Consideration:

On April 11, 2022, the project was given the go light by the ethical committee of Minia College of Medicine (Minia University reference serial number: MUEOB00105). Every participant signed a written permission form after being fully briefed on the study's goals, procedures, expected outcomes, and potential risks. The research followed the Declaration of Helsinki's ethical standards [14]. Efforts were made to increase the response rate by informing all participants of the study's aims, procedures, and potential results. We guaranteed your privacy, anonymity, and the ability to opt out at any time.

Results

A total of 3860 women aged 16-46 years who had given birth to a live newborn with birth weight ≥ 500 gm and/or gestational age ≥ 28 weeks of pregnancy in the period from April to September 2022 from Minia Maternity University Hospital

Table 1 showed the baseline characteristics of the study participants. The mean age was 26.8 ± 5.9, ranged between 16 and 46 years. The median number of gravidities was 5 (3-16), parity 3 (1-10) and abortions 1 (0-12). Out of 3860 women, 1689 underwent normal vaginal delivery with a median of 2 (1-8) and 2171 underwent CS with a median of 1 (1-8). Also, the mean gestational age was 36.9 ± 3.1 weeks, and the median number of fetuses was 1 (1-4). Additionally, the majority (91%) had cephalic presentation and only 9% had either breech or oblique presentation. For the major maternal

risk factors, 13% had either pre-eclampsia or hypertension, 3.4% had DM, and 1.7% had fits/HELP/cardiac problems.

Table 2 demonstrated the obstetric data among the studied cohort. Distribution of type of placenta was as follows; the majority had fundal placenta (97.5%) and only 2.5% had either previa or accreta. Regarding the major maternal risk factors, about 8% had post-date, and 2.5% had IUGR/fetal distress/ macrosomia/ oligohydramnios/ICSI. Also, distribution of fetal sex was approximately equal (Male/female was 51%/49%). Respecting complication, only less than 0.5% had complications (0.3% had hysterectomy, 0.1 had obstructed labor and only one case had rupture uterus). As well, according to Robson's classification, about one-half was in Group 5 (n=860) or 10 (n=869), about one-fifth was in group 3 (n=739), 12.4% was in group 1 (n=487), about one-fifth was in groups 2, 4, 6, 7, 8 and 9. Notably, 4.4% (n=168) had incomplete data **(Fig. 1)**.

Table 3 presented the Robson's classification system report table. For the absolute group share to the overall CS; CSR was more than 85% in G-9 (100%), G-6 (96.9%), G-5 (96.4), G-7 (96.3%) and G-2 (86%). Further, CSR was around 70% in G-10 (70.5%) and G-8 (70.2%). Also, it was less than 30% in G-4 (29), G-1 (12.9%) and G-3 (12.4%) **(Fig. 2)**.

Respecting the CSR according to Robson's groups, **Group 5**: multiparous, at least 1 previous CS, single, cephalic term) represents most of CS rates (37.8%) of CS**, group 10**: preterm, single, cephalic including women with previous CS, represented the 2nd most common with a rate of 28.2%, **group 8**: Multipara including CS represented the 3rd most common group with 8.3%, **group 7**: Multipara with single breech pregnancy including women with previous CS, represented the 4th most common with a rate of 7.1% this was followed by **groups 2:** Nulliparous women, single cephalic ≥ 37 weeks, induced or CS before labor represented the 5th most common with a rate of 4.8% **(Fig. 3)**.

Regarding relative group share to the overall CS, 1st G-5 with CSR 21%, 2nd G-10 with CSR 16%, 3rd G8 and G-7 (4.7% and 4%, respectively). Also, CSR was below 3% in G-2 (2.7%), G-3 (2.4%), G-4 (29), G-1/G-6 (1.6%) and below 1% in G-4 (0.8%) and G-9 (0.7) **(Fig. 3)**.

Table 1: Baseline Demographic and Delivery Characteristics of the studied Cohort

Variable	Category	n = 3860
Age/years	• **Mean ± SD**	26.79 ± 5.9
	• **Median (Range)**	26 (16 – 46)
Parity	• **Gravidity**	5 (3 – 16)
	• **Parity**	3 (1 – 10)
	• **Abortion**	1 (0 – 12)
Previous Delivery		
✓ **SVD (n=1689)**	• **Mean ± SD**	2.14 ± 1.2
	• **Median (Range)**	2 (1 – 8)
✓ **CS (n=2171)**	• **Mean ± SD**	1.74 ± 1.0
	• **Median (Range)**	1 (1 – 8)
Gestational Age/weeks	• **Mean ± SD**	36.91 ± 3.0
	• **Median (Range)**	37 (10 – 42)
Number of Foetus	• **Mean ± SD**	1.07 ± 0.2
	• **Median (Range)**	1 (1 – 4)
Presentation	• **Cephalic**	3504 (90.8%)
	• **Breech**	309 (8%)
	• **Oblique**	30 (0.8)
Maternal Risk Factors	• **HTN**	237 (6.1%)
	• **Pre-eclampsia**	272 (7%)
	• **DM**	133 (3.4%)
	• **Fits**	4 (0.1%)
	• **HELP**	13 (0.3%)
	• **Cardiac**	50 (1.3%)

Table 2: Maternal Factors of the studied Cohort

Variable	Category	n = 3860
Type of Placenta	• **Fundal**	3773 (97.6%)
	• **Previa**	77 (2%)
	• **Accreta**	16 (0.4%)
Foetal Risk Factors	• **Post-date**	317 (8.2%)
	• **Foetal Distress**	36 (0.9%)
	• **Macrosomia**	13 (0.3%)
	• **Oligohydramnios**	5 (0.1%)
	• **IUGR**	20 (0.5%)
	• **ICSI**	27 (0.7%)
Foetal Sex	• **Male**	1917 (49.7%)
	• **Female**	1792 (46.4%)
	• **Both**	126 (3.3%)
Number of Each Sex	• **Male**	1 (1 – 2)
	• **Female**	1 (1 – 3)
Complication	• **Hysterectomy**	11 (0.3%)
	• **Rupture Uterus**	1 (<0.1%)
	• **Obstructed Labour**	5 (0.1%)

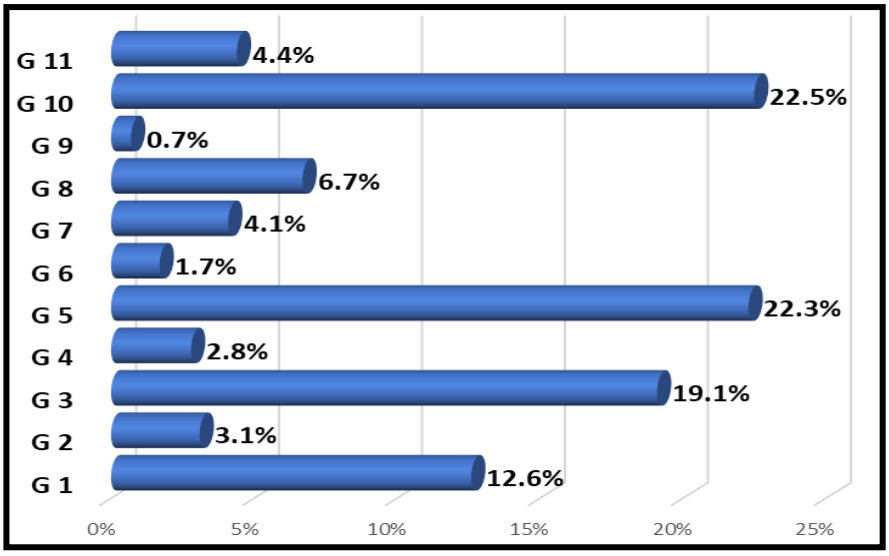

Fig. 1: Sample Distribution according to Robson Group

Births not classified in any groups due to lack of information were included in the present study under the unofficial terminology "group 11."

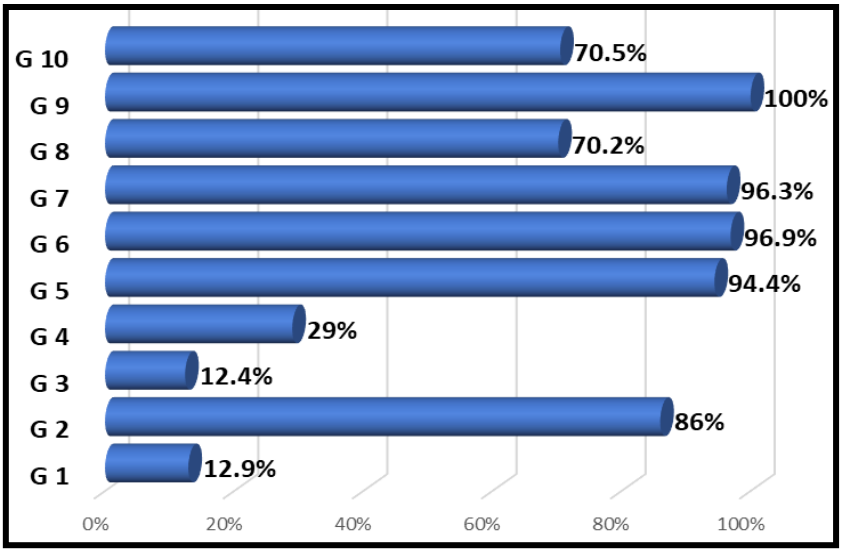

Fig. 2: CSR according to Robson Group

Table 3: Standard Robson Table with Interpretation

Robson Group	Description	Group Size	CS in Group	CSR%	Absolute Group Share to Overall CSR	Relative Group Share to Overall CSR
1	**Nulliparous women, single cephalic ≥ 37 weeks, in spontaneous labor**	**487**	63	12.9	2.9	1.6
2	**Nulliparous women, single cephalic ≥ 37 weeks, induced or CS before labor**	**121**	104	86	4.8	2.7
3	**Multiparous women without a previous CS, with a single cephalic pregnancy ≥ 37 weeks gestation in spontaneous labor**	**739**	92	12.4	4.2	2.4
4	**Multiparous women without a previous CS, with a single cephalic pregnancy ≥ 37 weeks gestation who had labor induced or were delivered by CS before labor**	**107**	31	29	1.4	0.8
5	**All Multiparous women with at least one CS with a single cephalic pregnancy ≥ 37 weeks gestation**	**860**	812	94.4	37.4	21
6	**All nulliparous women with a single breech pregnancy**	**65**	63	96.9	2.9	1.6
7	**Multiparous women with a single breech pregnancy including women with previous CS**	**160**	154	96.3	7.1	4
8	**All women with multiple pregnancies including women with previous CS (S)**	**258**	181	70.2	8.3	4.7
9	**All women with a single pregnancy with a transverse or oblique lie, including women with previous CS(s)**	**26**	26	100	1.2	0.7
10	**All women with a single cephalic pregnancy <37 weeks gestation, including women with previous CS(s)**	**869**	613	70.5	28.2	15.9
Total		**3860**	2171	56.2	100	56.2

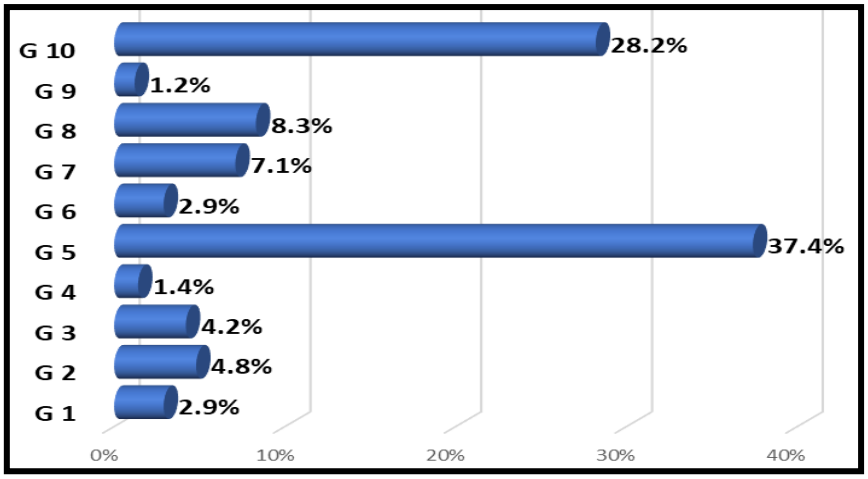

Fig. 3: Absolute Group Share to Overall CS

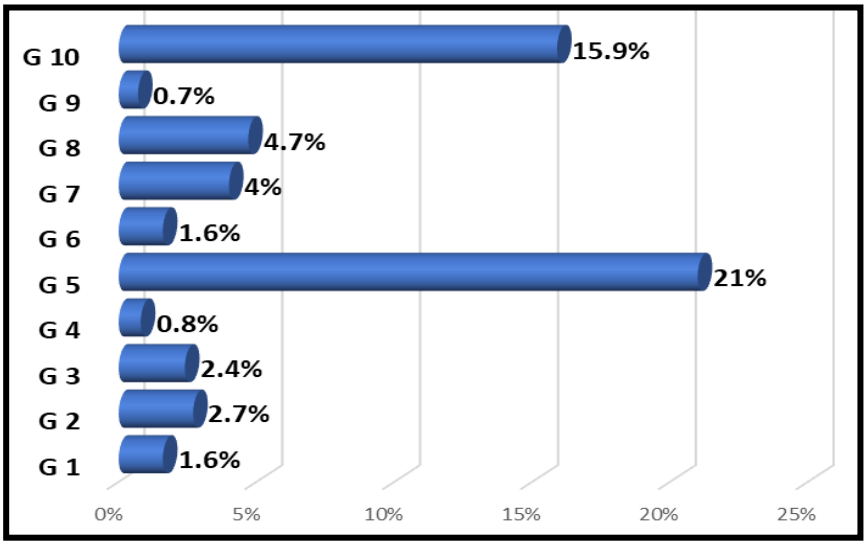

Fig. 4: Relative Group Share to Overall CSR

Discussion

The worldwide increase in the frequency of needless CS has become a major cause for worry. The most recent poll indicated a CS rate of roughly 20%. [(15)]. Five nations (Egypt, Turkey, the Dominican Republic, Azerbaijan, and China) saw a rise in their CS rates of more than 30 percentage points during the previous 20 years. The most recent numbers show that the CS rate in Egypt varies by more than 50% across rural and urban areas. Egypt had the highest CS rate (54%) there in Eastern Mediterranean Region (EMRO), where residence played a factor [(16)].

However, determining the population-level CSR, that is, the minimal rate for medically needed CS while avoiding medically unsuitable procedures, may be challenging. Variations in general CSR in various settings either over time are hard to evaluate and compare because to inherent differences in hospital features, infrastructure as well as change in the profiles of the obstetrics population treated. This is a barrier to understanding the reasons of recent advances in computer science. To effectively develop and execute strategies for achieving ideal CS rates, it is first necessary to identify whose groups of women is contributing more to the total CS rate and to study the underlying

reasons for trends in various contexts. In the framework of extensive study aimed only at eradicating unnecessary CS costs, healthcare practitioners or organisations are only given advice on financial strategy [17].

The guideline developer (GDG) recommended equalising physician fees for uterine and caesarean sections, but only in the context of thorough research examining their effect on caesarean births, exploring their acceptance level to key stakeholders, and determining whether or not they are feasible to implement. This was because of doubts about how much caesarean sections would affect finances.[18]

The excessive use of CS in Egypt is indicative of an over-medicalization of delivery that has to be addressed immediately to protect the health of mothers and their newborns. In order to determine which population is most likely to undertake this operation, case-by-case analysis is required for CSR reduction [19]. For this reason, several different types of categorization systems have been described. According to a 2011 meta-analysis, the Richardson Ten Group is the most effective categorization for satisfying both international and regional needs[20].

The World Health Organization has performed a thorough assessment of CS classification systems, and their findings show that the 10-Group Robertson categorization system may be used to reliably and effectively compare and monitor CS rates in facilities and to detect changes over time. The World Health Organization has deemed it to be an evidence-based and clinically-relevant system with well-defined, all-encompassing categories [20]. To evaluate, track, and compare C-section rates worldwide in 2015, the World Health Organization used the Robson Ten Group categorization [21].

Policymakers and health groups have stressed the need for a standardised, reliable, consistent, and action-oriented categorization system to monitor and compare CSR[20]. This prospectively classifying and clinically meaningful categorization of women facilitates the rollout and evaluation of targeted therapies. Researchers have found that using this categorization on a regular basis may provide important feedback for making methodological adjustments [22]. The purpose of this research was to document an examination of the CS rate at Minia University Hospital's maternity ward via the lens of the 10 Group Robson categorization.

In the time frame of the research, 3,860 women gave child at the institution, with 2,171 of those births using CS (56.2%). Group iii (all primigravida women with at last once CS or a single cephalic birth, 37 weeks gestation) accounted for the largest share of the total CS rate (37.4% Absolute contribution). In group 5, the most common reason for alarm was a history of two or more previous caesarean sections. It may be difficult to reduce the caesarean birth rate in this group; in reality, this cohort will continue to grow if no actions are made to avoid a first caesarean delivery. Women's caesarean section rates might be lowered by the implementation of VBAC rules.

The second most frequent contributor to the relative CS rate was Groups 10 (Those women with a singular cephal pregnancy 37 weeks gestation, inclusive women with prior CS(s), which accounted for 28.2% of the total CS rate. Considering that Minia Maternity is one of the major tertiary referral hospitals, most of the patients treated there are considered to be part of a "high risk" group due to their greater likelihood of having a premature baby and other complications during pregnancy.

In addition, 8.3% of the total CS rate came from women in Session 1 (All women with subsequent births including women with prior CS (S)). The increased prevalence of CS in subsequent pregnancies at this hospital was reflected in these numbers. Only two papers utilising CS analysis have been published in Egypt; one is from Assiut Medical University and was published in 2013 [23], while the other is from Benha Medical Center and was published in 2019 [24].

When comparing the CSR to the Assuit research [23], which looked at an annualised rate of 15,000 deliveries, the authors looked at only two months' worth of data, between December 2008 and 2011. In comparison to the CSR's 32.6% in 2008 and 38.5% in 2011, our levels in 2022 will reach over 56.2%. The results of this research are consistent with those of the Assiut

University Hospital, where group 5 with repeat CS was the most prevalent indication in both time periods. Group 1 (full-term nulliparas who gave birth naturally) and Group 4 (low-risk pregnancies) tied for second place (term

multipara with previous series induced or pre-labor CS). Groups 10 and eight followed Group 5 in the real world, but not in our research. The second research, conducted in 2019 [23] at Benha University Hospital, revealed a CSR of 55% overall, with the contributions to that figure coming mostly from groups 5, 6, and 10. That we now know the most prevalent reasons of CS and are able to lower the CS incidence has important implications for clinical treatment, as shown by this research.

One potential limitation of this research is that six months of data collection is not nearly long enough to guarantee that the results are representative for the whole year.

Conclusion

Several benefits of a well-executed RTGCS have been uncovered. To begin, the Robson subgroups that significantly impact the CS rate as a whole are allocated more precisely. Identifying subsets of the population where even small changes in the Ts rate may have a dramatic effect on the overall Bs rate is the first step in any audit. Second, the technique is quite dependable and yields a legitimate means of comparing CS rates across different levels of institutions or even across time within a same institution. Thirdly, by analysing trends in CSR for the whole organisation and for individual departments or divisions, it may be utilised to gauge how well the management procedures are working.

Disclaimer: The scientists have no competing interests to disclose.

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