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Original Research Article

A study comparing the caesarean section rates in various groups of Robson classification in a tertiary care hospital and its comparison with the predicted rate by the World Health Organisation C-model

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ABSTRACT

Background: The incidence of cesarean section is increasing worldwide. The World Health Organisation (WHO) C-section model can be used to predict the incidence of cesarean section. The purpose of this study is to determine the incidence of cesarean section across various Robson groups and compare it with the WHO C-section model.
Methods: 683 women who delivered after 22 weeks of gestation were studied. WHO C Model predicted caesarean rates were studied in various Robsons group. The observed caesarean section rates in various groups were compared with the predicted caesarean section rates in various Robsons groups.
Results: We found high rates of caesarean section among various Robsons groups when compared with the predicted WHO C-model. Fetal distress and caesarean sections on maternal request were the commonest cause of caesarean section in our study.
Conclusions: We observed higher rates of section in our study when compared with the predicted WHO C model. Adhering to strict labour ward protocols and the use of sensitive methods of fetal monitoring, like fetal scalp pH, may reduce the number of sections.

Keywords: Labour, WHO C-section model, Robson's classification, Cesarean section

INTRODUCTION

The incidence of caesarean section is increasing worldwide. The ideal Caesarean section rate is around 15%, as recommended by the World Health Organization (WHO).[1] But most hospitals have a caesarean section rate more than this recommended rate. Caesarean section is associated with a higher risk in the immediate post-operative period, and it has other long-term risks.[2] Caesarean section is a lifesaving operation when indicated, but caesarean section has its own morbidity.

The incidence of caesarean section is increasing worldwide, and efforts must be made to decrease it. WHO has made a caesarean section model based on patient characteristics. The model was based on a large study that predicted caesarean section rates from patient characteristics.[3] In our hospital setting, the rate of caesarean section is more than the 15% recommended by WHO because of a mix of high and low-risk patients, being a tertiary care hospital. Robson's classification is a system based on patient characteristics. It helps classify patients into different categories and classify caesarean sections within each group (Figure 1).[4]

The aim of the study was to calculate the incidence of caesarean section for each caesarean section group according to Robson group and to compare it with the caesarean section expected in each group using the WHO C model.[5] The WHO C model was developed in 2018 and is considered a standard method of calculating expected caesarean section among various groups.

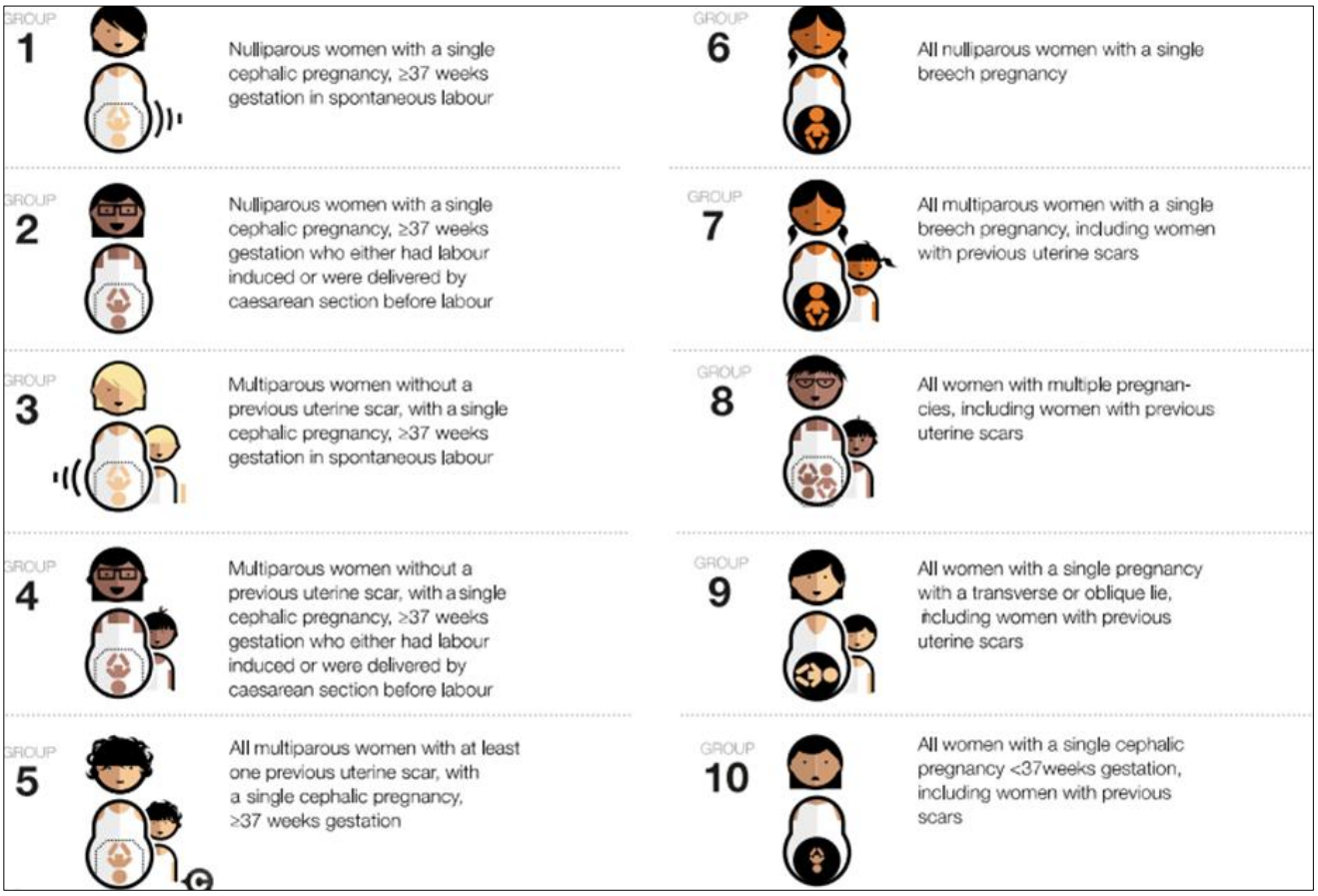

Figure 1: Robson classification (Licence: CC BY-NC-SA 3.0 IGO).[4]

METHODS

The study was conducted at Kasturba Hospital, Manipal, a unit of Manipal Academy of Higher Education, Manipal. It was a prospective observational study. The study was done between September 2024 to July 2025.The Hospital has about 3000 deliveries per year. All women who delivered after 22 weeks of gestation were included in the study. Patients with incomplete data entry and intrauterine death or a severely growth-restricted fetus needing an elective section were excluded from the study. Incidence of vaginal delivery and caesarean section in all Robson groups was calculated. Indications for caesarean within the Robson group were also studied. The sample size was estimated using the NMaster software version 2.2, with the following details applied to the formula - p: expected proportion, d: absolute precision, and 1−α/2: desired confidence level. The sample size calculated was 683. The data from all patients were entered into the WHO C-section model. In the WHO C section model data like parity, onset of labour (spontaneous/induction of labour)/elective CS), previous CS, singleton or multiple pregnancy, foetal presentation, gestational age, age of the woman, organ dysfunction or intensive care unit admission, antepartum haemorrhage, chronic hypertension, preeclampsia, renal disease and positive human immunodeficiency virus serology were considered in calculating the expected C section rate. The WHO-predicted and actual caesarean section rates were noted in the various Robson groups. All women in labour underwent standard-protocol monitoring and delivery in the hospital, and a partogram was used to monitor labour. The incidence of caesarean section in each Robson group was studied and compared with the WHO C-section model. The predicted and observed caesarean section rates in each Robson group were compared. The study was cleared by the institution's ethical committee under IEC 2/169-2024. The study was cleared by CTRI under CTRI/2024/08/072929. Informed consent was obtained from all women. The collected data is entered in Microsoft Excel and has been analysed with IBM statistical package for the social sciences (SPSS).

RESULTS

Demographic variables are depicted in Table 1. There was a total of 683 patients.

Overall, the caesarean section rate was 358 (52.4%). There was overlap between the sections' indications. Some patients underwent cesarean section for multiple indications. In our series, the observed caesarean section rate was higher than the WHO C-model predicted. The greatest difference was seen in Breech presentation in multi and primi, primigravida with induced labour,

preterm labour, and primigravid women with spontaneous labour (Table 3).

Table 1: Demographic variables.

Variables		Values
Mean age in years		30.02±3.94
Complications during pregnancy	Placenta previa	7 (1.0%)
	Abruptio placenta	2 (0.3%)
	Chronic hypertension	3 (0.4%)
	Pre-eclampsia	32 (4.7%)
	HIV positive	0 (0%)
	Previous section	77 (11.3%)
Mode of labour	Spontaneous	222 (47.6%)
	Induced	244 (52.4%)
Period of gestation	Term	586 (85.8%)
	Preterm	97 (14.2%)
Admission in labour	Before labour	466 (68%)
	After labour	217 (32%)
Fetal presentation at the time of admission	Cephalic	655 (95.9%)
	Breech	21 (3.1%)
	Transverse	7 (1.0%)
Mode of delivery	Vaginal	325 (47.5%)
	C section	358 (52.5%)
	Elective	92 (13.5%)
	Emergency	266 (39%)

Indications for caesarean section across the various Robson's groups are depicted in Table 2. Foetal distress and previous caesarean section were the commonest indications in our series. We observed higher rate cesarean section our study. In Robsons group 1 the absolute deviation from C- model was 20.7%. In group 2 absolute deviation was 24.2%. In group 3 the absolute deviation was 1.5% and in group 4 the deviation was 5.3%. In group 5 the deviation 16.1% and in group 6 it was 9%. In group 7 the deviation was 31.3%. In group 8 the deviation was 5.6%. In group 9 the deviation was 0.6%. In group 10 the deviation was 29.1%. In our study the overall deviation was 19.1%.

Table 2: Indications for caesarean section.

Indications	Occurrence
Fetal distress	32
Caesarean section on maternal request	32
Second stage arrest	4
Cephalopelvic disproportion	14
Meconium-stained amniotic fluid	44
Placenta previa	7
Failed induction	27
Breech	21
Oblique/transverse lie	7
Previous LSCS	77
Decreased fetal movements	5
Non progress of labour	16
Premature rupture of membranes	6
Fetal growth restriction	29
Anhydramnios	3
Preeclampsia	14
Oligohydramnios	2
Persistent occipito posterior position	4
Deep transverse arrest	2
Multiple pregnancy	11
Arrest of descent	1
Eclampsia	1

Table 3: Comparison between observed caesarean section rates and predicted caesarean section rates by the WHO C-model.

Robson group	Number of patients (%)	Number of C-section (%)	Mean calculated C section rate by WHO C-model (%)	Absolute deviation from C-model (%)
1	125 (18.3)	32 (25.6)	4.9	20.7
2	280 (41)	168 (60)	35.8	24.2
3	60 (8.8)	2 (3.3)	1.8	1.5
4	39 (5.7)	6 (15.4)	20.7	5.3
5	77 (11.3)	77 (100)	83.9	16.1
6	5 (0.7)	5 (100)	91.0	9
7	3 (0.4)	3 (100)	68.7	31.3
8	11 (11.6)	11 (100)	94.4	5.6
9	4 (0.6)	4 (100)	99.4	0.6
10	79 (11.6)	50 (63.3)	34.2	29.1
Total/overall rate	683	358 (52.4)	33.3	19.1

DISCUSSION

The WHO C model is a mathematical model that predicts caesarean section rates based on various obstetric parameters.[3] In most countries, there is now an overuse of caesarean section.[6] We did a study in our institution, which is a tertiary care hospital, to find out the actual caesarean section rates in each Robsons group, and we compared them with the predicted caesarean section by the WHO C-section tool. In low-risk groups (i.e., Robson groups 1 and

2), we found that the observed caesarean section rate in our study was higher than the predicted rates of 4.9 and 35.8 by the WHO C-model. The absolute deviation is 20.7 and 24.2, respectively. In our study, multigravida women (Robson 3 and 4) had higher rates of section than the predicted rate. But the deviation from the WHO C model was minimal. In Robson's group 5, there was almost 100 per cent caesarean section. In Robsons 6 and 7, the section rate was 100%. In the Robson group 8 with multiple gestation, we had a hundred per cent caesarean rate. Robson group 9 had a hundred per cent caesarean section rate. In Robson's group 10, the incidence of sections was 63.3%. In our series, we observed a high observed caesarean rate in Robson group 1, i.e., primigravid mothers who are in spontaneous labour. This rate is unacceptably high. More standardized protocols for labour management and training in instrumental deliveries may reduce the caesarean rate in this group. In group 2, i.e., primigravid mothers who were induced, had a high observed rate of 60%. Induction of labour should be done only for valid indications, and unnecessary inductions must be avoided. In group 5 of Robson's groups, i.e., with a previous caesarean scar, there was a hundred per cent caesarean section. Fear of scar rupture and litigation contributes to a high number of caesarean sections in this group. In Robson's groups 6 and 7 (i.e., with breech presentation), the caesarean section rate was 100%. Lack of training in breech delivery contributed to this high rate of observed caesarean section in this group. In Robson group 8 with multiple gestation, the rate of caesarean section was 100%. In Robson's group 9, a 100% caesarean section rate was observed. Lack of training in external cephalic version contributes to the high rate of caesarean section in this group. In group 10 is a preterm fetus and high observed caesarean as this group is associated with other complications like preeclampsia and fetal growth restriction.

Abdul-Aleem et al observed higher rates for section in all Robson groups.[7] The observed rate was much higher (61%) than the predicted rate (45%). In the USA, they observed a slightly higher caesarean rate of 29.4%, while the predicted rate was 22.9%.[8] The difference was much less in USA. This may be due to standardised labour management protocols and the use of scalp pH and other labour monitoring methods. Latin America observed much higher disparity between observed and predicted caesarean section rates (35.6 versus 17.5%).[9] In some countries, such as France, the difference between observed and predicted caesarean section rates was not much (19.8% versus 20.2%).[10] In Dublin, Ireland, among 8755 deliveries, the caesarean section rate was just 23.1%, and Robson group 5 accounted for the most caesarean sections.[11]

In our study, we observed a high rate of sections. Reasons for this could include the non-availability of fetal scalp pH and, as a referral institution, the high number of complicated cases, which would have contributed to the high incidence of section in our study. The WHO C model is a useful tool for predicting the expected rate of caesarean sections in a hospital setting. This model can be used to improve obstetric care and reduce the number of unnecessary caesarean sections, as they are associated with maternal morbidity. WHO C model is available online, and its use should be encouraged to optimise caesarean section rates. A substantial increase in the caesarean section rate is due to improper indications, the convenience of attending physicians, requests by mothers, and over-medicalisation of childbirth.[12]

Limitations

Though the study was conducted in a single center multiple individuals were involved in managing cases and that would have affected the rate of cesarean section. We do not have fetal scalp pH in our institution and that would have resulted in higher rate of section.

CONCLUSION

We observed high rates of caesarean section in our series when compared to the WHO C-model. Avoiding unnecessary inductions and adhering to strict labour ward protocols will help to reduce caesarean sections. Use of better modes of fetal monitoring, like foetal scalp pH, will help to reduce caesarean sections.

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