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Analysis of the caesarean section rate using the 10-Group Robson classification at Benha University Hospital, Egypt

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ABSTRACT

Background: Egypt has the third highest caesarean section rate (54%) in the world and lacks a standard classification system to analyse caesarean section rates. The World Health Organization (WHO) recommends the Robson classification as an effective caesarean section analysis and monitoring tool.
Aim: To analyse the caesarean section rate of Benha University Hospital, Egypt using the standard 10-Group Robson classification system.
Method: A prospective, cross-sectional study was conducted at the Benha University Hospital from 1 April to 30 June 2018. All women admitted for childbirth were categorised into Robson groups to determine the absolute and relative contribution made by each group to the overall caesarean section rate. Epi Data V.3.1 software programme was used to analyse the data.
Findings: 850 women gave birth during the study period, 466 (55%) by caesarean section (CS). Robson Group 5 (multiparous, term, cephalic presentation and previous caesarean section) contributed the most (36%) to the overall CS rate. 175/308 (56%) women in this group had previously undergone one caesarean section. Group 6 (all nulliparous women with single breech pregnancy) and Group10 (cephalic preterm pregnancies) were the second and the third greatest contributors toward the overall CS rate, with 4.6% and 2.8% respectively.
Conclusions: In keeping with other studies, Groups 5, 6, and 10 were the main contributors to the overall caesarean section rate. We found Robson classification to be clinically relevant and an effective tool to analyse the caesarean section rate even in settings with limited resources.

Statement of significance

What is the issue?

Egypt has the third highest caesarean section rate in the world (55%) but lacks a standardized classification system to analyze and compare the CS rate among the country's health care facilities.

What is already known?

The World Health Organization recommends the 10-Group Robson classification be used to monitor and compare CS rates within and among facilities providing care for childbirth.

What this paper adds?

First prospective study from the Egypt to analyse the CS rate in a single facility. It will help the facility to audit their practice of high risk group i.e., groups that are contributing most to the overall CS rate. It will encourage facilities to apply evidence-based strategies for high-risk groups. This study

Abbreviations: CS, caesarean section; BUH, Benha University Hospital; EDHS, Egypt demographic and health survey; VBAC, Vaginal birth after caesarean section; WHO, World Health Organization.

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has led to a multicentre trial involving 12 hospitals in Egypt both private and government to analyse their CS rate according to the Robson classification.

1. Introduction

The increasing rate of caesarean section (CS) has been a growing concern in most parts of the world. According to the latest survey 29.7 million (21.1%, 95% uncertainty interval 19.9–22.4) births occurred through CS in 2015, which was almost double the number of births by this method in 2000.[1] The Eastern Mediterranean Region (EMR) as classified by the WHO (World Health Organization) with its 22 Member States (MSs) is of no exception in this respect. Within the EMR, Egypt has the highest CS rate that has increased from 20% in 2005 to 52% in 2014 as per Fig. 1.[2] This exceptionally high CS rate without a corresponding improvement in maternal and child mortality suggests that although CS is available for populations at risk, numbers of medically unjustified CSs are on the rise.

Determining the adequate CS rate at the population level – i.e. the minimum rate for medically indicated CS, while avoiding medically unnecessary surgery is a challenge. Intrinsic differences in hospital infrastructure (primary versus tertiary level), difference in the characteristics of the obstetric population served (case mix) such as the percentage of women delivered by previous CS, and differences in clinical management protocols are all barriers to better understanding of CS trends.[3] Like many low to middle income countries, healthcare facilities in Egypt have no standard classification system in place to identify those women who contribute the most to the overall CS rate. A systematic review on classifications for CS conducted by the WHO suggests that the 10-Group Robson classification system can be used to monitor and compare facility-based CS rates in a consistent and action-oriented manner and determine trends over time.[4,5] The WHO determined that it is an evidence based, and clinically relevant system with clearly defined categories that are totally inclusive, mutually exclusive; little room for misunderstanding or misclassification. Studies have used this classification system with audit and feedback and reported a reduction or maintaining in CS rates without concomitant increase in their neonatal morbidity or other adverse outcomes.[6,7] The aim of this paper is to report on an analysis of the CS rate, using the 10 Group Robson classification in the maternity department of the Benha University Hospital, Al Qalyubiyah governorate, Egypt.

2. Methods

A prospective cross-sectional study was conducted for three months from April to 30 June 2018 at the obstetric department of Benha University hospital (BUH). The BUH is a tertiary referral centre with 23 maternity beds. The study population included women giving birth to a live or stillborn baby of at least 28 weeks gestation during the study period. We used the Robson 10-Group classification system to categorise all women giving birth at or more than 28 weeks gestation during our study period. We used the Robson implementation manual, as a tool guide for the study.[3] A formal training session was conducted to introduce the implementation manual to the staff responsible for the collection of the data.

The variables needed for the classification of women into one of the 10 Robson groups were obstetric characteristics including parity, previous CS, gestational age, onset of labour, fetal presentation and number of fetuses without needing to record the indication for CS (Table 1). A proforma was developed for the study and was used to collect the data for each woman during history taking and examination. A senior obstetrician confirmed data quality, and eligibility of cases. Using these variables, women were placed into one of the 10 Robson groups (Fig. 2). The EpiData V.3.1 software (http://www.epidata.dk) was used to analyze the data. Absolute (Number of CS in that group divided by total number of women giving birth in the study period × 100) and relative (Number of CS in that group divided by the total number of CS in the study period × 100) contributions were calculated and the results presented as percentages. The results are presented according to the Robson report table as recommended by the WHO (www.who.int/reproductivehealth/publications/maternal_-perinatal_health/robson-classification/en/).

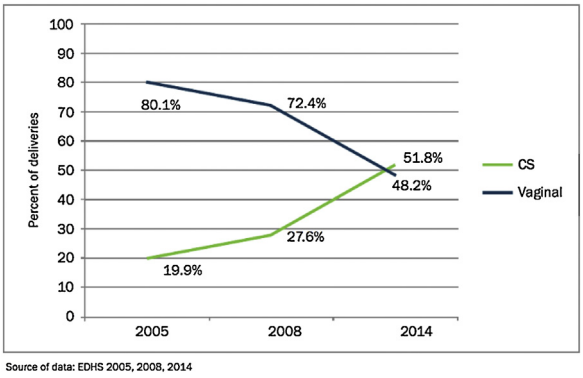

Fig. 1. Trends of caesarean sections and vaginal births in Egypt (2005–2014).

3. Results

During the study period 850 women gave birth at the facility, 466 (55%) by CS. Women classified into Group 5 (all multiparous women with at least one CS with a single cephalic pregnancy, > or = 37 weeks gestation) made the greatest contribution to the overall CS rate (66% relative contribution). On further analysis, 56% (175/308) of women had one previous CS and 43% (133/308) had a history of previous two or more CS. Among those women who had previous history of only one CS in Group 5, 164 women were presented in spontaneous labour and 94 of them had cervical dilatation of 2–5 cm on admission. The second highest contributors

Table 1
The Ten Group Robson classification system.

Robson groups	Characteristics
1	Nulliparous; single cephalic term pregnancy; spontaneous labour
2a	Nulliparous; single cephalic term pregnancy; induced labour
2b	Nulliparous; single cephalic term pregnancy; planned caesarean delivery
3	Multiparous without uterine scar; single cephalic term pregnancy; spontaneous labour
4a	Multiparous without uterine scar; single cephalic term pregnancy; induced labour
4b	Multiparous without uterine scar; single cephalic term pregnancy; planned caesarean delivery
5	Multiparous with scarred uterus; Single cephalic term pregnancy
6	Nulliparous; single breech pregnancy
7	Multiparous; single breech pregnancy (including women with scarred uterus)
8	All women with multiple pregnancy (including women with scarred uterus)
9	All women with a single oblique or transverse pregnancy (including women with scarred uterus)
10	All women with single cephalic preterm pregnancy (including women with scarred uterus)

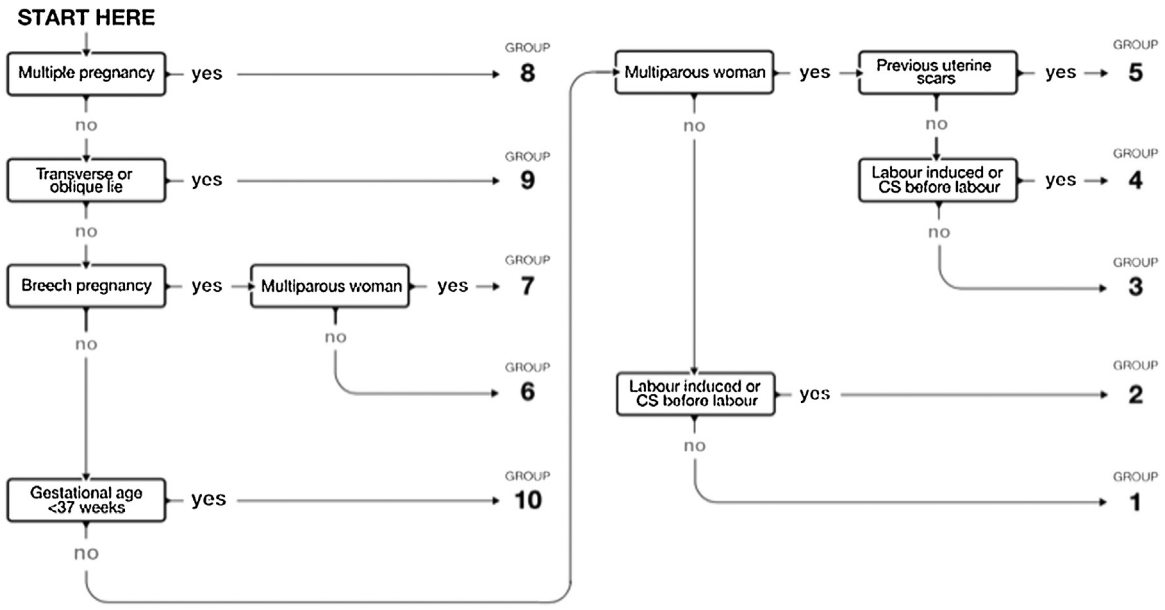

Fig. 2. Flow chart for the classification of women in the Robson classification.
Source: Adapted from Nassar LF, Sancho HD. Instrucción de Robson. v.0.1-1. 2015/06/08. Caja Costarricense de Seguro Social.

were women in Group 6 (all nulliparous women with single breech pregnancy) who made a relative contribution of 8.4% to the overall CS rate. In Group 6, 23/39 women had undergone a CS for breech presentation with no other risk factors. Women in Group 10 (women with single cephalic pregnancy <37 weeks gestation, including women with previous CS) made the third largest contribution (5.2% relative contribution) to the overall CS rate (Table 2).

4. Discussion

Our overall CS rate of 55% was comparable to the national CS rate of 54%. Our study showed that Groups 5, 6 and 10 were the main contributors towards overall CSR at the BUH. These were identified as "target groups". Women belonging to Group 5 are increasingly important determinant of overall CSR. Management of women from Group 5 (Multiparous women with previous CS) at the Benha Hospital included elective booking of repeat CS without any trial of labour. The study revealed that the CS was performed as an emergency procedure even for those women who presented in spontaneous labour and had a history of only one previous CS and who were therefore eligible for trial of labour. The detailed analysis of Group 5 showed that those women were more than half the total number of women in that group (164/308). Out of those 164 women, 94 had well-effaced cervical with dilatation from 2 to 5 cm. Considering the success rate 70% for vaginal birth after previous CS (VBAC),[8] these multiparous women with favourable cervixes would probably have had a chance of successful vaginal birth if they were given an option of trial of labour.

Possible explanations for the lack of trial of labour include a lack of information concerning previous caesarean section among women referred to our centre. In addition, it is possible that clinicians' fear of litigation and lack of availability of resources necessary for the safe trial of labour, for example continuous EFM (electronic fetal monitoring) during labour, and availability of one to one care are the factors identified for the high CS rate in this group. The instrumental birth rate within the department is also very low due to limited training opportunities and fear of clinical litigations. The family pressure and existing culture of "once a CS is always a CS" among the studied population played a major role in women not opting for VBAC. Interestingly, the same domino effect of CS use from this group has been observed globally including those countries that exhibit better socioeconomic conditions and health care infrastructure.[9,10]

Countries like, France and Netherland and Brazil with better socioeconomic status have also reported higher contribution from this group i.e., 61% and 47% and 30.8% respectively towards overall CS rate.[11–13] Further analysis in these studies showed that the main indication for CS in this group was women's preference to opt for repeat CS. These countries have higher female literacy rates and higher populations of women who are financially and socially independent. They may feel more able to exercise their choice regarding their mode of birth.

The eventual consequences of increased numbers of repeat CSs are same everywhere irrespective of the indications. Clinicians and researchers have observed increases in the incidence of abnormal placentation (placenta accrete and percreta), and haemorrhage leading to higher maternal and neonatal mortality. The risk of abnormal placentation is 40% with one CS, and 60% with more than one CS.[14] The effects of such complications are further intensified in low-income settings, due to their increase fertility rate, lack of essential obstetric interventions and limited resources.[15]

Interventions according to the given capacities, resources, and population characteristics are required to optimize the CS rate in this group. Strong political commitment for improved healthcare infrastructure is needed at the national level. Setting up a dedicated VBAC clinic in the hospital is a good starting point. It can provide focused care starting from antenatal counselling for VBAC, identification of suitable cases for trial of vaginal birth, and making a birth plan for each woman. The role of midwives in reducing over medicalization of labour and addressing women's concerns in this respect has been well established.[16] A well connected midwifery system allowing them to conduct normal vaginal deliveries will reduce the workload for obstetricians, as many obstetricians in Egypt do not offer VBAC due to their busy schedule. Regular audits and feedback using the Robson classification system should be conducted to identify issues with existing practice to improve the overall quality of care.

Women in Group 6 were the second major contributors to the overall CS rate. This group includes all nulliparous women with

Table 2
Robson report table for the Benha Obstetric Department (April–June 2018).

Group Number	Total number of CS in each group	Total number of women delivered in each group	Group size (%)	Group CSR	Absolute group contribution to overall CS rate	Relative contribution of the group to overall CSR. 466 CS total in 3 months
1	11/850	112	13.17%	9.82%	1.29%	2.36%
2	22/850	28	3.29%	78.57%	2.60%	4.72%
3	9/850	227	26.70%	3.96%	1.05%	2%
4	13/850	23	2.70%	56.52%	1.52%	2.80%
5	308/850	308	36.23%	100%	36%	66.09%
6	39/850	42	4.94%	92.85%	4.58%	8.36%
7	23/850	28	3.29%	82.14%	2.70%	4.4%
8	14/850	20	2.35%	70%	1.64%	3.00%
9	2/850	2	0.23%	100%	0.23%	0.43%
10	24/850	60	7.05%	40%	2.82%	5.15%

Group size (%) = n of women in the group/total N women delivered in the hospital × 100.
Group CS rate (%) = n of CS in the group/total N of women in the group × 100.
Absolute contribution (%) = n of CS in the group/total N of women delivered in the hospital × 100.
Relative contribution (%) = n of CS in the group/total N of CS in the hospital × 100.
CS (caesarean section).
Colour signifies the high risk groups.

breech presentation. Although breech presentation is not the most common indication of CS, it may be the most preventable one. Further analysis of this group showed that 10/39 women had no other risk factor apart from breech presentation. The timely diagnosis of breech presentation by offering third-trimester scan at 36 weeks to all women suspected to have a breech presentation and an attempt at external cephalic version (ECV) after 36 weeks for those suitable for intervention has been shown to safely reduce the need for CS.[17,18] There are no formal training facilities for ECV at Benha University Hospital. Women with breech presentation do not receive any other management option apart from elective caesarean section. Although setting up an ECV clinic and training for the doctors will incur additional cost and resources, it could provide women with options and reduce the CS rate in the long run.

Women from Group 10 were the third highest contributors with relative contribution of 5.2% towards overall CS rate. This group included women with <37 weeks gestation and with cephalic pregnancy with or without previous CS. Although preterm birth (<37 weeks gestation) is the main determinant of neonatal morbidity and mortality, prematurity itself with no other risk factors is not an absolute indication for CS. Clinical management varies with individual circumstances depending on the severity of the prematurity. Simões et al. showed in their systematic review that there is no evidence that with very preterm foetuses (<1500 g), CS reduces neonatal morbidity and mortality.[19] For new-borns considered intermediate and late preterm, (32–36 weeks gestation), an indication of CS, weighing logistic regression analysis, showed increase in the risk of neonatal morbidity and mortality.[20] A Cochrane review of caesarean section (CS) versus vaginal delivery (VD) for preterm birth in singletons with either cephalic or breech presentation concluded that there was also no difference between the caesarean or vaginal delivery groups in terms of markers of possible birth asphyxia (RR 1.63, 95% CI 0.84–3.14; one trial, 12 women) or Apgar score less than seven at five minutes (RR 0.83, 95% CI 0.43–1.60; four trials, 115 women) and no difference in attempts at breastfeeding (RR 1.40, 95% 0.11–17.45; one trial, 12 women). There was also no difference in neonatal fitting/seizures (RR 0.22, 95% CI 0.01–4.32; three trials, 77 women), hypoxic ischaemic encephalopathy (RR 4.00, 95% CI 0.20–82.01; one trial, 12 women) or respiratory distress syndrome (RR 0.55, 95% CI 0.27–1.10; three trials, 103 women).[21] After assessing maternal outcomes, higher morbidity for women undergoing CS compared to vaginal delivery has been identified.[22] According to

our results, 19/24 women with a preterm baby, had history of previous CS. Ten out of those women been presented in spontaneous labour with favourable cervical status up to 8 cm dilatation. The second common indication for which CS was performed in this group was oligohydramnios (reduced liquor volume). Measuring liquor volume on ultrasound is a subjective assessment and must be taken in to account along with other obstetric and medical factors before deciding for CS.

The contribution of CSs from Group 1 (Nulliparous single cephalic women at term) is not as high in our study as compared to other studies especially those conducted in high-income settings.[13,23] Although, this finding is encouraging, showing that primary CS rate is low in the Benha University Hospital, this may just be due to the fact that we have more multiparous population as compared to nulliparous women secondary to increase fertility rate. Although the relative group size of Group 2 (Nulliparous, term cephalic either induced or pre labour CS) in our study was small (28/850 women), the CS rate within the group was 78% (22/28) vs 9.9% (relative size 111/850). The common indications of CS in this group included precious baby and women with unfavourable cervix. These indications are quite vague and they need to be justified after proper risk assessment. The induction of labour for these women without proper assessment can increase their risk of having an unnecessary caesarean section.

We found the Robson classification system to be simple in its design and clinically relevant in that it allowed the analysis and interpretation of the CS data even in a setting with limited resources. It also highlights the complexity of CS decision-making (involving women, their families, and their healthcare providers) and contextual factors that can affect the overall CS rate.[9] Some of our target groups like Group 5 are comparable to other studies, highlighting the fact that rise in CS rate in that particular group is a global phenomenon. However, we found some new groups like Groups 6 and 10 indicating that the population characteristics, local culture, and clinical settings, can effect the management of labouring women. Further research is needed to conduct such trials in both public and private sectors in order to analyse and compare the CS rate at a national level.

5. Strengths and limitations

To our knowledge this study is the first prospective study conducted in Egypt to analyse the CS rate in a healthcare facility according to the Robson classification. It therefore provides a valuable addition to the existing evidence as it provides successful application of Robson classification to analyse the CS rate in a setting with limited resources. In contrast to other studies, our data were collected prospectively making sure that no relevant information was missed. However, the study covers only a short period of time and represents only one facility. Following this study, a multicentre trial involving 10 tertiary hospitals has been formulised by the Egyptian Representative Committee of Royal College of Obstetricians and Gynaecologists, UK to analyse CS rate from various regions of the Egypt. Influential factors such as the demographic details (socioeconomic status, education, BMI etc) were not considered in our study and these can affect the overall maternal and perinatal outcome. In future, these details along with maternal and fetal outcome from each group should be collected to determine the overall quality of the health care for mother and child.

6. Conclusions

In our study, Robson Groups 5, 6, and 10 were identified as the main contributors to the overall CS rate at the Benha university hospital. We believe that this classification can be incorporated successfully into the routine maternal and perinatal data collection system to improve the monitoring and evaluation of caesarean section rate.

Author contributions

Bismeen Jadoon and Tamer Assar were the main study coordinator, who conceptualized and initiated the study. They also supervised the data collection and performed final data analysis. The manuscript was written and edited by both of them. Amany Ali Abdel Rahman Nucier and Heba Elsayed Abdel Raziq, Ahmed Samy Abd El-azym Saad, and Wagdy Megahed Amer performed data collection and quality assurance. They also interpreted the final results. The manuscript is reviewed and edited by all of them.

Conflicts of interest

None declared.

Financial disclosure

None.

Funding

None declared.

Ethical approval

Permission to conduct the study was obtained from the Faculty of Medicine, Benha University.

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